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## Phase 1 Geo-Environmental Investigation (Desk Study)

105, Addington Road,  
Reading,  
Berkshire,  
RG1 5PZ

Project Reference J117



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## NOTES TO THE REPORT

### The Company

This report has been prepared by Julian Puzyna for and on behalf of Sackedgate Ltd. Company registered No. 09712671 at 26 Reading Road, Burghfield Common, Berkshire, RG7 3QA. (sole director and employee of Sackedgate Ltd). This report was produced for the benefit of the client detailed in the appointment section of the report and subject to the provisions set out in the document below and also within the applicable Sackedgate Ltd estimate and terms of engagement.

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### Reliance

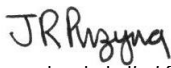
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### Limitations

This assessment has been carried out with reasonable skill, diligence and care with reference to the agreed scope of investigations, limitations set out in the estimate as well as the terms of engagement, applicable guidance and accepted practice.

Contaminated land investigations require forethought regarding the types and nature of any contaminants, as well as the nature of the ground and groundwater. It is not always possible to predict the exact nature of the historical use of any site or the full geological or hydrological setting from the available records. From a wider perspective, it is not always possible to turn over each and every stone during physical investigations within normal financial, logistical and sensible constraints.

It should therefore be understood that there may be issues undisclosed by the investigations documented in this report, that are outside the scope of the report or could not have been sensibly predicted or found.

| Document Control |                                                                                                                                                             |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Author           | <br>For and on behalf of Sackedgate Ltd<br>Julian Puzyna BEng Hons MCIEH |
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## 1.0 Introduction

### 1.1 Appointment

This report was commissioned by Charlie Sandhu to provide an environmental assessment of the soils underlying the proposed development site at No.105, Addington Road, Reading, Berkshire.

The work was carried out on the basis of Sackedgate Ltd estimate No E126A and subject to the provisions set out in the terms of engagement included with that estimate.

### 1.2 Proposed Development

The proposed development comprises the demolition and removal of the existing bungalow, excavation of a development platform over the changing ground levels at the site and construction of a new dwelling which spans ground level at the Addington Road with the lower ground to the rear of Addington Road.

### 1.3 Scope of Investigation

The work carried out by Sackedgate Ltd to produce this report comprised a phase 1 qualitative contaminated land assessment or desk study.

#### 1.3.1 Concept

The purpose of the investigation is to provide an important step in the assessment of the site prior to any physical soil or groundwater testing. This involves a qualitative search for available information that may identify potential contamination sources, both on and off site and how the ground or groundwater could be accumulating or transporting those contaminants with respect to the site area in question, as well as the surrounding land.

Review of information such as historic mapping, aerial pictures, geology and hydrology maps are the first investigation steps, followed by a review of assembled environmental data from local authorities and Environment Agency etc. More focussed searches are then carried out that follow the leads or blanks identified from mapping and the environmental database reviews where necessary.

The assessment of the information is then carried out on the basis of the well-established *source-pathway-receptor* linkage assessment described in a number of guidance documents. If any of the three parts is missing, the linkage is not considered plausible. Where a plausible linkage can be made, further consideration of information or quantitative physical investigations will be required.

#### 1.3.2 Limitations

All information sourced by this investigation is considered carefully with respect to its validity and accuracy however Sackedgate Ltd cannot accept responsibility for incorrect information provided in good faith by any third parties.

Although some geotechnical information and ground stability hazard information from third parties is appended to this report, no geotechnical recommendations are provided by Sackedgate Ltd.

Where hazardous ground is disclosed during these desk based investigations such as mine workings, wells or swallow holes, the issues will be reported as hazards but no design or mitigation recommendations are given.

## 1.4 Applicable Guidance

The investigations and methods used were carried out with reference to the Environment Agency report – Model Procedures for The Management of Land Contamination referenced CLR11. The CRL11 document is soon to be replaced by a new Environment Agency Land Contamination Risk Management (LCRM) and this new guidance has also been considered in this report.

Other applicable guidances have also been referred to where appropriate, such as the Environment Agency Guidance for the Safe Development of Housing on Land Affected by Contamination (R&D Publication 66-2008), Environment Agency Framework for the Use of Rapid Measurement Techniques (RMT) in the Risk Management of Land Contamination (March 2008) and BS 10175 (Code of Practice for the Investigation of Potentially Contaminated Sites).

## 1.5 Investigator and Author of this Report

The investigations, either desk based or physical examinations of this site were carried out and documented by myself, Julian Puzyna. I have an Honours degree in Civil Engineering (BEng Hons) from Kingston University (Kingston Upon Thames) and I am a member of the Chartered Institute of Environmental Health (MCIEH).

My first contaminated land investigation as lead engineer was carried out in 1998 however my first involvement with contaminated land investigations was in 1989 with Exploration Associates Ltd. at the Bell Green Gas Works in east London. Since then, I have carried out approximately 794 ground investigations (as of March 2020).

## 2.0 Site Details

### 2.1 Site Location

This site lies about 1.7km south east of central Reading (Civic Centre) and 470m south of Cemetery Junction (junction between the A4 Bath Road and the A329 Wokingham Road).

The centre of the proposed development site lies at grid reference 473230, 172740. The postcode for the site is RG1 5PZ.

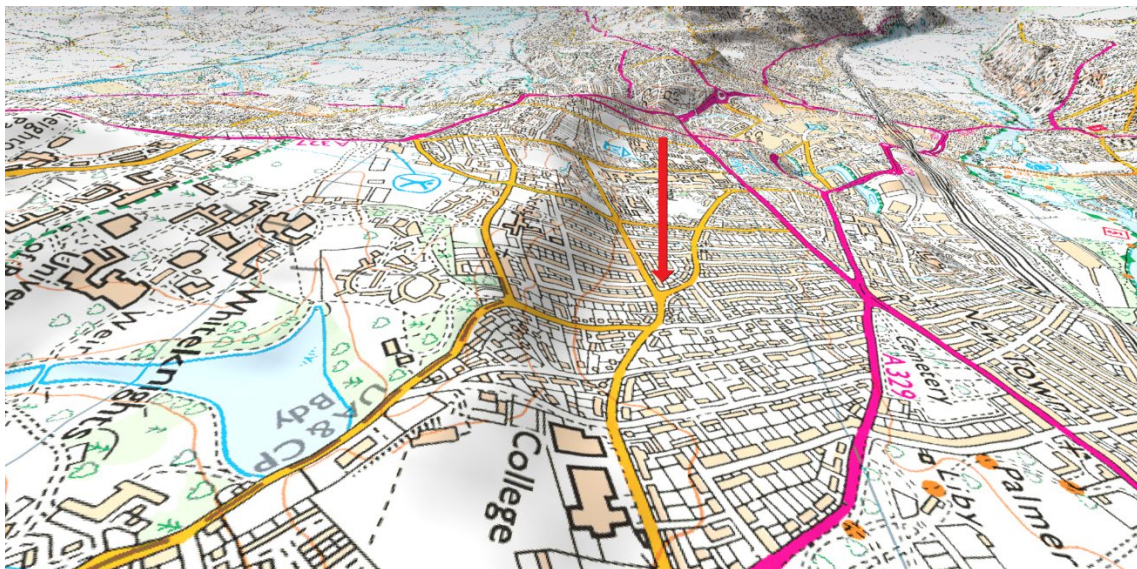
### 2.2 Site Description

This site lies at the eastern end of a long housing terrace built sometime between 1877 and 1899. The site is occupied by a single small bungalow that is not connected to the terrace. The bungalow is brick built with a pan tile roof and it appears on historical maps at the same time as the terrace.

The rear garden of the plot has been partitioned in two by a line of four large advertising hoardings. On the western side of the hoardings the remains of the garden area could be seen to be sloping down significantly to the west. The garden area to the eastern side of the hoardings is open to Erleigh Road and used for opportunist parking.

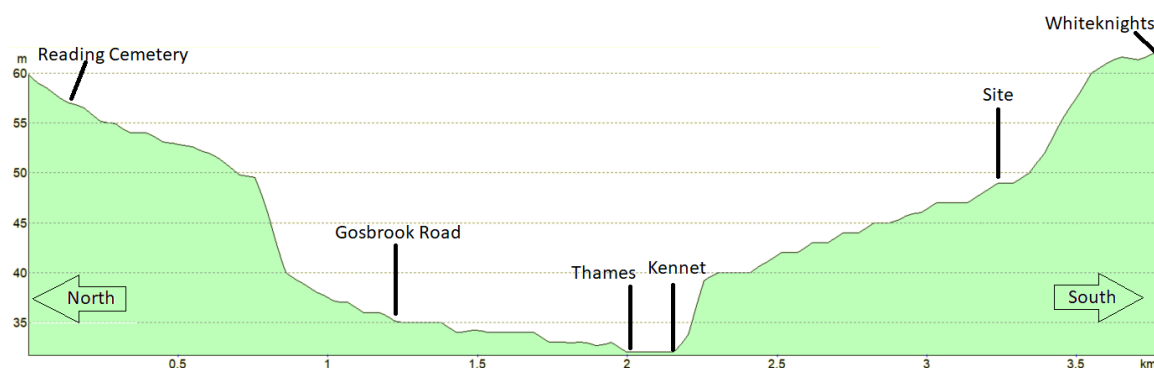
## 3.0 Geological and Hydrological Setting

### 3.1 Topography



*The topography shown above is greatly exaggerated to allow it to be visualised.*

The site lies on the southern slopes of the Thames Valley with ground levels dropping gently downward to the north and the wide flat flood plain of the River Thames.



The confluence of the River Kennet/Kennet and Avon Canal and the River Thames lies about 1.1km to the north of the site and the flood plain is roughly 1.2km wide whilst the crests of either side of the valley span almost 4km. Further downstream the Thames Valley narrows as the river passes back into the Chiltern Hills at Shiplake.

Locally to the site, ground levels drop down to the west, from elevated ground beside Erleigh Road on the eastern side of the site, to lower ground of the gardens to the terraced houses along Addington Road on the western side of the site.

### 3.2 Published Geology

Data from the British Geological Survey shows that the site is underlain by the Taplow Gravel Formation, also known as River Terrace Gravel. This Terrace Gravel is then underlain by the Lambeth Group of Deposits, a mixture of estuarine clays and sands. Below that lies the Upper Chalk Group.

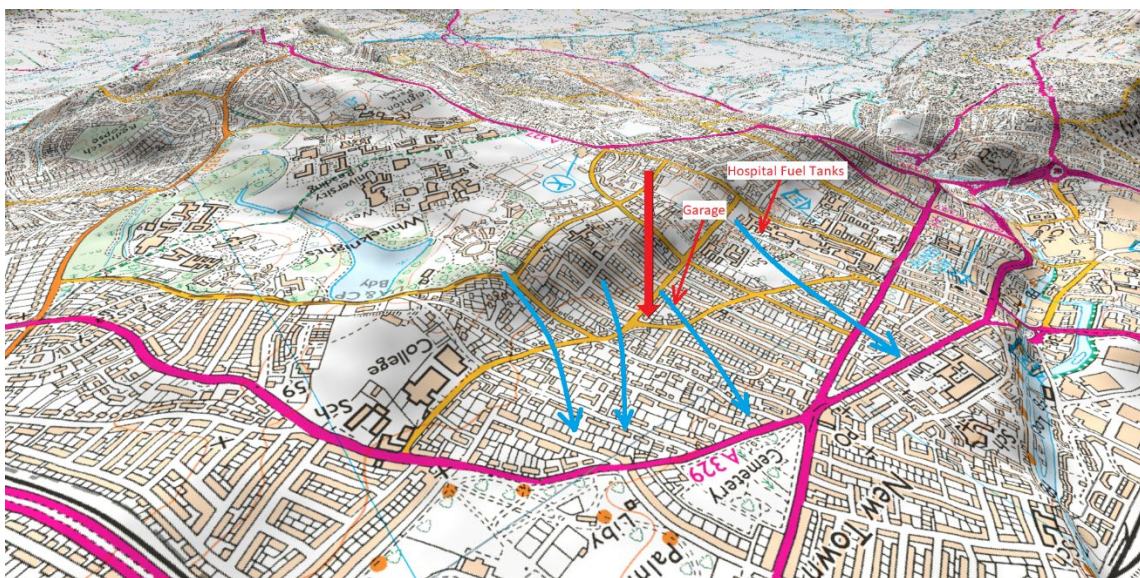
### 3.3 Published Hydrology & Hydrogeology

Hydrological maps of the area show that the Lambeth Group Deposits underlying the site are a Secondary (A) Aquifer. The overlying Gravels are also designated a Secondary (A) Aquifer. Below these deposits lies the Upper Chalk Group and this is known to be a Principal Aquifer. A sensitive abstraction of the groundwater in this area is noted at the nearby University of Reading about 820m to the west and the site is shown to lie in the Zone II Source Protection Area (SPZ) around that abstraction.

This area is a large bank or terrace of gravels formed by prehistoric flood events of the River Thames. Few channels or streams can be seen on any of the maps however, I would expect any old water courses to have been put into culverts below this well built up area.

Unless intercepted by storm drains, rainwater on this area would be expected to percolate rapidly into the underlying River Gravel and then into any sandy parts of the Lambeth Group. The Lambeth Group of deposits is variable and clay areas will force water to move laterally through the River Gravels until a sandy area allows the water down into the underlying Chalk aquifer. The general flow of groundwater in this aquifer is known to be eastward in the same direction as the river.

### 3.4 Migration of Contaminants



*Above, expected direction of surface and shallow groundwater flow*

Any mobile contamination in the site area, either floating (fuel or lubricants) or dissolved would be expected to move with surface waters in 1) the streams, drains and culverts and 2) within the flow of shallow groundwater, in any made ground or the terrace gravels downhill to the north. Contamination in areas to the north, east or the west of the site is unlikely to have historically migrated toward or onto the proposed development site.

On this basis it is considered that potential sources of contamination lying to south of the site, pose the greatest risk to the site area. Potential sources of contamination outside this catchment for the site, would not be expected to pose any risks to the site.

## 4.0 Site History

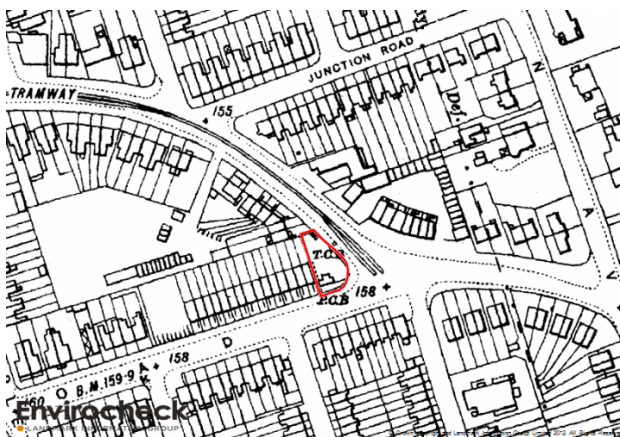
### 4.1 Historical Ordnance Survey maps

The available historic Ordnance Survey maps have been ordered from the Landmark Information Group and reviewed for this site. The maps are appended. The maps are at two scales. Firstly, are the six inches to one mile maps (1 in 10,560 scale) that was updated to 1 in 10,000 scale in the post war years. The second set of maps (extracts below) is at 1 in 2,500 scale.



1877

1899



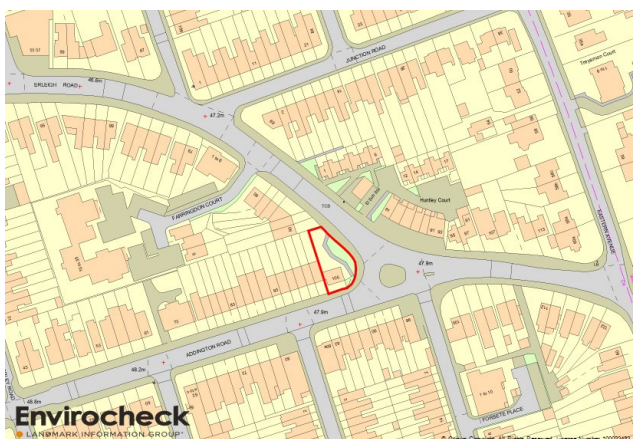
1933



1948



1990



2020

The earliest historical maps show that Victorian Reading was a well established town with large industrial areas, all clustered around the Kennet and Avon Canal wharfs to the west of the site and clustered around the railway to the north west of the site.

Industry slowly disappears from the maps in the post World War 2 period and the maps show many of the factories and the gas works closing down and being developed as shopping centres (Oracle centre lies on land occupied by gasworks and a tramway electrical power station) or residential areas.

The site area is shown to lie in a developing residential area that was present on the first ordnance survey map in the series dated 1877. This map shows that that houses are slowly being built along the roads to the north. The site area itself appears open and undeveloped on the 1877 maps on land between Erleigh Road and Addington Road. The only notable thing about this triangle of land is the gravel pit in its eastern most corner.

The next map in the series is dated 1899 and shows that the houses along Addington Road (including the bungalow on site) and Erleigh Road are now complete and the whole area is filled with neat rows of small terraced dwellings. This layout is largely still present today.

Notably the 1899 map shows that the land 100m to the north west that is now penned in behind the housing terraces along Addington Road, Erleigh Road and Hatherley Road, has become occupied by a row of small buildings, probably small sheds. The 1957 map then shows a large building to have appeared marked 'Works'. The 1966 edition shows this building to have been enlarged and re-labelled as 'Garage'. This remains unchanged until the most modern maps show that the garage building has been removed and replaced with numbered flats accessed by a new road named Farrington Court.

Other industrial areas also appear on the maps such as a depot some 250m south east of the site and works buildings 75m south east on the 1933 map and works 50m to the east on the 1957 map.

## 4.2 Mapping Observations



*Above, an overlay of the 1877 & 1993 maps(left) and 1877 & 1899 maps (right)*

The historical maps have shown that this site lies at the very edge of a gravel pit. The overlaid maps presented above show that the edge of the gravel pit occupies most of the garden to No.105. During site visits it was possible to see that the topography of the site matched what can be seen on the map overlay above with a steep slope beyond the advertising hoardings. This suggests that the gravel pit void is still in place and has not been infilled.

Land 100m to the north west of the site has been used industrially, marked first as a works building and then a garage. The area is now shown to be covered by a residential flats development. Other much smaller works buildings and depots are shown to the east of the site as described previously. With respect to the catchment area to the south of the site from where contaminants could migrate onto the site, none of the works, depots or garage lie in this catchment. Any contamination from the works, depots or garage would be expected to move northward and away from the site.

#### 4.3 Aerial Pictures



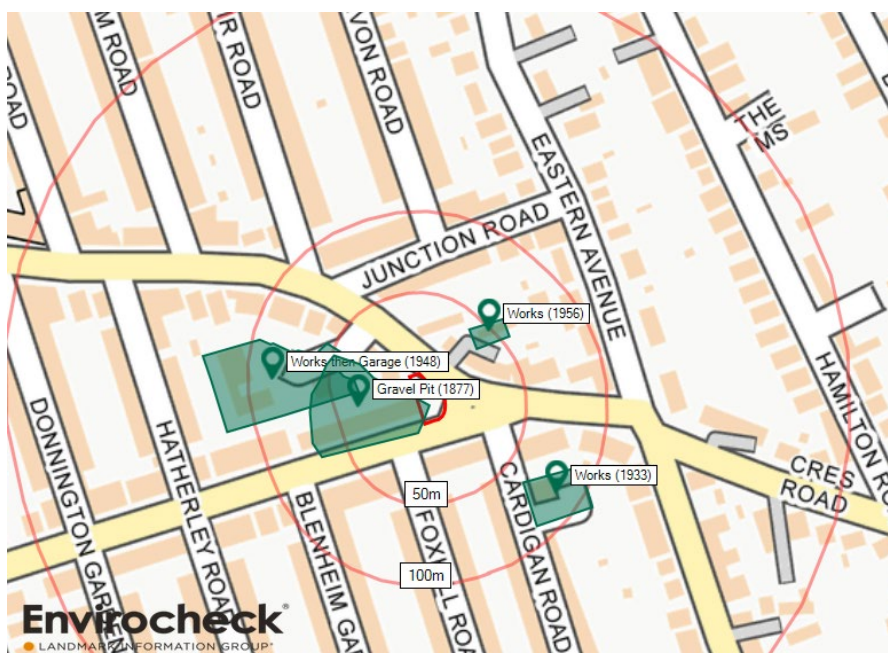
*Above, aerial pictures dated 1999 (left) and 2020 (right)*

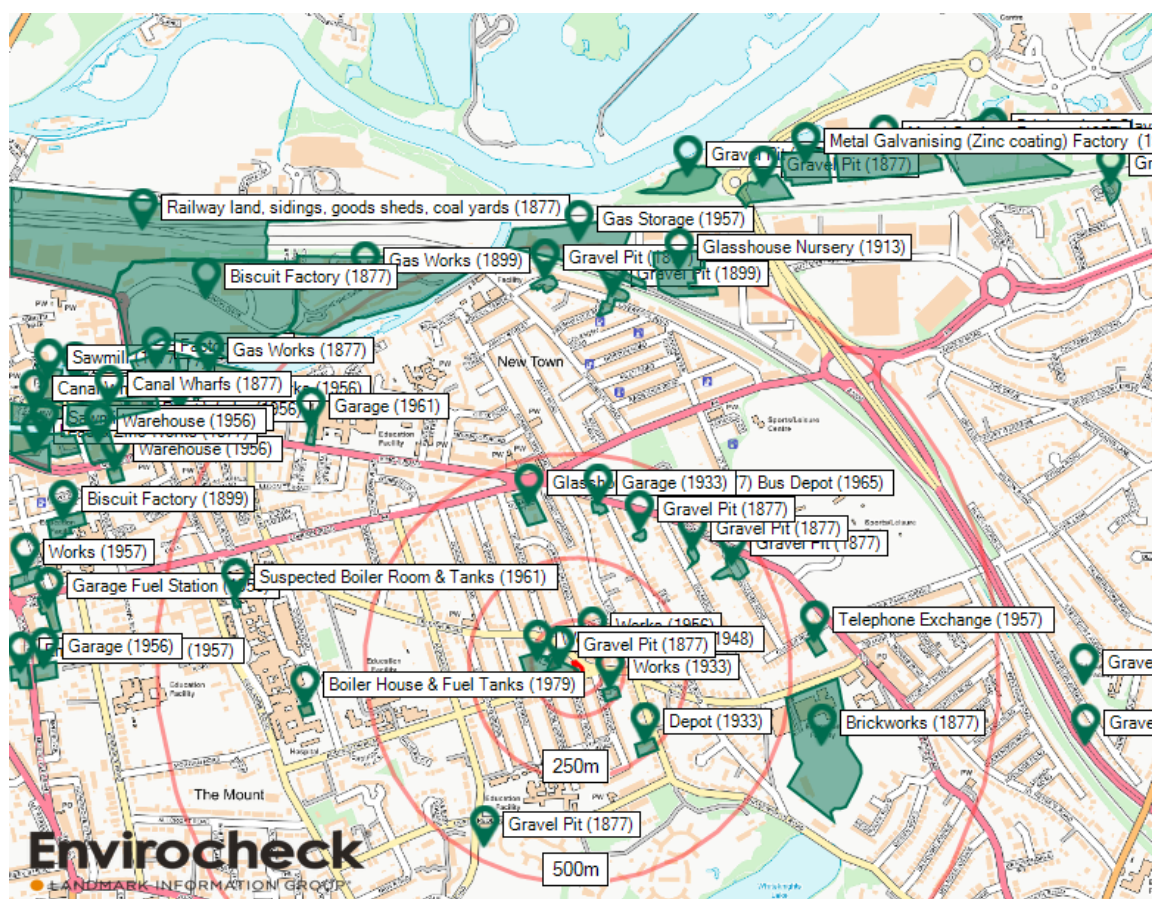
Aerial pictures from Google Earth have also been reviewed however, copies of the pictures are not presented in this report for copyright reasons.

Sixteen pictures are shown on Google Earth dated between 2003 and 2018. All for these pictures show the site with bungalow in place and the four advertising hoardings in place. All of the pictures show the garden to be an overgrown slope and not in use as a garden.

The gardens to the neighbouring properties to the west appear to be laid to grass with few features on pictures dated up to 2018. The two pictures dated 2018 however, show the neighbouring gardens to be possibly in the process of being re-landscaped.

#### 4.4 Summary of Map and Aerial Picture Review





The maps and aerial pictures have shown that Reading was heavily industrialised in the Victorian period and then in the periods up to and after World War 2 these industries faded away to be replaced by housing and retail areas. The site area however has lain in an area that was developed with housing by 1899.

The rear garden to this plot is shown on the maps to be underlain by a very old gravel pit. The pit was probably used to gain materials for road making prior to the area being developed with houses sometime between 1877 and 1899.

The only commercial or industrial activities close to the site were an old works, a garage some 100m to the north west and some small depots and works buildings to the east and south east of the site. As discussed, if present any potential contamination from these commercial/industrial areas would be expected to move north and away from the site.

## 5.0 Available Information

## 5.1 Database Search

This database of information is assembled by the Landmark group. The update cycles and the organisations (generally Local Authorities and the Environment Agency) who provided the data are summarised in the appended Envirocheck datasheet. This information is solely provided by third parties and Sackedgate Ltd cannot guarantee its accuracy or completeness.



| Data Type                       |                                                             | 0-250m | 250-500 | Note                                                                                                                                                                                                                              | Further Investigation required                               |
|---------------------------------|-------------------------------------------------------------|--------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Contaminated Land Register      |                                                             | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
| Regulators                      | Discharges Consents                                         | None   | None    | Closest 630m south east at University of Reading discharge of cooling water and Thames Water discharge to a freshwater stream flowing north east and away from site                                                               | No                                                           |
|                                 | Pollution Incidents                                         | None   | 2       | Closest 330m north west. All to the north west, north or north east. None on valley slope to the south of the site.                                                                                                               | No                                                           |
|                                 | Pollution Controls                                          | 1      | 1       | Closest 229m west at a dry cleaners on Erleigh Road. All were dry cleaners or fuel stations, none lay to the south of the site.                                                                                                   | No                                                           |
|                                 | Enforcements                                                | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | Prosecutions                                                | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
| Waste Treatment and Landfill    | BGS Recorded Landfill Sites                                 | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | Local Authority Recorded Landfill Sites                     | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | Registered Waste Treatment Sites                            | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | Registered Waste Transfer Sites                             | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | Licensed Waste Management Facilities                        | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | Other Made Ground                                           | 1      | 3       | The gravel pit on the site is noted to be potentially infilled land. Three other pits to the north east of the site are also noted                                                                                                | Yes                                                          |
| Industrial / Commerce           | Light-Heavy Industry                                        | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | General Commercial Activities                               | 2      | 9       | Dry cleaners vehicle workshops and printers shown around the site only a printers lay to the south however, the mapping indicates a residential address so this is a small scale business or just a business registration address | No                                                           |
|                                 | Radioactive Substances                                      | None   | None    | 16 800m to the west at Royal Berkshire Hospital. All suspected to be for medical radioactive tracers. Contamination of the ground by these controlled substances with very short half-lives (Technetium half-life is 6 hours)     | No                                                           |
|                                 | Areas of Pollution Control                                  | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | Areas under remedial Action                                 | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
| Fuel                            | Road Fuel Dispensing Forecourts                             |        | 1       | Closest 822m to the north west. None on the valley slope to the south of the site                                                                                                                                                 | Yes. Any soil analysis should include Petroleum Hydrocarbons |
|                                 | Fuel Storage Areas                                          | None   | None    | Some gas storage sites present 1km north of the site                                                                                                                                                                              | No                                                           |
| Hazardous Substances/Activities | Control of Major Accident Hazards                           | None   | None    | COMAH records for a number of gas storage sites 1km to the north referring to old gas works and gasometers.                                                                                                                       | No                                                           |
|                                 | Notification of Installations Handling Hazardous Substances | None   | None    | None                                                                                                                                                                                                                              | No                                                           |
|                                 | Explosives Sites                                            | None   | None    |                                                                                                                                                                                                                                   | No                                                           |
|                                 | Planning Hazardous Substances Consents or Enforcements      | None   | None    | Storage of LPG gas at Royal Berks Hosp 700m west and records for a number of gas storage sites 1km to the north referring to old gas works and gasometers                                                                         | No                                                           |

## 5.2 Findings of the Database Search

The environmental database search has shown that the site and surrounding areas have not been subject to landfills or heavy industry within 250m of the site. The site is noted to lie close to potentially infilled land due to the mapped gravel pit.

Some small businesses were noted in the area by the database such as dry cleaners and workshop garages however, none were sufficiently close to the site to pose a credible risk given the expected migration pathways for any mobile contaminants in this area.

## 5.3 Additional Information

A series of trial pits were excavated on the site for the tree protection officer. Photographs and records of those trial holes are appended (Appendix G). I do not know who carried out the trial pits.

The photographs show that a layer of questionable topsoil is present and perhaps a thin mantle of made ground comprising topsoil with some construction debris. Below that the trial pits appeared to reveal orange brown coloured natural clayey gravelly sand or sandy clay. No significant thicknesses of made ground were revealed by the trial pits.

Samples of these soils were not taken for analysis nor was any insitu analysis carried out using a PID meter for degraded fuel or an XRF detector for heavy metals.

# 6.0 Site Walkover / Inspection

## 6.1 Description

This site lies at the eastern end of a long housing terrace but is occupied by a single small bungalow that is not itself connected to the terrace. The bungalow is brick built and painted with a pan tile roof. The building appears on historical maps at the same time as the terrace and the brickwork, where visible (such as the chimney), appears to be a messy mixture of old brick stock, similar to the various brick types neatly laid in the neighbouring terrace. It almost appears that enough bricks and tile were left over following completion of the terraces along Addington Road, to construct an extra bungalow.

The front garden is mostly hardstanding with two open areas of flow beds. The rear garden has mostly been partitioned off to house four large advertising hoardings. The partitioned off section of the garden, facing Erleigh Road, has been partly covered by hardstanding and is currently being used for opportunist car parking.

Behind the advertising hoardings lies the remaining thin strip of the rear garden. This part of the garden is overgrown and rough in appearance. The ground level could also be seen to slope down to the west, down from the level of the hoardings and Erleigh Road to about 1m lower at the western boundary. A low retaining wall could be seen at the western garden boundary, beyond which lie the gardens to the terraced houses of the other gardens along Addington Road.

Although I could not fully access the rear garden, there was no evidence of any old heating oil tanks or any commercial activities in either garden.

The section of the garden to the east and the Erleigh Road side of the hoardings, was seen to include some areas of concrete hardstanding but most of the area was rough vehicle trafficked (chewed up) mud with some grasses attempting to grow. Due to the presence of parked cars, I could not fully inspect the ground for contamination, most likely from the parked cars if present.

## 7.0 Potential Contamination Sources

Following the assessment of maps and aerial photographs, as well as available environmental data for the site and preliminary ground exploration, the following potential sources of contamination have been identified. These are not proven sources at this stage and they do not represent any form of allegation against any persons historically or currently involved with the identified areas or locations.

### 7.1 Made Ground

The site overlies an old gravel pit. Whilst it appears that the pit has not been infilled, trial excavations have not been carried out to show that a face of fresh gravel lies below the topsoil visible on this slope. There is some potential therefore for imported soil to be present that was used to infill parts of the gravel pit to allow construction of the bungalow, the terrace or the roads.

Imported soils may have arisen from demolition or construction at old industrial sites and could therefore contain a variety of potential contaminants ranging from those associated with old building materials such as Hydrocarbons associated with old Tarmac, Copper, Lead, Zinc and Asbestos, or contaminants associated with activities at the source industrial site.

### 7.2 Lead Fallout

On several old residential sites in Reading, I have found some very high Lead concentrations in the gardens of old Victorian and Edwardian gardens. I suspect there are three potential sources.

Firstly, construction waste which included offcuts of Lead roof flashing, Lead pipework, Lead window beads and white Lead painted timber were all burned and the ash spread in the new gardens.

The second Lead source is the mass of coal burning industries in Reading from the Victorian period onward. The soot from the gas works, foundries and other factories contained high concentrations of metals including Lead.

The third source is the use of vehicle fuel with the fuel additive Tetraethyl Lead from the 1920s until they were finally banned in 2000. Reading has been subject to heavy traffic for decades and on still days, significant fallout of lead oxide would have taken place.

### 7.3 Car Parking

(To The East Of The Advertising Hoardings)

The car parking on the eastern half of the garden may have resulted in some low level contamination from any cars with leaking lubrication, hydraulic or fuel systems. The surface was largely a clayey mud that was heavily rutted by the cars being parked on that area. This would tend to stir any leaked hydrocarbons into the surface layers.

### 7.4 Works / Garage

The works / garage building 100m to the north west of the site is the closest plausible source of contamination to the site. The garage building appears to have been removed and re-developed with flats on a new cul-de-sac road.



Aerial pictures dated 1999 show the area to have been cleared with bare earth visible over the whole garage site. The garage workshops can be contaminated by the decay of old vehicles on the site. Outside and unprotected cars can degrade into piles of brown rust leaving just an engine, wheels and axels behind. When corroding, any alloy components of the steel such as Boron, Chrome, Nickel can be released. Old batteries can add Lead in an acidic mobile state and of course hydrocarbons associated with fuel, lubrication oil and hydraulic oil can cause contamination.

The workshop itself may have generated waste such as old engine oil and old hydraulic oil from brake and steering systems. This oil waste is often stored in old barrels and similar containers. Inevitable spillage and leakage can leave the ground blackened with these old oils.

I assume that some forms of investigation would have been carried out before the flats were constructed. Hydrocarbons, particularly fuel, can cause nuisance odours if any have been left behind so I would expect any obvious contamination to have been removed. However, I have not made any formal enquiries about the re-development of that area with the Local Authority at this stage and I cannot rule out the potential for that area to have been contaminated.

## 8.0 Conceptual Model

Potential linkages between sources of contamination and sensitive receptors are presented below in a tabular format. The layout is set up to allow it to be expanded into a number of separate tables if further investigations are required. The risks are assessed on the basis of being acceptable or unacceptable, as set out in Environment Agency CLR11.

### 8.1 Source-Pathway-Receptor Preamble

#### 8.1.1 Source

Potential Sources have been identified from the available information for the site and brought forward to be assessed with respect to the potential risks posed to receptors.

The source of contamination may not be the point of origin. Contamination may have been introduced into the ground elsewhere, moved along a migration pathway and accumulated on or below the site. This includes the migration and ingress of dust from contaminated ground into dwellings.

#### 8.1.2 Pathways

The pathways that are modelled here, vary according to the receptor. For human health protection, the pathway is the route that the contaminants take into the human body.

For assessing human health risk, absorption pathways generally fall into the following categories (Environment Agency CLEA Model v1.071). Direct soil ingestion, consumption of homegrown produce and attached soil, dermal contact indoors, dermal contact outdoors, inhalation of dust indoors, inhalation of dust outdoor, inhalation of vapours indoors and inhalation of vapours outdoors.

For controlled waters and sensitive environments protection, and migration onto a site, the pathway is the geological or hydrological route from the point of origin or accumulation zone, into an aquifer, sensitive ecosystem or surface waters

#### 8.1.3 Exposure Scenario

The applicability of these pathways depends on the exposure scenario for the use of the land. Scenarios where site occupants will not be exposed to any of the underlying soils such as the commercial land scenario differ greatly from the scenario where the land use is residential and close contact with the soil can be expected.

Generic exposure scenarios are used initially which assume various exposure durations and activity types. For this site the private gardens residential scenario, where homegrown garden produce will be consumed, has been selected.

#### 8.1.4 Receptors

For human health, the potential receptors depend on the exposure scenario. The critical receptors at this site would be expected to be the new residential site occupants. Given the known geology of the area, aquifer groundwater was also considered to be at risk given the permeable geology. Sensitive Environments or Ecosystems have not been identified downstream from the site.

## 8.2 Tabulated Conceptual Model

|           | Potential Source                | Potential Location               | Associated Contaminants                                                                                                                                                                                                                                                                                                                                                             | Potential Migration Pathway                                                                                                                    | Potential Absorption Pathway                                                                                                                     | Potential Receptor                                                                                      | Preliminary Risk Assessment                             | Note                                                                                                                                                                                                                                                                                                                                         |
|-----------|---------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linkage 1 | Made Ground                     | Whole site                       | Metals such as Lead Copper Zinc from solid metal building materials and Arsenic Chrome and Lead as pigments in paint and wallpaper.<br>Tarry PAH compounds from Bituminous materials such as pitch or old tarmac.<br>PAH compounds associated with combustion residues in ash.<br>Chrysotile asbestos roof boards and soffit panels crushed in with other brick and concrete rubble | Pathway not applicable. Potential source on site                                                                                               | Ingestion of Soil and dust<br><br>Consumption of homegrown produce and attached soil.<br><br>Dermal contact indoor<br><br>Dermal contact outdoor | Construction Workers.<br><br>Service and Maintenance Workers.<br><br>Site Occupiers<br><br>Wider public | Acceptable following earthworks to create a garden area | The proposed new garden area will lie at the same lower level as the other back gardens on Addington Road. This will require excavation into the existing slope to create space. The new garden area will therefore comprise natural clayey sands and gravels with any overlying made ground removed.                                        |
| Linkage 2 | Lead Fallout                    | Whole site                       | Tetraethyl Lead in fuel which oxidises to when combusted alongside petrol within an engine to form a solid Lead oxide particulate that is expelled in the exhaust gas.<br>Lead contaminated soot from the heavy Victorian industry to the west of the area                                                                                                                          | Pathway not applicable. Potential source on site                                                                                               | Inhalation of Dust Indoor<br><br>Inhalation of Dust Outdoor<br><br>Inhalation of Vapour Indoor                                                   | Groundwater                                                                                             | Acceptable following earthworks to create a garden area | The proposed new garden area will lie at the same lower level as the other back gardens on Addington Road. This will require excavation into the existing slope to create space. Any surface soils impacted by fallout would be removed.                                                                                                     |
| Linkage 3 | Car Parking (east of hoardings) | On site (eastern side of garden) | Contaminants associated with used engine oil such as PAH compounds and Cyanides. Aliphatic C21+ engine oil.<br>C10 to C35 diesel range aliphatic and aromatic hydrocarbons (50%/50%)<br>Hydraulic oils C10 to C20 and water soluble.<br>Light gasoline range C5 to C10 unlikely to persist                                                                                          | Pathway not applicable. Potential source on site                                                                                               | Inhalation of Vapour Outdoor<br><br>Groundwater                                                                                                  |                                                                                                         | Acceptable following earthworks to create a garden area | The proposed new garden area will lie at the same lower level as the other back gardens on Addington Road. This will require excavation into the existing slope to create space. The new garden area will therefore comprise natural clayey sands and gravels with any leaked contaminants from cars removed.                                |
| Linkage 4 | Works/Garage                    | 100m north west                  | Diesel and Lube oil contaminants listed above. Metals associated with corroding steel car parts such as Boron, Chrome, Nickel.<br>Aluminium from alloy engines and wheels.<br>lead from car batteries and old panel work which was soldered.                                                                                                                                        | Permeable gravel layers between the source and the site could be a pathway for these dissolved contaminants or hydrocarbon based contaminants. |                                                                                                                                                  |                                                                                                         | Acceptable                                              | Some assessment and remediation should have taken place when this area was redeveloped in about 1999 however, this cannot be relied upon. The expected migration pathways for any contaminants present in the ground below the garage would however, be expected to be moved northward by the flow of surface water and shallow groundwater. |

## 9.0 Interpretation

### 9.1 Plausible Linkages Posing Potential Risks

The assessment of the conceptual model has not revealed any potential linkages between suspected sources of contamination and receptors such as new residents, on the basis that earthworks will remove most of the soils that currently overlie the garden area.

The study of the topography shows that the site is only at risk from mobile contaminants whose source lies directly south of the site. Any contaminants in that area could easily move downhill with surface water and shallow groundwater flow and into the soils below the site. Offsite sources of contamination however, were not disclosed by this investigation in this catchment area to the south of the site. The area to the south is occupied by a residential area, to the crest or top of the side of the valley.

### 9.2 Recommendations

This investigation shows that it is unlikely that any contamination will be left at the surface in garden areas when the development is complete. Care will be required to ensure that the soils overlying the proposed development platform are removed cleanly and residues are not left behind.

The hauliers and tips that will accept the excavated soils will only do so if the material has been analysed. Samples should therefore be taken ahead of the actual earthworks and tested for the Waste Acceptance Criteria (WAC) suite. This looks at the impact these soils will have when buried such as solubility of inorganic compounds that could affect groundwater, the presence of a variety of hydrocarbons and the presence of organic matter which could decay and generate gas. The analysis will then allow the soils to be removed, hopefully as inert waste.

I would suggest that there is always a massive level of uncertainty with the ground in any area. The gravel pit appears not to have been infilled however, the eastern end of the pit could have been infilled to protect and support the soils below Erleigh Road. There is also a possibility that ash and other fireplace waste was cleaned from the bungalow hearth and dumped into the garden.

On this basis I would recommend that a discovery statement / disclosure requirement is put in place during the earthworks that details what might be found in the ground and the contingency plans that will halt the works and summon the Sackedgate engineer (and Local Authority if necessary) to assess the situation.

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