

## Proposal

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<b>To:</b>	██████████ Homes and Communities Agency 5 St Philips Place Colmore Row Birmingham B3 2PW	<b>Date:</b>	07 July 2016
		<b>Our ref:</b>	37865L012
		<b>Your ref:</b>	
		<b>Issued by:</b>	██████████
		<b>Approved by:</b>	██████████

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**Title:** **Lea Castle, Kidderminster – Proposed Scope of Works for the Additional Geoenvironmental Ground Investigation**

### Understanding Your Requirements

The former Lea Castle site is an important asset, which the HCA recognises can make an important contribution to the aims of delivering development on former public sector land. Amec Foster Wheeler is supporting the HCA to meet this objective and is acting as lead Technical Consultant responsible for securing planning permission for the re-use and advising on the disposal strategy. We welcome the opportunity to extend our role to undertake further ground investigations on the site, which will be used to support the site disposal.

The former Lea Castle Hospital site is an excellent redevelopment opportunity, but the HCA has experienced difficulty in securing a development partner that was able to bring forward this site in line with the HCA's disposal objectives. This has been a consequence, in part, because there remain uncertainties around the extent of some of the potential abnormal costs. We recognise that the principal objective of this commission is to help address some of these uncertainties and to prepare an evidence base which will enable potential developers to fully understand the costs related to the existing ground conditions.

Specifically we recognise that this work should:

- ▶ Complement and avoid duplication with the work previously undertaken by Amec Foster Wheeler at the site (Phase 1 Desk Study and a Preliminary Site Investigation and Assessment), making best use of resources and minimising the need for any further investigations by the future purchasers of the site.
- ▶ Undertake intrusive investigations across the site (prior to demolition) which are sufficient to inform purchasers of the site) as well as advise on the works required post demolition.
- ▶ Develop and apply an approach to identifying the extent of the underground structures at the site, setting out views on the implications for the redevelopment of the site.

## Our Approach

The works previously undertaken by Amec Foster Wheeler in December 2013 targeted the likely contamination sources identified during the Phase 1 Desk Study. The results of the ground investigation did not identify any elevated concentrations above the guidance values. However concentrations of solvents were identified around the former laundry and workshops on site, these elevated concentrations may indicate a potential source being present. Anecdotal evidence suggests that there was a spillage of solvents during its operation as a dry cleaners. It was therefore recommended that additional ground investigation was undertaken to assess the potential impact to the shallow soils and the deeper groundwater within the underlying Principal Aquifer.

It is proposed to undertake at least one exploratory hole position per 50 m grid square across the entire proposed development area for contaminated land purposes, specifically the re-use of topsoil. The proposed investigation will also allow for the hydrogeological and geotechnical constraints to be assessed with regard the proposed development.

Deep rotary boreholes will be sunk around the former laundry and workshops to allow for the installation of deep groundwater wells to enable representative groundwater samples to be obtained during return monitoring visits.

Any investigation under the footprint of the former laundry and workshops are outside of this investigation scope of work at present, due to the presence of unsafe buildings and bats being present.

## Regulatory Discussion

Allowance has been made for discussion with the regulatory bodies, as a single meeting, to formalise the proposed scope of investigation works. The discussion would include the number and frequency of the exploratory positions, chemical analysis and the number and frequency of the return gas and groundwater monitoring visits.

## Proposed Works

### *j) Health & Safety*

Appropriate management of the health and safety risks arising from or associated with the works will be required. The site works will fall under the CDM Regulations, although the works will not be notifiable to the Health & Safety Executive (HSE). We have costed on the basis of Amec Foster Wheeler fulfilling its design responsibilities under CDM with the client undertaking the role of CDMC. Should you require we would be able to undertake this role under an additional scope of work.

Suitable method statements and risk assessments for the proposed works will be prepared and submitted within a site specific health and safety plan to the client prior to the works commencing.

Temporary welfare facilities will be needed during the works and Amec Foster Wheeler has allowed for the provision of welfare facilities. The location of the welfare facilities will need to be discussed and agreed with the client; however we have costed on the basis that a suitable location on site or nearby will be made available by the client at no cost to Amec Foster Wheeler.

### *Service Clearance*

We have costed on the basis of the client providing up to date service plans for the site and adjacent area, free of charge in an electronic form. If this is not the case, Amec Foster Wheeler will obtain a utility service report from Landmark, at an additional cost. Note that there is a standard 2 week turnaround for such a search.

Prior to the intrusive works commencing, Amec Foster Wheeler and the ground investigation contractor will review each of the proposed drilling locations against the service plans provided, to ensure that all holes are a safe distance from any suspected location of services.



In addition, each proposed exploratory hole locations will be surveyed by a professional utility clearance company, procured by the appointed drilling contractor, prior to any excavations being undertaken on site. A hand excavated inspection pit will be dug as part of the service clearance exercise for the window sampling and rotary core boreholes.

#### *Reinstatement*

No allowance has been made for formal reinstatement of any hardstanding areas, however raised covers will be installed for the monitoring installations of the window sampling holes and rotary boreholes.

It is possible that there will be some remnant damage to the surface, particularly if the site works on the soft landscaped areas coincides with wet weather. We have not allowed for professional reinstatement in our costs, although this can be arranged if necessary.

#### *Waste Removal*

No allowance has been made for the removal of waste soil arisings. As such they will be retained on site and placed in areas agreed with the client for future reuse. In the event that grossly contaminated arising are encountered a secure skip will be provided on site for any excess arisings for off-site disposal (at an additional charge).

#### *Survey of Exploratory Hole Locations*

All exploratory hole locations will be surveyed (x, y, z coordinates or a topographic survey) by the drilling contractor. The survey data will be presented in AutoCAD format on a digital base plan.

#### *ii, iii, iv) Ground Investigation*

The proposed ground investigation works enable an assessment of both contaminated land and geotechnical constraints with regard the proposed mixed end use development. The proposed scope of works for the intrusive investigation is based upon the existing available information and Amec Foster Wheeler knowledge of the site.

The ground investigation will include a non-targeted investigation across the site, further delineation of the solvent contamination in the shallow soils and the drilling of deep rotary boreholes for groundwater sampling.

The scope of works detailed is based upon an approximate 50 m grid across the site in accordance with BS10175 and has been designed to ensure the safe and economic design of the works, in addition to providing sufficient information to supporting the proposed planning application for the development in line with the National Planning Policy Framework.

The proposed scope of works is consistent with the approach to contaminated land assessment outlined in Environment Agency guidance document CLR 11 'Model Procedures for the Management of Land Contamination, which underpins the contaminated land regime in the UK.

Additional exploratory positions will be undertaken around the former laundry and workshops to delineate further the solvent contamination.

Deep rotary boreholes will be sunk to enable groundwater sampling wells to be installed, this will allow samples to be obtained during the return visits following a period of settlement and development.

The proposed ground investigation scope of works is detailed in Table 1.

Table 1 – Ground Investigation Proposed Scope of Works

Exploratory Hole Type	Proposed No. Locations	Proposed Maximum Depth (m bgl)	Comment
<b>Rotary Boreholes</b>	3 – around the former laundry and workshop	50	The boreholes will be undertaken to allow deep groundwater monitoring wells to be installed. This will allow groundwater samples to be obtained to assess the potential impact from the solvents
<b>Trial pits (TP)</b>	52	3	The trial pits will allow assessment of the shallow ground conditions and to obtain samples for environmental and geotechnical laboratory analysis. All trial pits are to be backfilled with arisings Should visual / olfactory evidence of contamination be encountered the TP should be extended vertically / laterally (where safe to do so) to determine the extents of contamination.
<b>Window Sample Boreholes (WS)</b>	28	5	Window sample boreholes will be undertaken to assess the shallow ground conditions and to obtain samples for environmental and geotechnical laboratory analysis. Dual purpose gas and groundwater monitoring wells will be installed to allow future monitoring to be undertaken.
<b>Return Gas and Groundwater Return Visits</b>	6 return visits will be undertaken over a 3 month period	6	The return monitoring visits will allow for an assessment of the hazardous gas regime across the site in accordance with the proposed development. The visits will allow an assessment of the standing groundwater levels for hydrogeological and geotechnical interpretation.
<b>Groundwater Sampling Visits</b>	4 return visits will be undertaken during the gas and groundwater visits	4	The initial visit will be to develop the wells, on the additional three visits samples will be obtained from the wells for chemical analysis.

### Sampling Regime – Chemical Samples

Where possible the following chemical samples shall be obtained from each exploratory hole:

- ▶ Single sample of Topsoil (to enable assessment of suitability for re-use within the proposed development;
- ▶ Single sample of Made Ground in the upper 1m of soils ; and
- ▶ Single sample of natural soils (within upper 0.5m of natural soils).

Groundwater samples will be obtained from the deep rotary borehole installations.

Soil and groundwater samples shall be obtained and stored in line with current best practice. Samples are to be submitted for chemical analysis by a UKAS / MCERTs accredited laboratory.

The samples shall be tested for suite of the suite of analysis presented in Table 2.

Table 2 – Laboratory Based Chemical Testing

Determinand	Soil Samples	Soil Leachate	Groundwater and surface water
<b>Metals (Ag, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn, Se)</b>	x	x	x

Determinand	Soil Samples	Soil Leachate	Groundwater and surface water
pH	x	x	x
Hexavalent chromium	x	x	x
Semi Volatile Organic Compounds	x		x
Total petroleum hydrocarbons (TPH CWG aliphatic/aromatic split)	x		x
Asbestos	x		
Cyanide (free and total)	x		x
Volatile organic compounds, semi-volatile organic compounds	x		x
Speciated phenols	x		x
polychlorinated biphenyl	x		x
Dissolved organic content			x
Chloride			x
Hardness			x
Total organic carbon	x		

Allowance has been made for laboratory assessment for geotechnical purposes to allow the design of the proposed development and the associated infrastructure to include the drainage solution and lake design.

The samples shall be tested for suite of the suite of analysis presented in Table 3.

*Table 3 – Laboratory Based Chemical Testing*

Determinand	Soil Samples	Groundwater Samples
Natural Moisture Content	x	
Liquid limit, plastic limit and plasticity index	x	
Particle size distribution by wet sieve	x	
Sedimentation by pipette	x	
Sulphate content of acid extraction	x	
Sulphate content of water extraction	x	
Sulphate content of groundwater	x	x
pH Value	x	
Shear strength of a set of three 60mm x 60mm square specimens	x	



#### **v) Gas Monitoring**

Six ground gas and groundwater level monitoring visits will be undertaken over a period of three months. Amec Foster Wheeler will ensure that at least two visits are undertaken during a period of low and/or falling pressure, which is considered to be representative of worst-case gassing conditions.

Concentrations of flammable gas (methane), carbon dioxide, oxygen, carbon monoxide, hydrogen sulphide, along with gas flow rates will be measured using infrared gas analyser (or similar), with concentrations of potentially volatile contaminants being recorded using a photoionisation detector (PID). The site engineer will record general weather conditions, ground conditions, condition of the borehole at the time of monitoring and groundwater levels within each installation as these may affect the results.

#### **vi) Groundwater Sampling**

The deep groundwater monitoring wells installed within the rotary boreholes will be allowed to stabilise following the ground investigation and will then be developed during the first return monitoring visit completed. The wells will then be sampled on the following three occasions during the return visits using low flow techniques. The parameters of the groundwater conditions will also be measured during these visits to ensure the optimal samples are obtained.

Allowance has also been made for duplicate samples and trip blanks to ensure QA/QC procedures are followed.

#### **vii) Phase 2 Geoenvironmental Interpretative Report**

On completion of the ground investigation we will review the ground investigation to ensure it has been completed in line with the specification and current best practice.

We will provide a single preliminary interpretative report, which shall provide a summary of the supplementary ground investigation, in addition to an interpretation of the contamination data.

#### *Human Health*

With regards to contamination, the report will include a Generic Quantitative Risk Assessment (GQRA), which shall make use of all chemical laboratory data and appropriate UK published assessment criteria for both human health and controlled waters receptors. The outcome of the GQRA will be used to inform the revised CM. Where the CM identifies potentially significant contaminant linkages representing a potentially unacceptable risk, recommendations for further works, e.g. Detailed Quantitative Risk Assessment (DQRA) and remediation, shall be made. At this stage no allowance has been made for DQRA.

#### *Ground Gas*

A semi-quantitative risk assessment will be undertaken following the completion of the ground gas monitoring, following the methodology set-out in CIRIA C665 and BS8485.

#### *Controlled Waters*

The overall methodology for undertaking the Controlled Waters risk assessment will follow the approach set out in the EA's guidance document 'Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination' (Environment Agency, 2006). The GQRA will compare water chemical analysis results to water quality targets which will be set for each of the identified contaminants of concern, based on Environmental Quality Standards (EQS) and / or UK Drinking Water Standards (UKDWS). The assessment will also consider leachate data for soils to assess if identified contaminants in controlled waters are leachable from site soils.

We have costed on the basis that we shall provide a single electronic copy of the draft report for client comment, with receipt of a single set of collated comments. A final version of the report will be provided on completion of the gas monitoring programme.



### *Limitations and Assumptions*

In compiling the proposal and associated costs presented below we have made a number of assumptions, should these assumptions prove to be incorrect we may need to amend our pricing accordingly.

- ▶ Any investigation under the former laundry and workshops footprint are outside of this investigation at present due to the presence of unsafe buildings and bats being present.
- ▶ We have assumed unfettered access to the site and that access to the buildings is currently not available;
- ▶ Allowance has been made for basic temporary fencing and pedestrian signage around each of the work areas.
- ▶ We have allowed for the provision of a basic welfare unit during the intrusive works and assume that the client will arrange for a suitable location for these welfare facilities to be placed. It is also assumed that a safe place will be made available by the client (on or close to the site) for plant and equipment to be left overnight, at no additional cost to Amec Foster Wheeler.
- ▶ We have not allowed for weekend working or works outside the hours of 8am to 5pm;
- ▶ No allowance has been made for reinstatement of any hardstanding areas disturbed during the works. A raised cover will be concreted in above any gas and groundwater installation.
- ▶ Site investigation costs (inclusive of Amec Foster Wheeler fees) are remeasurable and may be affected by difficult ground conditions, adverse weather conditions etc.;
- ▶ Amec Foster Wheeler will not be responsible for any damage to services that are not shown on the service plans or and are not located by the utility clearance company;
- ▶ Amec Foster Wheeler assume that the works will come under CDM but will not be notifiable;
- ▶ Rates for subcontractors are based on a formal tender (to be completed) and are dependent on availability and status at the time of procurement;
- ▶ Any waste water from the groundwater monitoring from the exploratory locations will be released back to ground;
- ▶ We have allowed for attendance of three client meetings;
- ▶ Any additional time incurred by Amec Foster Wheeler will be charged at the appropriate hourly rate;
- ▶ Costs for chemical testing have been based on a standard turnaround of 10 working days. Should there be a requirement to expedite the testing a surcharge will be applied by the laboratory;
- ▶ Minor further stages of investigation may be required to define any identified contamination risks;
- ▶ Our costs above are based on providing a final report directly (i.e. no draft for comment stage). In the event that you require a draft for comment, we would charge an additional cost of £460 excluding VAT is allowed for finalisation of the report following one set of client comments.

### *viii) Ground Penetrating Radar (GPR) Survey of underground service tunnels*

It is known that there are a series of underground service tunnels on the site, however the extent of which is not fully understood. As part of a previous ecology survey the tunnels were assessed for the presence of bat roosts, so the entrance to the tunnels area known.



[Redacted]

[Redacted]

[Redacted]

[Redacted]

## Management and Programmes

Amec Foster Wheeler’s Quality Assurance procedures are independently certified and accredited and are focused on ensuring clear and effective communication along with a good understanding of the scope of works, deliverables and programme by the project team. [Redacted] will work with [Redacted] to prepare the revisions to our existing Project Quality Plan and ensure the project team have clear instructions relating to the client’s expectations, roles and responsibilities as well as key milestones, data sources, reporting requirements and health and safety matters relating to undertaking works at the former Lea Castle site.

[Redacted] will have overall responsibility for reviewing the quality plan and ensuring the key technical outputs have been technically reviewed by a competent resource before issue to HCA.

We will undertake regular project reviews throughout the project to ensure that adequate resources are available to meet the technical needs and project programme. A summary programme for completion of each of the works is presented below, with week 0 representing the point of commission (your written instruction to proceed), the programmes will be the same for both investigations, however there will be time savings gained if both investigations are undertaken at the same time.

### Proposed Programme

Task No.	Description	Programme
1	Instruction to proceed	Week 0
2	Phase 2 Geoenvironmental Ground Investigation <ul style="list-style-type: none"> <li>- Procure contractor and prepare Health and Safety documents prior to mobilisation</li> <li>- Site works</li> <li>- Laboratory testing</li> </ul>	Week 2 Weeks 3 – 5 Weeks 5 – 7
3	Post investigation monitoring	Weeks 7, 9, 11, 13, 15 and 17
4	Phase 2 Interpretative report	Week 14 – 18

The project team will be updated throughout the reporting process with updates given following the completion of the intrusive investigation and the completion of the laboratory testing.

## Fees and Commercials

### Providing Value for Money

We believe we offer good value for money by:

- ▶ Integrating our project management arrangements with our wider remit and role on the site
- ▶ Drawing on our existing knowledge and experience of working at the site to ensure the scope integrates with the historical work and deliverables, and that health and safety matters at the site are fully integrated into our approach.
- ▶ Using a competitive approach to ensuring our supply chain provides an appropriate quality and standard of delivery.

### Fee Estimate

The fee estimate for the above scope of works is provided.

#### Fee Estimate (excluding VAT)

Item	Activity	Amec FW Hours	Fee (£)	Disbursements	Total (£)
i	Project management and H&S risk assessment	█	█	█	█
	Regulator approvals for the ground investigation – allowance for single meeting	█	█	█	█
ii, iii, iv	Intrusive works including utility clearance	█	█	█	█
v, vi	Ground gas monitoring and water sampling	█	█	█	█
vii	Reporting	█	█	-	█
viii	Service Tunnel GPR survey	█	█	█	█
ix	Post demolition work (indicative)		█		

