

Remediation Options Appraisal & Strategy

Weldale Street, Reading

August 2019



FAIRHURST

CONTROL SHEET

CLIENT: Ropemaker Properties Limited

PROJECT TITLE: Weldale Street, Reading

REPORT TITLE: Remediation Options Appraisal and Strategy

PROJECT REFERENCE: 112990

DOCUMENT NUMBER: R6

STATUS: FINAL

Issue & Approval Schedule	Issue 1	Name	Signature	Date
	Prepared by	E Young		August 2019
	Checked by	A Fawcett		August 2019
	Approved by	A Smith		August 2019

Revision Record	Rev.	Date	Status	Description	Signature	
					By	
					Check	
					Approve	
					By	
					Check	
					Approve	

This document has been prepared in accordance with procedure OP/P02 of the Fairhurst Quality and Environmental Management System

*This document has been prepared in accordance with the instructions of the client, Ropemaker Properties Ltd., for the client's sole and specific use.
Any other persons who use any information contained herein do so at their own risk.*

CONTENTS

1.0	INTRODUCTION	4
2.0	SITE SETTING AND DESCRIPTION	6
3.0	REMEDIATION OPTIONS APPRAISAL	9
4.0	REMEDIATION STRATEGY	11
5.0	CONCLUSIONS.....	14

FIGURES

FIGURE 1	SITE LOCATION PLAN
FIGURE 2	EXPLORATORY HOLE LOCATION PLAN
FIGURE 3	CLEAN CAPPING EXTENT

APPENDIX

APPENDIX A	PROPOSED DEVELOPMENT PLANS
APPENDIX B	LOCAL PLANNING AUTHORITY CORRESPONDENCE
APPENDIX C	CLEAN CAPPING ACCEPTANCE CRITERIA

1.0 INTRODUCTION

1.1 Scope and Objectives

Fairhurst have been appointed by Ropemaker Properties Ltd., (The Client) to provide a Remediation Options Appraisal and Strategy, based on the 'Geo-Environmental and Geotechnical Ground Investigation Report' (112990/R5, June 2018) recently prepared, for the site and proposed development (see [Appendix A](#)) at Weldale Street. A site location plan is provided as [Figure 1](#).

The Fairhurst Ground Investigation Report (112990/R5, June 2019) built on the findings of the 2016 Preliminary Risk Assessment carried out by Fairhurst (112990/R3, dated January 2017) and the later Phase II Geo-Environmental Ground Investigation Report (112990/R4, dated January 2017 and also carried out by Fairhurst) to delineate contamination previously identified. The recent intrusive investigation confirmed the presence of source-pathway-receptor pollutant linkages which should be addressed to render the site 'suitable for use' under the context of the National Planning Policy Framework, for the development detailed in below. This report has therefore been prepared in conjunction with the Fairhurst Ground Investigation Report to address Conditions 18-23 of the Reading Borough Council Planning Permission 170326. The planning status of the site is discussed further in Section 1.3.

Following correspondence with the local planning authority (See [Appendix B](#)), although the approach of creating an encapsulating cover system (see Sections 3 and 4) have been deemed as acceptable, further details have been requested in the form of a Remediation Method Statement. This report provides an options appraisal in order to confirm this is the most suitable remediation method, and provides greater detail as requested within the correspondence in order to make the site suitable for use with regards to human health.

The Ground Investigation Report should be referred to for full details and findings of the recent intrusive work, however for ease a summary of the ground conditions and pollutant linkages relevant to this report are presented within Section 2.0.

1.2 Development Proposals

The current development plans indicate the scheme will comprise the demolition of all existing buildings (including 3 retail units) and structures and the erection of new buildings ranging between lower ground & 4 storeys to lower ground & 11 storeys in height. The proposed development is understood to provide 427 No. residential units (Class C3) including 233 No. 1-bed, 182 No. 2-bed & 12 No. 3-bed units) and 1 No. flexible ground floor retail shop (Class A1) or restaurant and cafe (Class A3) unit, together with new public realm, landscaping, accesses, parking and associated works.

Foundation solutions are likely to include piling, with continuous flight auger (CFA) piling likely to be the most suitable piling technique for this site. Soft landscaping is proposed, concentrated in central, eastern and southern sections of the site.

The site plan as currently proposed are provided as [Appendix A](#).

1.3 Previous Investigations and Reports.

As noted above, Fairhurst have produced a number of reports in relation to the site including

- Preliminary Risk Assessment Ref: 112990/R3 (January 2017);
- Phase II Geo-Environmental Ground Investigation Report Ref: 112990/R4 (January 2017);
- Geotechnical & Geo-Environmental Ground Investigation Report Ref: 112990/R5 (June 2019).

The following reports were made available by the Client for review:

- CBRE Ltd (December 2015). Combined phase I and II Geo-Environmental Assessment.
- Peter Brett Associates LLP Due Diligence Feasibility Report Ref: 32183 (December 2014);

1.4 Planning Status

The site is subject to Reading Borough Council Planning Permission Application Ref: 170326, within which the following planning conditions pertaining to contaminated land are noted:

Condition 18 – No development shall take place until a detailed remediation scheme to bring the site to a condition suitable for intended use by removing unacceptable risks to human health, buildings and other property and the natural and historic environment. The scheme must include all works to be undertaken, proposed remediation objectives and remediation criteria, an appraisal of remedial options, and proposals of the preferred options and a timetable of works and site management procedures. The scheme must also ensure the site will not qualify as contaminated land in relation to the intended use of the land after remediation.

Condition 19 - The approved remediation scheme shall be implemented in accordance with the approved timetable of works. A validation report should also be submitted to and approved by the LPA prior to construction of the development.

Condition 20 - In the event of contamination is found at any time when carrying out the approved development not previously identified, development shall be halted on that part of the site the contamination reported in writing to the LPA.

An assessment of the nature and extent of the contamination shall be undertaken and where remediation is necessary a remediation scheme, together with a timetable for its implementation, shall be submitted to the LPA for its written approval.

The measures in the approved remediation scheme shall be implemented in accordance with the approved timetable. Halted works shall not be re-commenced until the measures identified in the approved remediation scheme have been completed and a validation report approved in writing by the LPA.

Condition 21 - No development shall take place until a detailed land gas site investigation has been carried out by a competent person to fully and effectively characterize the nature and extent of land gas and its implementation.

Condition 22 - No development shall take place until a scheme showing how the development is to be protected against the possibility of land gas has been submitted to and approved in writing by the LPA. The scheme as approved should be fully implemented and completed before the development is first occupied and those measures incorporated in other development is first occupied and those measures incorporated into the development shall thereafter be retained unless stated otherwise by LPA in writing.

Condition 23 - The land gas remediation scheme shall be implemented in accordance with the approved timetable of works. A validation report (that demonstrates the effectiveness of the remediation carried out) must be submitted and approved by the LPA prior to any part of the accommodation hereby approved is occupied. Unless stated otherwise by LPA in writing.

Conditions 21, 22 and 23 have been addressed under the submission of the Ground Investigation Report. This report aims to support discharge of Conditions 18 & 19 following correspondence with Reading Borough Council as shown within [Appendix B](#) and discussed within Section 1.1.

2.0 SITE SETTING

The site is centred on National Grid Reference 471020 173610 and is located at the address; Weldale Street, West Reading, RG1 7BZ, with access gained to both the eastern and western sections of the site via a security gate located on Weldale Street, which bounds the site to the north. A site location plan is presented in [Figure 1](#).

The central northern portion of the site is occupied by a vacant Iceland supermarket warehouse, with an associated goods / delivery yard positioned in the north-eastern portion of the site. The delivery yard is surfaced in concrete hardstanding. The central southern and south-eastern portions of the site are occupied by a vacant single storey warehouse.

The western third of the site is occupied by car parking with a dual storey parking present in the far western portion. An electrical substation is positioned in the car park, adjacent to former supermarket and the northern site boundary. The car park is accessed via Weldale Street to the north and a ramp on the western site boundary provides egress to Chatham Street to the south of the site, which runs east to west at this location and is bisected from the site by an area of soft landscaping and a public footpath.

To the west, the site is bounded by residential dwellings and to the east a parade of vacant shops bisects the site from the A329, which runs south to north at this location. Visually, the site is relatively level with limited change in elevation. An increase in ground level of approximately 2-3m is noted between the site boundary and Chatham Street to the south.

At the time of the site investigation, the site was unoccupied and comprised an empty two storey car park, as well as the vacant structures relating to the former supermarket and a storage unit. The site was entirely surfaced in hardstanding which included recorded occurrences of concrete, tarmacadam, block paving, red brick, ceramic tile and grout.

2.1 Site History and Environmental Setting

The historical map data reviewed within the Fairhurst 2016 Desk Study revealed that the site was occupied by residential housing with a central road named 'Somerset Place' by 1879. By 1931, Somerset Place and the residential housing were occupied by a large building with further smaller buildings on the eastern boundary of the site. By 1957, this building had been extended north and was labelled as a Bus Depot. A garage was also noted on the eastern boundary. By 1962, no residential buildings remained and the site was occupied by the bus depot and garage with ancillary buildings and an electricity sub-station. By 1986, the site layout was altered with a large building occupying the central area and a possible car park in the western area, with an additional smaller building in the eastern area. By 1993, a large building was noted in the south-western area, the layout appeared to be similar to the current layout.

Immediately off-site, the surrounding area chiefly comprised mixed residential / light industrial / commercial setting since the earliest available historical map in 1879 and as such this has characterised the majority of surrounding land uses. Nearby sources identified during the historical map review included saw mills and later a timber yard (approximately 200m south-east) between 1879 and the late 1950s, various garages (present immediately adjacent to the south-eastern site boundary, 60m south and approximately 250m south-east), present between the late 1950s and late 1970s, and a garage and trading estate (approximately 20m north) since the late 1980s.

The Environment Agency defines the underlying Taplow Gravel Member and White Chalk Subgroup as Secondary A and Principal Aquifers respectively with the nearest surface water feature is an unnamed stream positioned approximately 260m north of the site.

2.2 Ground Investigation Findings

A summary of the ground conditions encountered at the site is provided below although the Ground Investigation Report should be referenced for full lithological descriptions of each of the units.

Table 1 – Summary of ground conditions encountered

Lithology	Proven Base of Lithology Range (m bgl)	Proven Base of Lithology Range (m AOD)	Proven Thickness (m)
Hardstanding (concrete, tarmacadam, block paving, red brick, ceramic tile, grout)	0.07 – 0.40	39.79 – 42.92	0.07 – 0.40
Made Ground	0.40 – 3.10	38.04 – 42.00	0.20 – 2.90
Taplow Gravel Member	0.80 – 4.70	36.00 – 41.70	0.10 – 4.10
White Chalk Subgroup (Structureless)*	4.70 – 13.40	27.87 – 36.37	3.10 – 11.90
White Chalk Subgroup (Structured)*	30 - 40	1.27 – 11.97	25.30 - 28.70

*Structured chalk was only obtained using core recovery during rotary drilling. It is possible that structured chalk may be present at shallower depths, however any structure would be destroyed from the cable percussive and windowless sampling drilling technique, and the recovered description would not be considered representative of in-situ conditions.

**Base of White Chalk Subgroup was not proven. Depth and elevation to which it was proven is shown above.

The groundwater levels recorded during the recent site investigation indicated a relatively stable groundwater table within the structureless White Chalk Subgroup (between 35.89 and 36.52mAOD). Considering this with historical monitoring data, it is considered likely that the Taplow Gravel Member is also in hydraulic connectivity with the underlying chalk aquifer. Based on the monitoring results, the anticipated groundwater flow direction is towards the north-east.

It was noted within the CBRE ground investigation that widespread visual and olfactory evidence of hydrocarbon contamination was present within the structureless chalk, and generally noted to be at depths of between 3.50 – 6.00m bgl. The Fairhurst investigation (2019) also identified widespread presence of hydrocarbon impact at depth across the site within both the structureless (BHE at 11.00m bgl only) and structured chalk.

2.3 Geo-Environmental Considerations

Full details of the geo-environmental risk assessment are presented in the Ground Investigation Report, however risks which were considered to require remediation or further consideration related to the presence of limited soil contaminants are summarised below. An Exploratory Hole Location Plan is included as [Figure 2](#).

It was recorded that soil contaminant concentrations at shallow depths were not frequently elevated although levels of a number of contaminants were found to exceed the human health risk assessment criteria (for residential without plant uptake end use) within shallow material on 4no. occasions.

Occurrences of elevated PAH concentrations were rare and noted to be marginally above acceptance criteria for the site. These were limited to dibenzo(ah)anthracene identified at a concentration of

0.40mg/kg within WS1 at 0.40m bgl during the CBRE 2015 investigation (compared to the acceptance criteria of 0.31mg/kg), and benzo(b)fluoranthene identified at a concentration of 4.0mg/kg within BHA at 1.00m bgl during the Fairhurst 2019 investigation (compared to the acceptance criteria of 3.9mg/kg). These occurrences were both positioned within the north-western portion of the site.

Concentrations of lead were recorded up to 800mg/kg (within BHA and as high as 380mg/kg within WSF), compared to the guidance value of 310mg/kg. These exceedances were again concentrated to the north-western portion of the site.

A single fragment of asbestos tile was recorded within an exploratory hole undertaken as part of the 2016 Fairhurst investigation (within BH101). Analysis on samples from this position and also TP123 (from the same investigation) identified the presence of fibres, however when quantitatively analysed, these were identified to be below the limit of detection (<0.001%). On the basis of this, it was considered that risks to construction workers were likely to be low. .

It was discussed within the 2019 Fairhurst Ground Investigation Report that no contamination had been identified within the Made Ground which would pose a risk to drinking water supply pipework. It would however be prudent to consult the water supplier prior to installation.

Assessments undertaken during historical ground investigations have also identified risks resulting from ground gases and vapour to be low with regards to human health. It was concluded that no ground gas or vapour protection measures would be required as part of the proposed development.

Leachate analyses undertaken during ground investigation did not identify evidence for potential leachable contaminants within the soil. Groundwater samples taken from depth did provide contaminant data which noted the presence of elevated concentrations of hydrocarbons of moderate mobility. Due to the composition of the contamination recorded, it was considered that the source of this was likely to have been of significant age (several decades). On the basis of the absence of constituents of potential concern at concentrations above water quality standards that would be typical for the nature of the contamination and the absence of a known on-site entry point, no remedial work was considered to be warranted.

The following sections of this report discuss the pollutant linkage between the inhalation, dermal contact and ingestion of soils impacted with elevated concentrations of lead and PAH and (human health) site end users.

3.0 REMEDIATION OPTIONS APPRAISAL

3.1 General

Based on the potential pollutant linkage between the inhalation, dermal contact and / or ingestion of soils impacted with elevated concentrations of lead and PAH and site end users, a remediation options appraisal has been undertaken, to determine the most sustainable solution in respect to economic, social and environmental impact, in addition to the technical viability, and the site development.

3.2 Inhalation, dermal contact or ingestion of lead contamination by site end users

Ground investigation has identified the presence of lead concentrations up to 800mg/kg and marginally elevated concentrations of PAH, within the Made Ground in the western portion of the site. Although detailed engineering levels are not yet available, significant changes in site level are not proposed.

In areas of proposed built structure and hardstanding, the construction materials will present a barrier to human health (i.e. in the area of BHA), however, depending on the upfill materials origin and thickness, Made Ground may remain within influencing depth of human health in areas of soft landscaping (i.e. in the vicinity of WSF where elevated levels of lead and WS1 where marginally elevated PAHs were identified).

The Combined General Arrangement (Cameo + Partners drawing C0049 L101, June 2017), provided as [Appendix A](#), shows soft landscaping areas to predominantly comprise grassed areas with trees and planting. A sufficient thickness of suitable imported topsoil and subsoil will likely be needed to meet Landscape Architect requirements and reduce the phytotoxic risk to plants.

Contaminant concentration reduction

Given only marginal risks remain within areas of soft landscaping, and metals have been encountered slightly above generic assessment criteria, reduction to acceptable limits may be possible.

In proposed areas of soft landscaping where Made Ground potentially impacted with elevated lead (and marginal PAH) concentrations remain, the following remedial options are considered:

- Chemical oxidation and reduction – This works by reducing the toxicity of metals, however, the use of aggressive reagents on a site overlying the Principal Aquifer of the White Chalk Subgroup is not considered appropriate and could also cause discolouration of groundwater. As risks are limited in terms of receptors (human health/planting medium) and applicable only in areas of soft landscaping such a technique is not considered appropriate;
- Soil Screening and Washing – As the contaminants are isolated to the Made Ground, these could be excavated and screened. The treatment works on the basis of separating the fine particles of granular soils, where it is considered that contaminants are concentrated. Although the method is effective in granular soils and would likely achieve reduction below the human health GAC due to the nature of the process (which includes washing of the material) there is increased leachate risk to Controlled Waters which, given proximity to the Primary Aquifer and as such, the technique is not considered to be appropriate.
- Encapsulation – although the extent of soft landscaping it is understood to not yet have been finalised, the Combined General Arrangement (Appendix A) identifies soft landscaping areas to comprise grassed areas and planting including small trees. Made Ground materials present on-site will not form a suitable rooting medium. The Ground Investigation Report also identified a potential risk to human health and landscaping from elevated concentrations of organic and inorganic contaminants in Made Ground soils. As such, clean cover is to be placed in proposed landscaped areas across the site. The clean cover requirements are to be designed by the Landscaped Architect and agreed with the LPA Contaminated Land Officer

prior to finalising the landscape design but are expected to comprise a minimum of 150mm topsoil and 300mm subsoil. In areas of shrub or tree planting this thickness is likely to be significantly greater. In the absence of any suitable site won material, it is likely that suitable imported growing medium (i.e. subsoil/topsoil) will be required.

As the placement of a suitable growing medium are already required, it is considered that if appropriately specified in terms of thickness, this could provide a capping system to the underlying Made Ground within areas of soft landscaping within the west of the site, providing protection of ingestion/inhalation and dermal pathways to site end users.

If this method is adopted, the form of encapsulation would need to be agreeable to the Landscape Architect, be protective of human health, consider maintenance over the site's use and be approved by the Local Planning Authority.

- **Source Removal** – As noted above, the exceedance appears to be limited in extent to the west of the site. The benefit of offsite removal is the ongoing management/maintenance of encapsulation is not relied upon and it does not need to work in conjunction with proposed finished floor levels (i.e. to incorporate encapsulation, Made Ground soils may require removal to allow sufficient thickness of capping to be provided to maintain proposed development levels).

In accordance with best practice and waste regulations, removal and offsite disposal is not considered a sustainable solution and the 'waste hierarchy' should be adopted where landfill should be the last option available.

Selected Remedial Action: Retention of Made Ground beneath a suitably designed encapsulation system. Capping system to be used in areas of proposed soft landscaping within the west of the site and comprise certified clean imported subsoil and topsoil, including growing medium.

4.0 REMEDIATION STRATEGY

4.1 General Requirements

The remedial works proposed in order to break the potential pollutant linkage between the inhalation, dermal contact and / or ingestion of soils impacted with elevated concentrations of lead and marginally elevated concentrations of PAH and site end users is detailed below.

It is the responsibility of the Principal Contractor to ensure that all necessary Materials Management Plans, Qualified Person Declarations, Environmental Permits, Health and Safety Plan, Risk Assessments and Method Statements, and Discharge Consents are obtained/approved, as required. These should be provided to the Geo-Environmental Engineer for incorporation within the Verification Report to be completed following the remedial work.

It should be noted that where the Local Authority are referenced, this may include the Local Planning Authority and/or Environmental Health under the planning regime, or Building Control Inspector in relation to the Building Regulation requirements.

4.2 Inhalation, dermal contact or ingestion of lead and PAH contamination by site end users

4.2.1 Remedial Strategy

The above options appraisal has identified that encapsulation of lead and PAH contamination within Made Ground beneath areas of proposed soft landscaping within the west of the site is likely to be the most appropriate remedial action. Elevated soil concentrations (above assessment criteria) of the aforementioned contaminants in areas of proposed landscaping and outside of footprints of proposed structures were found to be relatively limited in terms of the exceedances although there is still the potential for risk to human health, as well as phytotoxic risk which may result in poor quality landscaping. As such, the encapsulation proposed below has been split to consider grassed lawn areas and areas of deeper planting such as hedgerows or trees, taking consideration of vertical mixing as a result of root action and potential for digging to depth. It is noted that there are no suitable growing medium on site, and as such it is assumed suitable topsoil and subsoil will be imported. The specification for these materials should be agreed with the Landscape Architect and Local Authority, in addition to agreeing the proposed minimum thicknesses and make-up of the capping system detailed below.

There are no current prescriptive standards in relation to the design of cover systems, although suggested minimum thicknesses have been presented by some Local Authorities, NHBC and in the BRE 'Cover Systems for Land Regeneration' (2004) (no longer cited) document.

The following clean cover systems are therefore proposed within the west of the site. A plan showing the extent of where the clean capping material is required is shown on [Figure 3](#). It is noted that although elevated concentrations of contaminants were only identified in the three aforementioned positions (BHA, WS1 and WSF), the area of potentially elevated contaminants has been extended up to the closest positions where concentrations below the acceptance criteria were identified.

- In areas of proposed lawn, a minimum of 450mm clean cover system, comprising 150mm topsoil and 300mm subsoil (and in keeping with the Landscape Architects requirements), is considered appropriate where deep root action/intermixing and site user digging is unlikely;
- In areas of proposed new planting where maintenance / digging could occur, and root systems are likely to be present, the clean cover system thickness should be increased to 600mm in thickness. In this instance, it is recommended the capping system comprise either:

- An orange alert barrier (such as barrier fencing) to act as a visual/anti-dig warning, overlain by 450mm subsoil and 150mm topsoil; OR
- 150mm clean non-calcareous coarse reject stone (to act as a physical barrier to digging) overlain by 300mm subsoil and 150mm topsoil.

In either case, all materials contained within the cover system must contain contaminants below the site specific assessment criteria and meet the Landscape Architect's requirements, including any additional topsoil/subsoil quality standards.

Any materials to form part of the clean cover system, or general fill to be relied upon as cover as noted above, must be tested and validated as detailed in the following sections.

Across the remainder of the site, in landscaped areas where a cover system is not required, the specification and requirements for subsoil and topsoil shall be proposed by the Landscaped Architect.

4.2.2 Verification Procedures

A sampling regime is to be undertaken in areas of soft landscaping, to verify the cover system as follows:

- Provision of soils results to confirm capping materials meet the site acceptance criteria detailed in [Appendix C](#) and certified as clean under BS 3882 at a frequency of minimum 3No. per source, or 1 per 250m³ (whichever sampling frequency is greatest). Test results and details of the origin should be made available prior to acceptance of imported material onto site. Should any general fill be relied upon as part of the encapsulation system, the 300mm thickness and same testing protocols must be followed prior to placement;
- Verification pits (on an approximate 25m by 25m grid) are to be undertaken across the affected area, with photographs confirming the suitable thickness of materials and barriers have been placed. Locations of the pits are to be determined by the Geo-Environmental Engineer with records and photos to be included within the Validation Report.

4.3 Unexpected Contamination

If any grossly visual or olfactory evidence of contamination is identified or encountered during earthworks, works in the area/affected works should cease and an appropriately qualified Geo-Environmental Engineer should be consulted.

Site inspections, further testing and risk assessment may be required to determine if the potential risks associated with the unexpected contamination pose an immediate, and / or long term risk, and mitigation measures should be designed accordingly.

Any deviations from protection measures detailed in this Remediation Statement should be sent to the Local Planning Authority and / or appropriate regulators, including details of the unexpected contamination encountered, the associated potential risks and the proposed mitigation measures where required, for approval. Any remedial actions undertaken should be verified, and included within the Verification Report for the site.

4.4 Earthworks Procedures and Geo-Environmental Classification of Imported Material

It is the responsibility of the Principal Contractor to assess the suitability for use of material imported to site for use within the capping layer.

Any imported materials for use in areas of soft landscaping, should meet the site specific acceptance criteria detailed in [Appendix C](#). Any soft landscaping materials must also meet the Landscape Architect's specification and certified clean under BS 3882.

All materials imported for use on-site (including within areas clean capping), should be free from visual / olfactory evidence of contamination and shall be tested against the assessment criteria set out in Table 1, [Appendix C](#). Consignment / delivery notes for all materials imported should be collated detailing the source, volume and carrier of materials, and provided for inclusion within the Verification Report, as necessary. It is recommended that all materials imported on to site are recorded within an Earthworks Plan for the site, including stockpiling referencing and areas of re-use, in accordance with an appropriate Earthworks Specification. This will allow a transparent and clear audit trail of materials generated / re-used and imported to facilitate the development.

No site won materials are anticipated to be acceptable for reuse within clean cover layers.

Testing Frequency

As a minimum, clean capping materials shall be tested for the parameters detailed within [Appendix C](#) at a frequency of 1 per 250m³ or a minimum of 3 samples per source (whichever results in the greatest testing frequency). The Geo-Environmental Engineer may request additional testing.

Reporting

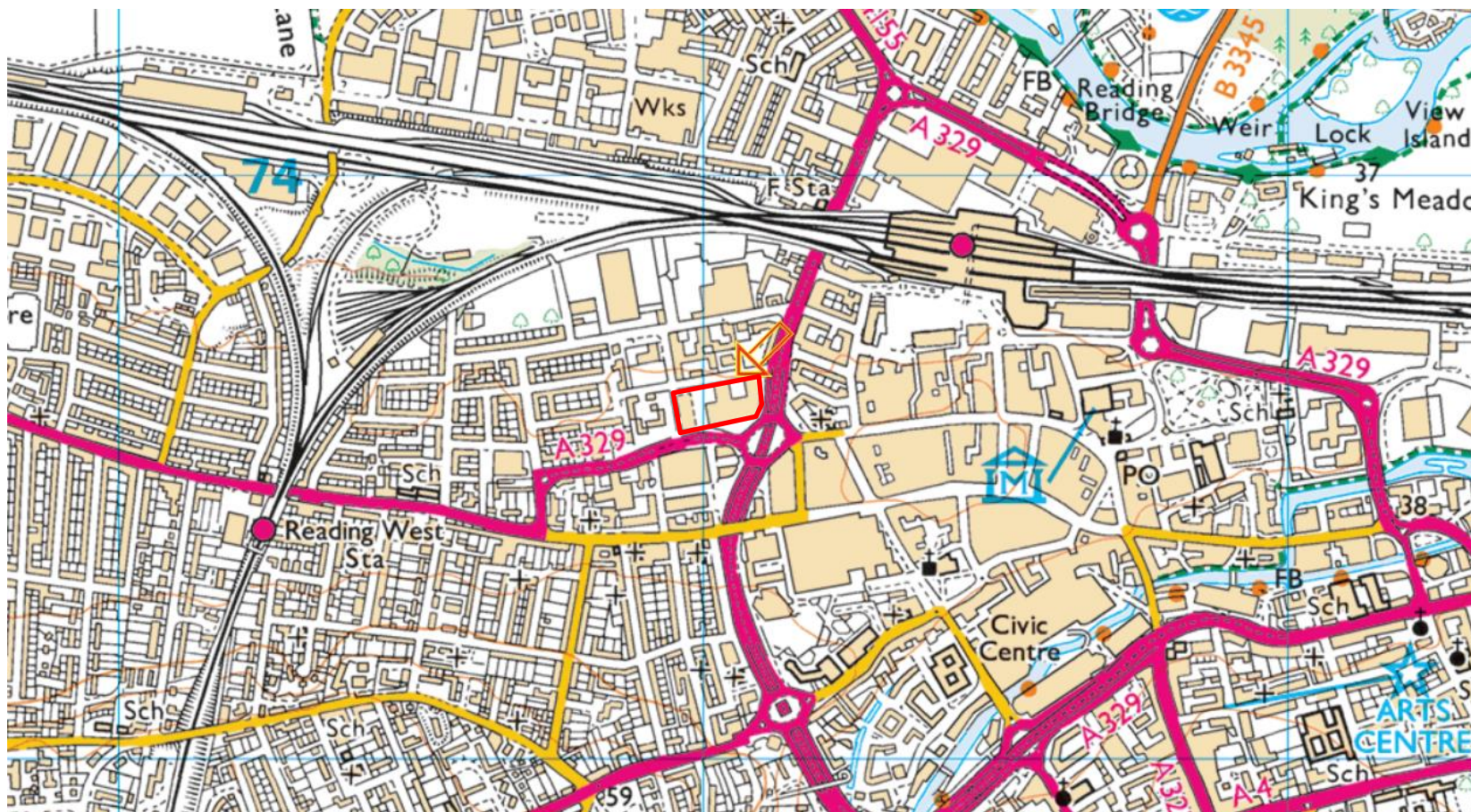
A survey shall be carried out by the Main Contractor prior to and after placement of the clean cover to confirm that the extents and thicknesses comply with the requirements of this Method Statement. Validation pits, the positions of which are to be agreed with the Engineer, are also be required to confirm that adequate thicknesses have been placed. These records, along with appropriate chemical testing results are to be included in the Completion Report.

A Verification Report detailing the material movement shall be required to confirm the Principal Contractor's undertaking of remedial activities were completed to the specification of this Remedial Method Statement. This will provide a clear audit trail of material import and testing and where the material has been incorporated into the development. It is the responsibility of the Principal Contractor to maintain these records.

5.0 CONCLUSIONS

Following the proposed remedial activities detailed in Section 4.0 of this report, it is considered the site will be rendered 'suitable for use' based on the development details provided in [Appendix A](#). This Remediation Strategy should be approved by the Local Planning Authority and subsequently a Verification Report should be prepared and submitted for approval, in line with the planning requirements and CLR11.

FIGURES



— Approximate Site Boundary

FAIRHURST

Weldale Street
Reading

Site Location Plan
(Not to Scale)

Remediation Method
Statement

Date:
26/04/19

Initials:
HB

Figure:
1



Do not scale from this drawing.
SAFETY HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARD/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION.
RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO DESIGN ASSESSMENT FORM NO.
CONSTRUCTION
DEMOLITION
FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE
IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

- Potential extent of elevated lead concentrations.
- Areas of soft landscaping requiring cover system.
- Elevated contaminant (lead / PAH) concentrations.
- Contaminant (lead / PAH) concentrations below acceptance criteria level.

Rev.	Date	Description	Drwn.	Chkd.	Appd.
FAIRHURST 135 Park Street LONDON SE1 9EA Tel: 020 7828 8205 Fax: 084 4381 4412 Fairhurst.co.uk			Client: Ropemaker Properties Ltd.		
Project Title: Weldale Street, Reading					
Drawing Title: Clean Capping Extent					
Scale at A3: Not to Scale		Status: ISSUE			
Drawn: EY		Checked: DD		Approved: DD	
Date: 05/08/19		Date: 06/08/19		Date: 08/08/19	
Drawing No.: 112990 Figure 3					Revision: -

APPENDIX A

Development Plans



Disclaimer

- The drawing is the property of Cameo + Partners Ltd.
- It must not be copied or reproduced without written consent.
- Do not scale from this drawing.
- Check all dimensions on site before setting out.

HARD LANDSCAPE

	Development Boundary Line
	PT1 - Resin Bound Surfacing Supplier: Ardabound or Similar App. Colour: Dark Grey, 20mm
	PT2 - Granite Setts Supplier: Marbells or Similar App. Granite Set Paving, 100 x 100 x 10mm. Silver grey granite, herringbone pattern.
	PT3 - Concrete Paving Supplier: Marbells or Similar App. Tegula Pavers Permeable Paving, 160 x 240 x 80mm, herringbone pattern, harvest colour.
	PT4 - Concrete Paving Supplier: Marbells or Similar App. Tegula Pavers Permeable Paving, 160 x 240 x 80mm, herringbone pattern, harvest colour.
	PT5 - Concrete Paving Slabs Supplier: Marbells or Similar App. Concrete paving slabs, 800 x 800 x 85mm, silver grey.
	PT6 - New Four Sided Surface Supplier: TBC 1-4mm granules, Earth blend colour.
	ET1 - Precast concrete kerb to BS EN 12402-2003. Subject to highway engineer's approval.
	ET2 - Flexible aluminium edging 40x20x250mm, 3mm thick top edge. Supplier: Kinley Systems or Similar Approved
	ET3 - Flexible aluminium edging 70x100x250mm, 3mm thick top edge. Supplier: Kinley Systems or Similar Approved
	BT1 - Defensible space railing Supplier: Jackson's Fencing Galvanized and powder coated steel to BS EN13438. Colour: RAL 7015. Height: 1200mm
	BT2 - Block Walls Full faced reinforced concrete wall with a smooth finish & anti-graffiti coating. Refer to engineer's specification.
	BT3 - Concrete Plaster Wall Full faced reinforced concrete wall with a smooth finish & anti-graffiti coating. Refer to engineer's specification.
	BT4 - Central Avenue Walls Reinforced concrete with full brick facing with precast smooth finished concrete coping. Stone & powder coated railing on the top.
	BT5 - East Boundary Wall to engineer's detail. Brick elevations to match architect's facade. Powder coated railing mounted on the top.
	BT6 - West Boundary Retaining Wall Galvan relining wall to engineer's specification with hessian pockets to facilitate planting. Powder coated railing mounted on the top.
	FT1 - Fortis Bench Supplier: Fortis or Similar Approved. Finish & colour: Light grey with smooth finish. Size: 250 x 90 x 45mm
	ET2 - Litter Bin: Fines Supplier: Fines Steel Only (RAL 7015) powder coated steel furniture.
	FT3 - Sealed, One Supplier: Marbells or Similar Approved Minimum diameter: 100mm above ground. Normal and automated.
	FT4 - Handwood wall top seat Supplier: Steelworks or Similar Approved. Product: Rough & Ready Wall Top Seat Handwood seating, galvanneal frame, stainless steel fixings.
	FT5 - Sheffield Cycle Stands Supplier: Furniture 1000 x 750mm (length x height above ground)
	FT6 - Handrails Supplier: Alpha Rail or Similar Approved Galvanized and powder coated steel. Colour: RAL 7015
	L1 - Levels Existing with a border. Proposed without a border.

SOFT LANDSCAPE

	Proposed Semi-Mature Tree Lignature: Refer to Design & Access Statement Supplier: TBC Size/Colour: 35-40cm girth, R8, 2m clear stem.
	Proposed Semi-Mature Tree Lignature: Refer to Design & Access Statement Supplier: TBC Size/Colour: 35-40cm girth, R8, 2m clear stem.
	Proposed Semi-Mature Tree Lignature: Refer to Design & Access Statement Supplier: TBC Size/Colour: 35-40cm girth, R8, 2m clear stem.
	Proposed Multi-Stem Tree Lignature: Refer to Design & Access Statement Supplier: TBC Size/Colour: 25-35cm girth, R8, 1.5m clear stem.
	Proposed Specimen Shrub Lignature: Refer to Design & Access Statement Supplier: TBC Size/Colour: 1.5m height.
	Existing mature tree
	Proposed Evergreen - Low Level Planting Refer to Design & Access Statement Supplier: TBC Height: 500mm
	Proposed Shrub - Low Level Planting Refer to Design & Access Statement Supplier: TBC Size/Colour: 100-150cm high
	Perennial Planting Refer to Design & Access Statement Supplier: TBC
	Proposed Lawn Product: Quality Lawn Turf Supplier: Rossmore Meadows or Similar Approved
	(Wild Flower field / ornamental grasses) Supplier: John Chambers Wildflower Seed or Similar Approved

04	Updated following comments from architects	MR 29.06.2017
03	Updated following drawings received from architects on 23.06.17	MR 29.06.2017
02	Updated following comments received from architects on 18.02.17	DF 29.02.2017
01	Updated according to comments	MR 01.02.2017
00	Issued for Planning Information	MR 27.01.2017
rev	details	by date

cameo + partners
design studio

Cargo Works - ET 5.04
1-2 Hatfields
Watlington
London
SE1 9PD
Company Registered No: 8756613.
T: 0203 7760 150
E: info@cameoandpartners.com

Project
C0049 Weldale Street, Reading

Drawing
Combined General Arrangement

Scale 1:200@A0	Checked By DF	Drawn By MR
Drawing No. C0049 L101	Revision 04	

Purpose of Issue.
P
D = design information / P = planning / T = tender / C = construction / B = as built

Drawing sheet size - A0

Scale 1:200

North

40 Alfred Street

© Cameo & Partners

APPENDIX B

Local Planning Authority Correspondence

From: Markwell, Jonathan <Jonathan.Markwell@reading.gov.uk>
Sent: 22 July 2019 13:03
To: Emma Greening <EGreening@ridge.co.uk>
Cc: Jarvis, Ross <Ross.Jarvis@reading.gov.uk>
Subject: Land at Weldale Street, Reading (191011)

Dear Miss Greening,

Further to your email below, please see below observations received this morning from my colleague Ross Jarvis in the Environmental Protection team regarding application 191011. You are provided with an opportunity to submit more information which seeks to address the concerns presently raised in relation to conditions 18 and 19. If your consultant has any specific queries, please feel free to contact Ross directly in the first instance.

Please submit any additional information as soon as possible to both Ross and I (via email) by no later than Monday 12th August at 9am, with view to the application being determined by the statutory determination date of 19th August.

If these timeframes are problematic for you, you can either suggest an extension of time for the application (I would welcome your suggested timeframes to a) submit more information by and b) for the application to be determined by – at least 5 working days after the submission of satisfactory information) or withdrawn conditions 18/ 19 from this application and submit them separately in due course (in the meantime conditions 21/ 22/ 23 would be able to be determined as part of this application as soon as conditions 18/ 19 are withdrawn).

I trust that this update is of assistance to you and look forward to hearing from you as to how you wish to proceed.

Yours sincerely,

Jonathan Markwell
Principal Planning Officer
Planning Section| Directorate for Economic Growth and Neighbourhood Services

Reading Borough Council
Civic Offices,
Bridge Street,
Reading,
RG1 2LU

0118 937 2458 (72458 internal extension)

[Website](#) | [Facebook](#) | [Twitter](#) | [YouTube](#)



The information in this e-mail (and its attachments) may contain data which constitutes 'personal data' or 'sensitive personal data' and it is provided to you on the understanding that you are (a) entitled to receive such data (b) that you will store and safeguard this data and (c) that you will take all reasonable care not to distribute this data to other parties not entitled to receive it – either deliberately or inadvertently. Furthermore, the information is provided on the understanding that it will only be used for the purposes that it was disclosed to (or requested by) you and you will safely & securely destroy / delete this data once it has been used for that purpose/s or otherwise store it in accordance with the guidance set down by the Council from time to time. Failure to adhere to these requirements may lead to a breach of the Data Protection Act, data storage requirements set down by the Council and could result in significant fines and / or adverse publicity. In addition, please note that the advice contained within this email (and attachments – if applicable) is that of an officer of the Borough Council and is provided without prejudice to the decision of the Borough Council.

From: Jarvis, Ross
Sent: 22 July 2019 11:42
To: Markwell, Jonathan
Subject: 191011 Weldale Street

Hi Jon,

I cannot recommend discharge of condition 18 or 19. The site investigation has identified elevated levels of lead and hydrocarbons which future users of the site could potentially come into contact with. It is proposed that the building will cover most of these areas and top soil will be imported for soft landscaping to break any pollutant linkages. This approach is acceptable, but is too vague in the site investigation to enable the condition to be discharged. Detail should be added to this in the form of a remediation method statement.

Please note that top soil should be certified clean NHBC BS3882 and laid at an appropriate depth to ensure that pollutant linkages are broken.

No elevated levels of ground gas of concern have been detected during the investigations. Therefore no specific ground gas protections measures have been recommended. I can now recommend the discharge of the conditions that relate to this issue (21, 22 and 23).

Regards

Ross

Ross Jarvis
Senior Environmental Health Officer
Environmental Protection & Nuisance | Directorate of Economic Growth and Neighbourhood Services
Reading Borough Council
Civic Offices
Bridge Street
Reading
RG1 2LU

0118 937 2314 (72314)

[Website](#) | [Facebook](#) | [Twitter](#) | [YouTube](#)

APPENDIX C

Clean Capping Acceptance Criteria

Table 1 – Clean Cover Earthworks Material Suite

All SHW Class 4, Class 5A and Class 5B materials (both site won and imported) intended for use within the clean cover detail which includes the capillary break and landscaping separation layer should be tested (prior to import for the offsite sources or placement for the site won sources) and assessed against the Assessment Criteria detailed below:

Determinand	Total Concentration (mg/kg)			Source	Model
	1.0% SOM	2.5% SOM	6.0% SOM		
Metals/Metalloids					
Arsenic (inorganic)	40			LQM/CIEH S4ULs	CLEA v1.071
Barium	1,300			CL:AIRE	CLEA V1.06
Beryllium	1.7			LQM/CIEH S4ULs	CLEA v1.071
Boron	3			ICRCL2	-
Cadmium	3			MAFF 1998	-
Chromium	400			MAFF 1998	-
Chromium (VI)	6			LQM/CIEH S4ULs	CLEA v1.071
Copper	100 pH <6 135 pH 6-7 200 pH >7			MAFF 1998	CLEA v1.071
Lead	300			MAFF 1998	-
Mercury	1			MAFF 1998	-
Molybdenum	4			MAFF 1998	-
Nickel	60 pH <6 75 pH 6-7 110 pH >7			MAFF 1998	CLEA v1.071
Selenium	3			MAFF 1998	-
Vanadium	1,200			LQM/CIEH S4ULs	CLEA v1.071
Zinc	200 pH <6 200 pH 6-7 300 pH >7			MAFF 1998	-
Other Inorganics					
Asbestos	NAD			-	-
Free Cyanide	34			ATKINS ATRISK SSV	CLEA v1.04
Total Cyanide	34 (*)			ATKINS ATRISK SSV	CLEA v1.04
pH	<5			-	-
Total Sulphate	2400			BRE (2005)	-
Water-Soluble Sulphate	0.5g/l			BRE (2005)	-
Polyaromatic Hydrocarbons (PAH's)					
Acenaphthene	3,000	4,700	6,000	LQM/CIEH S4ULs	CLEA v1.071
Acenaphthylene	2,900	4,600	6,000	LQM/CIEH S4ULs	CLEA v1.071
Anthracene	31,000	35,000	37,000	LQM/CIEH S4ULs	CLEA v1.071
Benzo(a)anthracene	11	14	15	LQM/CIEH S4ULs	CLEA v1.071
Benzo(a)pyrene	3.2	3.2	3.2	LQM/CIEH S4ULs	CLEA v1.071
Benzo(b)fluoranthene	3.9	4.0	4.0	LQM/CIEH S4ULs	CLEA v1.071
Benzo(g,h,i)perylene	360	360	360	LQM/CIEH S4ULs	CLEA v1.071
Benzo(k)fluoranthene	110	110	110	LQM/CIEH S4ULs	CLEA v1.071
Chrysene	30	31	32	LQM/CIEH S4ULs	CLEA v1.071
Dibenzo(a,h)anthracene	0.31	0.32	0.32	LQM/CIEH S4ULs	CLEA v1.071
Fluoranthene	1,500	1,600	1,600	LQM/CIEH S4ULs	CLEA v1.071
Fluorene	2,800	3,800	4,500	LQM/CIEH S4ULs	CLEA v1.071
Indeno(1,2,3-cd)pyrene	45	46	46	LQM/CIEH S4ULs	CLEA v1.071
Naphthalene	2.3	5.6	13	LQM/CIEH S4ULs	CLEA v1.071
Phenanthrene	1,300	1,500	1,500	LQM/CIEH S4ULs	CLEA v1.071
Pvrene	3,700	3,800	3,800	LQM/CIEH S4ULs	CLEA v1.071

Determinand	Total Concentration (mg/kg)			Source	Model
	1.0% SOM	2.5% SOM	6.0% SOM		
Total Petroleum Hydrocarbons (TPH's)					
Aliphatic EC 5-6 (benzene)	24	40	80	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >6-8 (toluene)	52	110	250	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >8-10	13	30	70	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >10-12	60	150	360	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >12-16	500	1,200	2,600	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >16-35	41,000	69,000	94,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >35-44	41,000	69,000	94,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >5-7	155	300	630	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >7-8	370	800	1,800	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >8-10	20	53	125	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >10-12	120	280	650	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >12-16	1,100	1,900	2,300	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >16-21	1,800	1,900	1,900	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >21-35	1,900	1,900	1,900	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >35-44	1,900	1,900	1,900	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic + Aromatic EC >44-70	1,900	1,900	1,900	LQM/CIEH S4ULs	CLEA v1.071
PRO	1,000	1,000	1,000	EA	-
DRO	10,000	10,000	10,000	EA	-
MRO	10,000	10,000	10,000	EA	-
Phenols					
Phenol	440	690	1,200	LQM/CIEH S4ULs	CLEA v1.071
Other (unchlorinated)					
MTBE	73	120	220	CL:AIRE	CLEA V1.06
BTEX					
Benzene	0.38	0.7	1.4	LQM/CIEH S4ULs	CLEA v1.071
Toluene	880	1,900	3,900	LQM/CIEH S4ULs	CLEA v1.071
Ethylbenzene	83	190	440	LQM/CIEH S4ULs	CLEA v1.071
o-xylene	88	210	480	LQM/CIEH S4ULs	CLEA v1.071
m-xylene	82	190	450	LQM/CIEH S4ULs	CLEA v1.071
p-xylene	79	180	310	LQM/CIEH S4ULs	CLEA v1.071
VOCs & SVOCs					
VOCs	<0.01	<0.01	<0.01	Lower Detection Limit	-
SVOCs	<0.1	<0.1	<0.1	Lower Detection Limit	-
Calorific Value					
Calorific Value	2MJ/Kg			ICRCL1	-

- Assessment Criteria based upon 1%, 2.5% and 6% soil organic content for residential end use (without home grown produce).
- Validation testing shall be carried out in an MCERTS accredited laboratory.
- The testing suite and frequency of testing shall be as recommended in the Remediation Strategy and Materials Management Plan or as determined at the discretion of the Geo-Environmental Engineer as appropriate to the ground conditions encountered during the ground engineering works.
- (*) In the absence of assessment criteria for total cyanide the assessment criteria value for free cyanide was utilised.
- The values provided within the import table relate to the determinand upper limits for human health. Where the UK hazardous waste thresholds are below these limits the Contractor shall adopt the hazardous waste threshold instead. Hazardous waste is not to be imported to the site.

Assessment Criteria References:

MAFF 1998	Soil Code: The 1998 Code of Good Agricultural Practice for the Protection of Soil (PB0617)
LQM/CIEH S4ULs CL:AIRE	The LQM/CIEH S4ULs for Human Health Risk Assessment. February 2015. Soil Generic Assessment Criteria for Human Health Risk Assessment. January 2010.
ICRCL1	Interdepartmental Committee on the Redevelopment of Contaminated Land. Notes on the fire hazards of contaminated land. July 1986.
ICRCL2	Guidance Note 59/83 Second Edition July 1987. Guidance on the assessment and redevelopment of contaminated land.

CIVIL ENGINEERING • STRUCTURAL ENGINEERING • TRANSPORTATION • ROADS & BRIDGES
PORTS & HARBOURS • GEOTECHNICAL & ENVIRONMENTAL ENGINEERING • PLANNING &
DEVELOPMENT • WATER SERVICES • CDM COORDINATOR SERVICES

www.fairhurst.co.uk

Aberdeen	Inverness
Bristol	Leeds
Birmingham	London
Dundee	Manchester
Edinburgh	Newcastle upon Tyne
Elgin	Sheffield
Glasgow	Watford

FAIRHURST