

Application for approval of details reserved by condition.
Town and Country Planning Act 1990
Planning (Listed Buildings and Conservation Areas) Act 1990

Publication of applications on planning authority websites.

Please note that the information provided on this application form and in supporting documents may be published on the Authority's website. If you require any further clarification, please contact the Authority's planning department.

1. Site Address

Number

Suffix

Property name

Address line 1

Address line 2

Address line 3

Town/city

Postcode

Description of site location must be completed if postcode is not known:

Easting (x)

Northing (y)

Description

2. Applicant Details

Title

First name

Surname

Company name

Address line 1

Address line 2

Address line 3

Town/city

2. Applicant Details

Country	<input type="text"/>
Postcode	<input type="text" value="GL51 9FL"/>
Are you an agent acting on behalf of the applicant?	<input checked="" type="radio"/> Yes <input type="radio"/> No
Primary number	<input type="text"/>
Secondary number	<input type="text"/>
Fax number	<input type="text"/>
Email address	<input type="text"/>

3. Agent Details

Title	<input type="text" value="Miss"/>
First name	<input type="text" value="Kate"/>
Surname	<input type="text" value="Da-Costa-Greaves"/>
Company name	<input type="text" value="Quattro Design Architects Ltd"/>
Address line 1	<input type="text" value="Matthews Warehouse"/>
Address line 2	<input type="text" value="High Orchard Street"/>
Address line 3	<input type="text"/>
Town/city	<input type="text" value="Gloucester Quays, Glos"/>
Country	<input type="text"/>
Postcode	<input type="text" value="GL2 5QY"/>
Primary number	<input type="text"/>
Secondary number	<input type="text"/>
Fax number	<input type="text"/>
Email	<input type="text"/>

4. Description of the Proposal

Please provide a description of the approved development as shown on the decision letter

Reference number

Date of decision (date must be pre-application submission)

Please state the condition number(s) to which this application relates

Condition number(s)

4. Description of the Proposal

Has the development already started?

Yes No

5. Part Discharge of Conditions

Are you seeking to discharge only part of a condition?

Yes No

If Yes, please indicate which part of the condition your application relates to

Condition 03(1) Site Characterisation

6. Discharge of Conditions

Please provide a full description and/or list of the materials/details that are being submitted for approval

Please refer to the attached Information Provided Sheet for full details

7. Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land?

Yes No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact?

- The agent
- The applicant
- Other person

8. Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application?

Yes No

9. Declaration

I/we hereby apply for planning permission/consent as described in this form and the accompanying plans/drawings and additional information. I/we confirm that, to the best of my/our knowledge, any facts stated are true and accurate and any opinions given are the genuine opinions of the person(s) giving them.

Date (cannot be pre-application)

10/11/2021

Discharge of Conditions 03 and 09
Information Provided Supporting
Application Ref No. 21/00269/FUL
PP-10383182



- Condition 03(1):** Please refer to the attached Ground Investigation Report prepared by Wilson Associates.
Ref: 4801 Issue 2 Ground Investigation Report - Badminton Road
- Condition 09:** Please refer to the attached Construction Environmental Management Plan prepared by Lane Britton Jenkins.
Ref: GCH - CEMP Badminton Road

APPLICATION NO: 21/00269/FUL
VALIDATED ON: 8th March 2021

TO

Gloucester City Homes
c/o Ms Emma Blunt
SF Planning Ltd
12 Royal Crescent
Cheltenham
GL50 3DA

TOWN AND COUNTRY PLANNING ACT 1990
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (ENGLAND)
ORDER 2015

Location: Badminton Road Gloucester

Proposal: Demolition of garages and erection of 2no. dwellings and 1no. bungalow with associated parking and landscaping

In exercise of its powers under the above-mentioned Act and Order the City Council as the Local Planning Authority **GRANT PERMISSION** for the development described above in accordance with the terms of the application and the plan/s submitted therewith subject to the following conditions:

Condition 1

The development hereby permitted shall be begun before the expiration of three years from the date of this permission.

Reason

Required to be imposed by Section 91 of the Town and Country Planning Act 1990 as amended by Section 51 of the Planning and Compulsory Purchase Act 2004.

Condition 2

The development hereby permitted shall be carried out in accordance with the application form, and drawing numbers

- 6393-P-01 Site Location Plan
- 6393-P-05A Existing Site Layout
- 6393-P-10L Proposed Site Layout
- 6393-P-15C Proposed Soft Landscaping Plan
- 6393-P-16C Proposed Hard Surfaces and Boundary Plan
- 6393-P-20A Proposed Floor Plans Plots 1-2
- 6393-P-21C Proposed Floor Plans Plot 3
- 6393-P-70C Proposed Elevations Plots 1-2
- 6393-P-71D Proposed Elevations Plot 3
- 6393-P-73 Proposed Elevations Car Port
- Arboricultural Impact Statement October 2021
- Drainage Strategy Drawing number 100 Rev D

except where these may be modified by any other conditions attached to this permission.

Reason

To ensure that the development is carried out in accordance with the approved plans.

Condition 3

No development other than demolition, site securing, archaeological works or that required to be carried out as part of an approved scheme of remediation shall commence until parts 1 to 4 below have been

complied. If unexpected contamination is found after development has begun, development must be halted on that part of the site affected by the unexpected contamination to the extent specified by the Local Planning Authority in writing until part 4 has been complied with in relation to that contamination.

1. Site Characterisation

An investigation and risk assessment, in addition to any assessment provided with the planning application, must be completed in accordance with a scheme to assess the nature and extent of any contamination on the site, whether or not it originates on the site, which has first been submitted to and approved in writing by the Local Planning Authority. The investigation and risk assessment must be undertaken by competent persons and a written report of the findings shall be submitted to and approved in writing by the Local Planning Authority. The report of the findings must include:

- i. a survey of the extent, scale and nature of contamination;
- ii. an assessment of the potential risks to:
 - o Human health,
 - o Property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes,
 - o Adjoining land,
 - o Groundwaters and surface waters,
 - o Ecological systems,
 - o Archaeological sites and ancient monuments;
- iii. an appraisal of remedial options, and proposal of the preferred option(s).

This must be conducted in accordance with DEFRA and the Environment Agency's 'Model Procedures for the Management of Land Contamination, CLR 11'.

2. Submission of Remediation Scheme

A detailed remediation scheme to bring the site to a condition suitable for the intended use by removing unacceptable risks to human health, buildings and other property and the natural and historical environment must be submitted to and approved in writing by the Local Planning Authority. The scheme must include all works to be undertaken, proposed remediation objectives and remediation criteria, timetable of works and site management procedures. The scheme must accord with the provisions of the Environmental Protection Act 1990 in relation to the intended use of the land after remediation.

Where undertaken on a phased basis the Remediation Scheme must specify measures to ensure that remediated phases continue to be protected from impacts from un-remediated phases.

3. Implementation of Approved Remediation Scheme

The approved remediation scheme must be carried out in accordance with its terms prior to the commencement of development other than demolition, site securing, or that required to be carried out as part of an approved scheme of remediation, unless otherwise agreed in writing by the Local Planning Authority. The Local Planning Authority must be given two weeks written notification of commencement of the remediation scheme works.

Following completion of measures identified in the approved remediation scheme, a verification report (elsewhere referred to as a validation report) that demonstrates the effectiveness of the remediation carried out must be submitted to and approved in writing by the Local Planning Authority.

4. Reporting of Unexpected Contamination

In the event that contamination is found at any time when carrying out the approved development that was not previously identified it must be reported in writing immediately to the Local Planning Authority. An investigation and risk assessment must be undertaken in accordance with the requirements of part 1 of this condition, and where remediation is necessary a remediation scheme must be prepared in accordance with the requirements of part 2 above, and submitted to and approved in writing by the Local Planning Authority.

Following completion of measures identified in the approved remediation scheme a verification report must be prepared and submitted to and approved in writing by the Local Planning Authority in accordance with part 3 above.

5. Long Term Monitoring and Maintenance

A monitoring and maintenance scheme to include monitoring the long-term effectiveness of the proposed remediation over an appropriate time period, and the provision of reports on the same, shall be submitted to and approved in writing by the Local Planning Authority.

Following completion of the measures identified in that scheme and when the remediation objectives have been achieved, reports that demonstrate the effectiveness of the monitoring and maintenance carried out must be submitted to and approved in writing by the Local Planning Authority.

This must be conducted in accordance with DEFRA and the Environment Agency's 'Model Procedures for the Management of Land Contamination, CLR 11'.

Reason

To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors.

This condition is required as a pre-commencement condition because there is potential for contamination to exist on the site.

Condition 4

The development shall be carried out in accordance with the submitted Drainage Strategy has been submitted to and approved in writing by the Local Planning Authority. The scheme for the surface water drainage shall be implemented in accordance with the approved details and timetable and shall be fully operational before the development is first put in to use/occupied.

Reason

To ensure the development is provided with a satisfactory means of drainage and thereby reducing the risk of flooding. It is important that these details are agreed prior to the commencement of development as any works on site could have implications for drainage, flood risk and water quality in the locality.

Condition 5

The development hereby permitted shall not be brought in to use/occupied until a SuDS management and maintenance plan for the lifetime of the development, which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime, has been submitted to and approved in writing by the Local Planning Authority. The approved SuDS maintenance plan shall be implemented in full in accordance with the approved details for the lifetime of the development.

Reason

To provide for the continued operation and maintenance of sustainable drainage features serving the site and to ensure that the development does not result in pollution or flooding, to improve water quality at point of discharge.

Condition 6

No building or use hereby permitted shall be occupied or use commenced until the car/vehicle parking area and turning spaces shown on the approved plans have been completed and thereafter the areas shall be kept free of obstruction and available for the parking of vehicles associated with the development.

Reason

To ensure that there are adequate parking facilities to serve the development constructed to an acceptable standard.

Condition 7

The development hereby permitted shall not be occupied until details of secure and covered cycle storage facilities for a minimum of 2 bicycles per dwelling has been made available in accordance with details to be submitted to and approved in writing by the LPA.

Reason

To give priority to cycle movements by ensuring that adequate cycle parking is provided, to promote cycle use and to ensure that the appropriate opportunities for sustainable transport modes have been taken up in accordance with paragraph 108 of the National Planning Policy Framework.

Condition 8

The development hereby permitted shall not be first occupied until the proposed dwellings have been fitted with an electric vehicle charging point. The charging points shall comply with BS EN 62196 Mode 3 or 4 charging and BS EN 61851. The electric vehicle charging points shall be retained for the lifetime of the development unless they need to be replaced in which case the replacement charging point shall be of the same specification or a higher specification in terms of charging performance.

Reason

To promote sustainable travel and healthy communities.

Condition 9

No development shall take place, including any demolition works, until a construction management plan or construction method statement has been submitted to and approved in writing by the Local Planning Authority. The approved plan/statement shall be adhered to throughout the demolition/construction period. The plan/statement shall provide for:

- 24 hour emergency contact number;
- Hours of operation;
- Parking of vehicle of site operatives and visitors (including measures taken to ensure satisfactory access and movement for existing occupiers of neighbouring properties during construction);
- Routes for construction traffic;
- Locations for loading/unloading and storage of plant, waste and construction materials;
- Method of preventing mud being carried onto the highway;
- Measures to protect vulnerable road users (cyclists and pedestrians)
- Any necessary temporary traffic management measures;
- Arrangements for turning vehicles;
- Arrangements to receive abnormal loads or unusually large vehicles;
- Methods of communicating the Construction Management Plan to staff, visitors and neighbouring residents and businesses.

Reason

In the interests of safe operation of the adopted highway in the lead into development both during the demolition and construction phase of the development.

Condition 10

Notwithstanding the provisions of the Town and Country Planning (General Permitted Development) (England) Order 2015 (or any Order revoking or re-enacting that Order, with or without modification), no windows on the side elevation above first floor level; neither extensions, outbuildings dormers or rooflights shall be added and constructed within approved residential plots without the prior consent of the Local Planning Authority.

Reason

In order to protect the residential amenity of the existing and proposed residents in accordance with policy SD14 of the Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (2017).

Condition 11

During the construction phase (including demolition and preparatory groundworks), no machinery shall be operated, no process shall be carried out and no deliveries shall be taken at or dispatched from the site outside the following times: Monday-Friday 8.00 am-6.00pm, Saturday 8.00 am-1.00 pm nor at any time on Sundays, Bank or Public Holidays.

Reason

To protect the noise climate and amenity of local residents.

Note 1

Your attention is drawn to the requirements of the Building Regulations, which must be obtained as a separate consent to this planning decision. You are advised to contact the Gloucestershire Building Control Partnership on 01453 754871 for further information.

Note 2

Your attention is drawn to the Party Wall Act 1996. The Act will apply where work is to be carried out on the following:

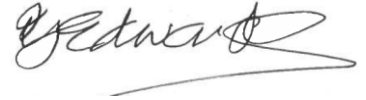
- Work on an existing wall or structure shared with another property.
- Building a free standing wall or a wall of a building up to or astride the boundary with a neighbouring property.
- Excavating near a neighbouring building.

The legal requirements of this Act lies with the building/ site owner, they must find out whether the works subject of this planning permission falls within the terms of the Party Wall Act. There are no requirements or duty on the part of the local authority in such matters. Further information can be obtained from the DETR publication The Party Wall Act 1996 - explanatory booklet.

Note 3

In accordance with the requirements of the NPPF the Local Planning Authority has sought to determine the application in a positive and proactive manner by offering pre-application advice, publishing guidance to assist the applicant, and publishing to the council's website relevant information received during the consideration of the application thus enabling the applicant to be kept informed as to how the case was proceeding.

Date: 26th October 2021



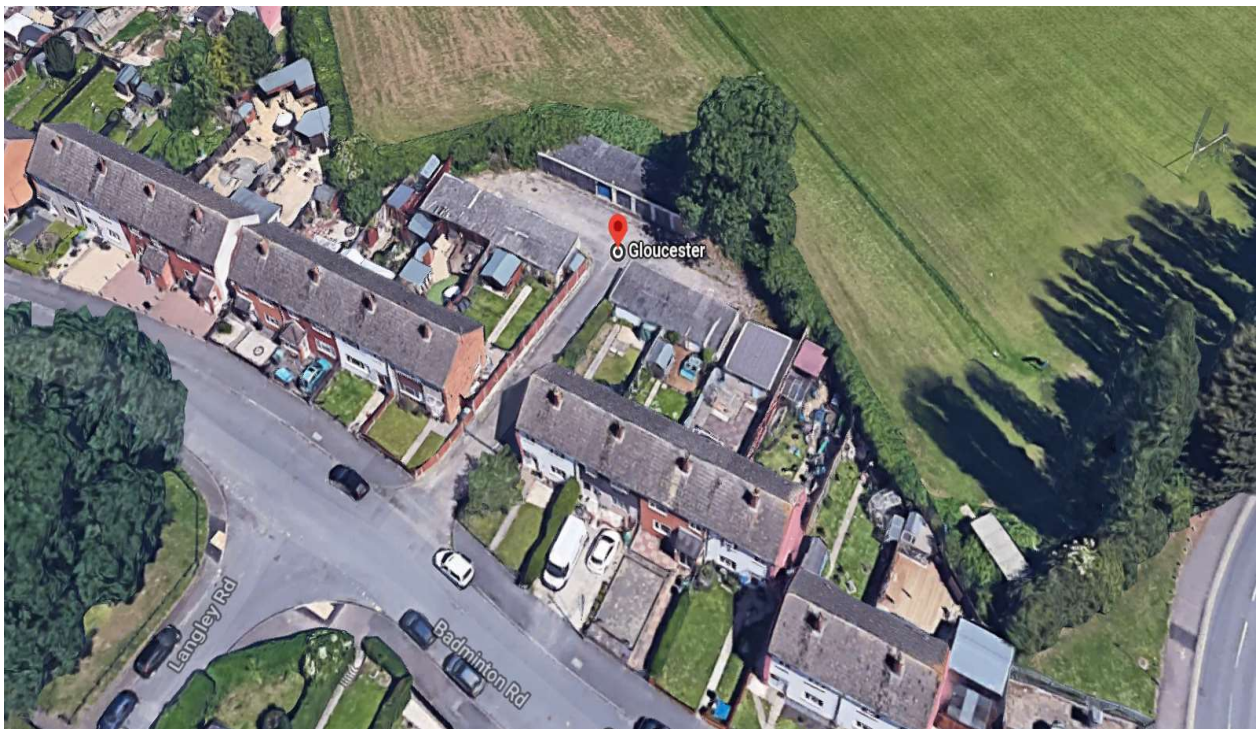
Head of Place

PLEASE SEE NOTES SET OUT IN THE ENCLOSED LEAFLET



Construction Environmental Management Plan

Demolition of existing garages and erection of 3 number new build houses at Badminton Road, Matson, GL4 6AZ



Prepared By	Date
[REDACTED]	29 th October 2021
[REDACTED]	

Revision/Amendments		
Date	Revision/Amendment No	Revision/Amendment



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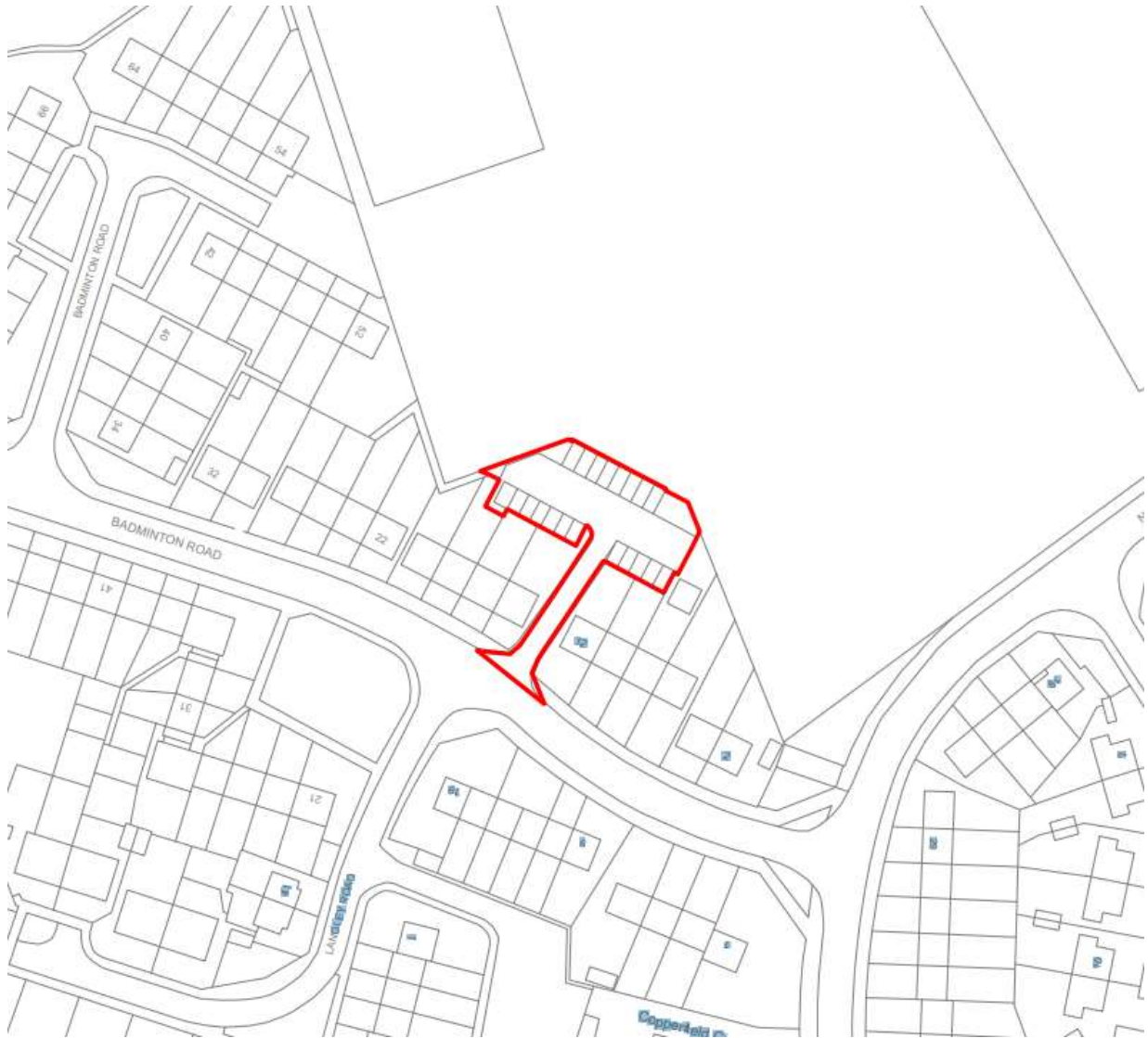
4.17 Communication with the public

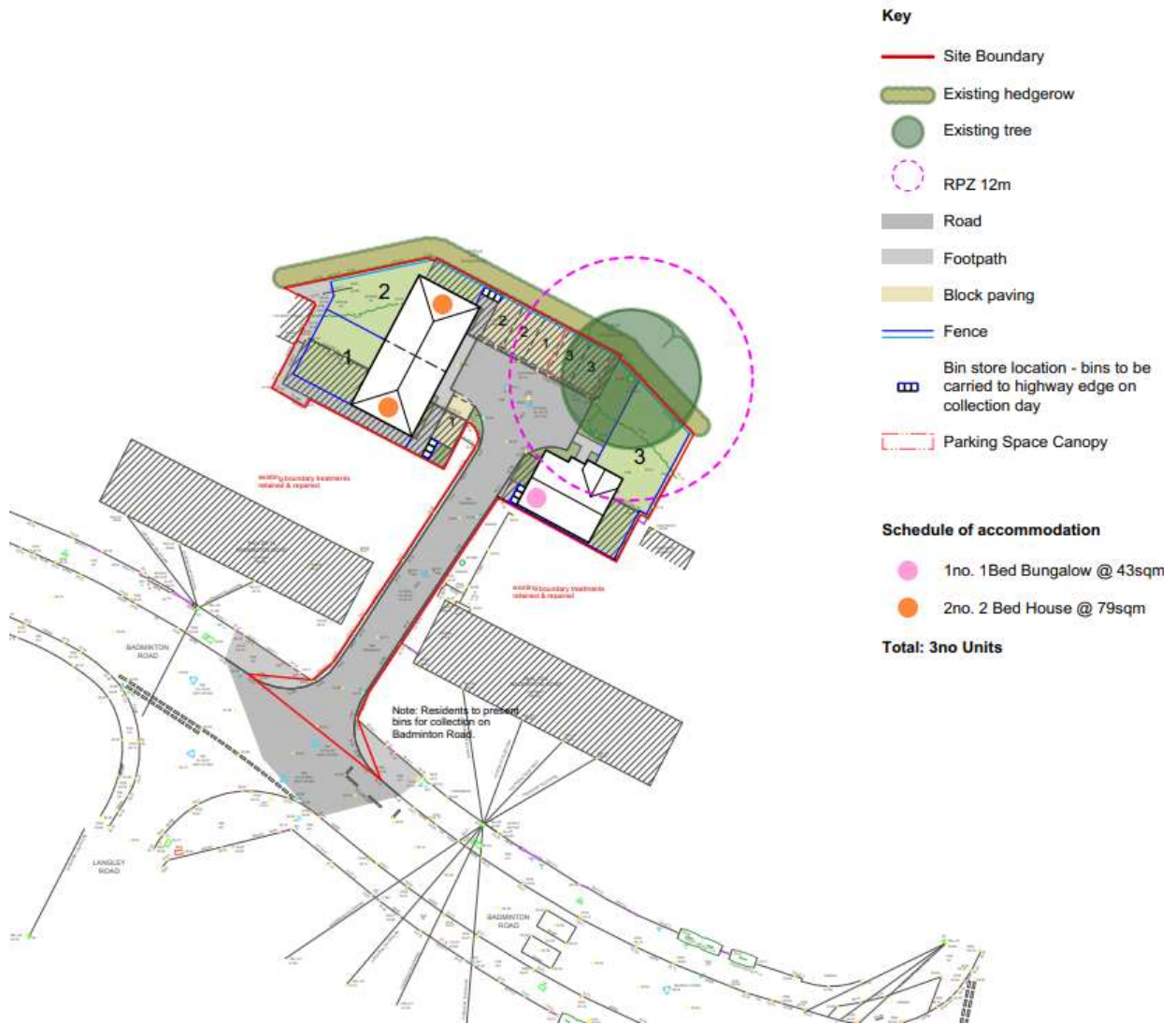
4.18 Monitoring and control

1 Introduction:

1.1. Overview

█ has compiled this Construction and Environmental Management Plan in support of the planning application ref: 20/00828/PREAPP for the redevelopment of garages for 3no. dwellings with associated parking and landscaping (The Proposed Development) on land at Badminton Road, Matson, GL4 6AZ (The Site).





1.2 Purpose and scope

The focus of this CEMP is to address the construction principles that will be employed at the site and set out mitigation measures that will be utilised to manage the impact of construction on local residents, the surrounding community and the local highway network.

To include:

- Ensuring compliance with all applicable legislation and statutory controls included in the planning conditions.
- Ensuring conformance with the Lane Britton Jenkins environmental policy.
- Deliver the best practicable environmental performance possible to prevent pollution, and to minimise adverse environmental impact.

2 Roles and Responsibilities

2.1 The project team

Employer:

Gloucester City Homes

Site Manager:

[REDACTED]

Lane Britton Jenkins Ltd
21 Space Business Centre, Tewkesbury Rd, Cheltenham,
GL51 9FL

[REDACTED]

[REDACTED]

Health and Safety Advisers:

Glenn Webb Ltd

[REDACTED]

[REDACTED]

3 Construction Activities

3.1 Overview

All construction activities will be carried out in line with this CEMP and the developed CPP.

The access to the site will be made suitable for site delivery vehicles and emergency vehicles.

Access to neighbouring buildings and premises will not be obstructed at any time.

Clearly defined site compound comprising office and rest areas, and welfare in line with CDM 2015 regulations will be put in place.

The immediate work area within the plot will be made secure with hoarding.

The overall site will be secured when no work is taking place, and emergency contact numbers will be displayed.

Site storage areas will be identified and securely locked when not in use.

COSHH substances will be stored in line with the manufacturer's instruction and the Lane Britton Jenkins COSHH risk assessments.

Waste will be segregated in line with local authority requirements.

[REDACTED]

Waste will be removed on a regular basis to prevent build up.

Combustible waste will be stored in a position where it will be difficult for an arsonist to create a fire hazard.

There will be no bonfires on site.

The environmental effect of dust will be controlled by either wet cutting (bricks, concrete), or in general if necessary, by damping down.

Noise levels will be controlled to as low a level as is reasonably practicable. Mobile plant will not be left to idle when not in direct use, thus reducing noise and exhaust pollution.

There will be no unnecessary revving of engines.

Activities which generate noise which cannot be controlled will not commence until after 09.00am.

Vibration will be controlled in the same way as noise, with the necessity for any vibratory activity being carried out post 09.00am.

Fuel and oil will be stored in a bund.

On site fuelling will be done in a bunded area to prevent ground contamination.

The use of water will be, as far as is reasonably practicable, controlled. Hose pipes if used will be turned off when not required.

It is not anticipated there will be any major light pollution during the construction phase. Though on darker winter days some external and internal illumination will be required for safety purposes, it will not be excessive, and it will not, other than for possible security reasons, be on after the site closes.

Site working will be from 08.00 to 17.00 (or earlier if in the winter months) Monday to Friday, and 08.00 to 13.00 on Saturdays.

There will be no Sunday or Bank Holiday working.

It is unlikely that any fauna or flora not already identified in preconstruction searches will be affected.

The building is new and will not have any effect local bat life.

Personnel will not be allowed to leave the site and "trespass" on any adjoining land under any circumstances.

It is likely a generator will be necessary during the early stages of construction, until a power supply is established. This will be placed on a bund to avoid ground contamination.

It is anticipated a maximum of ten persons will be on site at any one time, with an average of probably five.

The following activities will from time to time take place or be necessary during the construction phase:

Ground Works

- Excavation for new road, pathways and parking
- Excavation of footings and drains
- Excavation for new services

Super structure works

- Masonry and external wall construction
- Scaffolding
- Carpentry
- Roof tiling
- Plumbing and electrics
- Plastering
- Flooring and tiling
- Decorating

External works

- Fencing
- Landscaping

3.2 Potential Environmental impact

The potential environmental impact of the construction phase will be listed.

It will be held in the site office and all personnel attending site will be made aware of it at induction.

The environmental risks will be identified as:

- Air quality and emissions
- Noise and vibration
- Use of hazardous materials.
- Waste management
- Minimisation of waste
- Wildlife and biodiversity
- Ground contamination
- Disposal and discharge of water
- Consideration and protection of the general public.

3.3 Risk Assessments and Method Statements (RAMS)

All of the site and operational risks will be reviewed prior to commencement of the construction phase.

Rams for all site activities will be drawn up and these will form the basis of the H&S and environmental operating standards.

Subcontractors will be instructed to follow these RAMS and/or where necessary be required to provide their own RAMS for work they will be undertaking.

3.4 Environmental Impact

All persons engaged to carry out work on the site will be made aware of the possible environmental impact of the work they are undertaking. **(3.2)**.

Other than ground disturbance and surface layer removal in places, there will be minimal direct effect on wildlife (fauna and flora) by the construction activity.

The negative environmental effects which will mainly occur during construction, (noise, dust, vibration), may have a slightly disturbing effect on the wildlife inhabiting the surrounding trees, and to some extent the general public.

The actions planned to raise awareness of this, communication making these actions aware at site induction, and the overall management control in place to monitor, should keep this under control.

The Lane Britton Jenkins environmental policy, also made aware to subcontractors at engagement and at induction, will aim to control the use of resources (water) and reduce unnecessary waste of materials.

Should at any time during the construction phase, the activities cause anything which could be interpreted as having a negative environmental action, work will cease until such times as a remedial action has been decided and implemented.

4.0 Project Environmental Requirements

4.1 Site Working Hours

Site working hours will be as follows:

Monday to Friday 08.00 to 17.00

Saturday 08.00 to 13.00

There will be no Sunday working or working during bank holidays.

4.2 Site Access and Egress/ Site Traffic and Pedestrian Routes

The Site is located a stone's throw away from the A38, a national and primary link, and approximately 10 minutes to the M5 motorway, a national link. These highways and major roads provide links to Hereford, Tewkesbury, Cheltenham and further afield. The Site is also near to the B4073 which is a major route into the city centre

Access and egress will be kept clear at all times to facilitate the movement of emergency vehicles.

No public roads, footpaths or unadopted rights of way will be obstructed by site traffic.

The site manager will control the movement of delivery vehicles to the site.

Reversing will be kept to an absolute minimum. Where manoeuvring of this type is necessary will be controlled by a banksman/marshal.

Pedestrian routes will be clearly defined, and pedestrians will have right of way.

No deliveries will be permitted when the site is closed.

The Principal Contractor will ensure that all drivers and their vehicles delivering to or attending the site will meet their legal obligations for safe operation and obey any traffic sign, road marking or traffic signals upon all road networks.

The Principal Contractor shall appoint a Transport Coordinator (TC) from within the Principal Contractors staff who will work in conjunction with key personnel of the Principal Contractor, Contractors, Sub-Contractors and the appropriate authority, and shall identify all access and delivery routes upon all public highway, footway/footpath, cycleway or public right of way that may be used or affected by the construction movements generated by the works. The TC shall be responsible for the monitoring of the implementation and operation of the construction logistics throughout the extent of construction activity.

4.3 Site Parking

Parking on local streets will be discouraged and the Lane Britton Jenkins site team is vigilant in ensuring that site personnel or visitors do not park illegally. Should any sub-contractor decide to continue to park illegally, Lane Britton Jenkins will not hesitate to remove that contractor from the site. There is strictly no parking for any local residents on site and shall be strictly prohibited whilst construction works are on-going until completion / handover.

This plan will form part of the Sub-contractor's tender enquiry documents to ensure its contents are taken into account within their pricing and methodology. Upon contact award the contents of this plan will be communicated to all site personnel during their pre-start inductions which will include but not be limited to the use of the dedicated access and egress routes, restricted routes, the need to adhere to the speed limits and no parking other than within designated areas.

4.4 Speed Limits

N/A

4.5 Construction Vehicle /Vehicle Movement

All vehicle operation on site must have fully up to date safety certification, with evidence of current mandatory inspections. This information to be held on site.

All vehicles must comply with the latest design standards (roll over protection, 360-degree vision, flashing beacons, reverse warning signal).

A vehicle inspection procedure must be in place.

Only qualified fully competent drivers will drive site plant.

When vehicles are left unattended, they will be switched off and the keys removed.

All site personnel must wear high visibility jackets when moving about the site.

4.6 Material Delivery and Storage

Loading and unloading of plant shall take place within the confines of the construction site where possible.

Loading and storage area will be designated as a priority before construction commences.

Materials delivered to the work area will be positioned to minimise the necessity for excessive manual handling.

Deliveries are to be pre-booked in advance and restricted to between 9.00 & 3pm. Failure to comply could lead to deliveries being turned away. All drivers will call the Site Manager 20 minutes ahead of arrival to avoid stacking and banksmen/traffic marshal will be on hand to speed loading / unloading, direct traffic and provide safe passage for pedestrians.

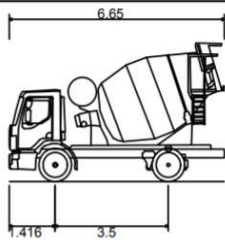
4.61 Vehicles (numbers) Accessing the Site Per Day/Week

In Phase 1 Muck-Away Wagons and Concrete Mixer Trucks shall comprise the bulk of construction traffic while other smaller material deliveries are less numerous. Estimated 2/3 large vehicles per day in the early stage of the project with flat bed lorries delivering general building materials, anticipated to be once weekly.

In Phase 2 (After Excavation and sub-structure) smaller deliveries shall occur more frequently bringing materials, products and finishes anticipated to be ¾ on average daily.

Examples:

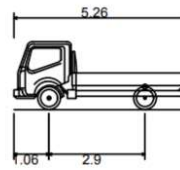
VEHICLE DETAILS:



CONCRETE MIXER 4X2 27FT

Overall Length	6.650m
Overall Width	2.600m
Overall Body Height	4.200m
Min Body Ground Clearance	0.358m
Max Track Width	2.413m
Lock to Lock Time	5.00s
Kerb to Kerb Turning Radius	6.350m

VEHICLE DETAILS:



3.5T NISSAN NT400 TIPPER WB2900

Overall Length	5.260m
Overall Width	1.900m
Overall Body Height	2.055m
Min Body Ground Clearance	0.335m
Track Width	1.808m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	5.800m

All suppliers shall be required to call 1 hour before booked arrival to make sure space is available.

4.7 Highway Cleanliness

Highway adjacent to the site shall be kept free of all mud, dirt debris or other deleterious matter.

Any such deposit will be cleared either mechanically or manually immediately.

A high-pressure jet wash may be installed at the site entrance to the site to clean mud from departing vehicles, should it prove necessary.

4.8 Site Security and Tree Protection

Prior to commencement on site the necessary construction site boundaries will be made secure by a 2.4-metre-high hoarding or heras.

The hoarding will be regularly checked and kept in a secure state of repair.

Tree protection N/A

4.9 Welfare Facilities

Welfare facilities in line with CDM 2015 schedule 2 will be in place.

In keeping with the size of the site:

Adequate toilets for anticipated numbers on site, including lockable facility for use by females.

This to include hot and cold running water.

Rest area to include drying area for hanging and drying clothes.

To include:

Means of boiling a kettle.

Means of heating food.

Potable water supply.

4.10 Protective Equipment

All persons seeking to enter the site must have the following protective equipment (PPE):

Hard Hat; Hi Visibility Jacket; gloves; safety glasses.

Other PPE as directed by risk assessments, operators' handbooks, or site managers instruction will be available on site and must be worn.

4.11 Storage of Fuel, Oils, Construction Chemicals

All fuel and oils must be stored in a bunded situation.

Tanks of fuel for fuelling plant and vehicles must also be securely locked to avoid tampering.

These tanks must have a 110% of the tank bunded surround. (*CIRIA – Construction of bunds for oil storage tanks (R163)*)

Flammable liquids must be designated as non-naked flame (smoking) areas.

Tanks should be sited where any damage or spillage from contact with moving vehicles (other than refuelling) is unlikely.

COSHH building substances will be stored in secure locked containers or sheds.

Only sufficient substance for the task to be removed at any time.

All COSHH substances to be stored and used in line with manufacturers standards as indicated in the Lane Britton Jenkins COSHH risk assessments which will be held on site.

Handling of liquid run – off Water pollution, spills of oil and fuel Lane Britton Jenkins will have emergency procedures in place with the relevant equipment on site i.e., spill kits, etc.

4.12 Waste Management

Where possible the waste being generated during construction will be recycled either on site or by sending to a recycling specialist.

Non-recyclable waste will be segregated as required by the local authority into separate waste skips.

Any contractor engaged to remove waste must show to site management:

- Waste carrier's registration certificate

Non-hazardous/inert waste must be recorded on a Waste Transfer note.

Hazardous waste to be recorded on a Hazardous Waste Consignment note.

These records to be kept by Lane Britton Jenkins for a minimum of two years.

4.13 (a) Particulate matter- air pollution and dust

Site preparation:

- Appropriate hoarding shall be provided around the whole working area to reduce dust dispersion.
- Hoardings, fencing, barriers and scaffolding shall be regularly cleaned using wet methods (not blowing with compressed air lines) to prevent re-suspension of particulate matter.
- Where site space and layout plans permit, an adequate area of hard surface road shall be installed between wheel wash facilities and the working area egress points.
- All the appropriate spill kit clean up and containment materials shall be available in strategic locations on site and they shall be utilized immediately in the event of a spillage occurring.

On-site activities:

- Dust producing plant shall be kept as far away as possible from sensitive areas (and may be screened). A physical distance and/or barrier shall be created between dust/emission generating activities and receptors.
- Stockpiles shall be covered or seeded to prevent wind whipping, and loose materials shall be removed as soon as possible.
- The materials with the potential to produce dust (i.e., sand and other aggregates) shall be kept away from working area boundaries and shall be ensured that are stored in bunded areas and are not allowed to dry out unless required for a particular process and other control measures are in place.
- Where practicable, re-fabrication, fabrication and dismantling of materials and machinery shall be encouraged to be undertaken off-site to reduce the need for grinding, sawing and cutting on-site. In cases where such work must take place, water-based dust control shall be used.
- The site shall use cutting, grinding or sawing equipment fitted, or in conjunction with, suitable dust suppression techniques such as water sprays or local extraction.
- The site shall implement the use of water to effectively suppress dust emissions.
- Where practicable, identified work activities that have a high potential for dust emissions shall be fully enclosed and the enclosure shall be maintained for the entire duration that the specific work activity is in operation.

- An adequate supply of water shall be available at all work areas for dust suppression measures. Where practicable, used water shall be collected and reused to maximize the use of recycled and non-potable water.
- All dust control equipment shall be maintained in good condition and a record of maintenance and servicing activities shall be kept.
- Drop heights shall be minimised from conveyors loading shovels, hoppers and other loading (lorries, etc.) or handling equipment, and fine water sprays shall be used on such equipment.
- The site shall provide enclosing chutes and/or conveyors. The site shall use enclosed conveyors where crossing roads, other public areas and property which is not ownership or control by the site. Loaded bins and skips shall be sheeted or otherwise enclosed.
- The movement of delivery materials shall be handled in a manner which minimises dust production and disturbance.
- A programme of wet sweeping for site access and egress points shall be implemented and it shall include area of public road potentially affected by dust accumulation from the working area.
- The site shall provide and ensure the usage of wheel wash facilities near the site exit wherever there is a potential for carrying dust or mud out of the work areas onto the public highways. It shall be ensured that wheel wash facilities are fitted with rumble grids to dislodge accumulated dust and mud prior to leaving the work sites wherever there is a potential for carrying dust or mud out of the work areas. Wheel washes shall ensure run-off is contained suitably on-site to prevent it running into the highway.
- Site runoff of water and mud shall be avoided.
- Long term haul routes shall be provided with hard surfaces. Those shall be regularly damped down with fixed or mobile sprinkler systems and regularly cleaned in dry conditions, using wet sweeping methods avoiding dry sweeping or large areas. Haul routes shall be inspected for integrity and necessary repairs to the surfaces shall be investigate as soon as it is reasonably practicable.
- The burning of material on site shall be strictly prohibited.
- The site shall use enclosures or shield areas designated for mixing large quantities of cement, bentonite, grouts and other similar materials. The location of designated areas for mixing these materials shall be remote from the site boundary and potential receptors.

- The site shall ensure that bulk cement and other fine powder materials shall be delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of materials and overfilling during delivery. For construction, for smaller supplies of fine powder materials, bags shall be sealed after use and stored appropriately to prevent dust.

Vehicles and equipment:

- All vehicles transporting loose or potentially dust generating materials to and from working areas shall be fully sheeted.
- Wet materials that have the potential to leak from the vehicle shall be transported in sealed vehicles.
- No idling when vehicles are stationary. The engines of vehicles and plant on site shall be not left running unnecessarily.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment, where possible. Petrol- and diesel-powered generators shall only be used if mains electricity or battery powered equipment is not available.

Dust inspections / toolbox talks (TBT):

- All employees shall be provided with an appropriate induction and ongoing briefings and toolbox talks (TBT) regarding management of environmental issues (i.e. dust mitigation measures required from the works they are carrying out, etc.).
- Weekly visual dust site inspections shall be carried out to monitor compliance with air quality and dust control procedures, and to monitor site outside the work site.
- Records of inspection results shall be maintained within the respective site offices and make available to the local authority when asked.
- When activities with a high potential to produce dust and emissions are being carried out during prolonged dry or windy conditions, daily dust visual inspections at the boundary of such activities shall be completed to ensure dust and emissions are controlled.
- Record any exceptional occurrences causing dust episodes on or off the site and the action taken to resolve the situation.
- In the event of non-compliance with obvious visual impacts and/or complaints, the following measures shall be implemented: Immediately undertake an investigation of activities on site to ascertain whether any visible dust is emanating from the site or activities are occurring that are not in line with dust control procedures. If on-site sources are identified, the relevant activities shall be rectified and/or

suspended where practicable until remedial measures can be implemented. Actions shall be recorded in a site logbook. The activity shall then be monitored to ensure that the mitigation measures are working and that there is no repeat incident. If the cause of the alert is not related to site operations, the outcome of any investigations shall be recorded in the site logbook.

4.13 (b) Noise and vibration

Every effort will be made to reduce or eliminate noise nuisance and effect on the locality.

This will be achieved as follows:

- Locate plant and equipment away from neighbours.
- Isolate plant and equipment when not in use.
- Fit white noise systems on vehicles to reduce noise nuisance when reversing.
- Limit vehicle movements on-site, i.e., use of one-way system.
- Vehicles and mechanical plant used for the purpose of the works shall be fitted with effective exhaust silencers, maintained in good and efficient working order and operated in such a manner as to minimise noise emissions. The contractor shall ensure that all plant complies with the relevant statutory requirements.
- Put acoustic (movable noise) barriers in place to manage the levels of noise pollution.
- There will be no unnecessary revving of engines.
- Activities which generate noise which cannot be controlled will not commence until after 09.00am.
- Using quiet power tools and equipment to manage noise pollution. Where possible, use modern construction equipment that has been designed specifically to produce less noise.
- Compressors should be fitted with properly lined and sealed acoustic covers which should be kept closed whenever in use. Pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers.
- Equipment which breaks concrete, brickwork or masonry by bending or bursting or “nibbling” shall be used in preference to percussive tools where practicable. Avoid the use of impact tools where the site is close to occupied premises.
- Where practicable, rotary drills and bursters activated by hydraulic, chemical or electrical power shall be used for excavating hard or extrusive material.
- Where practicable, equipment powered by mains electricity shall be used in preference to equipment powered by internal combustion engine or locally generated electricity.
- Neither any part of the works nor any maintenance of plant shall be carried out in such a manner as to cause unnecessary noise or vibration except in the case of an emergency when the work is absolutely necessary for the saving of life or property or the safety of the works.

- Plant shall be maintained in good working order so that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum.
- Noise emitting machinery which is required to run continuously shall be housed in a suitable acoustically lined enclosure wherever practicable.
- Care to be taken to reduce noise when loading or unloading vehicles or dismantling scaffolding or moving materials etc.

4.14 Visual Amenity

The following actions will be taken so as not to have negative visual impact:

- No vegetation will be removed unless absolutely necessary.
- Lighting for compounds and safe movement will be switched off when site is closed.
- Depositing of mud on public road to be avoided and cleared if it occurs.
- Work area to be kept as clean and tidy as practicable.
- On completion all waste, and construction related items to be removed from site and surroundings affected restored to previous state.

4.15 Previous Unidentified Matters

If any of the following is discovered work will stop immediately and the local authority or Police notified

- Contaminated soil
- Archaeological Remains or features
- Suspicious objects (UXO)
- Underground storage tanks
- Invasive species (Japanese knotweed)
- Protected species (i.e., bats; reptiles; amphibians; plants)

4.16 Emergency and Incident Prepared ness

Should an anything occur which could in anyway be deemed a pollution incident, Lane Britton Jenkins will immediately contact the local authority (Environmental Health)

A site fire and accident procedure will be in place on site as per the Lane Britton Jenkins H&S procedures

4.17 Communication with the Public

Suitable out of hours contact details will be posted on the entrance to the site.

The local neighbours will be made aware of the date of commencement of the construction phase.

The MD of Lane Britton Jenkins will deal personally with any enquiries or complaints made with regard to the construction work taking place.

4.18 Monitoring and control

Lane Britton Jenkins developed Construction Phase Plan shall detail the on-site management, monitoring and control. The CPP is an integral part of the project's implementation strategy for controlling issues that have the potential for impacting on the wider community.

The operational safety of the construction operations will be audited on a monthly basis.

This audit will also assess Lane Britton Jenkins compliance with the statements made in the CEMP (Construction Environmental Management Plan).

GROUND INVESTIGATION REPORT FOR BADMINTON ROAD, MATSON, GLOUCESTER, GL4 6AY



PREPARED FOR
GLOUCESTER CITY HOMES LIMITED

Report No. 4801

Report Production Record		
Report No	4801	
Site Name	Badminton Road, Matson, Gloucester, GL4 6AY	
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1	SITE PHOTOGRAPHS
2	BOREHOLE AND HAND DUG PIT LOGS (INCLUDING PHOTOGRAPHS)
3	CONTAMINATION STATUTORY FRAMEWORK/METHODOLOGY AND CERTIFIED CONTAMINATION TEST RESULTS
4	WASTE CLASSIFICATION CALCULATIONS AND WASTE ACCEPTANCE CRITERIA (WAC) TEST RESULTS

GROUND INVESTIGATION REPORT
FOR BADMINTON ROAD, MATSON, GLOUCESTER, GL4 6AY
PREPARED FOR GLOUCESTER CITY HOMES LIMITED

1 INTRODUCTION

- 1.1** The above site is under consideration for the development of three residential dwellings to include private gardens, parking and vehicular access. A ground investigation was requested to ascertain the ground conditions for appropriate foundation, ground floor slab, external pavement and soakaway design. A preliminary quantitative contamination risk assessment with regard to potential impacts to human health and/or controlled waters has also been undertaken.
- 1.2** The geotechnical investigation has been carried out in general accordance with Eurocode 7 'Geotechnical Design', in particular BS EN 1997-1:2004 and 1997-2:2007 and BS EN ISO 14688-1:2002 and 14688-2:2004. The proposed development is considered to fall into the Geotechnical Category 2 classification, thus routine field and laboratory testing methods have been adopted. Reference has also been made to BS5930:2015 Code of Practice for Ground Investigations, and National House Building Council (NHBC) Standards Chapter 4.2 – 'Building Near Trees'.
- 1.3** The Geo-environmental assessment comprising Phase 1 desk study followed by Phase 2 testing and quantitative contamination risk assessment has been carried out in accordance with BS10175:2011 "Code of Practice for the Investigation of Potentially Contaminated Sites" and EA document LCRM "Land Contamination Risk Management" (2020).
- 1.4** This report has been prepared in accordance with quotation reference Q21046, dated 15th February 2021 with written instruction received from Daniel Lutman of Gloucester City Homes Limited dated 16th February 2021 and raised by **Purchase Order No. BADR/00022137**, to whom reliance on this report is presently restricted.

2 SITE LOCATION AND DESCRIPTION

- 2.1** The area under consideration is centred on National Grid Reference 384746, 216107 located in the Gloucester district of Matson, c2.5km southeast of the city centre as shown on drawing 4801/1.
- 2.2** The site comprises a roughly “T-shaped” plot of land covering an area of approximately 0.07 hectares which can be accessed from Badminton Road to the south.
- 2.3** A walkover survey was undertaken by this Practice on 25th February 2021 and a selection of representative photos are presented in Appendix 1, with their positions and orientations shown noted on drawing 4801/2. This identified the development area to comprise predominantly tarmac hardstand occupied by three rows of single storey lock up garages along the northern and southern boundaries respectively, plus a small area of soft landscaping in the north-east corner. These garages were of typical prefabricated concrete panel construction with corrugated roof sheets containing possible asbestos containing materials (pACM). There was no obvious visual or olfactory evidence of contamination noted across the ‘visible’ site surface; however an internal inspection of the garages was not possible. The site is surrounded by residential properties to the south and a school playing field on all other sides.
- 2.4** Topographic mapping data indicates that the site is essentially flat with a recorded elevation of c34m above Ordnance Datum (AOD).

3 DESK STUDY RESEARCHES

Recorded Geology

- 3.1** The geology of the site is shown on the British Geological Survey (BGS) 1:10,000 mapping sheet SO 81 NW and online. This mapping indicates that the site lies entirely within the outcrop of the undifferentiated Blue Lias Formation / Charmouth Mudstone Formation (BLi/ChM). The former comprises thinly interbedded limestone and the latter dark bluish-grey, friable, shaly mudstone. They both commonly weather near surface to firm to stiff, mottled grey-brown plastic clay. Occasional localised ‘rubbly’ weathered limestone bands may also be present, typically towards the base of the formation, although such strata are not anticipated at this location. The BLi/ChM often

contains elevations of sulphate in the form of gypsum crystals which may dictate sulphate protection for spread concrete foundations. There are no areas of mapped made ground, superficial deposits or any geological faulting shown either inside or within likely influencing distance of the site.

- 3.2** This Practice has previously undertaken intrusive investigation on a site 80m to the southwest, which below topsoil and a thin mantle of made ground identified inorganic clay of the recorded ChM and a similar ground profile is anticipated beneath the current site of interest. The BGS hold no borehole data either on or within a usable distance of the site.

Hydrogeology

- 3.3** The MAGIC website confirms that the BLi/ChM is a 'Secondary Undifferentiated' aquifer, which means the EA has not been able to characterise the rock due to the variable characteristics of the rock type. This Practice's experience of the BLi/ChM is that it mostly classifies as unproductive strata due to negligible permeability. There are no recorded groundwater abstractors listed within EA records and the site is not located within a groundwater Source Protection Zone.
- 3.4** Based upon the above information the site is considered to be within an area of low sensitivity in terms of groundwater resources.

Hydrology

- 3.5** The site itself contains no ponds or watercourses. The nearest significant surface water feature appears to be the Sud Brook c400m to the north-east. The EA does not consider the site to be at risk of flooding from either rivers or seas. The site is currently mostly developed with hardstand and building, so rainwater infiltration can be expected to be negligible, dependent instead on the existing drainage infrastructure. The site does not lie within a Nitrate Vulnerable Zone (NVZ).
- 3.6** Based upon the above information the site is considered to be within an area of low sensitivity in terms of controlled surface waters.

Site History

3.7 The history of the site has been deduced by inspection of historical Ordnance Survey maps dating back to 1884 together with historical aerial imagery provided as part of the online Google Earth mapping service, and a selection of relevant extracts is presented as drawing 4801/3. Any on and/or off-site points of interest that may affect or be affected by the proposed development have been summarised within Table 1 below.

TABLE 1: SUMMARY OF SITE HISTORY

Date (Source Map Scale)	On-Site	Off-Site	Potential Contaminants that may affect Site	Likelihood of Site Impact
1884 (1:2,500 & 1:10,000)	Located immediately adjacent eastern boundary of a large undeveloped open field	E – Boundary drain Open fields on all sides 160m W – Farm yard	None	Negligible
1902 - 1938 (1:2,500 & 1:10,000)	No significant change	160m W – Farm yard no longer mapped	As above	Negligible
1954 - 1954 (1:2,500 & 1:10,000)	No significant change	150m W - Matson Reservoir Camp, Robinswood Barracks	As above	Negligible
1956 – 1963 (1:2,500 & 1:10,000)	Three rows of garages constructed that remain until the present day	S - Residential properties N – Playing field for newly constructed Saintbridge Comprehensive School 150m W - Matson Reservoir Camp, Robinswood Barracks in the process of being demolished	Toxic/ phytotoxic metals Polyaromatic hydrocarbons (PAH) Petroleum Hydrocarbons (TPH) ACM	Low - Moderate
1963 - 2021 (1:2,500, 1:10,000, Google Earth aerial mapping and present day site walkover)	No significant change	No significant change	As above	Low - Moderate

3.8 Please note that Ordnance Survey plans only represent periodic snapshots in time, and do not provide a continuous record of previous site usage, there is therefore a risk that the site may contain buried remnant foundations of former buildings or waste products associated with unrecorded previous site usage, which may not be evident from the site walkover inspection and desk study researches.

Landfill Gas and Radon Gas

- 3.9** Consistent with the site history researches the EA landfill register shows no record of either active or historic landfills within potential influencing distance of the site, nor are there any nearby historic features such as potentially infilled ponds, gravel pits or quarries, which if infilled with putrescible waste, could otherwise represent potential sources of migrating landfill gas to the proposed development. On the basis of the foregoing unless intrusive ground investigation proves potentially methanogenic materials within the site itself, there should be no requirement for landfill gas protection measures within any proposed development.
- 3.10** Consultation of the Public Health England “UK maps of radon” online resource and BRE records indicates 0-1% of homes to be above the actionable level, suggesting that no radon protection measures are required in new development at this site. This should as usual be confirmed with the local building control officer.

Unexploded Ordnance Risk

- 3.11** An online review of regional unexploded bomb data on the Zetica website indicates that this area of Gloucestershire is considered to constitute a low risk (less than fifteen bombs per thousand acres), and for which a more detailed unexploded ordnance (UXO) assessment is considered unnecessary.

4 PROPOSED DEVELOPMENT

- 4.1** The site is to be developed with a residential end use comprising three plots including a single one-storey dwelling and two semi-detached two-storey dwellings each with associated private gardens and parking. The existing vehicular access from Badminton Road is to be retained. The proposed development layout (based upon Quattro Design Architects Drawing No. 6393-P-10 Rev H, dated June 2020) is reproduced as drawing 4801/2.

5 PRELIMINARY RISK ASSESSMENT AND CONCEPTUAL SITE MODEL

5.1 The site and its immediate surroundings have been assessed in terms of current and historical land use and the environmental, geological and hydrogeological setting; the methodology of which is described in Appendix 3. In view of the proposed residential development, for risk assessment purposes the **critical receptor** would be a female child (age class 1-6) and our assessment has been progressed on this basis.

5.2 Review of historical mapping suggests that the site was undeveloped since the earliest available mapping of 1884 up until c.1963 when the lock-up garages that remain until the present day were originally constructed.

5.3 In view of the foregoing the potential sources and the **principal contaminants of concern** are presented in Table 2 below.

TABLE 2: POTENTIAL SOURCES AND PRINCIPAL CONTAMINANTS OF CONCERN

Potential Sources		Principal Contaminants of Concern
ON-SITE	Unrecorded made ground	Toxic and phytotoxic metals PAH TPH pACM
	BLi/ChM	Elevated sulphates/ sulphides
OFF-SITE	None	None

5.4 The above information is converted into the preliminary Conceptual Site Model shown in Figure 1 below, and the **potential pollutant linkages** involving future residents, proposed services and local environmental receptors are discussed in Table 3, with appropriate risk levels.

FIGURE 1: PRELIMINARY CONCEPTUAL SITE MODEL (NTS)

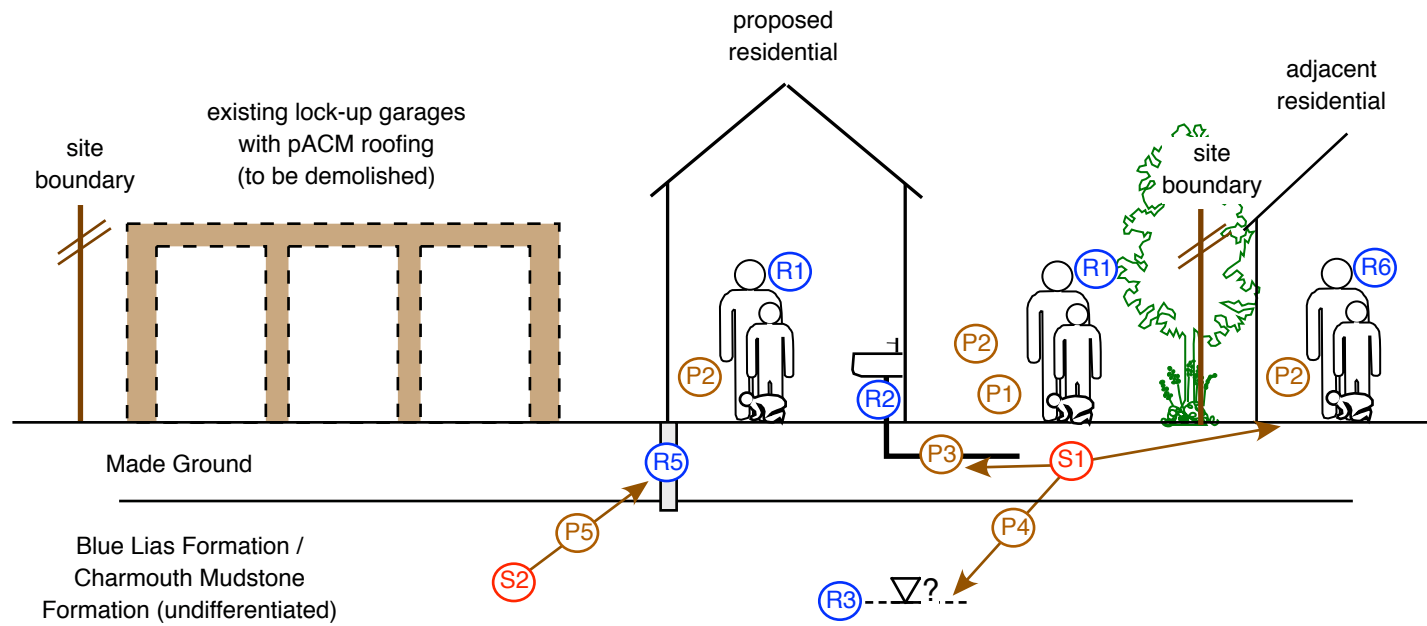


TABLE 3: SUMMARY OF PRELIMINARY POTENTIAL POLLUTANT LINKAGES

Potential Sources	Pathways	Receptors						Comments	Preliminary Risk Assessment
		R1	R2	R3	R4	R5	R6		
ON-SITE									
S1	P1	X						Former site usage as lock-up garages may have led to localised contamination of near surface subsoil	Low - Moderate
	P2	X					X		
	P3		X						
	P4			X					
	P5								
	P6								
	P7								
S2	P1							BLi/ChM often naturally elevated in sulphate/sulphide	High
	P2								
	P3								
	P4								
	P5					X			
	P6								
	P7								
S3	P1							Garages identified as having pACM corrugated cement roofing. Roofing currently in good unbroken condition	Low - Moderate
	P2	X					X		
	P3								
	P4								
	P5								
	P6								
	P7								
OFF-SITE									
None									
SOURCES	S1	Unrecorded near surface made ground beneath site							
	S2	Natural BLi/ChM							
	S3	pACM corrugated roofing on existing garages							
PATHWAYS	P1	Direct dermal contact or ingestion and via soil attached to vegetables							
	P2	Inhalation of dust and vapours							
	P3	Permeation into new water supply pipework							
	P4	Vertical leaching of leachable contaminants in unsaturated zone and lateral migration in saturated zone							
	P5	Direct contact with high sulphate-bearing clay							
	P6	Landfill gas migration through unsaturated zone and accumulation within confined spaces							
	P7	Radon gas migration through unsaturated zone and accumulation within confined spaces							
RECEPTORS	R1	Future site users (critical residential receptor is female child age class 1-6)							
	R2	Potable water supply							
	R3	Groundwater (BLi/ChM classified as "Secondary undifferentiated" aquifer)							
	R4	Surface waters (Sud Brook c400m NE)							
	R5	Concrete foundations							
	R6	Adjacent site users (residential)							

- 5.5** The findings of the Phase 1 desk study suggest a low to moderate risk that the site may contain contaminants at elevations sufficient to pose a significant risk to human health or environmental receptors. Given the proposal for a sensitive residential development including private gardens it was considered prudent to undertake an intrusive ground investigation, the results of which are reported below. All contamination test results have been incorporated into an appropriate quantitative risk assessment to determine risk levels to the obvious receptors in the form of future site users and groundwater quality, as well as those less obvious such as the proposed buildings and infrastructure, such that any necessary remedial measures can be identified and recommended to ensure that the developed site will be “fit for purpose”.

6 **GROUND INVESTIGATION REPORT**

Site Works

- 6.1** The Phase 2 intrusive investigation took place on 1st March 2021 by a combination of borehole drilling and trial pitting. The locations of all exploratory hole positions were selected by this Practice with due regard to the proposed development layout and taking into account access limitations imposed by the site’s existing structures. All available service plans were reviewed and positions were subsequently marked out on site (again by this Practice) using on and off-site reference points and these are indicated on drawing 4801/2. A CAT electrical service scanner was deployed at surface prior to all intrusive works and as an added precaution all borehole positions were preceded by manually excavated inspection pits up to 1.0m depth. No services (recorded or unrecorded) were physically encountered during the intrusive works.
- 6.2** A total of three small diameter windowless sampling boreholes (WS1 - WS3) were drilled up to 3.45m depth using a Terrier 2002 drilling rig. In-situ standard penetration tests (SPT) were undertaken at 1.0m intervals in accordance with BS EN ISO 22476-3:2005 to assess the relative density of the material penetrated and these results are indicated on the respective logs in Appendix 2. All arisings were logged by a suitably qualified engineer from this Practice in accordance with Eurocode 7 (BS EN ISO 14688-1:2002 and 14688-2:2004) and representative disturbed samples taken for geotechnical and contamination testing as appropriate.

- 6.3** Insitu percolation testing was undertaken during the works to establish the infiltration potential of the natural ground with a single representative ‘falling head’ percolation test undertaken in borehole WS1. Results are presented graphically on the log in Appendix 2 and soakaway feasibility is discussed in Section 6.15-6.16 of this report.
- 6.4** Boreholes were supplemented by a single manually excavated trial pit (HDP1) excavated to 0.40m depth, located to target the proposed private garden area of plot 1 for purposes of sampling for contamination testing. As above, detailed descriptions of all the strata encountered and samples taken are included on the trial pit logs in Appendix 2.
- 6.5** Upon completion all boreholes/pits were backfilled using arisings nominally compacted by hand flush with surface.

Laboratory Testing - Geotechnical

- 6.6** A number of disturbed samples were taken for routine geotechnical classification testing, comprising moisture content and plasticity determinations, along with classification to the Unified Soil Classification Scheme (USCS) and NHBC Standards, plus acidity and sulphate analysis to BRE Special Digest 1 requirements. Results are tabulated below.

TABLE 4: PLASTICITY TEST RESULTS AND CLASSIFICATION

WS No.	Depth (m)	Sample of	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Plasticity / USCS	Consistency Index	<425µm (%)	Modified Plasticity Index (%)	Volume Change Potential (NHBC)
WS1	1.00	BLi/ChM	38	68	34	34	SIH	0.88	88	30	Medium
WS1	2.00	BLi/ChM	27	63	28	35	CIH	1.03	100	35	Medium
WS2	0.50	BLi/ChM	27	80	30	50	CIV	1.06	82	41	High
WS2	1.50	BLi/ChM	28	66	29	37	CIH	1.03	100	37	Medium
WS3	2.50	BLi/ChM	27	65	31	34	CIH	1.12	100	34	Medium

BLi/ChM: Blue Lias Formation / Charmouth Mudstone Formation (undifferentiated)

TABLE 5: CHEMICAL TEST RESULTS AND CLASSIFICATION

BH No.	Depth (m)	Sample of	Total sulphate SO ₄ (%)	Total sulphur (%)	Total potential sulphate SO ₄ (%)	Oxidisable Sulphides SO ₄ (%)	pH value in soil	Water soluble sulphate SO ₄ (mg/l)	Design Sulphate Class	Aggressive Chemical Concrete Class
WS1	1.00	BLi/ChM	0.121	0.177	0.531	0.41	7.8	495	DS-2	AC-2
WS1	2.00	BLi/ChM	6.15	1.83	5.49	0	7.5	3520	DS-5	AC-5
WS2	0.50	BLi/ChM	0.108	0.04	0.12	0.012	7.7	226	DS-1	AC-1
WS2	1.50	BLi/ChM	9.27	2.49	7.47	0	7.5	5010	DS-5	AC-5
WS3	2.50	BLi/ChM	4.48	1.32	3.96	0	7.3	4980	DS-5	AC-5

BLi/ChM: Blue Lias Formation / Charmouth Mudstone Formation (undifferentiated)

Laboratory Testing - Contamination

- 6.7** The contamination sampling scheme was conducted in accordance with BS10175:2011. Exploratory positions were selected (where possible) with the intention of targeting the locations of proposed gardens. All test results have been incorporated into an appropriate risk assessment to determine risk levels to the receptors, such that any necessary remedial measures can be identified and recommended to ensure that the proposed development site is 'fit for use'.
- 6.8** Representative samples of topsoil and natural undisturbed soil taken from the upper 1.0m of extracted ground were sent to UKAS accredited i2 Analytical Ltd Laboratories in Poland where (based upon the principal contaminants of concern in Table 2) analysis selectively comprised the following:
- Toxic and phytotoxic metals
 - pH
 - Total Petroleum Hydrocarbons (TPH)
 - Poly Aromatic Hydrocarbons (PAH)
 - Asbestos Screen and ID
 - Soil organic matter content
- 6.9** Risk to controlled waters was determined by leachate analysis of a single representative sample of subsoil (WS3/0.40m) which was tested to determine the leachable content of toxic and phytotoxic metals plus PAH.

- 6.10** The certified laboratory test results are presented as Appendix 3 and for convenience these have also been summarised to facilitate comparison against assessment criteria. All results and their implications upon the preliminary CSM are further discussed in Sections 8 and 9.

Discussion on Ground Conditions

- 6.11** Ground conditions appear to be commensurate with both geological mapping and anticipated findings. Beneath a thin mantle of hardstand and made ground sub-base all exploratory holes encountered undisturbed clay of the recorded BLi/ChM. A summary of the observed strata is presented in Table 6 below.

TABLE 6: SUMMARY OF OBSERVED STRATA

Stratum	Base Depth (m)	Notes
HARDSTAND: probable dense, black, medium to coarse GRAVEL of tarmac	0.06 - 0.10	Encountered in all exploratory positions
MADE GROUND (SUB-BASE): probable medium dense, orangish brown, sandy, fine to coarse angular GRAVEL of limestone	0.25 – 0.40	Encountered in all exploratory positions
CLAY: initially soft, greenish-grey, rapidly becoming firm, mottled orangish brown plastic CLAY. With increasing depth grading to bluish-grey with localised shell fragments and gypsum crystals. Becoming stiff below 3.0m depth <i>(Undifferentiated Blue Lias / Charmouth Mudstone Formation)</i>	>3.45	Encountered in all exploratory positions
Perched/Groundwater	NA	
Roots	WS1 - >2.5m	
Desiccation	NA	

- 6.12** Based upon on-site visual and olfactory examination of the subsoil there was nothing to suggest the presence of obviously significantly contaminated subsoil, although a thin mantle of made ground sub-base was identified immediately below tarmac hardstand throughout. No odour or staining typical of hydrocarbon contamination was identified, nor was there any indication of visible asbestos fragments.
- 6.13** The BLi/ChM was identified as entirely cohesive in composition and index testing performed on this undisturbed material classifies it as high to very high plasticity clay

of medium to high volume change potential in accordance with NHBC Standards. Consistency index (CI) values of between 0.88 and 1.12 suggests that soils (at the borehole locations at least) are currently normally hydrated. Please note that boundary trees would be expected to continue to desiccate the soil throughout the summer months with worst-case conditions expected at the end of the summer season, so depending upon the time of year of development the foregoing may change from that reported.

- 6.14** No water entry was recorded in any of the exploratory holes and all boreholes remained dry during the time they remained open. Please note that perched/groundwater levels are of course subject to seasonal fluctuation according to prevailing weather conditions, and the situation encountered and described above could potentially change in the future, especially in a period of seemingly ever-apparent but unpredictable climate change.

Percolation Testing - Soakaway Feasibility

- 6.15** A single representative falling head percolation test was undertaken within borehole WS1 with a test zone depth of between 0.75m and 3.00m (test records are provided with the logs in Appendix 2). Time constraints meant that only a single test was possible within the single day of sitework. The test took place into undisturbed clay of the BLi/ChM and as predicted due to the cohesive soil profile throughout the test zone, negligible infiltration was recorded meaning that it has not been possible to calculate a soil infiltration rate.
- 6.16** The soil profile and infiltration results are considered to be representative of the soils beneath the entire site and the undisturbed BLi/ChM is considered unsuitable for the adoption of a conventional SUDs-type drainage system. It is therefore recommended that an alternative drainage option be considered such as rainwater harvesting or transmission of storm water run-off to the existing drainage network. In the case of the latter it will be necessary to provide evidence to the local water provider (Severn Trent Water) that the construction of soakaways within the site is not practical given the impermeable nature of the underlying geology, and the results in Appendix 2 of this report should suffice.

7 GEOTECHNICAL DESIGN REPORT

7.1 The site investigation works achieved by the exploratory holes have proven ground conditions beneath the site to be in accordance with recorded mapping. Beneath a surface mantle of building/hardstand and underlying sub-base all boreholes encountered undisturbed clay of the recorded BLi/ChM to termination.

7.2 In the absence of definitive information pertaining to structure and/or anticipated design loads etc, foundation recommendations at this stage are relatively generic, based upon assumed/envisaged methods of construction in light of the ground conditions encountered.

Strip / Trenchfill Foundations

7.3 The natural weathered cohesive soils of the BLi/ChM classify as predominantly high plasticity and of medium volume change potential, therefore (following NHBC Standards) a minimum founding depth of 0.9m is required, or greater within the radius of influence of trees and obviously subject to those foundations also penetrating through any localised softer or disturbed deposits (including any made ground etc) to found in competent undisturbed and normally hydrated natural material.

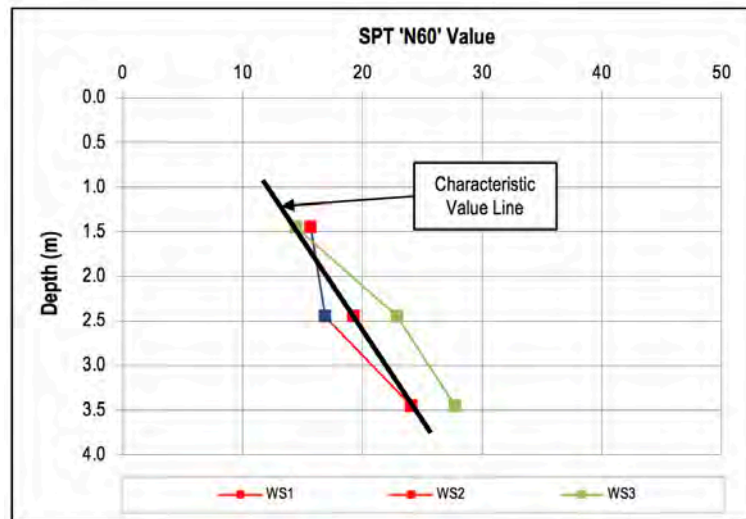
7.4 Consideration has been given as to whether any additional foundation deepening is required (beyond the aforementioned minimum) to account for potential tree root activity. Site observations indicate a small boundary number of on-site and off-site trees/hedgerows, the most significant of which is a mature oak (high water demand). Plot specific foundation depths have therefore been calculated as shown on drawing 4801/2 and are based on the proposed development layout using mature tree height and medium volume change potential of the soil.

7.5 All buildings will be located within the zone of influence of the mature Oak tree and will therefore require heave protection. Given the medium volume change potential, a 50mm thick compressible membrane is recommended against the inside face of all external foundations deeper than 1.5m in order to overcome unbalanced lateral heave forces (unless NHBC is satisfied that the soil is not desiccated at the time of construction). Such protection should be applied on all faces of external foundations with the lower 0.5m left unprotected. Given the proximity of trees and potential for rooted soils the buildings will also require suspended ground floor slabs. These should

incorporate a subfloor void of 100mm for insitu concrete or 250mm for precast concrete and timber floors.

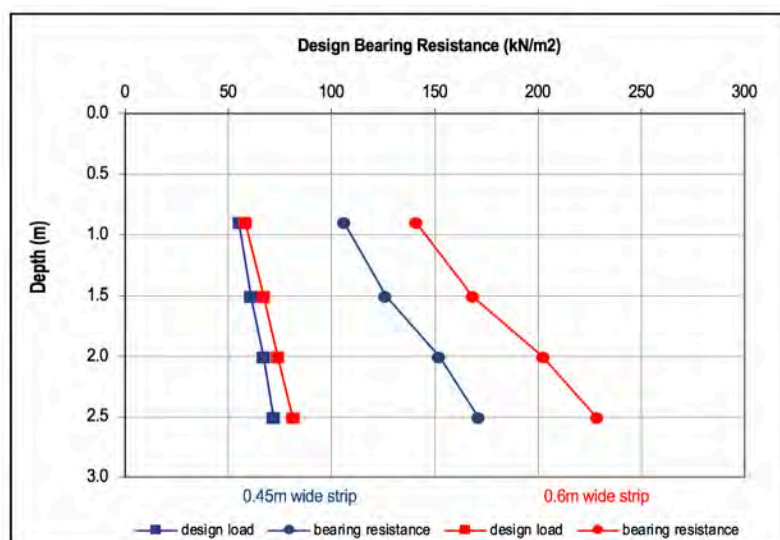
- 7.6** Design calculations in Eurocode 7 (BS EN 1997-1) require the establishment of design values for actions, ground properties and ground resistances, definition of the limits that must not be exceeded (usually a serviceability limit state), the setting up of calculation models for the relevant ultimate or serviceability limit state, and showing by such calculation that these limits will not be exceeded. Design values for such calculations are derived by applying partial factors to characteristic values for actions, ground properties and ground resistances, and based upon the foregoing geotechnical model and following the requirements of Design Approach 1, both Combination 1 and Combination 2 calculations have been undertaken. This Practice has adopted the Combination 2 calculation for foundation design as this applies partial factors to resistances rather than actions and therefore provides a slightly more conservative value. Calculation sheets can be presented upon request.
- 7.7** BS EN 1997-2:2007 and BS EN ISO 22475-1:2006 require quality class 1 samples for determination of soil shear strength, and such samples can only be obtained by category A sampling methods. To avoid the costly complexities of such sampling in-situ tests can alternatively be undertaken, the borehole standard penetration test (SPT) being a commonly adopted method. Field results are adjusted or 'normalised' in accordance with Eurocode requirements (BS EN ISO 22476-9:2009), to enable the generation of characteristic values of undrained shear strength that can then be used for determination of bearing resistance as described above.
- 7.8** Uncorrected SPT N-values are shown on the borehole logs and normalised N-values shown are also presented as N_{60} versus depth in Figure 2.

FIGURE 2: SPT 'N₆₀' VALUE -v- DEPTH



7.9 Using the characteristic value line in Figure 2 and adopting a characteristic SPT N_{60} value of 13 at 0.9m depth, based on a conventional two-storey residential line load of 45kN/m, the design bearing resistance (bearing capacity) for a standard 0.6m wide strip/trench-fill foundation is estimated to be approximately 141kN/m², which exceeds the likely bearing pressure of 58kN/m² and confirms suitability. Similar calculations also demonstrate suitability for 0.45m wide foundations at this depth, with a bearing capacity of 106kN/m² which exceeds a likely bearing pressure of 55kN/m². The design bearing resistance continues to increase with increasing depth so greater founding depths will also be sufficient for the proposed development. The design bearing resistance is plotted in Figure 3 below.

FIGURE 3: DESIGN BEARING RESISTANCE -v- DEPTH



- 7.10** Perched water / groundwater is unlikely to be encountered at the minimum founding depth. As always please be aware that groundwater levels may vary seasonally, and water may therefore be encountered at levels in variance to those recorded by this investigation. It is recommended that any excavations are not left open and unsupported for any longer than necessary.

Buried Concrete Protection

- 7.11** The results of acidity and sulphate testing presented in Table 5 show that buried concrete associated with foundations will require a Design Sulphate Class DS-5 and Aggressive Chemical Environment for Concrete Class ACEC-5 in accordance with BRE Special Digest 1 (2005). Floor slabs can potentially be designed to a specification of DS-1/AC-1 as long as they don't come into contact with clay arisings from greater than 0.5m depth, in which case an increased specification will be necessary.

Road/Pavement Design

- 7.12** With regard to road/pavement design, laboratory index analysis, compared to Highways Agency Interim Advice Note 73/06, Rev 1 (2009) indicates a CBR value of 2.0-2.5%, although it is recommended that in-situ testing be carried out closer to the time of construction to obtain a more accurate bearing ratio, since CBR value will vary seasonally. The clay soil is not considered to be frost-susceptible, however the Local Authority should be able to advise based upon their previous experience in the area.

Recommendations for Monitoring of Ground Conditions During Construction

- 7.13** In view of the importance of founding on natural ground, a careful watch must be maintained during all foundation excavations to ensure that this requirement has been satisfied.
- 7.14** Due to the potential for cohesive soils to shrink and swell, inspection during foundation excavations should ensure that no live roots or evidence of desiccation is visible at the founding horizon.
- 7.15** In the event of any doubt in the above matters, this Practice would be pleased to attend site as instructed.

8 CONTAMINATION RISK ASSESSMENT AND SOIL WASTE CLASSIFICATION

Human Health

- 8.1 The contamination risk assessment has been carried out in general accordance with the methodology described within Appendix 3. Testing has included samples of the near-surface topsoil and made ground to assess their suitability for retention within a proposed residential development. Tier 1 risk modelling has adopted the '**Residential – with plant uptake**' land use scenario and the 'critical receptor' is taken as a female child age class 1-6.
- 8.2 A number of disturbed samples were taken for laboratory contamination testing as previously detailed in Section 6.8. Whilst these results are presented in full in Appendix 3, for ease of reference Table 7 below provides a summary of the maximum measured concentration of each determinant against respective Tier 1 GAC.

TABLE 7: COMPARISON OF SOIL CHEMICAL TEST RESULTS WITH GUIDELINE VALUES

Determinant	Maximum Measured Concentration (mg/kg)	LQM/CIEH S4UL Residential with plant uptake (mg/kg) \$	Tests Undertaken (No8.)	Exceedances (No.)	Notes
Arsenic	23	37	4	0	
Cadmium	<0.2	11	4	0	
Chromium (III)	41	910	4	0	
Chromium (VI)	<1.2	6	4	0	
Copper	20	2,400	4	0	
Lead	19	200*	4	0	
Mercury	<0.3	40	4	0	
Nickel	24	130	4	0	
Selenium	<1.0	250	4	0	
Zinc	77	3,700	4	0	
TPH (C6-C40)	1100	various	2	0	
PAH compounds	7.84	various	4	0	
Asbestos	ND	N/A	4	0	
Notes:					

ND	None Detected
*	Provisional C4SL
\$	Based on soil organic matter = 2.5%

- 8.3** It will be seen from the above table and summary sheet presented in Appendix 3 that concentrations of all individual toxic and phytotoxic metals, PAH compounds and TPH compounds fall below Tier 1 C4SL/S4UL levels and additionally no loose fibres of asbestos were detected. On the basis of the foregoing, progression to a Tier 2 assessment is considered unnecessary, with no requirement for further assessment or consideration of remedial measures to address risk to human health.

Water Supply Pipework

- 8.4** In addition to the above, consideration has been given to the potential effects of recorded concentrations on new water utility pipework. Given the general absence of organic contaminants there ought to be no requirement for upgraded barrier pipework and the results of the contamination testing undertaken as part of this investigation would seem to support this, although of course this is subject to the proposed actual route of pipework through the site. As always it is recommended that advice be sought from the local regulatory authority prior to ordering, since it is possible that their specific in-house thresholds may differ markedly from those within the most recent guidance by UK Water Industry Research (UKWIR) report "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (2010).

Landfill Gas and Radon Gas

- 8.5** It was previously established in the desk study researches that there are no active or historical landfill sites, and indeed no potentially infilled features such as ponds or quarries were identified within potential influencing distance so the site is therefore unlikely to be affected by landfill gases. The boreholes have since found no evidence of methanogenic material beneath the site thus landfill gas protection measures are not considered necessary within new development.
- 8.6** As discussed in Section 3.10 no radon gas protection measures are required in new development at this site.

Controlled Waters

- 8.7** The risk to controlled waters has been assessed by leachate analysis on a single representative sample of subsoil, tested to determine the leachable content of toxic and phytotoxic metals plus PAH compounds. Consistent with the soil phase results it will be seen that there are no significant elevations exceeding WFD, EQS or UK DWS levels, and on this basis it is considered that the site does not pose a significant risk to controlled waters or groundwater resources and pre-construction remedial action is not currently considered necessary.

Waste Classification for Off-Site Disposal of Arisings

- 8.8** In accordance with current legislation all soil arisings generated for disposal as part of this development site are by definition a "commercial waste" and will be classified as both a directive and a controlled waste. Should it be necessary to remove from site any surplus excavation arisings, topsoil or undisturbed ground, then as per the European Waste Catalogue (EWC) these will be coded 1705, that is "soil (including excavated soil from contaminated sites), stones and dredging spoil".
- 8.9** Using the HazWasteOnline software and in accordance with Technical Guidance Waste Management 3 (TGWM3) 1st Edition, 2015) the contamination test results obtained for that material have been compared with respective threshold data as set out in TGWM3 in order that this specific waste stream can be classified. As shown in Appendix 4, this material would be classified as a "Non-hazardous Mirror Entry" under EWC Code 170504 (soil and stones that do not contain the tested dangerous substances above the respective threshold value).
- 8.10** The foregoing has been supplemented by a WAC test (performed upon a single composite sample from across the site). Results are presented in Appendix 4, which show that all tested determinands fall within acceptable thresholds for inert waste (EWC Code 17-05-04), although as always clarification should be sought from the receiving landfill operator concerning the acceptability of the material. It is recommended therefore that results be provided to the receiving landfill operator for their assessment/interpretation, since the acceptance/classification of waste is at their discretion.

Caveats

- 8.11** In line with best industry practice the scope of contamination testing has been based upon the site history, current land usage and actual findings, with reference where necessary to DoE Industry Profiles and DEFRA/EA guidance. To the best of our knowledge information concerning the land quality assessment is accurate at the date of issue, however subsurface conditions including ground contamination may vary spatially and with time. There may be conditions pertaining to the site not disclosed by the above sources of information, which might have a bearing upon the recommendations made, were such conditions known. We have however used our professional judgement in order to limit this during the investigation.
- 8.12** The conclusions and recommendations made in respect of land quality do not address any potential risks to site operatives or ground workers during the construction stage. These issues should be addressed by the Principal Contractor in accordance with the relevant statutory procedures and regulations (CDM Regulations 2015).
- 8.13** It is important that these limitations be clearly recognised when the findings and recommendations of this report are being interpreted. Additional assessment may be necessary should a significant delay occur between report date and implementation of the proposed scheme to which it relates.

9 REFINED CONCEPTUAL SITE MODEL

9.1 In view of the above discussions the preliminary conceptual site model has been refined as shown in Figure 4 and Table 8 below.

FIGURE 4: REFINED CONCEPTUAL SITE MODEL (NTS)

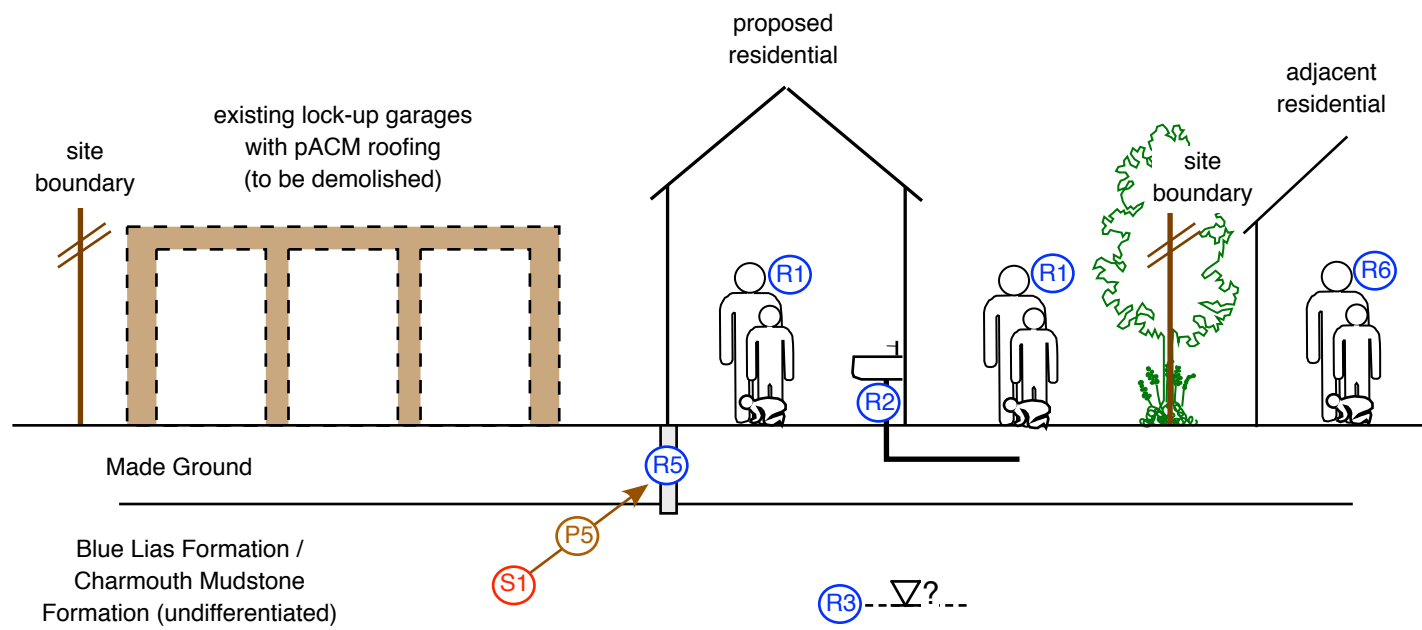


TABLE 8: SUMMARY OF POTENTIAL / IDENTIFIED POLLUTANT LINKAGES

Potential Sources	Pathways	Receptors						Comments	Refined Risk Rating	Remedial/Mitigation Requirements
		R1	R2	R3	R4	R5	R6			
ON-SITE										
S1	P1							Elevated sulphate/sulphide recorded within BLi/ChM	High	DS-1/AC-1 above 0.50m depth, increase to DS-2/AC-2 between 0.50m and 1.00m depth, and below 1.0m depth increase to DS-5/AC-5
	P2									
	P3									
	P4									
	P5					X				
	P6									
	P7									
S2	P1							Garages identified as having pACM corrugated cement roofing. Roofing currently in good unbroken condition	Low / Moderate	Roofing to be carefully removed by specialists and disposed off-site as Hazardous Waste
	P2	X					X			
	P3									
	P4									
	P5									
	P6									
	P7									
OFF-SITE										
None										
SOURCES	S1	Natural BLi/ChM								
	S2	pACM corrugated roofing on existing garages								
PATHWAYS	P1	Direct dermal contact or ingestion and via soil attached to vegetables								
	P2	Inhalation of dust and vapours								
	P3	Permeation into new water supply pipework								
	P4	Vertical leaching of leachable contaminants in unsaturated zone and lateral migration in saturated zone								
	P5	Direct contact with high sulphate-bearing clay								
	P6	Landfill gas migration through unsaturated zone and accumulation within confined spaces								
	P7	Radon gas migration through unsaturated zone and accumulation within confined spaces								
RECEPTORS	R1	Future site users (critical residential receptor is female child age class 1-6)								
	R2	Potable water supply								
	R3	Groundwater (BLi/ChM classified as "Secondary undifferentiated" aquifer)								
	R4	Surface waters								
	R5	Concrete foundations								
	R6	Adjacent site users (residential)								

- 9.2 In summary, the findings of the foregoing quantitative contamination risk assessment indicate that the soil beneath the site is uncontaminated, with low perceived risk to human health and similarly no significant risk to controlled waters. Despite the foregoing the existing buildings do contain roofing suspected as consisting of Asbestos Containing Material, so prior to demolition it is recommended that this is checked and confirmed by an asbestos specialist, and the sheets subsequently removed prior to main demolition to prevent potential release of loose asbestos fibres into the atmosphere.

10 **CONCLUSIONS AND RECOMMENDATIONS**

- 10.1 The foregoing discussions and recommendations are based upon the results of a geo-environmental desk study, followed by intrusive ground investigation comprising boreholes plus laboratory geotechnical and contamination testing. The intrusive works appear to present a consistent pattern of subsoil conditions concordant with recorded geological mapping, comprising a thin surface mantle of made ground, underlain by weathered “bedrock” of the BLi/ChM. As always however a careful watch should be maintained for any anomalous conditions during site stripping and excavation, which should be reported back to this Practice for further investigation and assessment.
- 10.2 Phase 1 researches indicate that the site was undeveloped since the earliest available mapping of 1884 up sometime between 1956 and 1963 when the lock-up garages were constructed. The site appears to have subsequently remained unchanged until the present day.
- 10.3 The intrusive investigation has proven a superficial mantle of surface hardstand and made ground (sub-base) up to 0.4m depth, underlain by natural weathered cohesive material of the BLi/ChM proven to terminal depth in all exploratory positions. All exploratory holes remained dry and stable during the time that they were left open and the short-term stability of side walls within open excavations is unlikely to be an issue during construction, however groundwater levels do vary seasonally and care should be taken if development is proposed during the traditionally wetter winter months as a potentially high water table (not encountered during this investigation) may then result in an adverse effect upon short-term side wall stability. As always it is recommended that any excavations are not left open and unsupported for any longer than necessary.

- 10.4** Foundations will need to penetrate any near surface disturbed, softer or desiccated ground to found at minimum 0.90m depth within normally hydrated soils of the BLi/ChM, with foundation deepening within influencing distance of existing trees (see **Section 7** and drawing 4801/2). Suspended ground floor slabs and heave protection will be required.
- 10.5** Buried concrete associated with foundations will require a Design Sulphate Class DS-5 and Aggressive Chemical Environment for Concrete Class ACEC-5 in accordance with BRE Special Digest 1 (2005). Floor slabs can potentially be designed to a specification of DS-1/AC-1 but only as long as they don't come into contact with clay arisings from greater than 0.5m depth, in which case an increased specification will be necessary.
- 10.6** In terms of proposed external road/pavement design a CBR value of 2.0-2.5% has been determined which indicates such material at a depth horizon of 0.5m should be suitable for road/pavement design and such material is unlikely to be frost susceptible. As always we recommend that in-situ tests be undertaken closer to the time of construction.
- 10.7** Percolation testing confirms the site to be unsuitable for the installation of a soakaway (SUDs) drainage system, thus an alternative method of rainwater disposal will need to be utilised.
- 10.8** A detailed contamination risk assessment indicates that the site is effectively uncontaminated with no impact from suspected off-site sources, where there is no perceived risk to human health and similarly no significant risk to controlled waters. Based upon the foregoing there is no identified requirement for remediation necessary to render the site "fit for use".
- 10.9** There is no requirement for landfill or radon gas protection measures in new dwellings.
- 10.10** With regards to off-site disposal of arisings, all arisings classify as a "Non-hazardous Mirror Entry" and a supporting WAC test has also confirmed that such soils can be disposed of as inert waste (EWC Code 17-05-04).
- 10.11** Should planning consent be subject to certain conditions, this report and attachments should be lodged with the local planning authority, such that they can update their records.

10.12 The above recommendations must not be used in respect of any development differing in any way from the proposals described in this report, without reference back to this Practice or to another geotechnical/geo-environmental specialist. This report is subject to our standard terms and conditions.

11 **REFERENCES**

Geotechnical

BS EN 1997-1:2004 'Geotechnical Design - *General Rules*'

BS EN 1997-2:2007 'Geotechnical Design - *Ground Investigation and Testing*'

British Standards Institute, BS5930:2015 '*Code of Practice for Ground Investigations*'

National House Building Council (NHBC) Standards: Chapter 4.2 '*Building Near Trees*' (2016)

BS EN 14688: '*Geotechnical Investigation and Testing - Identification and Classification of Soil Part 1 Identification and Description*' (2002)

BS EN 14688: '*Geotechnical Investigation and Testing - Identification and Classification of Soil Part 2 Principles for a Classification*' (2004)

BS EN 14689: '*Geotechnical Investigation and Testing - Identification and Classification of Rock Part 1 Identification and Description*' (2003)

British Standards Institute, BS 1377: '*British Standard Methods of Test for Soils for Civil Engineering Purposes*', Parts 1 - 9, (1990)

Highways Agency *Interim Advice Note 73/06 Rev.1 (2009) Design Guidance for Road Pavement Foundations*

Building Research Establishment (BRE) Special Digest 1 '*Concrete in Aggressive Ground*' (2005)

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Building Research Establishment (BRE) Digest 365 "*Soakaway Design*" (2016)

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British Standards Institute, BS 10175: '*Code of Practice for the Investigation of Potentially Contaminated Sites*' (2011)

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CIRIA C735:2014 '*Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases*'

British Standards Institute, BS8485: '*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*' (2015)

Building Research Establishment (BRE BR211): Radon – '*Guidance on protective measures for new buildings*' (2015)

Environment Agency. '*River Basins Typology, Standards and Groundwater (Water Framework Directive) (England and Wales) Directions*' (2010)

Environment Agency. '*The Water Framework Directive (Standards and Classification) Directions (England and Wales)*' (2015)

The Water Supply (Water Quality) Regulations 2000 (Amendment) Regulations (2007)

UK Water Industry Research Limited (UKWIR). '*Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites*' (2010)

Technical Guidance Waste Management 3 (TGWM3, EA Version 1.0, May 2015)
Building Research Establishment (BRE)- *'Cover Systems for Land Regeneration'* (2004)
Envirocheck Historical Mapping Reference 74790599_1_1 dated 10th November 2015
Environment Agency (www.environment-agency.gov.uk)
Zetica (www.zetica.com)
Google Earth (current and historical aerial mapping plus street view)
UK Grid Reference Finder (www.gridreferencefinder.com)
MAGIC (www.magic-defra.gov.uk)
One Touch Data (www.HazWasteOnLine.com)

SITE LOCATION (based on Microsoft Bing Mapping)

Job No.

4801

Drawing No.

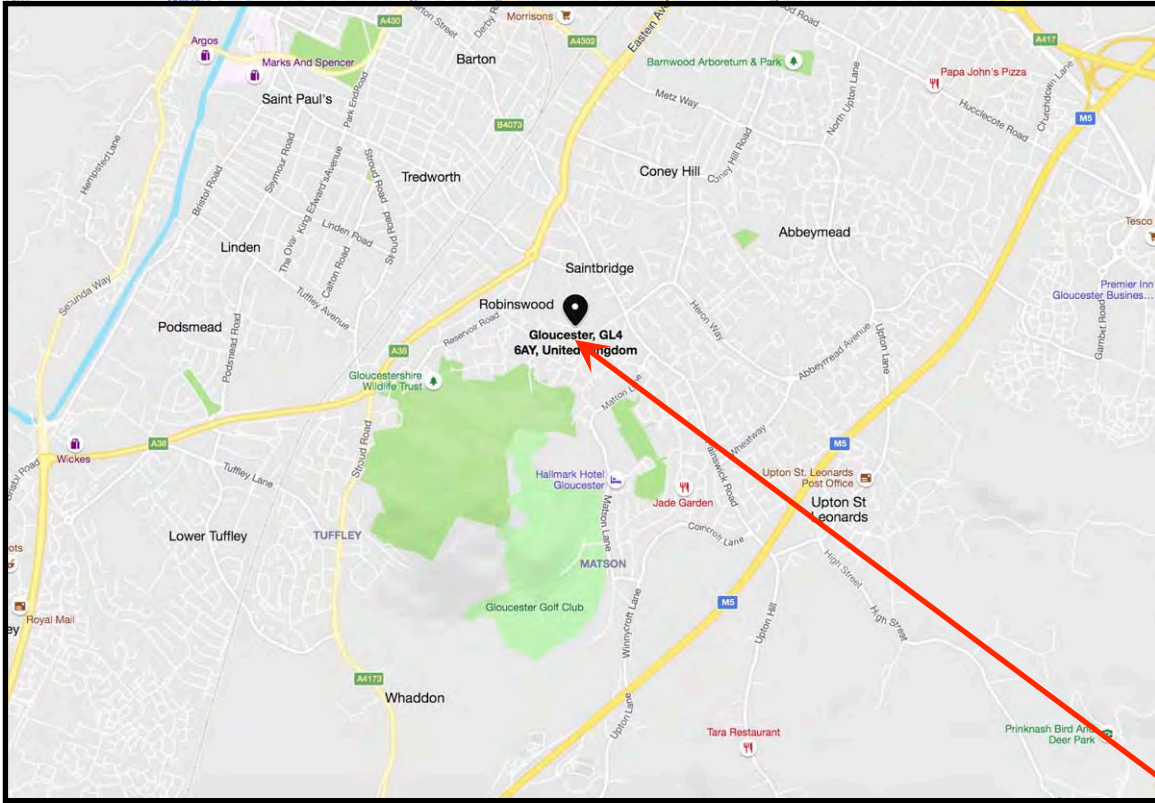
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18-02-21



THE SITE



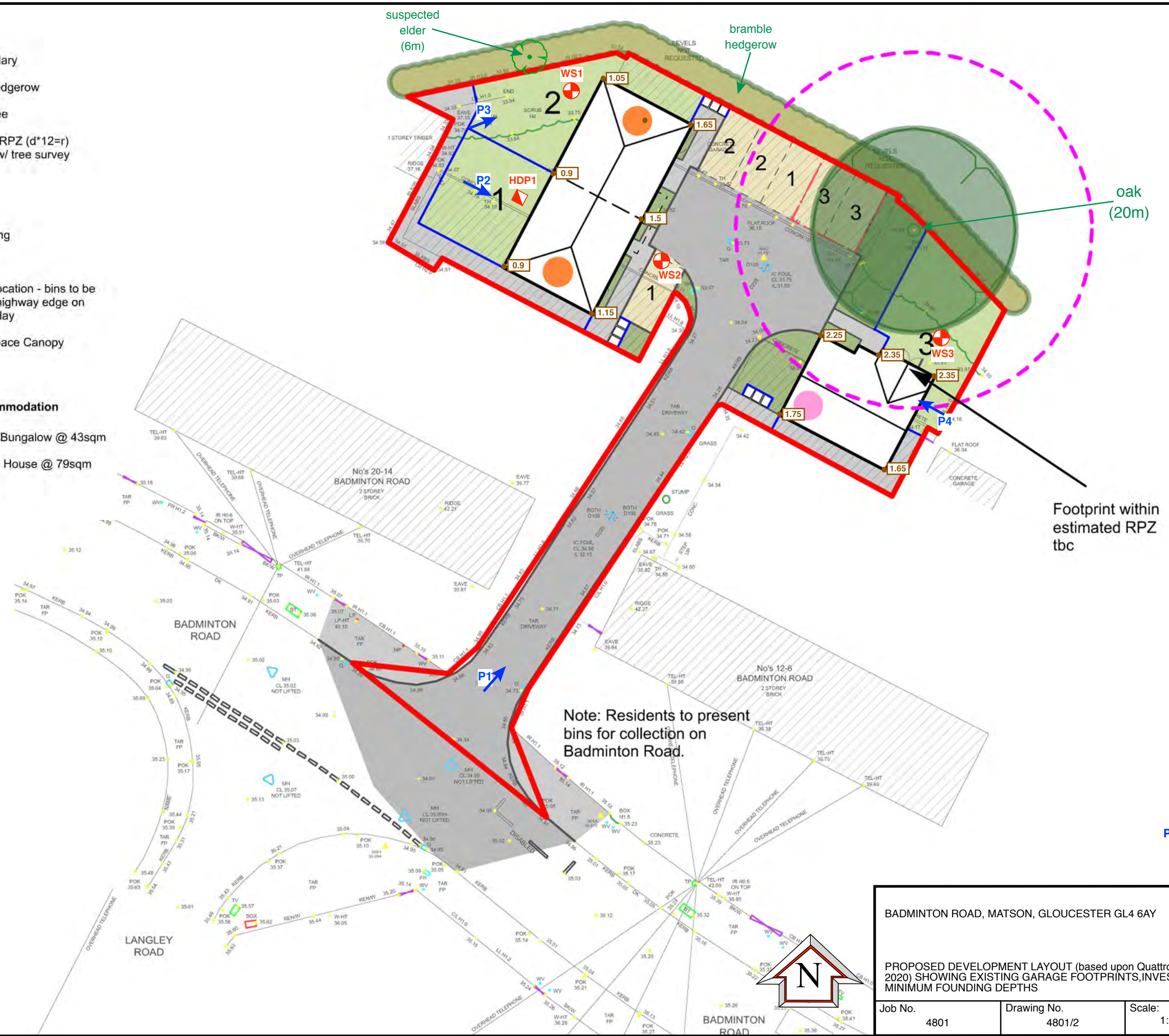
Key

- Site Boundary
- Existing hedgerow
- Existing tree
- Estimated RPZ (d*12=r)
- area tbc w/ tree survey
- Road
- Footpath
- Block paving
- Fence
- Bin store location - bins to be carried to highway edge on collection day
- Parking Space Canopy

Schedule of accommodation

- 1no. 1Bed Bungalow @ 43sqm
- 2no. 2 Bed House @ 79sqm

Total: 3no Units



suspected elder (6m)

bramble hedgerow

oak (20m)

Note: Residents to present bins for collection on Badminton Road.

Footprint within estimated RPZ tbc

Minimum founding depths 0.9 calculated in line with NHBC guidance
P1 ↓ Number and direction of photograph (Appendix 1)

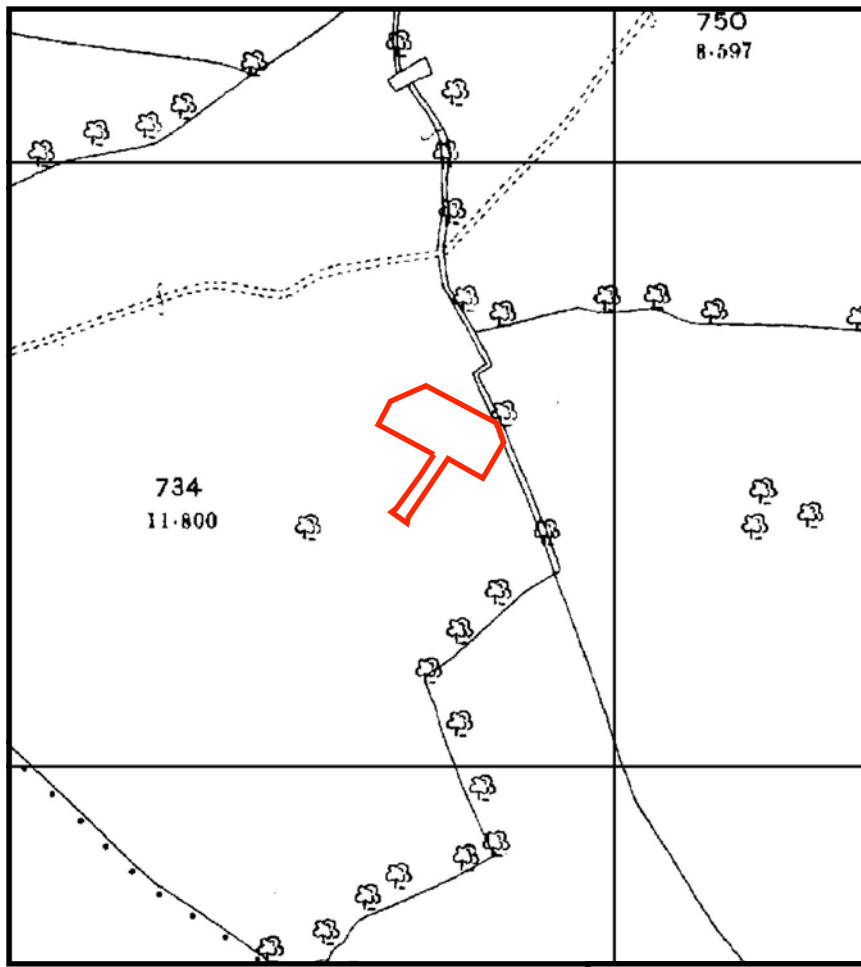
BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY

Wilson Associates
Consulting Engineering Geologists & Geo-Environmental Engineers

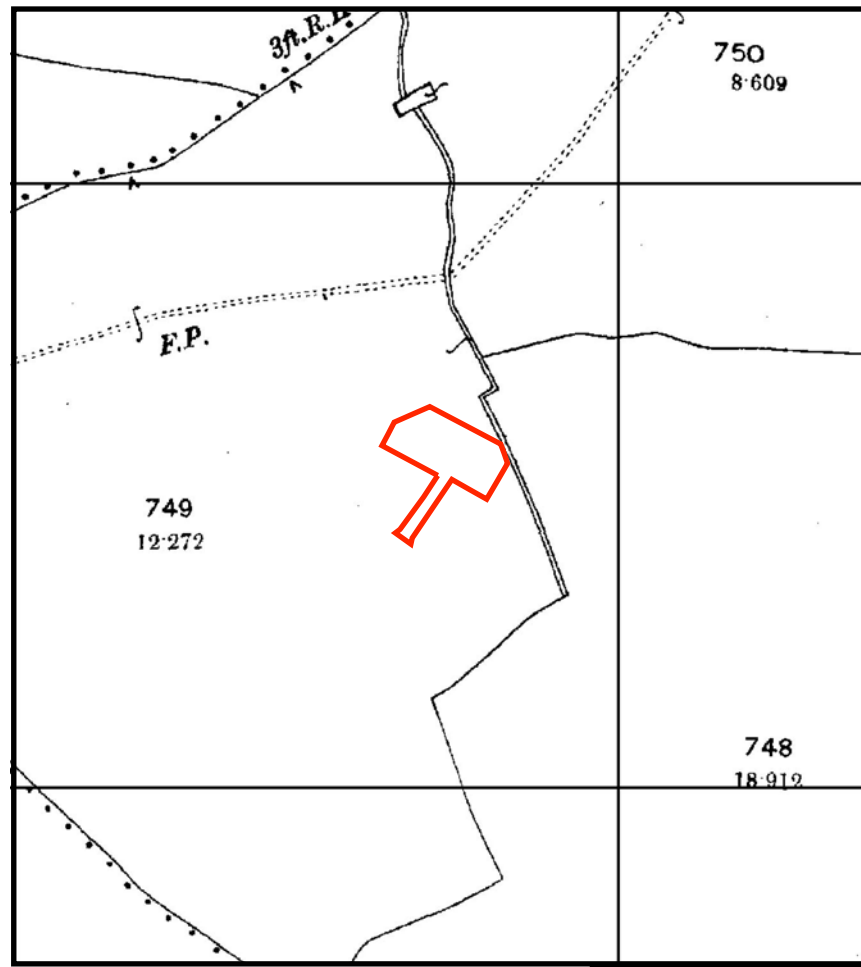
PROPOSED DEVELOPMENT LAYOUT (based upon Quattro drg 6393-P-10 Rev H, dated June 2020) SHOWING EXISTING GARAGE FOOTPRINTS, INVESTIGATION LOCATIONS AND MINIMUM FOUNDING DEPTHS

Job No. 4801	Drawing No. 4801/2	Scale: 1:250 @A3	Date: 18-02-21
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1884
(scale 1:2500)

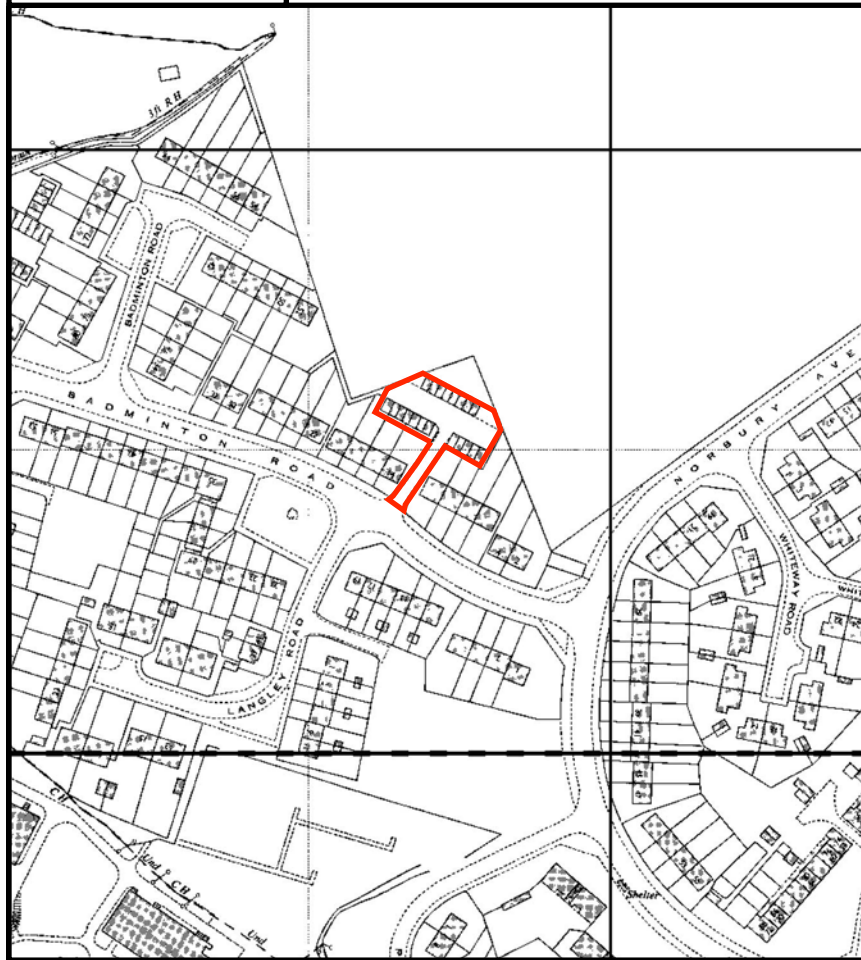


1902
(scale 1:2500)

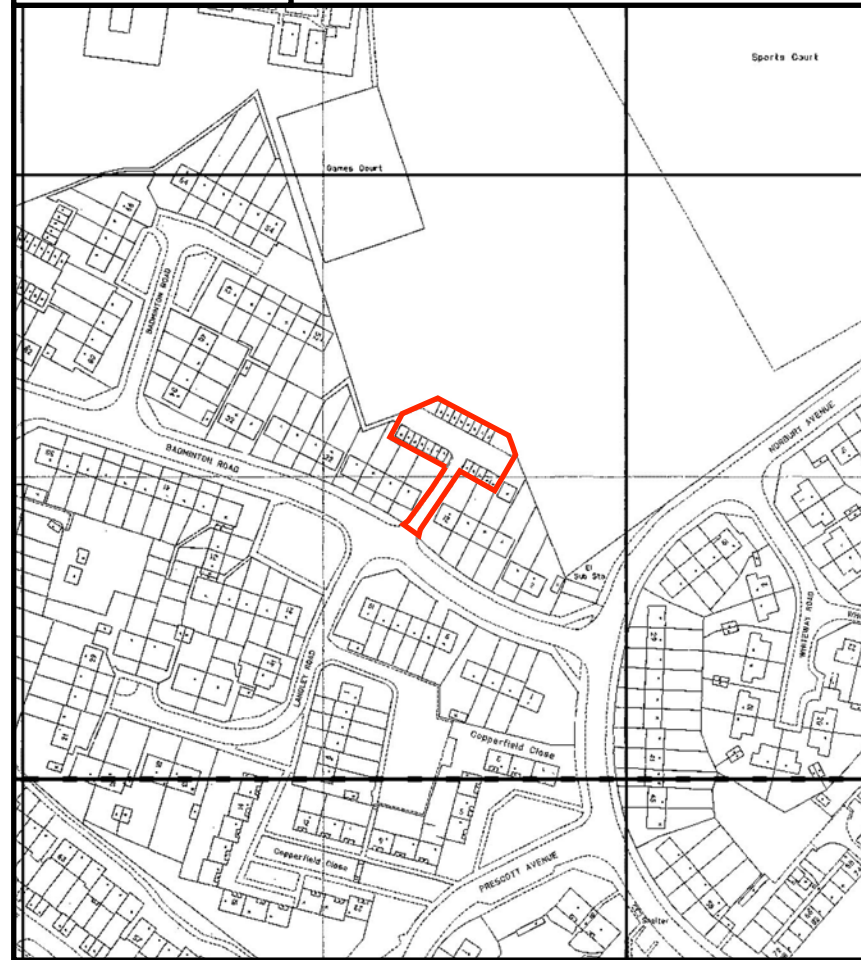


1946
(scale 1:2500)

1962-72
(scale 1:2500)



1994
(scale 1:2500)



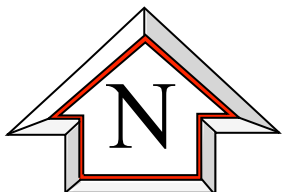
2020
(scale c1:2500)



BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY

EXTRACTS OF ORDNANCE SURVEY PLANS TO SHOW SITE HISTORY

Job No. 4801	Drawing No. 4801/3	Scale: as shown	Date: 22-02-21
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APPENDIX 1

SITE PHOTOGRAPHS



Photograph P1



Photograph P2



Photograph P3



Photograph P4

APPENDIX 2

BOREHOLE AND HAND-DUG PIT LOGS (INCLUDING PHOTOGRAPHS)

KEY TO BOREHOLE LOG SYMBOLS

Symbol	Explanation
D or J	Small Disturbed Sample (tub or jar sample)
B	Large Disturbed Sample
U	Undisturbed Sample
W	Water Sample
U70	Undisturbed Sample

Undrained Shear Strength Test (HSV)

90	Hand vane - direct reading in kN/m ²
----	---

Standard Penetration Test (SPT)

15	SPT 'N' Value (BS EN ISO 22476-3:2005)
125/50	Where full test drive not completed, penetration (125mm) and blow count (50) recorded
NR	No effective penetration

Water



Water struck



Water standing

Test/Core Range

TCR	Total Core Recovery - as percentage of core run. Where value significantly exceeds 100%, a note is given on remarks on log
SCR	Solid Core Recovery - as percentage of core run. Note: assessment of solid core is based on full diameter
RQD	Rock Quality Designation - the amount of solid core greater than 100mm expressed as percentage of core run
	Where SPT has been carried out at beginning of core run, disturbed section of core excluded from SCR and RQD assessment

Instrumentation



Bentonite Seal



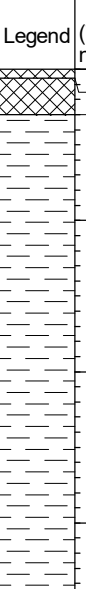
Solid / Perforated Standpipe



Granular Response Zone

BOREHOLE LOG

Project BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY				BOREHOLE No WS1
Job No 4801	Date 01-03-21	Ground Level (c.m,AOD) 34.00	Co-Ordinates (c.) E 884,737 N 216,118	
Contractor CC Ground Investigations Limited				Sheet 1 of 1

SAMPLES & TESTS			STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)		
0.50	D					0.06	TARMAC: dense, black, medium to coarse GRAVEL of tarmac	BLi/ChM
						0.30	MADE GROUND (sub-base): medium dense, orangish-brown, slightly sandy GRAVEL (gravel is fine to coarse, angular limestone) CLAY: soft to firm, greenish-grey, plastic CLAY 0.60 - becomes firm, mottled orangish-brown and light bluish-grey	
1.00	D						1.00 - firm	
1.45		N12						
2.00	D					(3.15)		
2.45		N16					2.50 -stiff; roots encountered	
3.45		N20					Core Recovery: 0.0 - 1.0m hand-dug starter pit 1.0 - 3.0m 100%	
								Borehole terminated at 3.45m depth; backfilled with arisings

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
01/03/2021					DRY						Borehole position scanned using Cable Avoidance Tool (CAT); no services detected BLi/ChM = Blue Lias Formation/Charmouth Mudstone Formation (undifferentiated)

All dimensions in metres Scale 1:50	Client Gloucester City Homes Limited	Method/ Plant Used Window Sampling / Terrier 2002 (T04)	Logged By RS
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Project BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY	Borehole No. WS1
Job No. 4801 Date: 01-03-21	



Hand-dug starter pit



Starter pit arisings



Borehole Core

Client Gloucester City Homes Limited	Method/Plant Used Window Sampling / Terrier 2002 (T04)	Logged By RS
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BOREHOLE LOG

Project BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY				BOREHOLE No WS2
Job No 4801	Date 01-03-21	Ground Level (c.m,AOD) 34.00	Co-Ordinates (c.) E 384,742 N 216,110	
Contractor CC Ground Investigations Limited				Sheet 1 of 1

SAMPLES & TESTS			STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)		
0.15	D				[Cross-hatch pattern]	0.07 0.40	TARMAC: dense, black, medium to coarse GRAVEL of tarmac MADE GROUND (sub-base): medium dense, orangish-brown, slightly sandy GRAVEL (gravel is fine to coarse, angular limestone)	
0.50	D				[Horizontal lines pattern]		CLAY: firm, greenish-grey, plastic CLAY, with shell fragments and gypsum crystals	
1.45 1.50	D	N13			[Horizontal lines pattern]	(3.05)		BLi/ChM
2.45		N14			[Horizontal lines pattern]		3.00 - stiff	
3.45		N20			[Horizontal lines pattern]		Core Recovery: 0.0 - 1.0m hand-dug starter pit 1.0 - 3.0m 100%	
Borehole terminated at 3.45m depth; backfilled with arisings								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
01/03/2021					DRY						Borehole position scanned using Cable Avoidance Tool (CAT); no services detected BLi/ChM = Blue Lias Formation/Charmouth Mudstone Formation (undifferentiated)

All dimensions in metres Scale 1:50	Client Gloucester City Homes Limited	Method/ Plant Used Window Sampling / Terrier 2002 (T04)	Logged By RS
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Project BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY	Borehole No. WS2
Job No. 4801 Date: 01-03-21	



Hand-dug starter pit



Starter pit arisings








Borehole Core

Client Gloucester City Homes Limited	Method/Plant Used Window Sampling / Terrier 2002 (T04)	Logged By RS
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BOREHOLE LOG

Project BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY				BOREHOLE No WS3	
Job No 4801	Date 01-03-21	Ground Level (c.m,AOD) 34.00	Co-Ordinates (c.) E 384,759 N 216,102		
Contractor CC Ground Investigations Limited				Sheet 1 of 1	

SAMPLES & TESTS			STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)		
0.40	D					0.08	TARMAC: dense, black, medium to coarse GRAVEL of tarmac	BLi/ChM
						0.30	MADE GROUND (sub-base): medium dense, yellowish-brown, sandy GRAVEL with COBBLES of concrete and brick (gravel is fine to coarse, angular limestone) CLAY: soft, mottled greenish-grey and orangish-brown, plastic CLAY	
1.45		N12				(3.15)	1.00 - firm	
2.45		N19					2.00 - stiff	
2.50	D							
3.45		N23						
			Core Recovery: 0.0 - 1.0m hand-dug starter pit 1.0 - 3.0m 100% Borehole terminated at 3.45m depth; backfilled with arisings					

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
01/03/2021					DRY						Borehole position scanned using Cable Avoidance Tool (CAT); no services detected BLi/ChM = Blue Lias Formation/Charmouth Mudstone Formation (undifferentiated)

All dimensions in metres Scale 1:50	Client Gloucester City Homes Limited	Method/ Plant Used Window Sampling / Terrier 2002 (T04)	Logged By RS
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Project BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY	Borehole No. WS3
Job No. 4801 Date: 01-03-21	



Hand-dug starter pit



Starter pit arisings



Borehole Core

Client Gloucester City Homes Limited	Method/Plant Used Window Sampling / Terrier 2002 (T04)	Logged By RS
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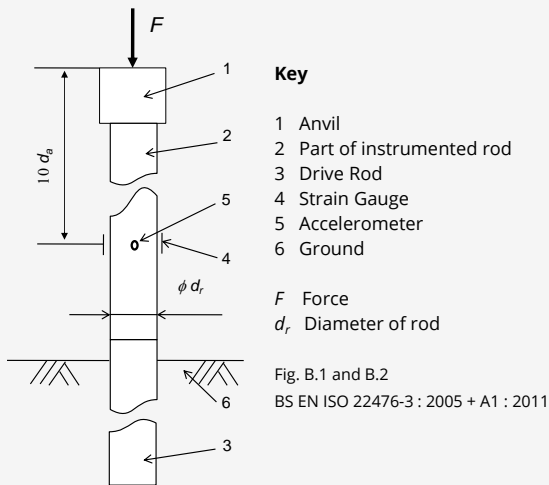
SPT Calibration Report

Hammer Energy Measurement Report

Type of Hammer TERRIER
Test No EQU2682
Client CC GROUND INVESTIGATIONS
Test Depth (m) 9.38
Mass of hammer $m = 63.5\text{kg}$
Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

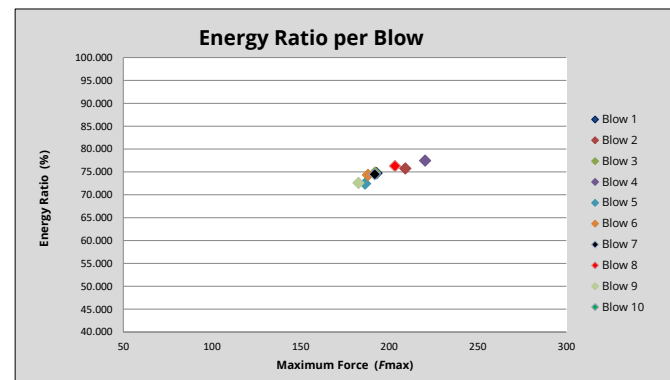
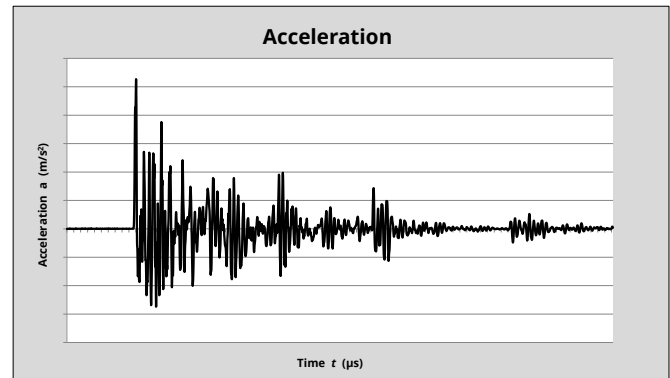
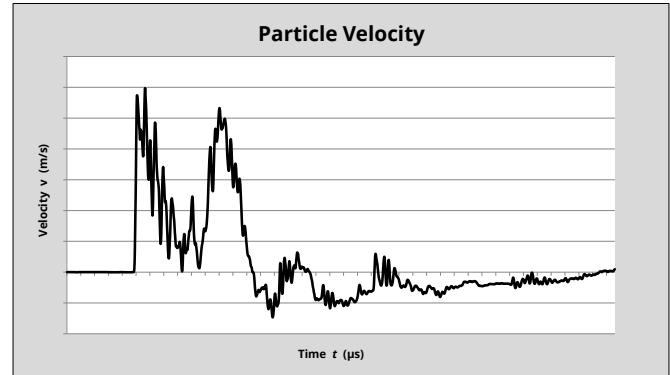
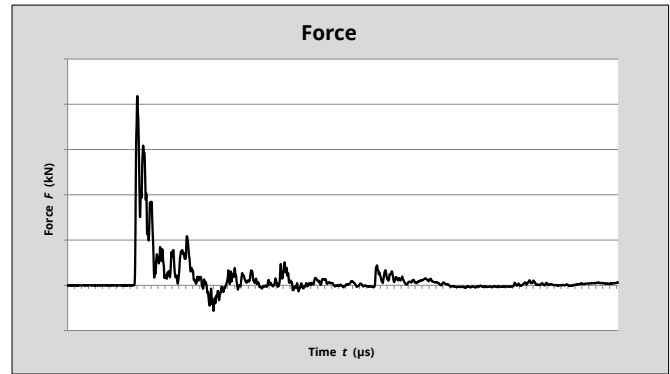
Diameter $d_r = 0.052\text{ m}$
Length of instrumented rod 0.558 m
Area $A = 11.61\text{ cm}^2$
Modulus $E_o = 206843\text{ MPa}$



DATE OF TEST	VALID UNTIL	HAMMER ID
21/12/2020	21/12/2021	T04

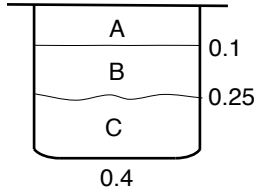
$E_{\text{meas}} = 0.352\text{ kN-m}$
 $E_{\text{theor}} = 0.473\text{ kN-m}$

Comments



Energy Ratio (Er) = $\frac{E_{\text{meas}}}{E_{\text{theor}}}$
74.49%
 © COPYRIGHT 2020

Site: BADMINTON ROAD, MATSON, GLOUCESTER GL4 6AY				TRIAL PIT No.
Job No. 4801	Date 01-03-21	Ground Level (c.m, AOD) 34m	Co-Ordinates (c.) E 384,733 N 216,115	HDP1



DETAILS OF SUBSOIL

- A TARMAC: dense, black, medium to coarse GRAVEL of tarmac
- B MADE GROUND (sub-base): medium dense, orangish-brown, slightly sandy GRAVEL (gravel is fine to coarse, angular limestone)
- C CLAY: soft to firm, greenish-grey, plastic CLAY
(Blue Lias Formation/Charmouth Mudstone Formation - undifferentiated)

NOTES

- 1 Pit logged from surface
- 2 Pit dry and stable
- 3 Soil sample taken at 0.3m depth



Scale: 1:20	Client Gloucester City Homes Limited	Logged By: RS
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APPENDIX 3

**CONTAMINATION
STATUTORY FRAMEWORK / METHODOLOGY
AND
CERTIFIED CONTAMINATION TEST RESULTS**

A3 CONTAMINATION RISK ASSESSMENT

Statutory Framework

A3.1 Part 2A of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) provides a regime for the control of specific threats to health or the environment from existing land contamination. In accordance with the Act and the statutory guidance document on the Contaminated Land (England) Regulations 2000, the definition of contaminated land is intended to embody the concept of risk assessment. Within the meaning of the Act, land is only 'contaminated land' where it appears to the regulatory authority, by reason of substances within or under the land, that:

- Significant harm is being caused or there is significant possibility of such harm being caused; or
- Pollution of controlled waters is being, or is likely to be, caused.

A3.2 In 2012 revised Statutory Guidance for Part 2A of the Environmental Protection Act (1990) came into force for England and Wales. This introduced a new four category approach for classifying land affected by contamination to assist decisions by regulators in cases of Significant Possibility of Significant Harm (SPOSH) to specified receptors, including humans, and significant pollution of controlled waters.

Category 1 describes land which is clearly problematic e.g. because similar sites are known to have caused a significant problem in the past. The legal definition is where "there is an unacceptably high probability, supported by robust science-based evidence, that significant harm would occur if no action is taken to stop it".

Categories 2 and 1 cover land where detailed consideration is needed before deciding whether it may be contaminated land. Category 2 is defined as land where "there is a strong case for considering that the risks from the land are of sufficient concern that the land poses a significant possibility of significant harm". Category 1 is defined as land where there is not the strong case described in the test for Category 2, and may include "land where the risks are not low, but nonetheless the authority considers that regulatory intervention under Part 2A is not warranted". The decision basis is initially related to human health risks, and if this is not conclusive due to uncertainty over risks, wider socio-economic factors (e.g. cost, local perception etc).

Category 4 describes land that is clearly not contaminated land, where there is no risk or the level or risk posed is low.

This same 4 category system has also been introduced to assist in identifying whether there is a significant possibility of significant pollution of controlled waters. Part 2A states that normal levels of contaminants in soil should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise.

Following publication of the revised Statutory Guidance, DEFRA commissioned a research project to develop new Category 4 Screening Levels (C4SLs) to provide a simplified test for regulators to aid decision-making on when land was suitable for use and definitely not contaminated land under the statutory regime. The output from this research project was published by CL:AIRE in December 2011, with Policy Companion Documents published in England by DEFRA in March 2014 and the Welsh Government in May 2014. The culmination of this work was the development of a framework and methodology for deriving C4SLs and the publication of final C4SLs for use as new screening values for six common contaminants.

Further research by LQM on behalf of CIEH lead to the publication in 2015 of the Suitable for Use Levels known as S4ULs, and these are now widely adopted as a robust and authoritative source of guidance (see A3.14 below).

Once land has been determined as contaminated land, the enforcing authority must consider how it should be remediated and, where appropriate, it must issue a remediation notice to require such remediation. The enforcing authority for the purposes of remediation may be the local authority which determined the land, or the Environment Agency which takes on responsibility once land has been determined if the land is deemed to be a “special site”. The rules on what land is to be regarded as special sites, and various rules on the issuing of remediation notices, are set out in the Contaminated Land (England) Regulations 2006

A3.3 The UK guidance on the assessment of land contamination has developed as a direct result of the introduction of the above two Acts. The technical guidance supporting the new legislation has been summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs), a proposed series of twelve documents. Seven were originally published in March 1994, four more were published in April 2002, while the last remaining guidance document (CLR 11 was published in

2004. In 2008 CLR reports 7 to 10 were withdrawn by the Department of Environment Food & Rural Affairs and the Environment Agency and updated versions of CLR 9 and 10 were produced in the form of Science Reports SR2 and SR1.

A3.4 The guidance defines 'risk' as the combination of:

- The probability, or frequency, of occurrence of a defined hazard (e.g. exposure of a property to a substance with the potential to cause harm); and
- The magnitude (including the seriousness) of the consequences.

A3.5 For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- A source, i.e. a substance that is capable of causing pollution or harm;
- A pathway, i.e. a route by which the contaminant can reach the receptor; and
- A receptor (or target), i.e. something which could be adversely affected by the contaminant.

A3.6 If any one of these elements is missing there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

A3.7 The presence of contamination is also a material issue in the determination of planning applications, and where a change of use is proposed, especially on brownfield (former industrial) land, investigation, assessment and remediation of contamination is often a requirement of the Planning Authority. The presence of contamination may consequently require remedial action prior to redevelopment, in circumstances which would otherwise be unlikely to result in the determination of the land as contaminated land as defined in the above legislation.

Contamination Assessment Methodology

A3.8 The guidance proposes a four-stage assessment process for identifying potential pollutant linkages on a site. These stages are set out in the table below:

No.	Process	Description
1	Hazard Identification	Establishing contaminant sources, pathways and receptors (the preliminary conceptual site model).
2	Hazard Assessment	Analysing the potential for unacceptable risks (what linkages could be present, what could be the effects).
1	Risk Estimation	Trying to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it).
4	Risk Evaluation	Deciding whether the risk is unacceptable.

A3.9 Stages 1 and 2 develop a '*preliminary conceptual model*' based upon information collated from desk studies and usually a site walkover inspection. The formation of a conceptual site model is an iterative process, and it should be updated and refined throughout each stage of the project to reflect any additional information obtained.

A3.10 The information gleaned from the desk studies and associated enquiries is presented in a desk study report with recommendations, if necessary, for further work based upon the preliminary conceptual site model. CLR 8, together with specific DoE 'Industry Profiles' provides guidance on the nature of contaminants relating to specific industrial processes. Whilst it is acknowledged that CLR 8 has been withdrawn no replacement guidance has yet been published that lists the contaminants likely to be present on contaminated sites, thus CLR 8 guidance is still considered relevant.

A3.11 If the preliminary conceptual model identifies potential pollutant linkages, a Phase 2 site investigation is normally recommended, unless appropriate mitigation measures can be incorporated into the proposed development sufficient to negate the identified risks, subject to local planning authority approval. The number of exploratory holes and samples collected for analysis should be consistent with the size of the site and the level of risk envisaged. This will enable a contamination risk assessment to be conducted, at which point the preliminary conceptual model can be updated and relevant pollutant linkages identified.

Preliminary Risk Assessment

A3.12 By considering the various potential sources, pathways and receptors, a preliminary assessment of potential risk is made based upon the likelihood of the occurrence and the severity of the potential consequence, the latter being a function of the sensitivity of the receptor. At Phase 1 desk study stage the qualitative risk assessment is based on the categories tabulated below.

Category	Definition
Severe	Acute risks to human health, catastrophic damage to buildings/property, major pollution to controlled waters
Moderate	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species, significant damage to buildings or structures
Mild	Pollution of non-sensitive waters, minor damage to buildings or structures
Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non-sensitive ecosystems or species

A3.11 The likelihood of an event (probability) takes into account both the presence of the hazard and receptor and viability of the pathway, and is based on the categories tabulated below.

Category	Definition
Highly likely	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term
Possible	Pollution linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable

A3.14 On this basis potential hazards are assigned a risk rating as shown below.

	Consequence				
		<i>Severe</i>	<i>Moderate</i>	<i>Mild</i>	<i>Minor</i>
Probability (Likelihood)	Highly likely	very high	high	moderate	low
	Likely	high	moderate	low/moderate	low
	Possible	moderate	low/moderate	low	very low
	Unlikely	low/moderate	low	very low	very low

A3.15 At Phase 2 stage, quantitative assessment of human health risk posed by ground contamination is achieved by comparison of soil concentrations with Tier 1 Category Four Screening Levels (C4SL) published by DEFRA (2014), and/or Suitable for Use Levels (S4UL) as published by LQM/CIEH (2015). The official Soil Guideline Values utilise a soil organic matter content of 6% which is considered to be higher than typical UK soils, however three sets of S4UL's have been developed for organic matter

contents of 1%, 2.5% and 6%, thus the most appropriate set is selected based upon proven site conditions.

- A3.16** Contaminant concentrations below the threshold screening values are considered not to warrant further risk assessment. Concentrations of contaminants above these screening values require further consideration of potential pollutant linkages and may indicate potentially unacceptable risks to site users. Such exceedances may trigger a Tier 2 detailed quantitative risk assessment (DQRA) where site-specific parameters are used to derive site specific assessment criteria (SSAC), usually by using the CLEA Model (v1.07 at time of writing). It should be noted that exceedance of a screening value does not necessarily indicate that the site requires remediation.
- A3.17** In order to assess any risk to controlled waters posed by contaminants within the underlying soils and groundwater, laboratory results have been screened against Level 1 Environmental Quality Standard (EQS) values derived from the Water Framework Directive (Standards & Classification) Directions (England & Wales) 2015 and the current UK Drinking Water Supply (Water Quality) Regulations (DWS), dependent upon the most vulnerable receptor. The EQS is usually an upper concentration set for the receiving watercourse and not the discharge itself. The DWS is established for compliance at the point of use or abstraction and not the source area.
- A3.18** In terms of controlled off-site disposal to landfill of site arisings, if/where intended, waste classification has been carried out in line with European Waste Catalogue (EWC) and Technical Guidance Waste Management 3 (TGWM3, EA Version 3, May 2015 – replacing the outgoing TGWM2) using contamination test results obtained for that material. The assessment utilises the ‘HazWasteOnline’ software to establish a ‘Hazardous’ (170503) / ‘Non-hazardous’ (170504) classification. Where required, the foregoing may be supplemented by Waste Acceptance Criteria (WAC) analysis, in order that the waste can further be designated as ‘Hazardous’ / ‘Stable non-reactive’ / ‘Inert’, for use by the receiving landfill operator. It should be noted that WAC is only required for disposal of wastes at certain classes of landfill; if arisings are not intended for removal to landfill, then WAC testing is not applicable.

SUMMARY OF CONTAMINATION TEST RESULTS

Sample Ref	SOILS				TIER 1: GENERIC ASSESSMENT CRITERIA						TIER 2: SITE SPECIFIC		Sample Ref	LEACHATE						
	Sample Depth (m)	WS1	WS2	WS3	HDP1	S4UL (Residential with plant uptake)	S4UL (Residential without plant uptake)	S4UL (Allotments)	S4UL (Commercial)	S4UL (Public Open Space - Residential)	S4UL (Public Open Space - Park)	Upper Confidence Limit [on true mean concentration, u] (CIEH Statistical Calculator)		Site-Specific Assessment Criteria (SSAC's) residential with homegrown produce	Sample Depth (m)	WS3	WFD (Groundwater)	WFD (Fresh Surface Water)	EA EQS	UK DWS
Sample of	subsoil	made ground	subsoil	subsoil										subsoil						
DETERMINAND																				
TOXIC METALS	pH	7.9	8.6	7.9	7.9															
	Arsenic	19	19	18	23	37	40	43	640	79	170									
	Cadmium	< 0.2	< 0.2	< 0.2	< 0.2	11	85	1.9	190	120	532									
	Chromium VI	< 1.2	< 1.2	< 1.2	< 1.2	6	6	1.8	33	8	220									
	Chromium	38	11	41	38	910	910	18,000	8,600	1,500	33,000									
	Lead	19	12	19	17	200▲	310▲	80▲	2330▲	630▲	1300▲									
	Mercury	< 0.3	< 0.3	< 0.3	< 0.3	40	56	19	1100	120	240									
	Nickel	21	12	24	18	130	180	230	980	230	800									
	Selenium	< 1.0	< 1.0	< 1.0	< 1.0	250	430	88	12000	1100	1800									
	PHYTOTOXIC METALS	Copper	20	11	19	15	2,400	7,100	520	68,000	12,000	44,000								
Zinc		73	47	77	66	3,700	40,000	620	730,000	81,000	170,000									
	Moisture Content (%)	24	4.5	22	22															
	Stone Content (%)	< 0.1	< 0.1	< 0.1	< 0.1															
	Soil Organic Matter (%)	3.8	-	1	1.9															
	Asbestos Screen	ND	ND	ND	ND															
SPECIATED POLYAROMATIC HYDROCARBONS (PAH)	Total PAH	< 0.80	7.84	< 0.80	< 0.80															
	Naphthalene	< 0.05	< 0.05	< 0.05	< 0.05	5.6	5.6	10	460 (183)s	4,900	1,900 (183)s									
	Acenaphthylene	< 0.05	< 0.05	< 0.05	< 0.05	420	4,600 (212)s	69	97,000 (212)s	15,000	30,000									
	Acenaphthene	< 0.05	< 0.05	< 0.05	< 0.05	510	4,700 (141)s	85	97,000 (141)s	15,000	30,000									
	Fluorene	< 0.05	< 0.05	< 0.05	< 0.05	400	3,800 (76.5)s	67	68,000	9,900	20,000									
	Phenanthrene	< 0.05	0.33	< 0.05	< 0.05	220	1,500	38	22,000	3,100	6,200									
	Anthracene	< 0.05	< 0.05	< 0.05	< 0.05	5,400	35,000	950	540,000	74,000	150,000									
	Fluoranthene	< 0.05	0.47	< 0.05	< 0.05	560	1600	130	23,000	3,100	6,300									
	Pyrene	< 0.05	0.49	< 0.05	< 0.05	1,200	3,800	270	54,000	7,400	15,000									
	Benzo(a)anthracene	< 0.05	0.47	< 0.05	< 0.05	11	14	6.5	170	29	56									
	Chrysene	< 0.05	0.59	< 0.05	< 0.05	22	31	9.4	350	57	110									
	Benzo(b)fluoranthene	< 0.05	1.4	< 0.05	< 0.05	3.3	4	2.1	44	7.2	15									
	Benzo(k)fluoranthene	< 0.05	0.53	< 0.05	< 0.05	93	110	75	1200	190	410									
	Benzo(a)pyrene	< 0.05	1.3	< 0.05	< 0.05	2.7	3.2	2.00	35	5.7	12									
	Indeno(1,2,3-cd)pyrene	< 0.05	0.96	< 0.05	< 0.05	36	46	21	510	82	170									
	Dibenz(a,h)anthracene	< 0.05	< 0.05	< 0.05	< 0.05	0.28	0.32	0.27	3.6	0.57	1.3									
Benzo(ghi)perylene	< 0.05	1.2	< 0.05	< 0.05	340	360	470	4000	640	1,500										
TOTAL PETROLEUM HYDROCARBONS (BANDED)	C6 - C8		< 0.1	< 0.1		230	230	600,000	17,000 (322)s	610,000	220,000 (322)s									
	C8 - C10		< 10	< 10		65	65	770	4800	13,000	18,000 (190)v									
	C10 - C12		< 1.0	9.5		180	590	31	28000	5,000	9700									
	C12 - C16		5.2	10		330	2300	57	37000	5,100	10000									
	C16 - C21		25	13		540	1900	110	28,000	3,800	7,700									
	C21 - C40		1100	74																
C6 - C40		1100	110																	

CIEH/LQM = GAC/S4UL presented exceeds the solubility saturation limit, which is presented in brackets
CIEH/LQM v = GAC/S4UL presented exceeds the vapour saturation limit, which is presented in brackets
CIEH/LQM d = S4UL based on a threshold protective of direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustration only)
S4UL LQM/CIEH published Suitable for use levels (2015)
DEFRA ▲ = C4SL (2014)
ND = None detected
Based on Soil Organic Matter of 2.5% (all levels expressed as mg/kg)

WFD (groundwater) WFD "Water Framework Directive Standards & Classification (England & Wales)" 2015
WFD (fresh surface water) WFD "Water Framework Directive Standards & Classification (England & Wales)" 2015
EA EQS River Basin Districts Typology, Standards & Groundwater Threshold Values (Water Framework Directive) (England & Wales) Directions 2010
UK DWS UK Drinking Water Standards "The Water Supply (Water Quality) Regulations 2000"
WHO World Health Organisation Guidelines



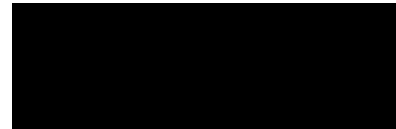
Richard Stokes
Wilson Associates (Consulting) Limited
36 Brunswick Road
Gloucester
GL1 1JJ

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS



Analytical Report Number : 21-60060

Project / Site name:	Badminton Rd, Matson	Samples received on:	03/03/2021
Your job number:	4801-RS	Samples instructed on/ Analysis started on:	03/03/2021
Your order number:	4801-RS	Analysis completed by:	10/03/2021
Report Issue Number:	1	Report issued on:	10/03/2021
Samples Analysed:	1 leachate sample - 4 soil samples		



Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-60060
 Project / Site name: Badminton Rd, Matson
 Your Order No: 4801-RS

Lab Sample Number	1789751	1789752	1789753	1789754			
Sample Reference	WS1	WS2	WS3	HDP1			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	0.50	0.15	0.40	0.30			
Date Sampled	01/02/2021	01/02/2021	01/02/2021	01/02/2021			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	24	4.5	22	22
Total mass of sample received	kg	0.001	NONE	0.4	0.4	1	1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	8.6	7.9	7.9
Organic Matter	%	0.1	MCERTS	3.8	-	1	1.9

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.33	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.47	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.49	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.47	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.59	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.4	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.53	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.3	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.96	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	1.2	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	7.84	< 0.80	< 0.80

Analytical Report Number: 21-60060
 Project / Site name: Badminton Rd, Matson
 Your Order No: 4801-RS

Lab Sample Number	1789751			1789752			1789753			1789754		
Sample Reference	WS1			WS2			WS3			HDP1		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	0.50			0.15			0.40			0.30		
Date Sampled	01/02/2021			01/02/2021			01/02/2021			01/02/2021		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									

Heavy Metals / Metalloids

Parameter	Units	Limit of detection	Accreditation Status	1789751	1789752	1789753	1789754
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	19	18	23
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	38	11	41	38
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	11	19	15
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19	12	19	17
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	12	24	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	73	47	77	66

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	1789751	1789752	1789753	1789754
TPH Texas (C6 - C8)	mg/kg	0.1	ISO 17025	-	< 0.1	< 0.1	-
TPH Texas (C8 - C10)	mg/kg	10	MCERTS	-	< 10	< 10	-
TPH Texas (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	9.5	-
TPH Texas (C12 - C16)	mg/kg	4	MCERTS	-	5.2	10	-
TPH Texas (C16 - C21)	mg/kg	10	MCERTS	-	25	13	-
TPH Texas (C21 - C40)	mg/kg	10	MCERTS	-	1100	74	-
TPH Texas (C6 - C40)	mg/kg	10	NONE	-	1100	110	-

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



Analytical Report Number: 21-60060
 Project / Site name: Badminton Rd, Matson

Your Order No: 4801-RS

Lab Sample Number				1789755
Sample Reference				WS3
Sample Number				None Supplied
Depth (m)				0.40
Date Sampled				01/02/2021
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

Speciated PAHs

Compound	Units	Limit of detection	Accreditation Status	Result
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
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Heavy Metals / Metalloids

Compound	Units	Limit of detection	Accreditation Status	Result
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.4
Copper (dissolved)	µg/l	0.7	ISO 17025	6.7
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.6
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	13

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



Analytical Report Number : 21-60060

Project / Site name: Badminton Rd, Matson

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1789751	WS1	None Supplied	0.5	Brown clay and sand.
1789752	WS2	None Supplied	0.15	Brown sand with gravel.
1789753	WS3	None Supplied	0.4	Brown clay and sand with gravel.
1789754	HDP1	None Supplied	0.3	Brown clay and sand with gravel.

Analytical Report Number : 21-60060
Project / Site name: Badminton Rd, Matson

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPH Texas (Soil)	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method	L064-PL	D	MCERTS

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

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 21-60060
 Project / Site name: Badminton Rd, Matson

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
HDP1	None Supplied	S	1789754	c	Hexavalent chromium in soil (Lower Level)	L080-PL	c
HDP1	None Supplied	S	1789754	c	Organic matter (Automated) in soil	L009-PL	c
HDP1	None Supplied	S	1789754	c	Speciated EPA-16 PAHs in soil	L064-PL	c
HDP1	None Supplied	S	1789754	c	pH in soil (automated)	L099-PL	c
WS1	None Supplied	S	1789751	c	Hexavalent chromium in soil (Lower Level)	L080-PL	c
WS1	None Supplied	S	1789751	c	Organic matter (Automated) in soil	L009-PL	c
WS1	None Supplied	S	1789751	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS1	None Supplied	S	1789751	c	pH in soil (automated)	L099-PL	c
WS2	None Supplied	S	1789752	c	Hexavalent chromium in soil (Lower Level)	L080-PL	c
WS2	None Supplied	S	1789752	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS2	None Supplied	S	1789752	c	TPH Texas (Soil)	L064-PL	c
WS2	None Supplied	S	1789752	c	pH in soil (automated)	L099-PL	c
WS3	None Supplied	S	1789753	c	Hexavalent chromium in soil (Lower Level)	L080-PL	c
WS3	None Supplied	S	1789753	c	Organic matter (Automated) in soil	L009-PL	c
WS3	None Supplied	S	1789753	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS3	None Supplied	S	1789753	c	TPH Texas (Soil)	L064-PL	c
WS3	None Supplied	S	1789753	c	pH in soil (automated)	L099-PL	c

APPENDIX 4

WASTE CLASSIFICATION REPORT AND WASTE ACCEPTANCE CRITERIA (WAC) TEST RESULTS

Waste Classification Report



CZHNM-N33NL-FENLN

Job name

Matson, Gloucester

Description/Comments

Project

4801

Site

Badminton Rd, Matson, Gloucester

Related Documents

#	Name	Description
None		

Waste Stream Template

Wilson Associates (Consulting) Limited

Classified by

Name:	Company:	HazWasteOnline™ Training Record:	
Richard Stokes	Wilson Associates	Course	Date
Date:		Hazardous Waste Classification	-
11 Mar 2021 10:52 GMT		Advanced Hazardous Waste Classification	-
Telephone:			

Report

Created by: Richard Stokes
Created date: 11 Mar 2021 10:52 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	Composite		Non Hazardous		2
2	WS2		Hazardous	HP 3(i), HP 7, HP 11	4

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	7
Appendix B: Rationale for selection of metal species	8
Appendix C: Version	9

Classification of sample: Composite

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
Composite	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
23% (dry weight correction)		

Hazard properties

None identified

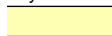



Determinands

Moisture content: 23% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	arsenic { arsenic trioxide }				23 mg/kg	1.32	24.689 mg/kg	0.00247 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
2	cadmium { cadmium oxide }				<0.2 mg/kg	1.142	<0.228 mg/kg	<0.0000228 %		<LOD
	048-002-00-0	215-146-2	1306-19-0							
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				41 mg/kg	1.462	48.719 mg/kg	0.00487 %	✓	
		215-160-9	1308-38-9							
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
5	copper { dicopper oxide; copper (I) oxide }				20 mg/kg	1.126	18.307 mg/kg	0.00183 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
6	lead { lead chromate }			1	19 mg/kg	1.56	24.095 mg/kg	0.00154 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
7	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
8	nickel { nickel chromate }				24 mg/kg	2.976	58.073 mg/kg	0.00581 %	✓	
	028-035-00-7	238-766-5	14721-18-7							
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<LOD
	034-002-00-8									
10	zinc { zinc chromate }				77 mg/kg	2.774	173.666 mg/kg	0.0174 %	✓	
	024-007-00-3	236-878-9	13530-65-9							
11	TPH (C6 to C40) petroleum group				110 mg/kg		89.431 mg/kg	0.00894 %	✓	
			TPH							
12	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
13	pH				7.9 pH		7.9 pH	7.9 pH		
			PH							
14	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
15	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	● acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
17	● fluorene	201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
18	● phenanthrene	201-581-5	85-01-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
19	● anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
20	● fluoranthene	205-912-4	206-44-0		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
21	● pyrene	204-927-3	129-00-0		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
22	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
23	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
27	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
29	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
Total:								0.0433 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase identified

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00894%)

Classification of sample: WS2



Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS2	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 03 * (Soil and stones containing hazardous substances)
4.5% (dry weight correction)	

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.105%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.105%)

Hazard properties (substances considered hazardous until shown otherwise)

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.105%)

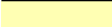




Determinands

Moisture content: 4.5% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				19	mg/kg	1.32	24.006	mg/kg	0.0024 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<LOD
	048-002-00-0	215-146-2	1306-19-0									

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				11	mg/kg	1.462	15.385	mg/kg	0.00154 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
5	copper { dicopper oxide; copper (I) oxide }				11	mg/kg	1.126	11.851	mg/kg	0.00119 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	12	mg/kg	1.56	17.912	mg/kg	0.00115 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				12	mg/kg	2.976	34.177	mg/kg	0.00342 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8											
10	zinc { zinc chromate }				47	mg/kg	2.774	124.77	mg/kg	0.0125 %	✓	
	024-007-00-3	236-878-9	13530-65-9									
11	TPH (C6 to C40) petroleum group				1100	mg/kg		1052.632	mg/kg	0.105 %	✓	
			TPH									
12	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>							
13	pH				8.6	pH		8.6	pH	8.6 pH		
			PH									
14	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
15	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8									
16	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9									
17	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
18	phenanthrene				0.33	mg/kg		0.316	mg/kg	0.0000316 %	✓	
		201-581-5	85-01-8									
19	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7									
20	fluoranthene				0.47	mg/kg		0.45	mg/kg	0.000045 %	✓	
		205-912-4	206-44-0									
21	pyrene				0.49	mg/kg		0.469	mg/kg	0.0000469 %	✓	
		204-927-3	129-00-0									
22	benzo[a]anthracene				0.47	mg/kg		0.45	mg/kg	0.000045 %	✓	
	601-033-00-9	200-280-6	56-55-3									
23	chrysene				0.59	mg/kg		0.565	mg/kg	0.0000565 %	✓	
	601-048-00-0	205-923-4	218-01-9									
24	benzo[b]fluoranthene				1.4	mg/kg		1.34	mg/kg	0.000134 %	✓	
	601-034-00-4	205-911-9	205-99-2									
25	benzo[k]fluoranthene				0.53	mg/kg		0.507	mg/kg	0.0000507 %	✓	
	601-036-00-5	205-916-6	207-08-9									
26	benzo[a]pyrene; benzo[def]chrysene				1.3	mg/kg		1.244	mg/kg	0.000124 %	✓	
	601-032-00-3	200-028-5	50-32-8									
27	indeno[123-cd]pyrene				0.96	mg/kg		0.919	mg/kg	0.0000919 %	✓	
		205-893-2	193-39-5									
28	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
29	benzo[ghi]perylene				1.2	mg/kg		1.148	mg/kg	0.000115 %	✓	
		205-883-8	191-24-2									
Total:										0.129 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database

Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>

Data source date: 17 Jul 2015

Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

- **confirm TPH has NOT arisen from diesel or petrol**

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

▪ **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

▪ **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

▪ **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

▪ **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil. (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.1, May 2018**
HazWasteOnline Classification Engine Version: 2021.60.4685.9008 (01 Mar 2021)
HazWasteOnline Database: 2021.60.4685.9008 (01 Mar 2021)

This classification utilises the following guidance and legislation:

WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2019 - UK: 2019 No. 720 of 27th March 2019
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019



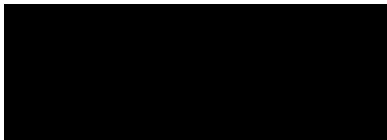
Richard Stokes

Wilson Associates (Consulting) Limited
36 Brunswick Road
Gloucester
GL1 1JJ

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,

Analytical Report Number : 21-60062

Project / Site name:	Badminton Rd, Matson	Samples received on:	03/03/2021
Your job number:	4801-RS	Samples instructed on/ Analysis started on:	03/03/2021
Your order number:	4801-RS	Analysis completed by:	10/03/2021
Report Issue Number:	1	Report issued on:	10/03/2021
Samples Analysed:	1 10:1 WAC sample		


Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Waste Acceptance Criteria Analytical Results

Report No:	21-60062					
				Client: WILSONASSO		
Location	Badminton Rd, Matson					
Lab Reference (Sample Number)	1789764 / 1789765			Landfill Waste Acceptance Criteria		
Sampling Date	01/02/2021			Limits		
Sample ID	WAC			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)						
Solid Waste Analysis						
TOC (%)**	0.5			3%	5%	6%
Loss on Ignition (%) **	2.1			--	--	10%
BTEX (µg/kg) **	< 10			6000	--	--
Sum of PCBs (mg/kg) **	< 0.007			1	--	--
Mineral Oil (mg/kg)	75			500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85			100	--	--
pH (units)**	8.3			--	>6	--
Acid Neutralisation Capacity (mol / kg)	15			--	To be evaluated	To be evaluated
Eluate Analysis						
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1		10:1	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
	mg/l		mg/kg			
Arsenic *	< 0.0010		< 0.0100	0.5	2	25
Barium *	0.0101		0.0870	20	100	300
Cadmium *	< 0.0001		< 0.0008	0.04	1	5
Chromium *	< 0.0004		< 0.0040	0.5	10	70
Copper *	0.0030		0.026	2	50	100
Mercury *	< 0.0005		< 0.0050	0.01	0.2	2
Molybdenum *	0.0055		0.0473	0.5	10	30
Nickel *	0.0025		0.022	0.4	10	40
Lead *	< 0.0010		< 0.010	0.5	10	50
Antimony *	< 0.0017		< 0.017	0.06	0.7	5
Selenium *	< 0.0040		< 0.040	0.1	0.5	7
Zinc *	0.0052		0.045	4	50	200
Chloride *	2.7		23	800	15000	25000
Fluoride	1.1		9.1	10	150	500
Sulphate *	32		270	1000	20000	50000
TDS*	110		970	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010		< 0.10	1	-	-
DOC	5.05		43.6	500	800	1000
Leach Test Information						
Stone Content (%)	< 0.1					
Sample Mass (kg)	0.70					
Dry Matter (%)	86					
Moisture (%)	14					
Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)						
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited						

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3. This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.



Analytical Report Number : 21-60062

Project / Site name: Badminton Rd, Matson

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1789764	WAC	None Supplied	None Supplied	Brown clay and sand with gravel.

Analytical Report Number : 21-60062

Project / Site name: Badminton Rd, Matson

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as received, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 21-60062
Project / Site name: Badminton Rd, Matson

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

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

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 21-60062
Project / Site name: Badminton Rd, Matson

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WAC	None Supplied	S	1789764	c	Acid neutralisation capacity of soil	L046-PL	c
WAC	None Supplied	S	1789764	c	BTEX in soil (Monoaromatics)	L073B-PL	c
WAC	None Supplied	S	1789764	c	Loss on ignition of soil @ 450oC	L047-PL	c
WAC	None Supplied	S	1789764	c	Mineral Oil (Soil) C10 - C40	L076-PL	c
WAC	None Supplied	S	1789764	c	Organic matter (Automated) in soil	L009-PL	c
WAC	None Supplied	S	1789764	c	PCB's By GC-MS in soil	L027-PL	c
WAC	None Supplied	S	1789764	c	Speciated WAC-17 PAHs in soil	L064-PL	c
WAC	None Supplied	S	1789764	c	Total BTEX in soil (Poland)	L073-PL	c
WAC	None Supplied	S	1789764	c	Total organic carbon (Automated) in soil	L009-PL	c
WAC	None Supplied	S	1789764	c	pH at 20oC in soil	L005-PL	c