

PHASE 1 ENVIRONMENTAL INVESTIGATION

NO 4178/19

GARAGES AT 14-16, ELDON TERRACE,

READING, BERKSHIRE

FOR

PROPOSED HOUSING DEVELOPMENT

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1 INTRODUCTION

- 1.1 This investigation was commissioned by the developers, M&S Lettings, in order to provide an initial assessment of the potential for ground contamination on the proposed development area.
- 1.2 The Contamination Assessments have been carried out with reference to CLR 11 (Model Procedures for the Management of Land Contamination), as well as Environment Agency Guidance for the Safe Development of Housing on Land Affected by Contamination (R&D Publication 66-2008) and BS 10175 (Code of Practice for the Investigation of Potentially Contaminated Sites). This phased approach is set out below.
- 1.3 Various photographs maps, plans and overlays are presented in the report text but these have also been reproduced at a larger size in the figure pages, 2 to 16. The figure pages also include snapshots of the appended geology, historic and site sensitivity map sets.

Phase 1 (or Desk Study)

- 1.4 The desk study or Phase 1 Environmental Investigation documents a site walkover inspection together with a detailed studies of geological maps, historic maps, aerial pictures and any available records for the site.

- 1.5 This allows us to define the nature of any potential contaminants and how they will behave in the particular geological setting for the site, before any physical investigations are carried out.
- 1.6 The research is drawn into a conceptual model detailing the identified plausible contaminant linkages between potential sources of contaminants and their routes to potential receptors of those contaminants. Particular attention is given to topography, hydrology and geology which influence the migration and the accumulation of contaminants.

Phase 2

- 1.7 If plausible contamination linkages are identified at phase 1, a generic quantitative risk assessment may need to be carried out by physical investigation. Measured contaminant concentrations would be assessed with respect to generic (rather than site specific) guideline values.

2 SITE DETAILS

Site Location

- 2.1 This site is located 1.15km east of central Reading (Reading Minster of St Mary) and lies on cross streets between The Kings Road A329 to the north and the London Road A4 to the south.
- 2.2 The site centre is located at grid reference 472530E 173140N and post code reference RG1 4DX.

Brief Description

- 2.3 The area under consideration is approximately 900m² and is roughly rectangular in shape. At the time of the investigation the site was occupied by a set of small garage units at the rear of a larger property at 17 Eldon Square.



Above left, a plan showing the proposed development above right the site extents from the planning documents

- 2.4 The maps and plans presented in this report show an outline of the entire property including the house and garden to 17 Eldon Square as shown on the 180274/FUL planning conditions document (extracts above). The proposed development area however, comprises just the garage area on the northern side of the site with a new garden wall marking an internal boundary.

3 GEOLOGY, HYDROGEOLOGY, TOPOGRAPHY AND HYDROLOGY

Published Geology

- 3.1 The British Geological Survey Map, 1 in 50,000 scale sheet No 268 shows the site to be underlain by The Seaford and Newhaven Chalk Formations (the mapping does not differentiate between the two) with an overlying layer of superficial deposits comprising the Taplow Gravel Formation and perhaps the Kempton Park Gravels.
- 3.2 The mapping also shows that an outcrop of the Lambeth Group of deposits to lie just to the south and south west of the site. This estuarine deposit can comprise layers of fine sand and stiff mottled clays and is often crossed by prehistoric estuary channels that are infilled with fine sands.
- 3.3 Further still to the south, the maps show that the London Clay Formation is outcropping above the Lambeth Group.
- 3.4 The maps also show areas of worked ground within the vicinity of the site. We can see that these include workings that removed the Kempton Park Gravel to the north east of the site beyond the River Thames.
- 3.5 The geology maps also identified worked ground to the south west which corresponded to part of the Lambeth Group outcrop. We are aware that these were clay pits for brick making. The London Clay Formation appears to have been avoided.

Published Hydrogeology

- 3.6 The Environment Agency Groundwater Maps (<http://maps.environment-agency.gov.uk>) which have replaced the old Groundwater Vulnerability mapping show the site to be underlain by 'bedrock' deposits (Seaford and Newhaven Chalk Formations) which are designated as a Principal Aquifer. The overlying deposit (Taplow Gravel Formation) is designated as a Secondary (A) Aquifer.

- 3.7 1 to 100,000 Institute of Geological Sciences Hydrogeological mapping for South West Chilterns and the Berkshire and Marlborough Downs shows the groundwater within the Chalk to be expected at a level of 40m AOD (The site lies almost directly on the +40m contour). Given that the site lies at approximately 43m AOD implies that groundwater lies some 3m below ground level at the site location.
- 3.8 The direction of the contours indicates that the movement of the groundwater in the Upper Chalk is eastward.
- 3.9 Groundwater at the site is suspected to lie at shallow depth below this site, probably within the Taplow Gravel Formation.

Topography and Hydrology



Above a copy of the 1 to 25,000 scale map rendered according the height data given on these maps. (Note the vertical scale is greatly exaggerated to allow the topography to be visualised)

- 3.10 The site lies on the southern side of the Thames Valley with ground levels dropping down to the north and the base of the valley. At this location the Thames Valley is over 1km wide between the hills of Caversham to the north and hills of Reading/Tilehurst to the south.

- 3.11 The site lies very close to the confluence of the River Thames and the River Kennet (890m to the north west). This side of the Thames Valley is cut through at an oblique angle by the valley of the River Kennet. This unusual course is a result of glaciation where ice sheets forced the Kennet Northward to join the new course of the River Thames which was itself diverted southward from its original route towards Welwyn Garden City and an estuary in East Anglia.
- 3.12 We would expect to have found a number of streams and brooks running down the valley towards either the River Thames or the River Kennet in this area however, this is an urban area where such streams and brooks would have been placed in culverts below the streets.

Migration of Surface Water and Groundwater

- 3.13 Given the topography and the underlying geology we would expect rain water falling in this area to move overland to the closest drain where hardstanding is present. These drains would then be expected to channel water toward the culverted system of streams and brooks underlying the area. This water would then be expected to be channelled to various outlets into the River Kennet or the River Thames.
- 3.14 Some rainfall will fall on open areas where no hardstanding is present or onto roofs which are connected to soakaways. This proportion of the rainwater would be expected to percolate downward through the Taplow Gravels and eventually join the groundwater in the Chalk. There may be clayey layers within the Taplow Gravel which encourage shallow groundwater to flow downhill to the north.

Catchment Areas for Contamination



Above a copy of the 1 to 25,000 scale 3d map showing the potential routes for contaminants that could migrate onto the site.

- 3.15 Given the northward downhill flow of shallow groundwater in the Taplow Gravel and the northward flow of water intercepted by the drainage of the area, we would expect that contamination could plausibly move from areas to the south of the site.
- 3.16 Contaminant migration from other directions would be considered implausible, with the exception of ground gases and fuel vapours.

4 SITE HISTORY

- 4.1 Extracts of historical maps which are centred on the site have been reviewed. Two sets of maps are available, the first set is at 1 in 10,560 scale or six inches to one mile and shows an area which encompasses a 1km radius around the site. During the 1960's to 1970's this set of maps was updated to a more rational scale of 1 in 10,000. The second set of maps is at 1 in 2,500 scale and encompass a 250m radius around the site.

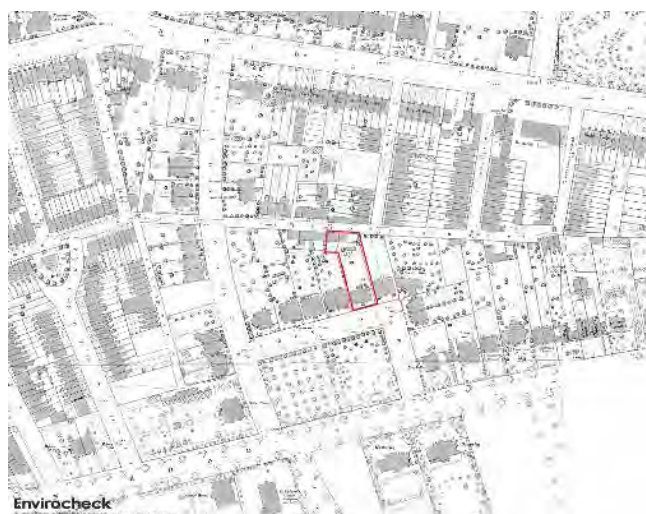
- 4.2 The maps have been scrutinised for potential features which could indicate a contaminative past and the locations of the features are summarised on a modern map at the end of this section. A detailed description of the changes between each map issue has not been drawn up.
- 4.3 Distances between particular features and the site are given as a 'closest boundary to closest boundary' basis and rounded to the nearest 5m. The nature of the features may be unclear from the maps and the features are generally labelled exactly as shown on the maps. Suspected features or unlabelled features are marked as such.
- 4.4 It should be noted that the decisions as to the inclusion of a surface feature during surveys was made by the surveyor involved at the time and not all pertinent features, with respect to contamination, may have been included.

Area Context

- 4.5 The first map in the six inches to one mile scale maps (1 in 10560) is dated 1883 and shows that Reading is a well-developed town with large areas of housing and much industry. The site area lies within one of these areas of housing.
- 4.6 The maps show that industry in Reading lay along the route of The Kennet and Avon Canal as various wharves and mills and also larger factories and gas works to the north of the site along the railway. These included tin works, a lead and zinc works, sawmills and many breweries and malthouses among others. The maps also show a gas works on the River Kennet about 300m to the north west and a larger gas works about 500m to 600m north east of the site.
- 4.7 Further afield the 1883 map also shows extensive brick works over a 1km to the south west (Katesgrove and Waterloo Kilns), over the outcrop of the Lambeth Group discussed previously.

- 4.8 There are also numerous engine sheds, coal yards and sidings shown along the railway to the north of the site, including the Great Western Railway Works. Given the large coal yards shown, we would assume that there would be equally sized ash dumps.
- 4.9 The next maps dated 1900, 1913 and 1933 show that industry is expanding in Reading. More factories appear to the west and north west of the site flowing the canal. Substantial new factories also appear to the north flanking the southern side of the railway which include the biscuit works, another gas works and some extensive new railway sidings and engine maintenance works. A gas works in the centre of Reading is shown to have been replaced by a tram terminus and power station.
- 4.10 Post war maps show that industrial development has slowed and the only new businesses appearing are automotive garages. The closest gas works to the site (300m north west) is no longer shown on the 1962 map and the main gas works 500m to 600m north east of the site and the neighbouring biscuit factory disappear on the 1990 map, replaced by new buildings labelled depots on a new road called Kenavon Drive. Later maps and aerial pictures show this area being developed with housing. Only one of the gasometers now remains.
- 4.11 The tram terminus and power station are replaced by the expansion of the neighbouring brewery. By 1990 this becomes a depot and then finally the Oracle Centre.
- 4.12 During this whole period, the area of Eldon Square, Eldon Terrace, Eldon Road and Eldon Street have remained largely unchanged with respect to the layout of the Dwellings on those streets. Of course the one way system was a later addition.

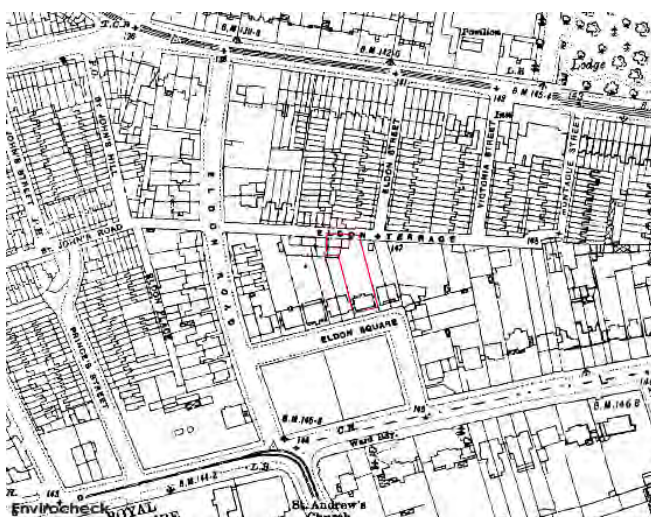
Site Area



1879



1912



1931



1948



1993



2018

- 4.13 The first of the 1 in 2500 scale maps is dated 1879 and shows that Eldon Square and Eldon Terrace are present together with the building at No 17 and buildings at the end of its garden. This map also shows the gas works some 300m to the north west.
- 4.14 The 1 in 500 scale town map dated 1879 show the gas works in great detail. Large retort houses, large coal stores , large gasometer, a tar tank and a large purifying station are shown with internal railway lines and turntables, together with a smaller experimental gas works with its own collection of scrubbers, purifiers and a small (tiny) gasometer.
- 4.15 The gas works is shown to be attached to a steam saw mill, the link between the two is unclear however, we would expect that tar/pitch and creosote from the gas works were used to preserve the cut timber.
- 4.16 Throughout this period the property at 17 Eldon Square and garages at 14-16 Eldon Terrace remain unchanged.
- 4.17 The rest of the pre World War 2 maps show little change to the area. Following the war, the first map edition is dated 1957 this shows that some of the housing, just over 100m to the north of the site, has given way to Reading Technical College and the gas works 300m to the north west has disappeared but the sawmill building remains. The 1966-72 edition then shows the sawmill to have become a biscuit factory and that the college has expanded.
- 4.18 The last maps in the series show that the gasworks and sawmill area 300m north west is now covered by houses. Again, throughout this period the property at 17 Eldon Square and garages at 14-16 Eldon Terrace remain unchanged.

Modern Aerial Photography

- 4.19 Aerial photography presented on the Google Earth platform shows 14 aerial pictures going back to 2003 (pictures not presented in this report). Although the dates appear somewhat spurious (i.e. pictures dated in December showing trees in full leaf) they do give a number of snapshots of the activities on the site.
- 4.20 The only change visible to the site from these photographs however, is the removal of a large tree from the southern side of the garages.
- 4.21 The aerial pictures did allow us to identify a large chimney stack (by its shadow) at Royal Berkshire Hospital 530m south of the site. We suspect that the chimney marks a building as a potential boiler house. Although we would expect this to be gas powered, backup generators and some backup heating may be present in the form of fuel oil burning generators and boilers. A fuel oil tank or tanks could therefore be expected at that location.

Summary



A section of the 2014 O-S Open map with the locations of features seen on preceding historic O-S maps.

4.22 The historic maps have shown that Reading has gone through a massive industrial expansion from well before the first of the maps in 1877, to the world war 2 period. After the war much of the industrialised land was turned to housing and other uses. The maps showed that the areas of industry followed the line of the Kennet and Avon Canal curving in from the south west, the geological outcrop of the Lambeth Group to the south west and the railway to the north.

4.23 Several large areas of housing were present on the earliest maps and the property at 17 Eldon Square and garages at 14-16 Eldon Terrace were present in one of these areas on the first map. This area of housing and the site area have remained unchanged throughout the whole mapping period of 1877 to 2019 (today).

5 ENVIRONMENTAL SENSITIVITY

- 5.1 Readers of this report should note that Terramech have used third party database information when compiling this report. All databases have their limitations, including not being regularly updated and not including all available data. No guarantee can therefore be given for the accuracy or completeness of the information.

Contaminated Land Register

- 5.2 There are no Contaminated Land Register Entries or Contaminated Land Register Notices within 2km of the site.

Controlled Waters

- 5.3 The Environmental Database search for this site was reviewed with respect to controlled waters. This comprises two sets of considerations, firstly aquifers with water abstractions and other sensitive bodies of groundwater and their protection. Secondly, entries for water discharges from various sources, including sewage discharges as well as industrial discharges have also been reviewed together with recorded pollution incidents with respect to potential risks to the site area.

Water Abstractions

- 5.4 The site is indicated by the database information to overlie a principal or major aquifer and the closest was at Royal Berkshire Hospital 350m to the south of the site for drinking cooking and sanitary uses. Any contamination at the site would not be expected to affect this abstraction.
- 5.5 The former gas works site to the south of the railway (now Kenavon Drive) was shown to be operating a pump and treat remediation scheme. This indicates contamination in that area however, this lies downstream from the site at Eldon Terrace and would not be expected to pose a risk to the site.

- 5.6 The remaining abstractions were along the Kennet and Avon canal at the Oracle Centre and River Thames at Caversham for transfer between water sources. The site and these abstractions would not be expected to affect each other in any way.

Discharge Consents

- 5.7 A number of discharge consents were noted, the closest was a sewage effluent discharge to the River Thames 285m to the north east. This lies downstream from the site with respect to drainage channels and shallow groundwater movement and would not be able to affect the site.
- 5.8 None of the recorded discharges lay in the area to the south of the site where the movement of water in drainage channels or the movement of shallow groundwater could bring the associated contaminants onto the site.

Pollution Incidents

- 5.9 A large number of pollution incidents were noted by the database search. The Site Sensitivity mapping shows that a bulk of the incidents flanked the Kennet and Avon Canal. A review of the entries showed that most involved unknown oils, with some described as unknown chemicals and incidents involving sewage, we presume the sewage incidents were storm overflows.
- 5.10 Given the identified migration pathways for surface waters, these incidents lay downstream from the site. Whilst they pose a risk to the River Kennet and the canal, the threat posed by these incidents to the site at Eldon Terrace is considered less than negligible.

Statutory Authorisations / Local Authority Pollution Control

- 5.11 These authorisations are recorded by the database and include entries for integrated pollution controls, radioactive substances, planning hazardous substances, planning hazardous activities and air pollution control authorisations, among others.
- 5.12 Although the substances and activities authorised are potentially contaminative, the presence of an authorisation implies some control or mitigation of the risks at source, rather than the presence of an uncontrolled industrial process.
- 5.13 The review of the database entries has shown that there were several records for authorisations for processes which could have a potentially adverse impact on the site. These were mostly fuel stations and dry cleaners but we did note air pollution controls for a crematorium at South Street some 600m from the site.
- 5.14 The closest records were for fuel stations, one on the Kings Road about 170m north of, and downstream from the site. The second was on the London Road 240m south west of the site. Migration of fuel from this garage eastward onto the site was not considered plausible.

Radioactive Substances

- 5.15 The database search has identified several radioactive substance authorisations at the Royal Berkshire Hospital, located to about 200m south of the site and the neighbouring University of Reading establishment to the west of the hospital. The authorisations were for holding radioactive substances as well as the disposal of radioactive substances.
- 5.16 We suspect that these were substances such as Technetium-99m, a medical tracer which can be detected by specialised scanners. This element emits only gamma radiation during a half-life of only 6 hours. It is expected that 93% of the Technetium will have decayed into its stable form Technetium-99tc (ground state) within 24hours.

- 5.17 Storage of a radioactive element which will degrade completed in less than 24 hours is not possible. Facilities using these tracers will often keep a stock of the isotope Molybdenum-99 which then decays into Technetium-99m that can be used as a tracer.
- 5.18 This short length of emission makes the source ideal for introducing into humans or animals as a tracer and also means that it would not persist as a low level radiation source in the environment. Disposal of bottles vials or syringes contaminated with Technetium-99m or Molybdenum-99, as well as bodily fluid from the person who was infused with these tracers, could be mildly radioactive for a short period hence the authorisations for disposal.
- 5.19 The use of these substances is highly controlled and involves tiny amounts. The widespread contamination of the ground below the hospital with radioactive materials could therefore be dismissed.

COMAH & NIHHS Sites

- 5.20 The database search did reveal some records of COMAH sites (Control of Major Accident Hazards) and records of NIHHS sites (Notification of Installations Handling Hazardous Substances) 543m north east of the site and 942m north east of the site at Kenavon Drive. The gas storage holders or gasometers were originally for storing town gas produced at that site. The works were removed and the gasometers were used for natural (fossil) gas storage.
- 5.21 Modern aerial pictures show that only one gasometer remains and that housing on the new Kenavon Drive now covers most of the old gas works. The gasometer first appears on the 1933 map and given its appearance on Google Street View with plants visibly growing on the top of the sump basin and up the guide frame we suspect it has been decommissioned.

- 5.22 Significant town gas associated contamination is probably present below the gasometer and within the water filled sump. Removal would be expected to be problematic hence this is the last undeveloped part of the gas works site.

Waste Treatment and Landfill

Historic Excavations

- 5.23 Waste disposal sites often begin their existence as old quarries and pits which are then filled, potentially with waste, refuse or even contaminated soils. Sometimes these were recorded as landfills but in some cases there was no control or authorisation for the disposal of waste in a pit. The following excavations were noted over the map area which could represent infilled ground.



Above, the 1877 map overlain on a 2019 map showing Katesgrove Kilns some 1.1km south west of the site.

- 5.24 We have seen a number of excavations within the mapping area for Eldon Terrace. The 1877 showed some large brickworks over 1km south west of the site named Katesgrove Kilns and Waterloo Kilns. Both areas are now covered by houses or commercial premises.