



## REMEDIAL STRATEGY REPORT

### Plots B & C The Airfields Deeside

<b>Reference</b>	<b>4671-JPG-XX-XX-RP-G-0608-S2-P01</b>
<b>Date</b>	<b>March 2019</b>
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JPG (Leeds) Ltd. The Airfields, Deeside. Boundary Plan: Plots B & C. Drawing No. 4671-FIG 3. March 2019.

Fletcher Rae. June 2017. The Airfields, Deeside. Proposed Masterplan. Drawing No. 13001\_SK116.

### Appendix B Yorkshire and Lincolnshire Pollution Advisory Group: Verification Requirements for Cover Systems. Technical Guidance for Developers, Landowners and Consultants



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## CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

Praxis Real Estate Management Limited  
13 Police Street  
MANCHESTER  
Greater Manchester  
M2 7LQ

This report has been prepared for the sole use and reliance of the above-named parties. This report shall not be relied upon or transferred to any other parties except in accordance with the conditions of our appointment. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party unless in accordance with our appointment.

## DOCUMENT HISTORY

VERSION	PURPOSE/DESCRIPTION	DATE
1	Final – For issue to client	March 2019



## 1.0 INTRODUCTION

JPG (Leeds) Limited has been instructed on behalf of Praxis Real Estate Management Limited to prepare a remedial strategy report for a proposed commercial development on Plots B & C at The Airfields, Deeside.

### 1.1 Location

The site forms part of a proposed commercial development area of a larger mixed-use site at The Airfields, Deeside. The site is located to the west of the A548 Welsh Road, approximately 6km northwest of Chester. The approximate centre of the site is located at NGR 332500, 370000. A site location plan is given as Figure 1 in Appendix A.

### 1.2 Site Description and Topography

The site is irregular in shape and occupies an area of approximately 25 ha. The site is at a general elevation of 4.60m above ordnance datum (AOD) and is generally level.

The site forms Plots B & C of The Airfields development, a wider scheme incorporating the whole former military base, occupying a total area of over 56 ha. Plot B is located within the eastern part of the site and Plot C is located in the west.

Access to the site is via a newly constructed road (the B5441) off the A548 Welsh Road which is located immediately to the east. The newly constructed highway forms the southern boundary to plots B & C.

The site is currently unoccupied and comprises mostly grassland. Vegetation comprises well maintained grassland with peripheral planting. At the time of the ground investigation, heras fencing separated the two plots.

A small part of the north-eastern corner of Plot B comprises grassland with a bituminous hardstanding path and adjacent redundant street lighting. The path and lighting are no longer used.

The boundaries of the site and adjacent land use is described below:

- ) The northern boundary of the site comprises generally dense vegetation, beyond which is the Chester Millennium Greenway cycle route, running parallel to the northern boundary. A surface water drain runs between the site boundary and the cycle route along part of the northern boundary and also extends along the western boundary. Immediately beyond the cycle route is Deeside Industrial Park (approximately 50m to the north of the site).
- ) Temporary fencing and stockpiles of demolition rubble are present immediately beyond the eastern site boundary. This area is currently being development.



- J The southern boundary comprises a newly constructed swale, beyond which is a newly constructed section of highway and roundabout. The road has several temporary egress points onto Plots B & C. The road is approximately 1m higher than the site. The River Dee is located approximately 600m to the south, beyond which is Queensferry.
- J The western boundary comprises generally dense vegetation, beyond which are agricultural fields. A surface water drain extends between the site boundary and the adjacent field, connecting to the drain identified along the northern boundary.

An aerial photograph of the site is presented as Figure 2, Appendix A.



## 2.0 PREVIOUS REPORTS

A geoenvironmental desk study report and geoenvironmental ground investigation report for the site have been prepared by JPG; which are referenced below:

- J) JPG (Leeds) Limited. Geoenvironmental Desk Study Report. The Airfields, Deeside. Report Ref. MT/DS/4671.v1, dated July 2014 for Praxis Real Estate Management Ltd.
- J) JPG (Leeds) Limited. Geoenvironmental Ground Investigation. The Airfields, Deeside. Report Ref. MHP/GI/4671.v1, dated December 2018 for Praxis Real Estate Management Ltd.

This report has been prepared with consideration to the following advice document which has been prepared by the County Council:

- J) Flintshire County Council. May 2012. The Development of Land Affected by Contamination. Reports to support planning applications. 2012.

The recommendations made in this remedial strategy report are based on the findings of the investigative works referenced above, which should be read in conjunction with this report.

## 3.0 SUMMARY OF THE PROPOSED DEVELOPMENT

The proposed commercial development comprises two large commercial units with associated parking, landscaping and roads. An electricity substation is proposed in the centre of the site.

A plan showing the proposed extent of the development is referenced below and a copy is presented in Appendix A.

- J) Fletcher Rae. June 2017. The Airfields, Deeside. Proposed Masterplan. Drawing no. 13001\_SK116. Rev L.



## 4.0 SUMMARY OF GROUND CONDITIONS

A summary of the ground conditions encountered is provided below. The sequence of strata generally comprises a thin layer of made ground topsoil, underlain by silty sand with localised clay horizons. These deposits are representative of the Tidal Flat deposits of the Quaternary Period, indicated on geological mapping.

### **Made Ground - Topsoil**

Reworked topsoil was encountered at all exploratory hole locations across the site. The thickness of topsoil was typically less than 0.20 m. The topsoil generally comprised dark brown silty sand with abundant rootlets. Anthropogenic inclusions were generally absent from the topsoil.

### **Natural Strata - Granular**

Natural Tidal Flat Deposits were found to underlie the reworked topsoil at all exploratory locations. The underlying natural deposits consisted of granular light greyish brown medium dense to dense sand, with frequent disseminated shell fragments. The granular strata were encountered to a maximum depth of 15m bgl; the base of the unit was not proven.

### **Natural Strata – Cohesive**

Clay was encountered during the investigation at eight exploratory hole locations. Generally, the cohesive natural strata was identified as lenses and thick laminations. The cohesive material comprised soft to firm, dark greyish brown, sandy clay. Clay horizons were noted within trial pits at depths of between 0.15m and 2.00m bgl and within boreholes at depths of between 7.50m and 9.00 m bgl.

The underlying bedrock was not encountered during the 2018 ground investigation due to a maximum drilled depth of 15.0m bgl, with all exploratory holes terminating within dense sand.

## 5.0 SUMMARY OF ENVIRONMENTAL RISK ASSESSMENT

### **Source – Pathway – Receptor Linkages**

Based on the ground and groundwater conditions encountered during the ground investigation, no sources of contamination have been identified on the site. Therefore, no potential pollutant linkages exist and no receptors are considered to be at risk.

However, the site is located in an area where between 5% and 10% of buildings are affected by radon. Therefore, basic radon protective measures are required.

A summary of the recommended general mitigation measures is provided in Section 7.0.



## 6.0 RECOMMENDED MITIGATION MEASURES

Based on the environmental risk assessment, no sources of contamination have been identified for the site and therefore consideration should be given to implementing the following general mitigation measures.

### **Development and maintenance workers**

- J Site workers involved in groundworks should use appropriate PPE, i.e. overalls and gloves and if appropriate, facemasks. Appropriate health and safety measures, e.g. washing hands prior to eating or drinking, should also be enforced.
- J During development of the site, all workers should remain vigilant to the possible risk of encountering areas of potentially contaminated material. Should potentially contaminated material be encountered, site management should be informed. Further testing may then be required to assess the risk to health and safety of the site workers and the environment.
- J Site workers involved in groundworks should take the necessary measures to ensure that all works in excavations and confined spaces are carried out in accordance with best practice.
- J All employers involved in works at the site should produce an appropriate method statement and risk assessment, to which all employees should comply. Reference should also be made to appropriate HSE and other guidance for working on contaminated and potentially contaminated sites.

Reference should be made to the report by MACC with regards to the risk from UXO.

### **Future Site Users**

As the site is located in an area where between 5% and 10% of buildings are affected by radon, basic radon protective measures are required.

### **Unexpected Contamination**

During development of the site, all workers should remain vigilant to the possible risk of encountering areas of unexpected potentially contaminated material. Should unexpected potentially contaminated material be encountered, site management should be informed. Further testing may then be required to assess the risk to health and safety of the site workers and the environment.

Any excavated potentially contaminated materials should be placed on a layer of visqueen and covered with a layer of visqueen to prevent the release of dust and leaching of potential contaminants.

Chemical analysis of the material may then be required to assess the risk to health and safety of the site workers and the environment. Chemical analysis may also be required in order to determine the classification of the material for disposal and the most appropriate disposal route.



## 7.0 IMPORTATION OF MATERIALS

Materials proposed to be imported onto site for use as general fill or soil cover for soft landscaping should be subject to the guidance provided in the following document, a copy of which is presented in Appendix B:

- J Yorkshire and Lincolnshire Pollution Advisory Council. Verification Requirements for Cover Systems. Technical Guidance for Developers, Landowners and Consultants. Version 3.3 – October 2016.

The guidance provides four broad classifications for materials, these are summarised below:

- J Greenfield – if it can be demonstrated that it has not been developed and that no past contaminative uses have occurred on the site.
- J Manufactured – from a commercial company who manufacture material by mixing or blending mineral soils (subsoil or sand) with an organic amendment (compost).
- J Brownfield – material from a donor site that has previously been developed.
- J Screened – material from a company who deal with skip/demolition waste which is screened for unsuitable material, i.e. bricks, wood, plastic etc.

Table 6 below provides testing requirements/documentation required for the material types summarised above, plus virgin quarried material and crushed hardcore, stone and brick. The testing below applies to each material source.

**Table 6 - Testing Requirements for Imported Materials**

Type	Number of Samples	Testing Schedule	Assessment Criteria
Virgin Quarried Material	1 or 2 depending on the type of stone utilised, to confirm the inert nature of the material	Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn).	Table 7
Crushed Hardcore, Stone, Brick	Minimum 1 per 1000m <sup>3</sup>	Standard metals/metalloids (as above). PAH (16 USEPA speciation). Asbestos.	
Greenfield/ Manufactured Soils	Minimum 3, or 1 per 250m <sup>3</sup> (whichever is greater)	Standard metals/metalloids (As above). PAH (16 USEPA speciation). Asbestos.	
Brownfield/Screened Soils	Minimum 6 or 1 per 100m <sup>3</sup> (whichever is the greater)	Standard metals/metalloids (As above). PAH (16 USEPA speciation). Asbestos. TPH (CWG banded). Any additional analysis dependant on the history of the site	

Samples should be tested at source prior to being imported onto the site. This is to avoid the costly exercise of re-excavating unsuitable material and the possibility of cross-contamination.



Where the material is provided by a commercial company, testing certificates will normally be accepted on the provision that it (i) relates to the actual material being imported to the site and the type and amount of analysis is compliant with Table 6 and 7, and (ii) the certificates are less than two months old.

Test sample results should be submitted to the engineer for review at least 48 hours prior to being imported onto site.

The nominated laboratory used by the Contractor shall be UKAS/MCERTS accredited. All relevant analytical methodology will be accredited and limits of detection shall be such that any exceedences of the thresholds for a commercial end use which are provided in Table 7 will be evident.

Materials with concentrations of potential contaminants in excess of their respective threshold concentrations will not generally be acceptable for use on the site.

Materials for use as general fill and soil cover layers in areas of soft landscaping (which are intended to promote plant growth) should also be subject to a visual/olfactory inspection.

It must be ensured that materials are free from obvious contamination, i.e. hydrocarbons (odours), Japanese Knotweed and unsuitable materials, i.e. glass, asbestos containing materials, brick, tarmac, plastic or timber. In the case of cover materials, it must also be ensured that they will provide a suitable growing medium.

There may also be a requirement for the analysis of imported topsoil (in accordance with BS 3882:2015) to assess whether it is suitable for its intended purpose.



## 8.0 THRESHOLD CRITERIA FOR IMPORTED MATERIALS

It is recommended that the threshold concentrations for potential contaminants in Table 7 are adopted for the proposed commercial development.

**Table 7 - Threshold Criteria for Potential Contaminants in Imported Materials**

Potential Contaminant	Threshold Criteria (mg/kg)
Arsenic	640
Cadmium	190
Chromium	8,600
Hexavalent Chromium	33
Copper	68,000
Lead	2,330
Mercury	1,100
Nickel	980
Selenium	12,000
Zinc	730,000
Phenol	84,000
Acenaphthene	83,000
Acenaphthylene	520,000
Anthracene	170
Benzo(a)anthracene	35
Benzo(a)pyrene	44
Benzo(b)fluoranthene	1,200
Benzo(k)fluoranthene	3,900
Benzo(ghi)perylene	350
Chrysene	3.5
Dibenz(ah)anthracene	23,000
Flouranthene	63,000
Flourene	500
Indeno(123-cd) pyrene	190
Naphthalene	22,000
Phenanthrene	54,000
Pyrene	84,000
Asbestos	Not Present
TPH C5 to C10* (includes Toluene, Ethylbenzene & Xylene)*	500
TPH >C10 to C35* (includes many of the 16-PAHs)*	1,000

**Notes: \*Speciated criteria is not required as the threshold criteria is lower than the threshold criteria for each speciated value.**



## 9.0 MATERIAL MANAGEMENT

Arisings generated during the development works have the potential to be designated as a waste and therefore may require off-site disposal. However, these materials could be recovered and deemed a non-waste if a certainty for use on-site is established or they are deemed suitable for re-use on site.

Where arisings are considered suitable for use on site and a requirement for their use has been identified, consideration could be given to the use of a Materials Management Plan in order to verify that the material is not considered to be a waste.

Regular records of all material movements on site should be retained for all aspects of any material movements.

## 10.0 VALIDATION REPORT

On completion of the remedial works, a validation report shall be produced for submission to the Local Authority. This will provide documentary evidence that the works have been undertaken in accordance with the remedial strategy and that the general requirements and objectives have been achieved.

The validation report shall include all relevant site records, test results, including plans showing pertinent information.

The Contractor shall provide copies of all waste transfer notes of potentially contaminated materials exported off site and materials imported onto the site, together with the relevant certificates of analysis. Duty of care documentation shall be submitted with the validation report.

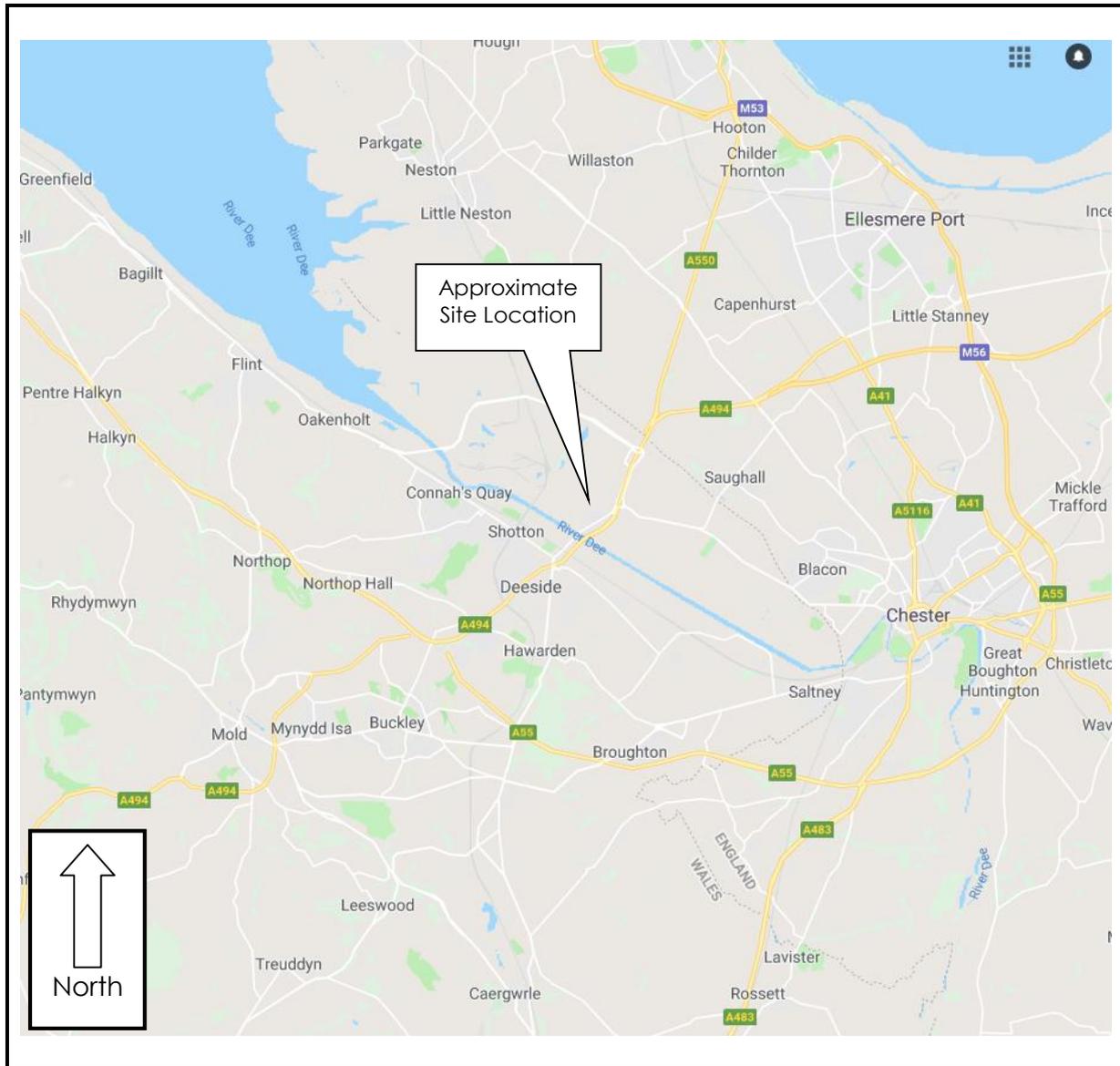
**M Peckham**  
**BSc FGS**

For and on behalf of JPG (Leeds) Limited

March 2019

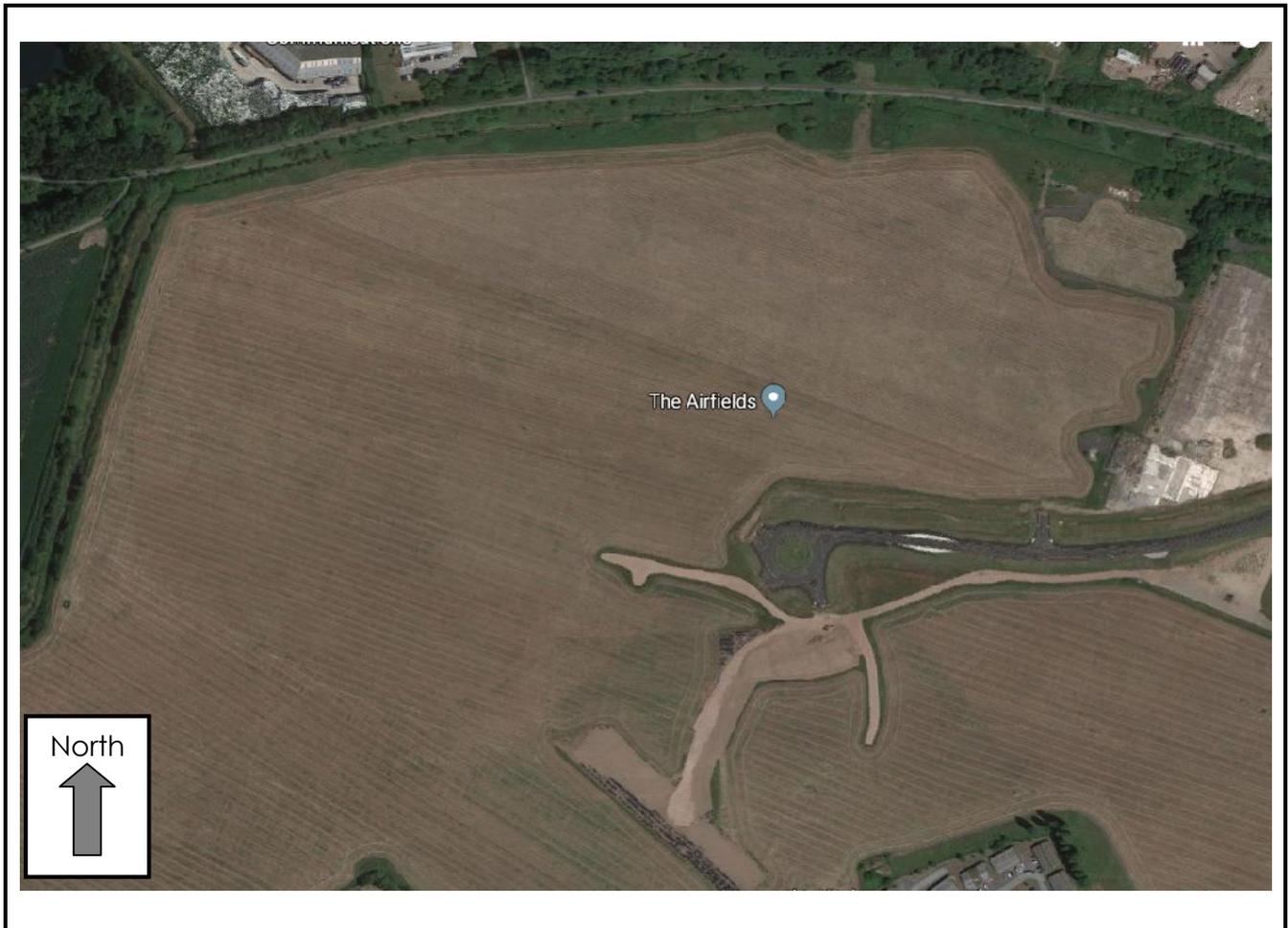


## Appendix A Figures



**Figure 1 – Site Location Plan**

<b>Site</b>	<b>The Airfields, Deeside</b>
<b>Client</b>	<b>Praxis Real Estate Management Limited</b>
<b>Job Number</b>	<b>4671</b>
<b>Scale</b>	<b>NTS</b>

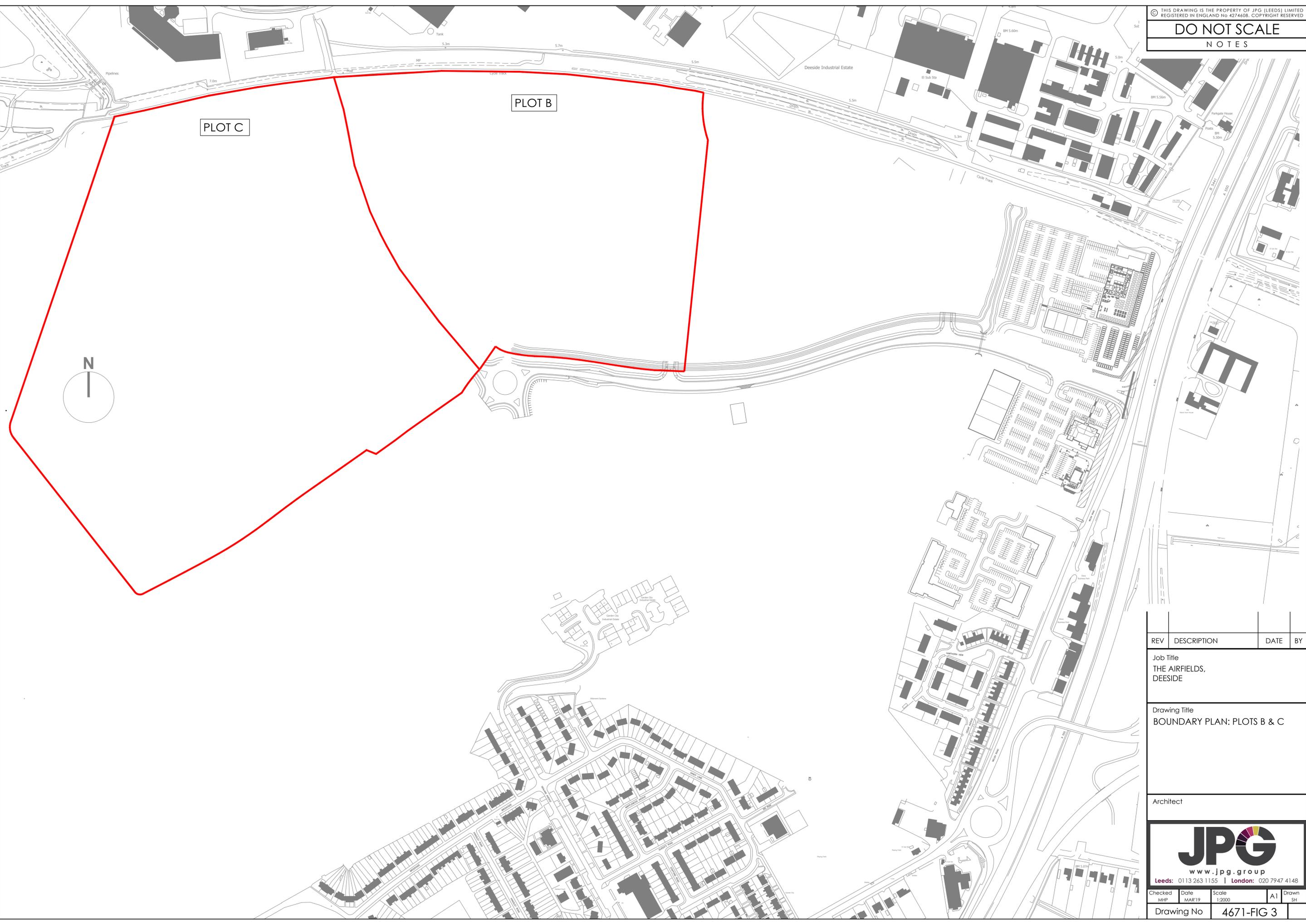


**Figure 2 – Aerial Photograph**

<b>Site</b>	<b>The Airfields, Deeside</b>
<b>Client</b>	<b>Praxis Real Estate Management Ltd</b>
<b>Job Number</b>	<b>4671</b>
<b>Scale</b>	<b>NTS</b>

**DO NOT SCALE**

NOTES



REV	DESCRIPTION	DATE	BY

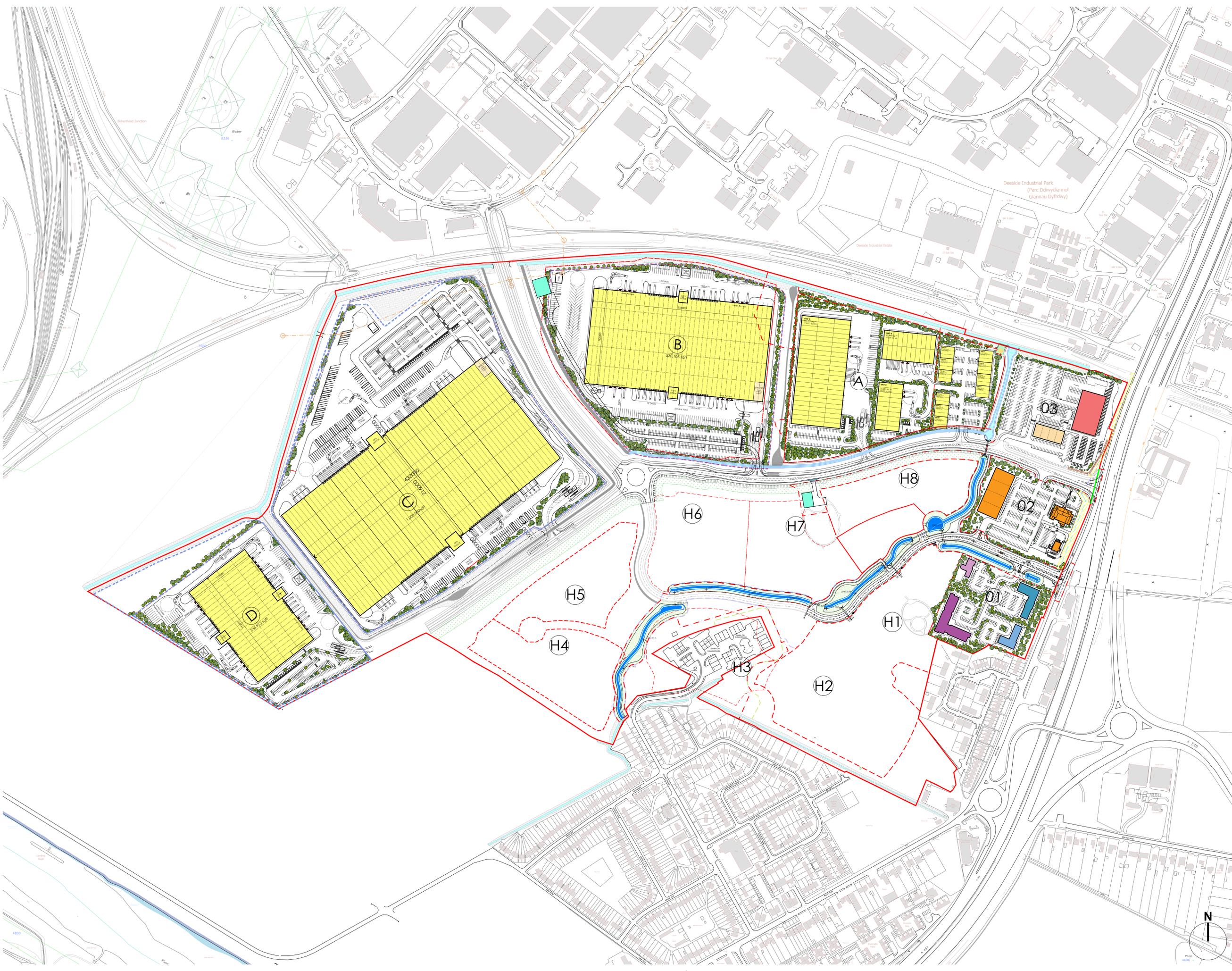
Job Title  
 THE AIRFIELDS,  
 DEESIDE

Drawing Title  
 BOUNDARY PLAN: PLOTS B & C

Architect

**JPG**  
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 Leeds: 0113 263 1155 | London: 020 7947 4148

Checked MHP	Date MAR'19	Scale 1:2000	A1	Drawn SH
Drawing No			4671-FIG 3	



**General Notes**

All site dimensions shall be verified by the Contractor on site prior to commencing any works.

Do not scale from this drawing.

Only work to written dimensions.

This drawing is the property of Fletcher-Rae (UK) Limited (t/a Fletcher-Rae) and copyright is reserved by them. The drawing is not to be copied or disclosed by or to any unauthorised persons without the prior written consent of Fletcher-Rae (UK) Limited.

**Note**

This drawing is for information purposes only and is not to be used as a contract drawing

- Plot 01**  
 Site Area - 5.69 Acres / 2.3 Ha  
 • Apartments - 60 dwellings over 3 storey  
 • Hotel - 60 beds over 3 storey  
 • Hotel - 70 beds over 3 storey  
 • Crèche - 371.60sqm / 4,000 sqft single storey
- Plot 02**  
 Site Area - 6.08 Acres / 2.46 Ha  
 • Coffee shop - 167.22 sqm / 1,800 sqft  
 • Food Outlet - 856 sqm / 9,214 sqft  
 • Retail Unit - 2,800 sqm / 30,000 sqft
- Plot 03**  
 Site Area - 7.51 Acres / 3.04 Ha  
 • Car showroom - 2,871 sqm / 30,903 sqft  
 • Unit - 1,100 sqm / 11,840 sqft
- Plot A**  
 Site Area - 18.68 Acres / 7.56 Ha  
 • Trade Counter - 4,645 sqm / 50,000 sqft  
 • Industrial - 15,271 sqm / 164,377 sqft  
 • Industrial - 4,259 sqm / 45,845 sqft  
 • Industrial - 3,280 sqm / 35,305 sqft
- Plot B**  
 Site Area - 27.68 Acres / 11.205 Ha  
 • Warehouse - 48,424 sqm / 521,236sqft  
 • Office GF - 465 sqm / 5,005 sqft  
 • Office FF - 465 sqm / 5,005 sqft  
 • Office SF - 465 sqm / 5,005 sqft  
 • Ancillary / Ops Office - 550 sqm / 5,920 sqft  
 • VMU - 165 sqm / 1,776 sqft  
**Total - 50,534 sqm / 543,948 sqft**
- Plot C**  
 Site Area - 48.75 Acres / 19.732 Ha  
 • Warehouse - 92,250 sqm / 992,979 sqft  
 • Office GF - 465 sqm / 5,005 sqft  
 • Office FF - 465 sqm / 5,005 sqft  
 • Office SF - 465 sqm / 5,005 sqft  
 • Ancillary / Ops Office - 1,100 sqm / 11,840 sqft  
 • VMU - 165 sqm / 1,776 sqft  
**Total - 94,910 sqm / 1,021,611 sqft**
- Plot D**  
 Site Area - 15.38 Acres / 6.227 Ha  
 • Warehouse - 22,196 sqm / 238,918 sqft  
 • Office GF - 348 sqm / 3,746 sqft  
 • Office FF - 348 sqm / 3,746 sqft  
 • Ancillary / Ops Office - 550 sqm / 5,920 sqft  
**Total - 23,442 sqm / 252,330 sqft**

L	Updated Plot 2 and Plot 3	25.05.18	LP
K	Updated Plot 1 and Plot 3	23.05.18	LP
J	Updated the location of the substations	15.05.18	LP
H	Commercial plots access amended in line with JPC Sketch. Amended Plot 2 & 3 to suit comments.	08.05.18	AE
G	Commercial plots access amended in line with JPC drawing.	30.04.18	CF
F	Overall updates in line with JPC drawing	09.04.18	CF
E	Updated plot 3 layout and schedule	24.10.17	LP
D	Amended plot 3 to suit client design	21.08.17	CF
C	Amended plot 3 to suit client design	02.08.17	CF
B	Overall Update in line with JPC drawing	27.07.17	CF
Revision	A	Overall Update	30.06.17

Scale 1:2000@A0  
 Status SKETCH  
 Drawn by LL  
 Date 02.06.17  
 Client CRAG HILL ESTATES LTD

Project THE AIRFIELDS, DEESIDE  
 Drawing Description PROPOSED MASTERPLAN  
 Drawing No. 13001\_SK116 Rev. L



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**Appendix B Yorkshire and Lincolnshire Pollution Advisory  
Group. Verification Requirements for Cover Systems.  
Technical Guidance for Developers,  
Landowners and Consultants**



# VERIFICATION REQUIREMENTS FOR COVER SYSTEMS

Technical Guidance for  
Developers,  
Landowners and  
Consultants



**Yorkshire and Lincolnshire  
Pollution Advisory Group**

Version 3.4 – November 2017

The purpose of this guidance is to promote consistency and good practice for development on land affected by contamination. The local authorities in Yorkshire, Lincolnshire and the North East of England who have adopted this guidance are shown below:



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## **Disclaimer**

This guidance is intended to serve as an informative and helpful source of advice. It is intended to review this guidance annually, but readers must note that legislation, guidance and practical methods are inevitably subject to change and therefore should be aware of current UK policy and best practice. This note should be read in conjunction with prevailing legislation and guidance, as amended, whether mentioned here or not. Where legislation and documents are summarised this is for general advice and convenience, and must not be relied upon as a comprehensive or authoritative interpretation. Ultimately it is the responsibility of the person/company involved in the verification of land contamination to apply up-to-date working practices and requirements.

## **Acknowledgments**

The author, Wakefield Council [David Jackson], would like to acknowledge the assistance provided by the following organisations: City of York Council, City of Lincoln Council, Leeds City Council and City of Sheffield Council. The author would also like to acknowledge Liverpool City Council's Contaminated Land Team, Coopers Consulting Engineers for allowing us to use their guidance document and photographs and WSP Environmental Ltd for also donating photographs.

## **Consultation**

39 Local Authorities and 6 Environmental Consultants were consulted over a four week period in 2010 during the production of the initial guidance. At that time, consultation comments were considered by the review panel and a number of revisions were made to the guidance to reflect these comments. Given that no major changes have subsequently taken place, only Local Authorities were consulted during the production of this version [3.1] of the guidance.

## Introduction

This guidance has been produced to help developers ensure that they can demonstrate that material brought onto a development site for gardens or areas of soft landscaping are suitable for use and do not present harm to people, the environment and/or property. It is intended to improve the quality of reports submitted to Local Authorities on this matter and to give contractors/consultants a point of reference to obtain approval for such work from their client. This guidance does not cover the geotechnical suitability of soils or material or chemical suitability that does not affect human health e.g. sulphates.

The verification of cover systems should be an integral part of the remediation project and agreed between developers and regulators at an early stage in the project.

There are some UK guidelines regarding verification, for example CLR 11<sup>1</sup> and the document on verification of remediation<sup>2</sup>. This guidance note should be considered as supplementary advice in conjunction with these documents.

This guidance relates to the remediation of land contamination by using cover systems; however, the verification of the quality of imported material is equally important in other situations, such as raising levels for flood prevention or general landscaping works. This guidance could also be used in such instances.

## The Process of Verification

Implementation plans for remedial works should always be site specific. Where a cover system and potentially, excavation, is the main remedial method or a component of an overall site remediation, specific goals will need to be set that are linked directly to the risk management strategy for the site in question.

For cover and containment systems, verification will normally depend upon the provision of defensible measurements, observations and records. Critical factors to be considered are:

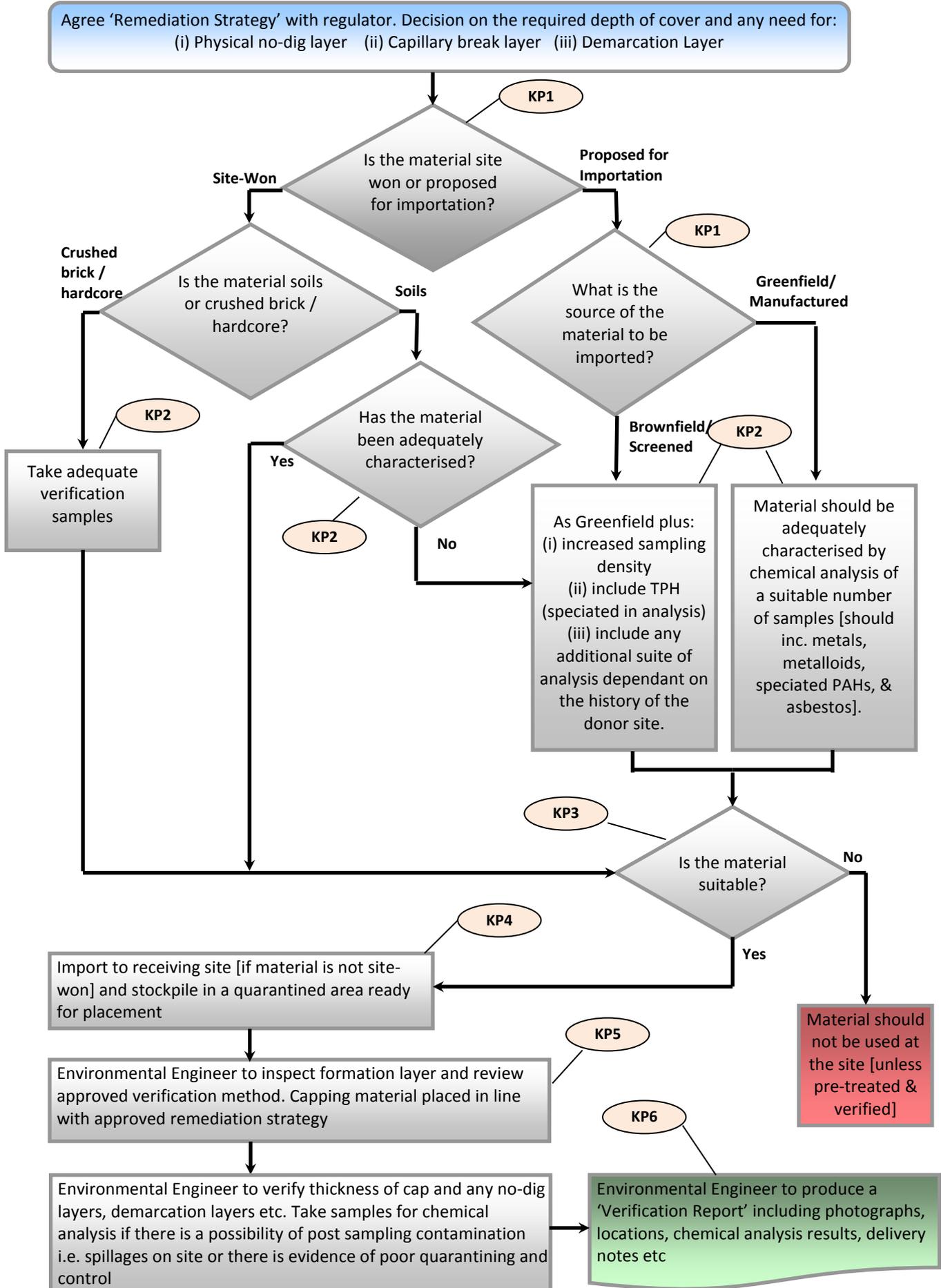
- What should be measured?
- When should they be measured?
- Where measurements need to be taken, what is the appropriate monitoring regime i.e. number and frequency of samples?
- Statistical constraints on sampling.

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<sup>1</sup> "Contaminated Land Report 11 - Model Procedures for the Management of Contaminated Land". Environment Agency, September 2004.

<sup>2</sup> "Verification of Remediation of Contaminated Land. Environment Agency, 2010 [draft report].

# Overview Flowchart



# Key Points

<p><b>KP1</b></p> <p><b>Source of Material</b></p>	<p>Material can be sourced from site won material i.e. crushed brick /hardcore or site-won soils from existing open or landscaped areas. In the interest of sustainability, Local Authorities promote the use of such site-won material providing that they are suitable for the intended end use of the site.</p> <p>Alternatively, material can be sourced from other developments and commercial companies. Dependent on the source of the material it can be classified as either from a '<u>Greenfield/Manufactured</u>' or '<u>Brownfield/Screened</u>' source.</p> <p>Broadly speaking material can be classified as follows:</p> <p><b>Greenfield</b> - if it can be demonstrated that it has not been developed and that no past contaminative uses have occurred at the site.</p> <p><b>Manufactured</b> – from a commercial company who manufacture material by mixing or blending mineral soils (subsoil or sand) with an organic amendment (compost).</p> <p><b>Brownfield</b> – material from a donor site that has previously been developed</p> <p><b>Screened</b> – material from a company who deal with skip/demolition waste which is screened for unsuitable material i.e. bricks, wood, plastic etc.</p>
<p><b>KP2</b></p> <p><b>Characterisation of Material</b></p>	<p>It is essential that material is inert and suitable for its intended use. Evidence of the source of the material should be provided to the Local Authority. What is required is a defensible method to ensure the verification proposals are site specific and that the level of sampling reflects the need to ensure that imported material are suitable for their intended use.</p> <p><b>When Should this be Done?</b></p> <p>Sampling of material should be undertaken as early as possible i.e. <u>prior to placement</u> [for site won material] and <u>prior to importation</u> [for imported material]. This is to avoid the costly exercise of re-excavating <u>unsuitable</u> material and the possibility of cross contamination. Where the assessor has confidence that the material is of sufficient quality (i.e. tested by supplier, used previously) it is acceptable to test the material on site but prior to placement. Although, if it is deemed <u>unsuitable</u> it would have to be either removed off site or pre-treated at the cost and time of the developer.</p> <p><b>What about Certificates from Commercial Suppliers?</b></p> <p>Where the material is provided by a commercial company, certificates or other industry Quality Protocol compliance i.e. WRAP, will normally be accepted. This is on the proviso that it (i) relates to</p>

	<p>the actual material being imported to the site and the type and amount of analysis is in line with what is prescribed in Appendix 1a and (ii) the certificates are less than two months old.</p> <p><u>Extreme caution</u> should be given to importing material that has been recycled from demolition or skip waste as they could be easily be contaminated e.g. asbestos containing materials. [Please refer to questions you should be asking your supplier in Appendix 1b and include the responses in your report]</p> <p><b>British Standard</b></p> <p>Imported topsoils should be as specified in BS 3882:2007 as 'suitable for their intended purpose'. BS3882:2007 relates to nutrient content of topsoil and phytotoxic contamination and <u>does not</u> consider contaminants that pose a risk specifically to human health. Soils should be tested for contaminants that are considered to pose a risk to human health in addition to BS3882:2007 to ensure that they are suitable for their intended use.</p> <p><b>Initial Screening</b></p> <p>A visual / olfactory inspection of the material should be carried out by an Environmental Engineer to ensure that:</p> <ul style="list-style-type: none"> <li>• it is a suitable growing medium</li> <li>• it is free from obvious contamination i.e. staining / free product etc</li> <li>• it has not come from areas where Japanese Knotweed or other invasive or injurious plants, as specified by the Environment Agency, are suspected to have been growing.</li> <li>• it is not odorous (could be considered a statutory nuisance)</li> <li>• it is free from unsuitable material i.e. bricks, brick ties, timber and glass etc)</li> <li>• there are no visible signs of asbestos containing material (ACM's)</li> </ul> <p><b>Testing Schedule &amp; Number of Samples</b></p> <p>Chemical testing will normally be required on any materials that are to be used as cover material, even where this includes first generation quarried material. This should be carried out by a suitably qualified Environmental Engineer.</p> <p>Please refer to the <u>Characterisation of Material Matrix</u> in Appendix 1a which details the number of samples to be taken; the testing schedule to be utilised dependant on the nature and source of the material and the acceptance criteria to be used.</p>
<p><b>KP3</b></p> <p><b>Suitability of Material</b></p>	<p>Based on the characterisation of material above, the material should be either deemed suitable or unsuitable. Obviously unsuitable material should not be used [unless it is treated to reduce levels of contaminants below agreed target levels i.e. bioremediation – this would have to be agreed and included within the Remediation Strategy] and an alternative source of material should be sought by the developer. If the material is considered suitable it can be</p>

	imported [if not site won] and stockpiled in a suitably quarantined area [refer to KP4].
<b>KP4</b> <b>Stockpiling &amp; Quarantining of Material</b>	<p>It is essential that the 'suitable' material is either placed in its intended area straight away i.e. soft / landscaped areas or stockpiled in a suitable quarantine area to prevent on-site contamination.</p> <p>In the event that an assessor finds material has been stored in an unsuitable area, samples should be taken to confirm that no cross contamination has occurred [including a visual/olfactory check of the material]. The material should then be suitably quarantined or placed at its intended location immediately.</p>
<b>KP5</b> <b>Verification of Required Depth</b>	<p>In line with the agreed 'Remediation Strategy', it is important to establish that the required depth has been achieved and is consistent across the site. There are two main ways to achieve this:</p> <p><u>Depth testing in situ</u> – small trial pit excavated to allow measurement of its depth by tape measure or measuring staff.</p> <p><u>Topographical surveys</u> – accurate survey of the base and final formation layer height to establish the depth of cover.</p> <p><b>Specific Local Authority Policy</b> Please check with the local Contaminated Land Officer to establish:</p> <ul style="list-style-type: none"> <li>• which type of method for testing depth is accepted; and</li> <li>• the number of verification areas per property, plot, landscaped area or garden area [some Local Authorities recommend at least 2 per plot]</li> </ul> <p><b>Important Note:</b> Where demarcation, physical no-dig and capillary break layers exist they should be verified for their thickness and presence during the time of their installation. Details of the demarcation layer should be agreed with the Contaminated Land Officer prior to placement. This will include the design, type and strength of the geotextile separator or visual warning membrane.</p> <p>The verification of depth and confirmation of such layers should be carried out by a suitably qualified environmental engineer.</p>
<b>KP6</b> <b>Reporting</b>	<p>The purpose of verification documentation is to provide transparent reasoning why the remediation was required, a methodology about how it was to be undertaken and proof that the specified works have been undertaken and to provide confirmation that the site is 'suitable for its intended use'.</p> <p>The document is utilised not only to satisfy conditions of planning permissions but also is to be kept on record by the Local Authority should queries be raised during the lifetime of the development and to confirm to future purchasers that the site is suitable for use. Therefore, the presence of good quality photographs is essential to</p>

prove beyond doubt that the remediation has been done as specified both by method and position.

It is also essential that other supporting documentation is included within a report e.g. laboratory analysis results, delivery tickets for material, certificates for imported material, trial pit logs etc. A checklist has been included in Appendix 2 to give an idea on what information should be recorded.

The reporting should be carried out by a suitably qualified Environmental Engineer.

To include details of any measures required to maintain the cover system integrity in the future e.g. successive construction phases (management plans) and longer term (restrictive covenants on title deeds).

### **Photographic Evidence for Validating the Depth of Cover**

The Local Authority ideally would recommend the following programme of photographs to be taken of the placement of inert cover:

- Photographs of any stockpiles and quarantine areas
- Proof that the depth of inert cover has been installed
- Proof of the quality of the material to be used as inert cover
- Proof there is a geotextile separator and visual warning membranes if used between the made ground and suitable for use soils.
- Proof of the method of placement and different layers if appropriate
- Proof of the completed project
- Inclusion of geographic background features which will aid locating the photograph
- Inclusion of site identification boards within the photos which show the date, position taken i.e. corner of plot 3 and the site name.
- Inclusion of photographs of site stockpiles and quarantine areas.

The photographs have to prove beyond doubt that the images have been taken from the specific area stated.

Refer to Appendix 3 for examples of good photographic evidence.

## Appendix 1a – Sampling & Testing Matrix

Type	Number of Samples	Testing Schedule	Assessment Criteria
Virgin Quarried Material	1 or 2 depending on the type of stone utilised, to confirm the inert nature of the material.	Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)	This needs to be agreed with the Local Authority. The Assessment criteria needs to be UK based, e.g. LQM S4UL's, Defra C4SL's or other similarly derived GAC's.
Crushed Hardcore, Stone, Brick	Minimum 1 per 1000m <sup>3</sup>	Standard metals/metalloids (As above) PAH (16 USEPA speciation) Asbestos	
Greenfield/ Manufactured Soils	Minimum 3 or 1 per 250m <sup>3</sup> (whichever is greater)	Standard metals/metalloids (As above) PAH (16 USEPA speciation) Asbestos	
Brownfield/ Screened Soils	Minimum 6 or 1 per 100m <sup>3</sup> (whichever is greater)	Standard metals/ metalloids (As above) PAH (16 USEPA speciation) TPH (CWG banded) Asbestos Any additional analysis dependant on the history of the donor site.	

## Appendix 1b – Questions to Ask Your Soil Supplier Relating to Soil Quality

- What is the source of the material (refer to KP1)?
- Will all of the material be coming from the same source?
- Are you satisfied that the material is a suitable growing medium for the proposed end use?
- Has the supplier used an appropriate sampling protocol to ensure a representative sample is analysed? What volume of soil is represented by the analysis and does it comply with Appendix 1a?
- Does the testing include analysis of contaminants identified in Appendix 1a?
- Does the laboratory conducting the analysis have UKAS and MCERTS accreditation for the tests they are carrying out?
- Can I have a copy of the whole analysts report and does it include an interpretive section?
- Will the provided certificate be dated within the last 2 months?

## Appendix 2 – Checklist for Verification Reports

**Example only. Not to be considered as typical minimum requirements. Additional information should be included for non cover systems aspects of the remediation i.e. gas protection measures etc.**

<b>Site Details</b>	
Site Name / location	
Developer name	
Development use	
Plot No / description of landscaped area (inc plan of inspection areas)	
National Grid Reference	
Inspection visit date	
<b>Supporting Evidence</b>	
Description of remediation (as per agreed Remediation Method Statement including depths / thickness checks, topographical readings)	
Material tracking information (including way tickets etc)	
Name of groundwork's remediation contractor	
Name of supervising environmental consultant	
Site Specific chemical analysis results	
Verification Photographs (inc. remarks)	
<b>Recommendations</b>	
Pass / fail	
If material fail, how will this be managed i.e. removed, treated	
Detail any further remedial works and / or inspection	
Signed off	

**Failure to provide any of the above information may prevent planning conditions from being discharged.**

## Appendix 3 – Examples of Good Quality Photographs



Photograph 1: Depth check of inert cover within area of public open space. Physical break layer and topsoil visible.



Photograph 2: Depth check of inert cover with Site & Location Information Board.



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Photographs 3 & 4:  
Depth check of inert  
cover within areas of  
front gardens.



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Photographs 5 and 6: Depth check of inert cover within rear gardens. Taut string line spans across excavation.



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Photograph 7 shows the spatial location of the verification pit.



Photograph 8:  
Excavation within public open space and verification pit showing the presence of a remediation break layer at the base, a crushed sandstone inert fill overlain by topsoil.



Photographs 9 and 10: Inert crushed sandstone being delivered with remediation break layer visible in Photograph 10. The spatial area of the remediation can be observed from these photographs (old terrace housing in Photograph 9 and traffic lights in photograph 10).





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Photographs 11 and 12 show the remediation of the rear garden, with a significant depth (1.0m) of inert cover. Remediation break layer visible at the base of the excavation. Photograph 11 has been stitched to form a panoramic photograph and



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## General

JPG (Leeds) Limited have 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 JPG (Leeds) Limited; a charge may be levied against such approval.

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## Phase I Desk Study Reports

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, JPG (Leeds) Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

## Phase II Geo-Environmental Investigations

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics and ground and groundwater conditions to allow a reasonable assessment of the environmental risks together with engineering and development implications. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and groundwater.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

The risk assessment and opinions provided, inter alia, take in to consideration currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

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