

building & project consultants



Phase I

# Environmental Risk Assessment

Bulls Bridge Industrial Estate, North Hyde Gardens, Hayes, UB3 4QQ

**A REPORT PREPARED**

**FOR AND ON BEHALF OF ARK DATA CENTRES LIMITED C/O HURLEY PALMER FLATT**

Issue Date:	11 March 2020
Revision NO:	B
Revision Date:	04 June 2020



ISSUING OFFICE: Paragon, The Harlequin Building, 65 Southwark Street, London DE1 0HR  
Tel: 020 7125 0112

DATE: 11 March 2020

REFERENCE: 19.0633/CB/NW

REPORT PREPARED BY: Charlie Bruinvels BSc MSc MCIWEM

REPORT CHECKED BY: Charlie Knox MSc CEnv

SIGNATURE:

For and on behalf of  
Paragon Building Consultancy Limited

**H** Critical or high risk issue for urgent management attention

**MH** Moderate to high risk issue considered as a significant management item

**M** Medium risk issue for ongoing management or action

**LM** Low to medium risk issue that may require management or action

**L** Low risk item or for information only

## DASHBOARD SUMMARY

### KEY ISSUES

<p>1.</p>	<p>The following issues represent the key matters for consideration as a result of our Phase 1 Environmental Audit with regards to ground conditions as part of the proposed construction of a data centre, MV energy centres and substation.</p> <p>Based on the historical use of the site as a creosote works, railway, power station and having an indication of ground workings and landfilling, there are a number of potential contaminants that could exist beneath the site. Based on the permeable gravel that underlies the site, contaminants have the potential to migrate to future users of the site as vapours and gas or through direct contact in areas of proposed soft landscaping. In addition, contaminants may migrate off-site into the adjacent water courses. Further investigation is required to determine the risks of the historical site use on site users and Controlled Waters.</p>	
<p>2.</p>	<p>Online information indicates that there were several bomb strikes around the site area and so a survey for Unexploded Ordnance should be completed.</p>	

### ENVIRONMENTAL RISK RATING

Based on the findings of this report, there are likely to be viable pollutant linkages associated with the proposed development. There is considered to be a **medium to high** risk from residual contaminants present on site causing significant harm to human health and a moderate to high risk to Controlled Waters.

### RECOMMENDATIONS AND COST

It is recommended that an intrusive ground investigation is completed to establish whether contamination pathways, identified by this audit, are viable. This investigation should comprise boreholes to assess soil contamination potential, ground gas and groundwater condition.

Geotechnical testing should be completed to identify potential constraints and key parameters for foundation and slab design etc. In addition, due to the presence of the London Clay Formation below the site, sulphate testing should be completed to assess the potential for aggressive ground conditions for concrete design.

A UXO Desk Study should be completed and an on-site presence by a UXO specialist may be required to check each borehole as it is advanced.

This report should be submitted to the Local Planning Authority in support of the planning application for the site.

# CONTENTS

## DASHBOARD SUMMARY

KEY ISSUES .....	3
ENVIRONMENTAL RISK RATING .....	3
RECOMMENDATIONS AND COST.....	3
1.0 KEY AUDIT FINDINGS .....	2
2.0 ENVIRONMENTAL RISK ASSESMENT .....	8
3.0 ENVIRONMENTAL RISK EVALUATION .....	8
4.0 CONFIRMATION OF INSTRUCTIONS .....	11

## APPENDIX 1: FIGURES

## APPENDIX 2: SITE DESCRIPTION

## APPENDIX 3: LAND USE

## APPENDIX 4: ENVIRONMENTAL DATA

## APPENDIX 5: ENVIRONMENTAL CONTEXT

## APPENDIX 6: REVIEW OF PREVIOUS REPORTS

## APPENDIX 7: PRELIMINARY CONCEPTUAL SITE MODEL

## APPENDIX 8: EXTENT OF SURVEY LIMITATIONS

## PHASE 1 ENVIRONMENTAL RISK ASSESSMENT

CLIENT NAME: Ark Data Centres Limited C/O  
Hurley Palmer Flatt

---

PROPERTY ADDRESS: Bulls Bridge Industrial Estate  
North Hyde Gardens, Hayes

---

INSPECTION DATE: 20 June 2019 and 22 January  
2020

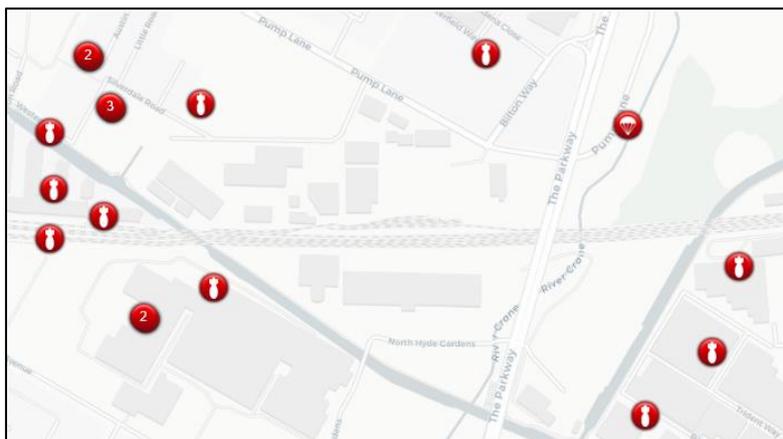
---



### 1.0 KEY AUDIT FINDINGS

<b>1.1</b>	<b>Introduction</b>	
1.1.1	This assessment has been carried out in general accordance with current UK best practice, requirements of the National Planning Policy Framework, Land Contamination: Risk Management (LCRM) 2019, Part IIA of the Environmental Protection Act (EPA) 1990 and CIRIA Contaminated Land Risk Assessment Guide to Good Practice C552.	L
<b>1.2</b>	<b>Development Proposals</b>	
1.2.1	The development proposals include site clearance and preparation, including the demolition of remaining buildings, and the redevelopment of the site to provide: a new data centre, two MV Energy Centres (including stand-by generation plant and gas storage), a HV Sub-Station, a visitor reception centre, plant, the creation of a new footpath and cycleway link to the canal towpath, works to the highway, car parking, cycle parking, associated infrastructure, enclosures and necessary physical security systems, hard and soft landscaping (including works to the River Crane) and ancillary uses, as well as associated external works.	L
<b>1.3</b>	<b>Environmental Site Assessment</b>	
1.3.1	<p>The wider Bulls Bridge Industrial Estate site comprised four main parcels of land with access roads, and each land parcel is predominantly used for commercial and industrial uses and summarised below.</p> <ul style="list-style-type: none"> <li>• Vodafone RMC House</li> <li>• British Airways (BA);</li> <li>• Abellio Bus Garage (Abellio);</li> <li>• Addison Lee; (not in current proposals) and</li> <li>• FM Conway (not in current proposals).</li> </ul>	L M

1.3.2	<p>The Vodafone plot is a detached office block arranged over three floors with a reception atrium at ground floor and a roof terrace at 3rd floor level with external back-up generator and above ground fuel storage tank (AST). The plot was previously used by Vodafone but is now vacant and subject to demolition. The British Airways (BA) plot was used as a British Airways Component Engineering depots and is now demolished.</p>	
1.3.3	<p>The Abellio plot comprises a bus garage, which includes parking areas for buses, an internal car wash, repair garage and a refuelling point. The refuelling point is located at the entrance to the bus garage and comprised two pumps each with two pump handles. An ad-blue tank was also situated on the pump island. The pipework runs underground to the east of the site entrance where it ran above ground to the 85,000L diesel tank in the northeast corner of the site. The tank was noted to have a bund alarm, and at the time of the survey contained 41,260L of fuel. The tank and infrastructure is currently the responsibility of the tenant (Abellio West London) who remain in occupation at the time of writing.</p>	
1.3.4	<p>The Addison Lee and Conway plots are situated to the west and east of the BA plot, however are not within the red line for this planning application. As such, the report has focused on the three areas that are to be developed – BA, Vodafone and Abellio.</p>	
1.3.5	<p>The site is situated in a predominantly commercial/industrial part of Hayes. The development site (BA, Abellio and Vodafone plots) is immediately surrounded by the Grand Union Canal and a bus garage to the south and southwest, Addison Lee taxi maintenance garage to the west, a railway to the north, and an industrial estate to the east. No sensitive land uses have been identified within the vicinity of the site. The nearest residential property is some 300m southwest of the site.</p>	
<b>1.4</b>	<b>Historical Land Use</b>	
1.4.1	<p>The earliest available map from 1865 shows the site as mostly vacant with a river running north to south along the eastern part of the site. This map also shows a railway and creosoting works in the northeast corner. By 1932, the creosoting works had extended into the site and a building was shown in the centre. Excavations and ground workings were noted onsite by 1963 to 1964; a pond was recorded in the Abellio plot, which was later infilled. The creosoting works were no longer shown by 1973 and a power station with chimney was shown in the western part of the site by 1983. Around a similar time (c. 1982) the Abellio plot had been levelled but was undeveloped. By 2002, the power station was no longer shown and the British Airways building was shown. Vodafone and Abellio were formed in their current layouts by 2010. A review of planning applications has not identified significant planning conditions. Historical map extracts are provided in Appendix 3.</p>	
1.4.2	<p>The surrounding area has supported various industrial (potentially contaminative) land uses, including factories (50m all directions), brick fields (200m northwest), mills (200m northwest), railway (10m north), electricity substation (100m south), creosoting works (1m east and northeast), and rubber works (200m east).</p>	
1.4.3	<p>Online information indicates that there were several bomb strikes recorded around the site during World War II.</p>	



Accessed: <http://bombsight.org/#16/51.5028/-0.4112>

**1.5 Potential Sources of Current and Historical Contamination**

1.5.1 Potential onsite sources of contamination include an above ground fuel tank (ASTs) was noted in the northeast corner of the Vodafone plot. It is possible that spillages of fuel could result in petroleum hydrocarbons in the soil and groundwater. During the inspection, the tank appeared to be in good order with no obvious damage or staining to surrounding ground. The tank was noted to be within a concrete bund. Furthermore, there are hydrocarbon sources within the Abellio plot including above ground tank storage, for refuelling purposes by Abellio West London who remain in occupation currently and are responsible for these tanks and their contents. Residual oil from buses was noted on the hard surfacing of the bus garage site and may present a source of hydrocarbon contamination if this were to leach through cracks and gaps in the surface covering.

M

1.5.2 There are also potential sources of contamination from the historical use of the site as a creosote works and suspected landfilling. Contaminants of concern include ground gas, vapour, petroleum hydrocarbons, polyaromatic hydrocarbons, volatile organic compounds and semi-volatile organic compounds, asbestos and heavy metals.

M  
H

1.5.3 In addition, the historical use of the surrounding area as brickfields, creosote works, factories and railway may have introduced heavy metals, asbestos, polyaromatic hydrocarbons, petroleum hydrocarbons, polychlorinated biphenyls, volatile organic compounds and semi-volatile organic compounds.

M  
H

**1.6 Environmental Setting**

1.6.1 Geological environmental and mapping data records summarised in Appendix 4 and Appendix 5 respectively indicate that the site is underlain by Lynch Hill Gravel, a Principal Aquifer of high permeability, over the London Clay, an Unproductive Strata. An area of artificial ground is also present onsite. There is one groundwater abstraction within a 1km radius which is approximately 530m southeast of the site and is used for evaporative cooling. The site is not located within a Source Protection Zone.

M

1.6.2	A borehole record obtained from BGS records and located onsite indicates the ground conditions comprise Made Ground (clay with ash and clinker) to 4.0m bgl over Silty Clay to 4.5m bgl, over Sand and Gravel to 7.5m over Clay to 19.45m bgl where the borehole was terminated. Groundwater was identified at 4.0m bgl.	
1.6.3	The River Crane/Yeading Brook forms the eastern boundary of the site and is considered a sensitive receptor. Whilst the river is situated at a lower elevation than the site, the underlying gravels may facilitate the migration of contaminants (if present). There are no active surface water abstraction points located within a 1km radius of the site.	
1.6.4	The Grand Union canal is 10m south of the site but is likely to be canalised which would restrict pathways to the watercourse. However, the construction of the canal is not known exactly.	
<b>1.7</b>	<b>Sensitivity Analysis</b>	
1.7.1	The potential for residual contamination to be present as a result of the longstanding industrial use of the site cannot be discounted. The perceived permeability of the underlying gravel may facilitate the migration of soil and groundwater contamination, if present, off the site. The Principal Aquifer beneath the site is classified as Controlled Waters and regulated by the EA. Additionally, the nearby surface water feature may be in hydraulic continuity with the shallow water table. Therefore, the likelihood of historical onsite contamination potentially impacting the aquifer and river cannot be discounted. Consequently, a ground investigation will be required to establish the impact (if any) of site borne contamination to Controlled Waters.	
1.7.2	As such, pollutant linkages have been identified between soil contamination, ground gas and vapours at the site (from earlier landfilling) to site users through ingestion, inhalation and dermal contact. Potential pollutant linkages have also been identified for gas /vapour ingress into the building impacting site users. Additionally, there are potential impacts to the Principal Aquifer and River Crane through the migration of contaminants in the underlying gravels towards the river.	
1.7.3	The risks to off site residents has been identified as low due to the distance from the site and the presence of the Grand Union Canal between the site boundary and residential properties.	
1.7.4	Based on the above, further investigations are required to quantify the risks and provide recommendations to facilitate the development. At this stage chemical analysis of soil and groundwater should be completed by drilling boreholes, gas monitoring should be undertaken on boreholes and a risk assessment should be prepared.	
<b>1.8</b>	<b>Flood Risk</b>	
1.8.1	The Environment Agency website indicates that part of the site immediately along the banks of the River Crane is located within a Zone 3 flood plain with an estimated annual probability of fluvial flooding of greater than 1 in 100 years. As such, there is a moderate to high risk of flooding along the watercourse and the banks itself. However, the majority of the site is in a Zone 1 flood plain, meaning the risk of flooding is less than 1 in 1,000 in any given year. As such, the site is considered to have a medium risk of flooding.	

<p><b>1.9</b></p>	<p><b>Waste</b></p>	
<p>1.9.1</p>	<p>A review of the Groundsure data pack indicated that the site was formerly used as a landfill which accepted inert, commercial and household waste until 1936. The mapping shows the geology to be artificial ground in this area. It is possible that the underlying gravel deposits were extracted from site and subsequently landfilled. This presents a potential risk of ground gas and vapours to future site users.</p>	
<p>1.9.2</p>	<p>The data pack also identified two offsite landfills, situated 35m north and 50m southeast of the site. There is no information outlining the composition of the waste. This presents a potential risk of ground gas and vapours to future site users.</p>	
<p><b>1.10</b></p>	<p><b>Additional Information &amp; Previous Reports</b></p>	
<p>1.10.1</p>	<p>The site is not located in a radon affected area.</p>	
<p>1.10.2</p>	<p>The site is not located in a coal mining affected area.</p>	
<p>1.10.3</p>	<p>We have been provided with the following environmental report for review:</p> <ul style="list-style-type: none"> <li>• Jomas Associates LTD, 2018. Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report for North Hyde Gardens, Hayes, UB3 4QR. Dated: May 2018. Ref: P1470J1364/SL.</li> </ul> <p>Although Paragon cannot be held responsible for the accuracy of the work of others, the following key points and extracts have been noted:</p> <ul style="list-style-type: none"> <li>• A Desk Study (not seen by Paragon) and intrusive investigation were completed.</li> <li>• Ten boreholes were drilled across the British Airways land parcel (around the now demolished building), gas monitoring was undertaken, chemical laboratory testing of soil and water was completed, and a preliminary geotechnical information was obtained.</li> <li>• Chemical analysis identified asbestos fibres in 3 samples, although quantification was &lt;0.001%.</li> <li>• Four gas monitoring visits were completed, and results indicated the site falls within Characteristic Situation 1, whereby no protective measures for gas are required.</li> <li>• Geotechnical testing indicated piling into the London Clay would be suitable.</li> </ul> <p>Paragon reviewed the report and determined that:</p> <p>Jomas only accounted for the British Airways plot of land, and therefore, there is a substantial portion of the site to be acquired that has not been tested for contamination. As such, an additional investigation is required on other areas of the site to assess the potential risks of any significant environmental liability associated with acquiring the site, and that may highlight potentially significant development constraints, which may impact future development proposals.</p>	

	<ul style="list-style-type: none"> <li>In addition, the assessment of the central and western areas identified shallow obstructions and boreholes were terminated at shallow depth due to buried obstructions. Recommendations were made to complete a trial pitting exercise following demolition. Jomas completed a foundation assessment, but did not specify that these obstructions would require removal prior to piling. It is likely that as part of any future development, if piles are adopted as the foundation solution, a probing exercise will be required by the piling contractor to minimise standing time and to refine the design of the pile layout and remove obstructions (where possible). It may be possible to complete a high-resolution Ground Penetrating Radar scan of the BA plot once demolition is complete. However, GPR can suffer from interference and may not be absolutely conclusive so both methods may be required.</li> <li>As a result, an additional investigation is required to obtain data for the areas untested by Jomas.</li> </ul> <p>Further details on previous reports are provided in Appendix 6.</p>	
<p><b>1.11</b></p>	<p><b>Regulatory Consultation</b></p>	
<p>1.11.1</p>	<p>This report is intended to support a planning application for the above described development. Therefore, the Contaminated Land Officer of Hillingdon Borough Council has not been contacted at this juncture. However, as the site is located within an industrial area and the nearest residential property is some 300m from the site (beyond a canal which would break direct contaminant migration pathways to the sensitive receptor), Paragon consider that it would be unlikely that the site is designated as Contaminated Land in its current use in respect of human health.</p>	<p>L</p>
<p>1.11.2</p>	<p>The investigation report prepared by Jomas (2018) included a response from the London Fire Brigade following a tank enquiry at the site. The letter (Dated: 23 April 2018, Ref: 26/011675) states that there are no records of petroleum storage tanks on the site and no current license for petroleum storage.</p>	<p>L</p>
<p>1.11.3</p>	<p>The Environment Agency has not currently been contacted as part of this assessment. Given the presence of previously contaminative land uses on the site and the river that is also on site, there is a possibility that (depending on the nature and extent of contamination at the property) a Detailed Quantitative Risk Assessment could be required to assess the potential impacts to the underlying Principal Aquifer and river. Piling has been recommended by Jomas and this has the potential to mobilise shallow surface contamination, depending on the technique used. A piling works risk assessment may be required if piles are adopted.</p>	<p>MH</p>

2.0 ENVIRONMENTAL RISK ASSESMENT

<b>2.1</b>	<b>Preliminary Conceptual Site Model (CSM)</b>
2.1.1	In connection with Part IIA of the EPA 1990 and the regulatory planning framework, a preliminary CSM has been compiled for the site, in Appendix 7. This assessment is based on the potential historical sources identified, the site’s environmental setting and the development proposals to evaluate the potential source-pathway-receptor linkages, which must exist to define a site as contaminated land. The evaluation of risk associated with these linkages is set out in Section 3.0.

3.0 ENVIRONMENTAL RISK EVALUATION

Having evaluated the information gathered during this study and described in the previous sections, Paragon have produced the following evaluation of the overall risk associated with the proposed development.			
<b>3.1</b>	<b>Contamination Potential</b>		
	<b>Issue</b>	<b>Detail</b>	
3.1.1	Significant on site contamination	The potential for residual contamination to be present as a result of the longstanding industrial use of the site cannot be discounted.	
3.1.2	Contaminant migration from site source(s) to off site receptor(s)	The perceived permeability of the underlying Gravel may facilitate the migration of soil and groundwater contamination, if present, off the site.	
3.1.3	Contaminant migration to on site receptor(s) from off site source(s)	The permeability of the underlying Gravel may facilitate the migration of soil and groundwater contamination, if present, onto the site.	

3.2	Environmental Impacts		
	Issue	Detail	
3.2.1	Risk of pollution of Controlled Waters	<p>The Principal Aquifer beneath the site is classified as Controlled Waters and regulated by the EA. Additionally, the nearby surface water features may be in hydraulic continuity with the shallow water table. Therefore, the likelihood of historical onsite contamination potentially impacting the aquifer and river cannot be discounted. Therefore, a ground investigation will be required to establish the impact (if any) if site borne contamination to Controlled Waters.</p>	
3.2.2	Risk of damage to property	<p>There is the potential for ground gas to be generated within Made Ground and ground works below the site, depending on the nature of the composition of landfilled materials. If a significant biodegradable fraction is present, then this may lead to the production of carbon dioxide and methane, which could migrate into the proposed structure and impact site users. In addition, based on the presence of a flood zone, there is a moderate to high risk of flooding onsite.</p>	
3.2.3	Risk of harm to human health	<p>Given the potential for soil contamination and gas / vapours at the site, there is considered to be potential risks to site users. The extensive covering of hardstanding across the subject site would limit direct dermal contact and ingestion pathways with contaminants (if present). However, it is not clear whether some of the existing structures have gas protection measures so further investigations will be required into the presence of gas and vapour. Construction workers should be equipped with suitable PPE.</p>	

3.3	Business Consequences		
	Issue	Detail	
3.3.1	Risk of liability for the developer	Potential source-pathway-receptor pollutant linkages have been identified including potential for gas /vapour ingress into the building impacting users. Additionally, there are potential impacts to the Principal Aquifer and surface water features.	
3.3.2	Likelihood of designation as Contaminated Land under EPA 1990	Due to the time constraints of the report, it has not been possible to contact the Contaminated Land Officer of Hillingdon Borough Council. However, Paragon consider that it would be unlikely that the site is designated as Contaminated Land in its current use as the site is located within an industrial area and the nearest residential property is some 300m from the site (beyond a canal which would break direct contaminant migration pathways to the sensitive receptor). This report should be submitted in connection with the planning application for the proposed development.	
3.3.3	Suitability for the proposed end use	Further assessment is required to establish the viability of pollutant linkages raised by the CSM and determine appropriate mitigation and / or remediation measures that are likely to be required to facilitate the proposed development.	
3.3.4	Requirement for further investigations	Further investigations are required to determine the risk of environmental liability from historical soil and groundwater contamination. It is anticipated that the ground investigation will comprise of boreholes for groundwater and gas assessment and to allow the collection of soil and groundwater samples for chemical analysis.	

#### 4.0 CONFIRMATION OF INSTRUCTIONS

4.1	We have been instructed by Ark Data Centres Limited C/O Hurley Palmer Flatt to undertake a Phase I Environmental Audit of Bulls Bridge Industrial Estate, North Hyde Gardens, Hayes. The purpose of the report is to highlight environmental considerations with respect to ground conditions as part of the proposed development.
-----	--

APPENDIX 1: FIGURES



Paragon Building Consultancy  
 65 Southwark Street  
 London  
 SE1 0HR  
 020 7125 0112  
 www.paragonbc.co.uk

**Notes:**

Basemap: Google 2019. Insert Map: Google 2019.

 Site Location

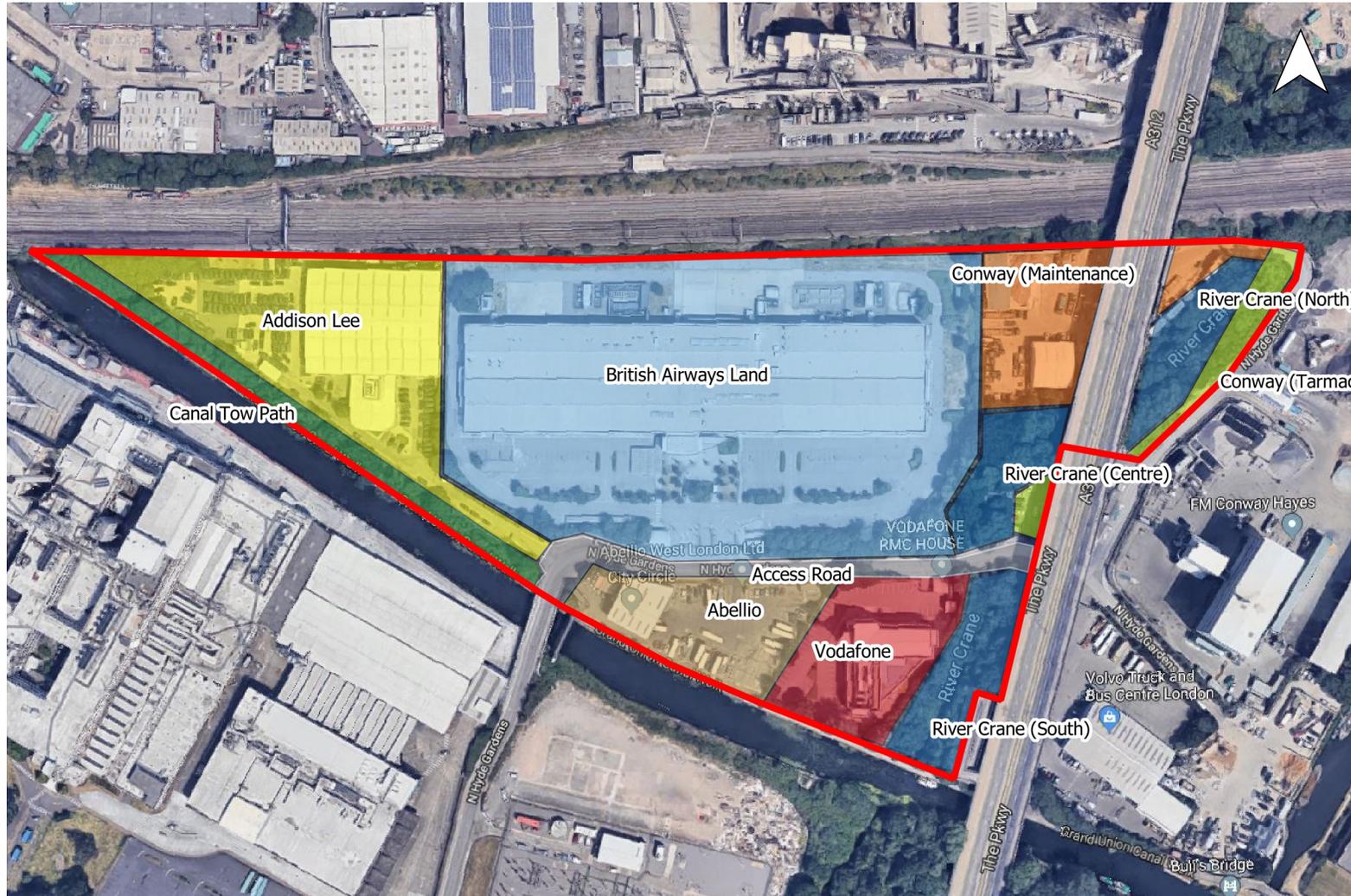
 Development Area

Rev	Description	Date

Project Bulls Bridge, Hayes	Scale 1:3000
	Drawn by CB
	Approved By CK
Title Site Location Plan	Drawing Number 1
	Date 21/05/2020

0 50 100 m





Key

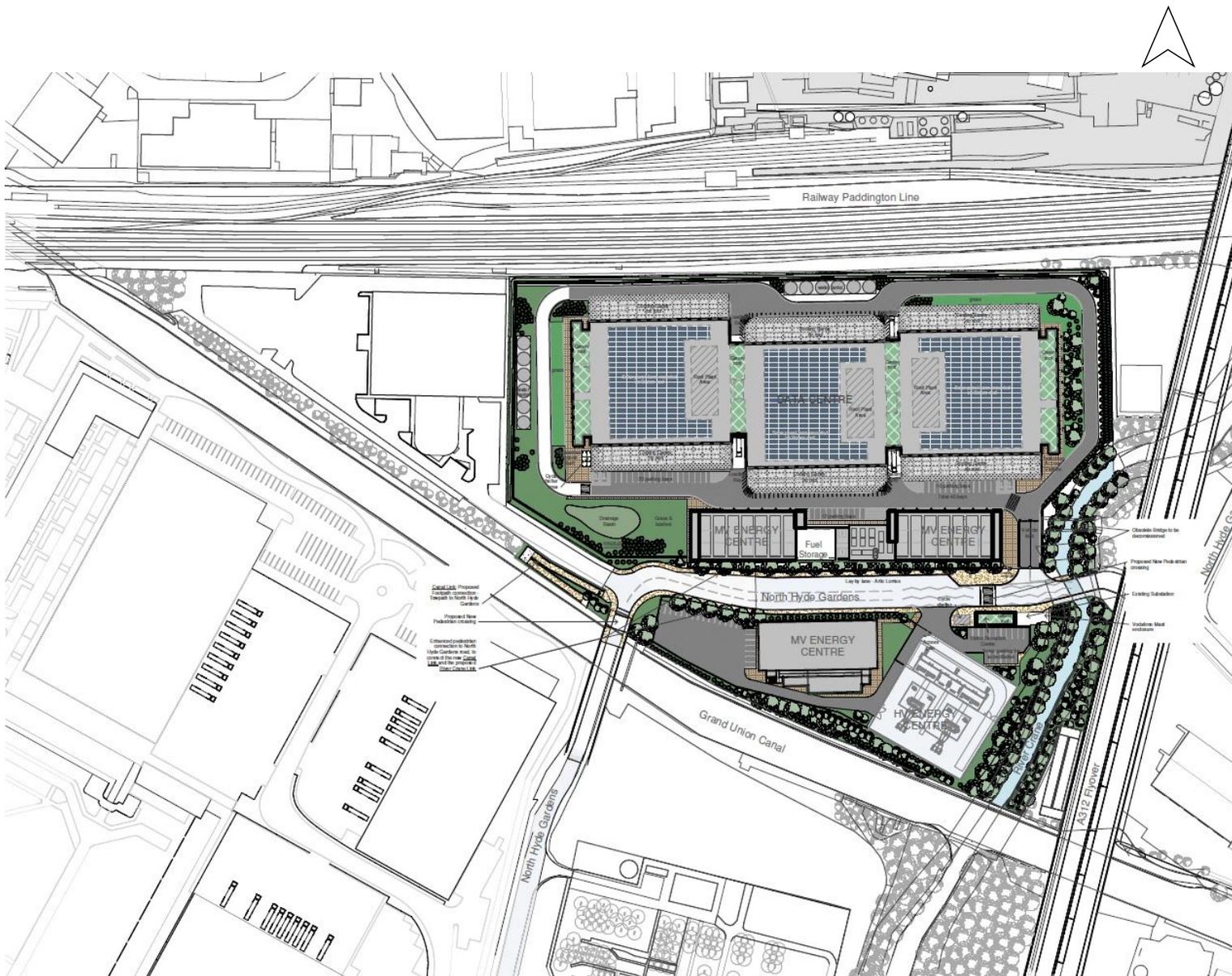
Site Boundary

Site Areas

- Access Road
- Addison Lee
- British Airways Land
- Canal Tow Path
- Conway (Maintenance)
- Conway (Tarmac)
- River Crane (North)
- River Crane (Centre)
- River Crane (South)
- Vodafone
- Abellio

Rev	Description	Date

Project Bulls Bridge, Hayes	Scale 1:3000
	Drawn by CB
	Approved By CK
Title Site Areas Plan	Drawing Number 2
	Date 21/05/2020



Paragon Building Conutancy  
 65 Southwark Street  
 London  
 SE1 0HR  
 020 7125 0112  
 www.paragonbc.co.uk

**Notes:**

Drawing based on Nicholas Webb Architects plc, Project Union A90 - External Works Site Plan. Ref: ZZ-DR-A-90-005 Rev 04. Dated 27/03/20.

Rev	Description	Date

Project Bulls Bridge, Hayes	Scale	Not to scale
	Drawn by	CB
	Approved By	CK
Title Proposed Development Plan	Drawing Number	3
	Date	26/05/2020

APPENDIX 2: SITE DESCRIPTION

## 2.0 SITE DESCRIPTION

### 2.1 Site Description and Location

2.1.1 The wider Bulls Bridge site is centred around National Grid Reference 510423, 179309 and is approximately 6.8Ha. The approximate elevation of the site is 31m Above Ordnance Datum (mAOD). Site information gathered during the preliminary report is summarised below.

2.1.2 The wider Bulls Bridge site comprised four main parcels of land and access roads that are predominantly used for commercial and industrial uses and summarised below.

- Vodafone;
- British Airways (BA);
- Abellio Bus Garage (Abellio);
- Addison Lee; (not in current proposals) and
- FM Conway (not in current proposals).

2.1.3 The proposed development currently includes construction within the Vodafone, Abellio and BA plots. Addison Lee and FM Conway are not in the red line for this planning application.

2.1.4 A site location map and photographs are provided as below.

### 2.2 Current Land Use/Site Activities

2.2.1 In general, the wider site is occupied by commercial and industrial uses. The properties are currently operated/occupied by the following tenants:

Occupant	Brief description of site activities
Vodafone	The property is a detached office block arranged over three floors with a reception atrium at ground floor and a roof terrace at 3rd floor level. The building is vacant and has recently been occupied by travellers and is subject to demolition.
British Airways	This area has been demolished to remove the former engineering building to slab level and materials are to be removed from site. Further site preparation and enabling works are due to commence soon to remove the slab and remove ground obstructions.
Abellio	The Abellio plot comprises a bus garage, which includes parking areas for buses, an internal car wash, repair garage and a refuelling point.
Addison Lee	This area is a vehicle maintenance yard for taxis. This area comprises a workshop and parking.
FM Conway (Maintenance Yard)	FM Conway operate two parcels of land on the western part of the site; a maintenance yard and tarmac plant. The maintenance yard is part of the site and comprises a workshop for HGV maintenance and stockpile of salt grit.

2.2.2	An inspection of the site was undertaken on 20 June 2019 and 22 January 2020. The following key details were noted.
2.2.3	The River Crane (also known as the Yeading Brook) runs within the wider site boundary, along the southeast boundary and north through the northeast part of the site (CFM onway's plot). The Grand Union Canal is off site and located within 5m of the southern boundary of the site.
2.2.4	Vegetation was noted along the banks of the River Crane which made access difficult in that area. A chain link fence was noted at points along the channel.
<b>2.3</b>	<b>Waste Materials</b>
2.3.1	A separate waste store was identified within the Vodafone plot. This was a steel framed building with wooden cladding.
<b>2.4</b>	<b>Potential Contaminative Sources</b>
2.4.1	Potential onsite sources of contamination include an above ground fuel tank (ASTs) was noted in the northeast corner of the Vodafone plot. It is possible that spillages of fuel could result in petroleum hydrocarbons in the soil and groundwater. During the inspection, the tank appeared to be in good order with no obvious damage or staining to surrounding ground. The tank was noted to be within a concrete bund.
2.4.2	There is a large AST within the Abellio bus garage plot, which is the responsibility of Abellio West London who remain in occupation of the site. There was some residual staining to the hard surfacing from bus parking and movements on this part of the site.



Title: Site Location Plan



01: BA site



02: BA site



03: BA site



04: BA site



05: Vodafone



06: Vodafone



07: Vodafone (Fuel Storage Tank)



08: Vodafone



01: Abellio Site Overview



02: Abellio Fuel Tank



03: Abellio refuelling area



04: Oil staining in bus parking area

APPENDIX 3: LAND USE

## 3.0 LAND USE

### 3.1 Former Land Uses

3.1.1 A study of historical Ordnance Survey maps, the site's planning history and local history information has been undertaken to identify any potentially contaminative former land uses.

### 3.2 Map Information

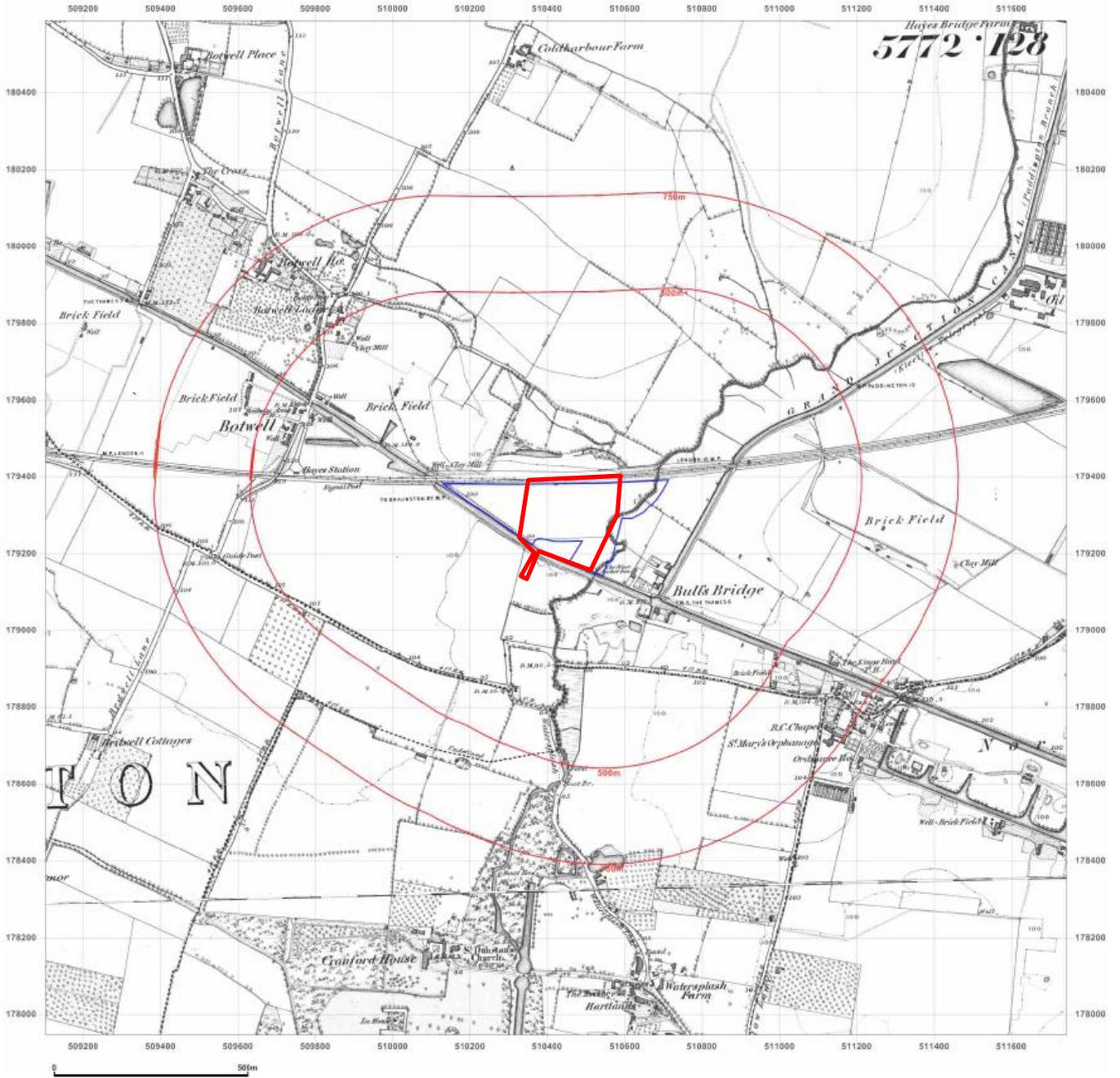
3.2.1 The following represents a summary of the historical use of the site:

Historical map dates	On Site Features
1865	River Crane in the eastern part of the site.
1894	Northeast corner used as Creosoting Works with railway sidings on the northern part of the site.
1912	Marshland in the southeast corner of the site.
1932	Creosoting works had extended into the site with rail lines and buildings.
1963	Pond noted in Abellio area, later subject to infilling.
1964	Excavations and ground works noted onsite.
1973	Buildings and rail line removed from site. Vegetation and excavations/groundworks noted.
1982	Abellio plot cleared, levelled and vacant.
1983	Power Station onsite with chimney in centre.
2002	Power station no longer shown. The British Airways building is shown.
2010	Vodafone shown in the south east, with Abellio bus garage to the west.
2014	FM Conway Maintenance building shown in the northeast of the site.

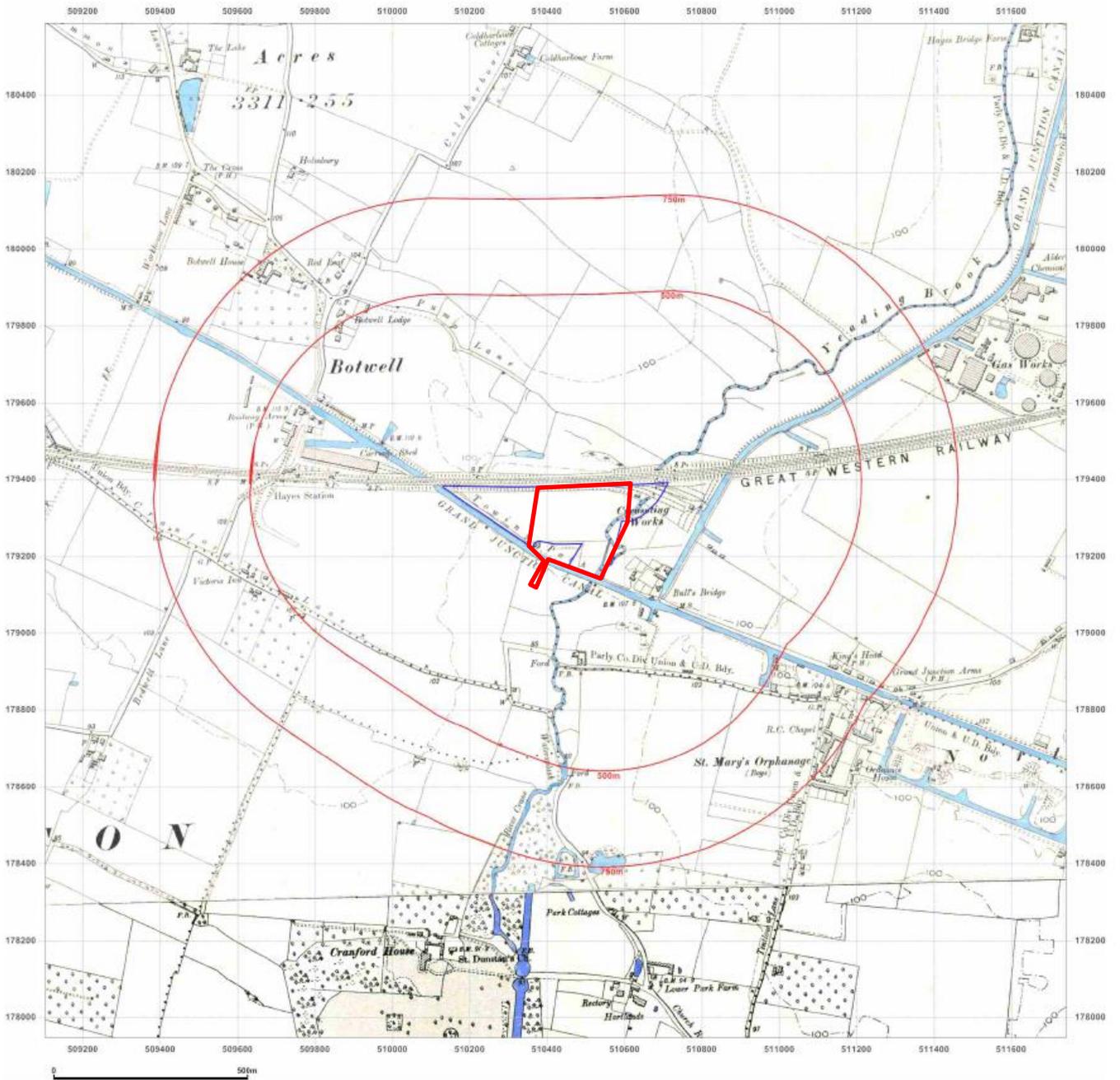
3.2.2 The following represents a summary of the historical use of the surrounding area (within 250 metres):

Historical map dates	Surrounding Site Features	Approx. Distance	Direction
1881	Brickfield and clay mill	200m	North west
1881	Railway	10m	North
1894	Creosoting works	1m	North east
1912	Rubber works	200m	east
1912	Creosoting works expanded south	1m	East
1932 - 2002	Factories surround the site	50m	All
1983	Electricity substation	100m	South.

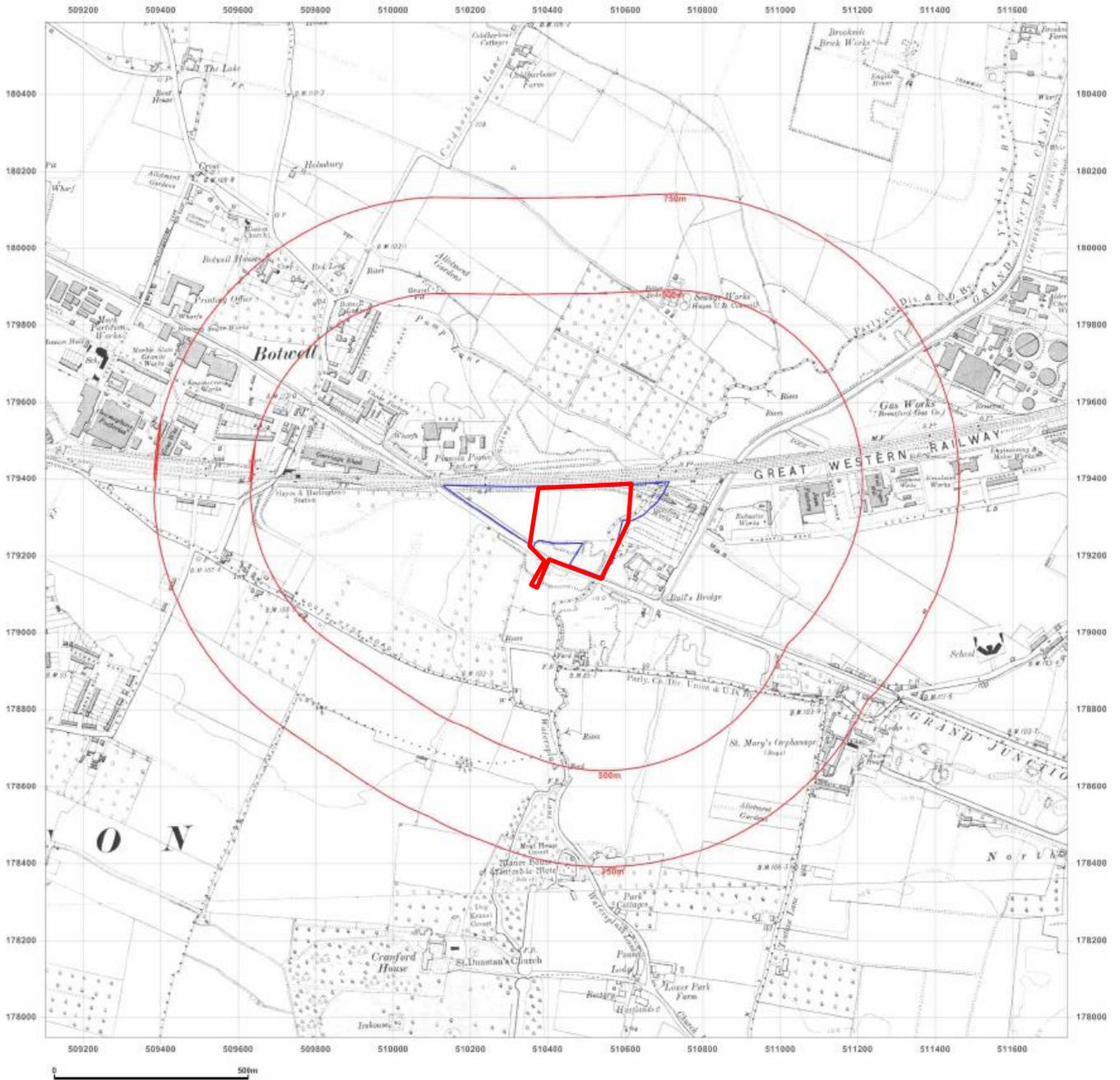
<b>3.3</b>	<b>Planning History</b>
3.3.1	A search of Hillingdon Council's online planning portal did not reveal environmentally pertinent information relating to the site.



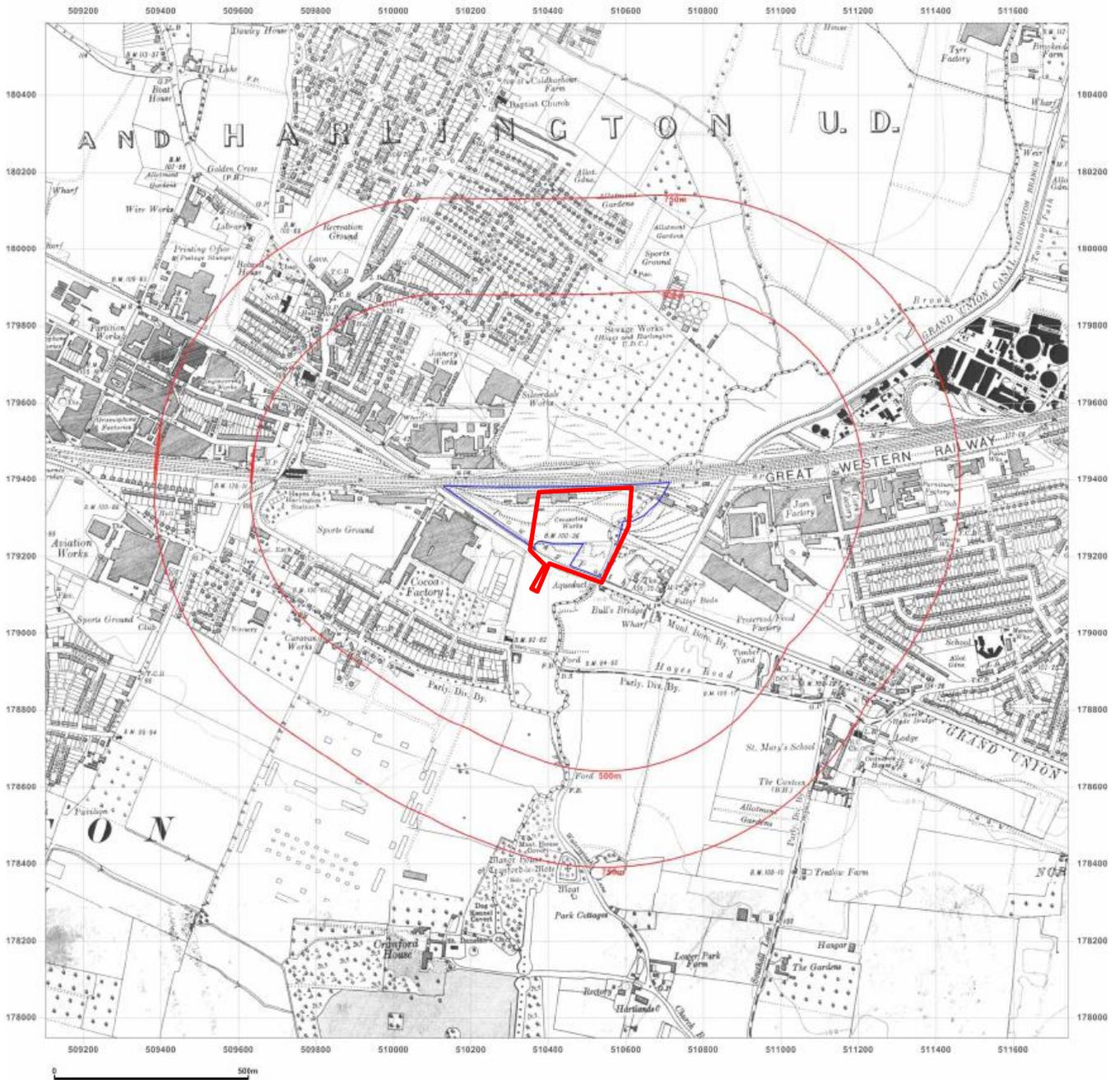
Title: 1865



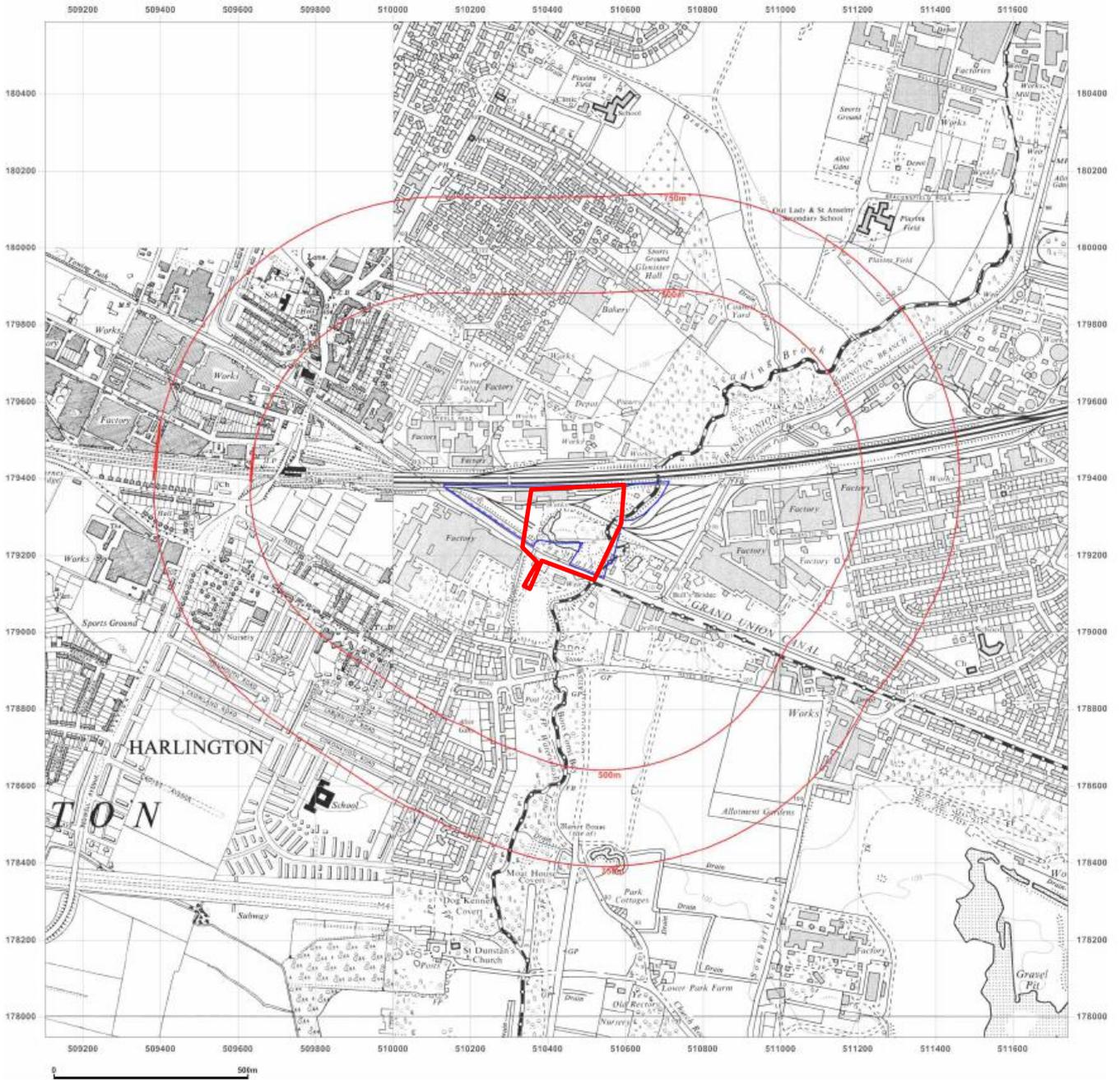
Title: 1894



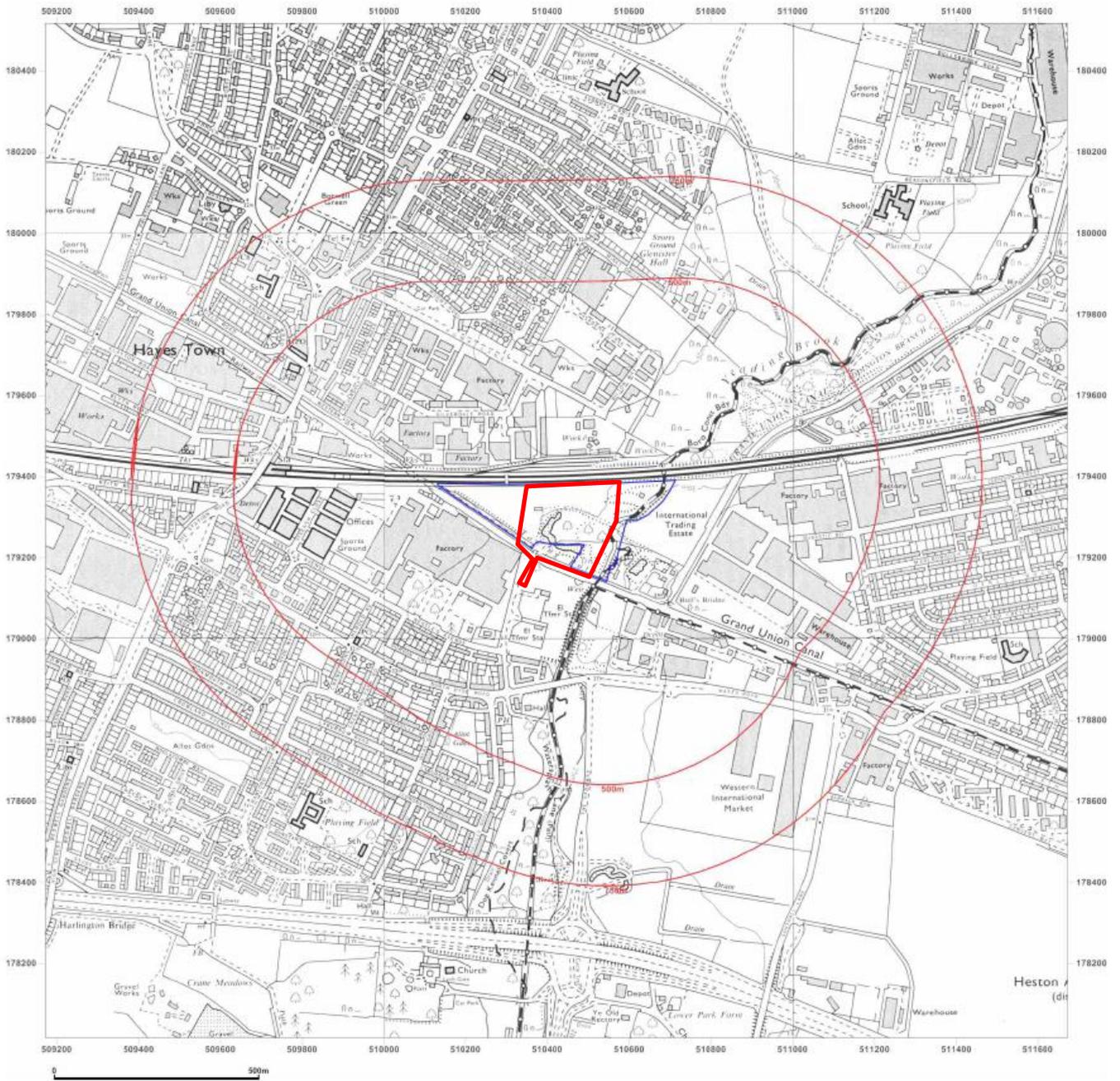
Title: 1912



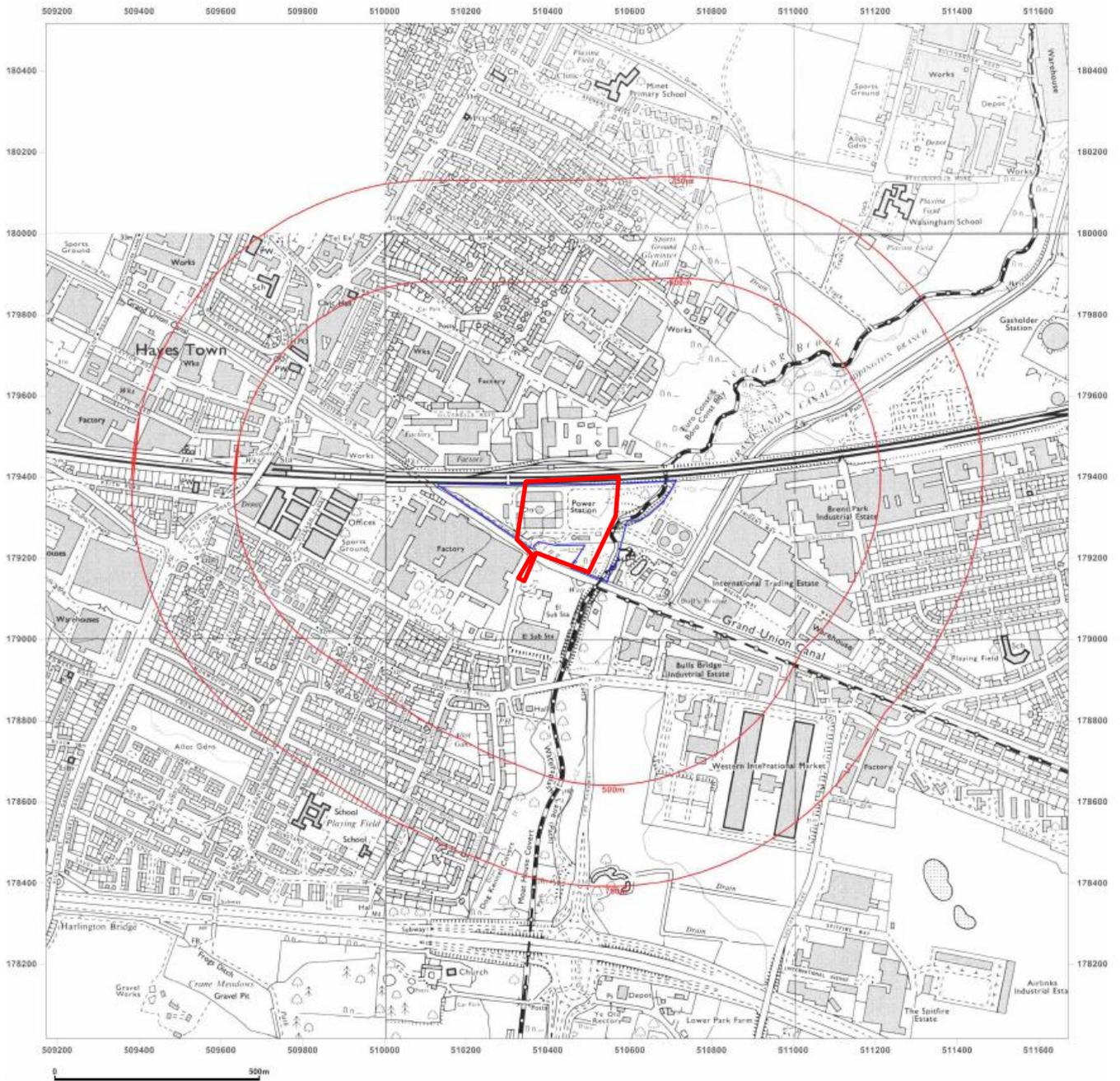
Title: 1932



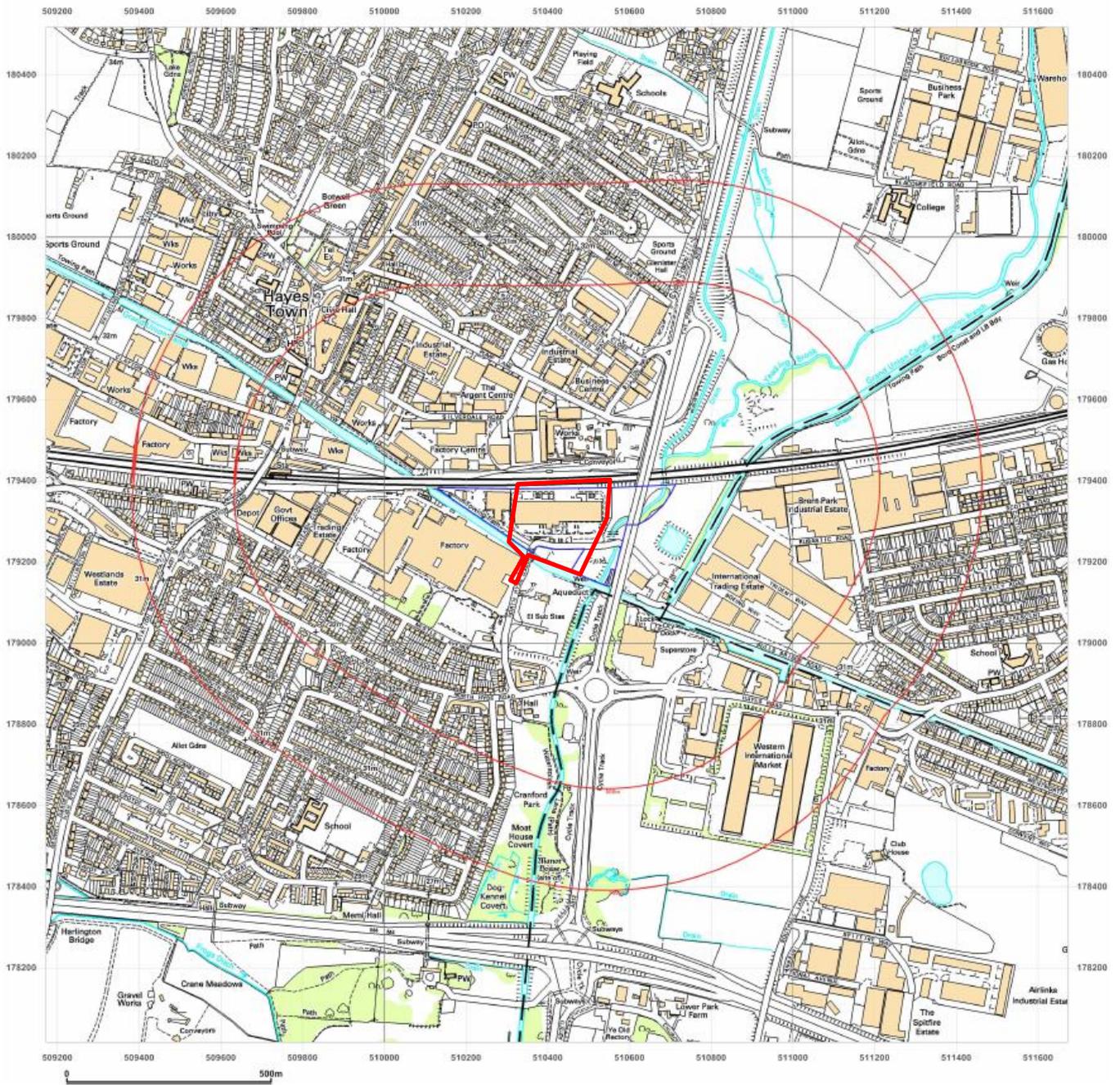
Title: 1964



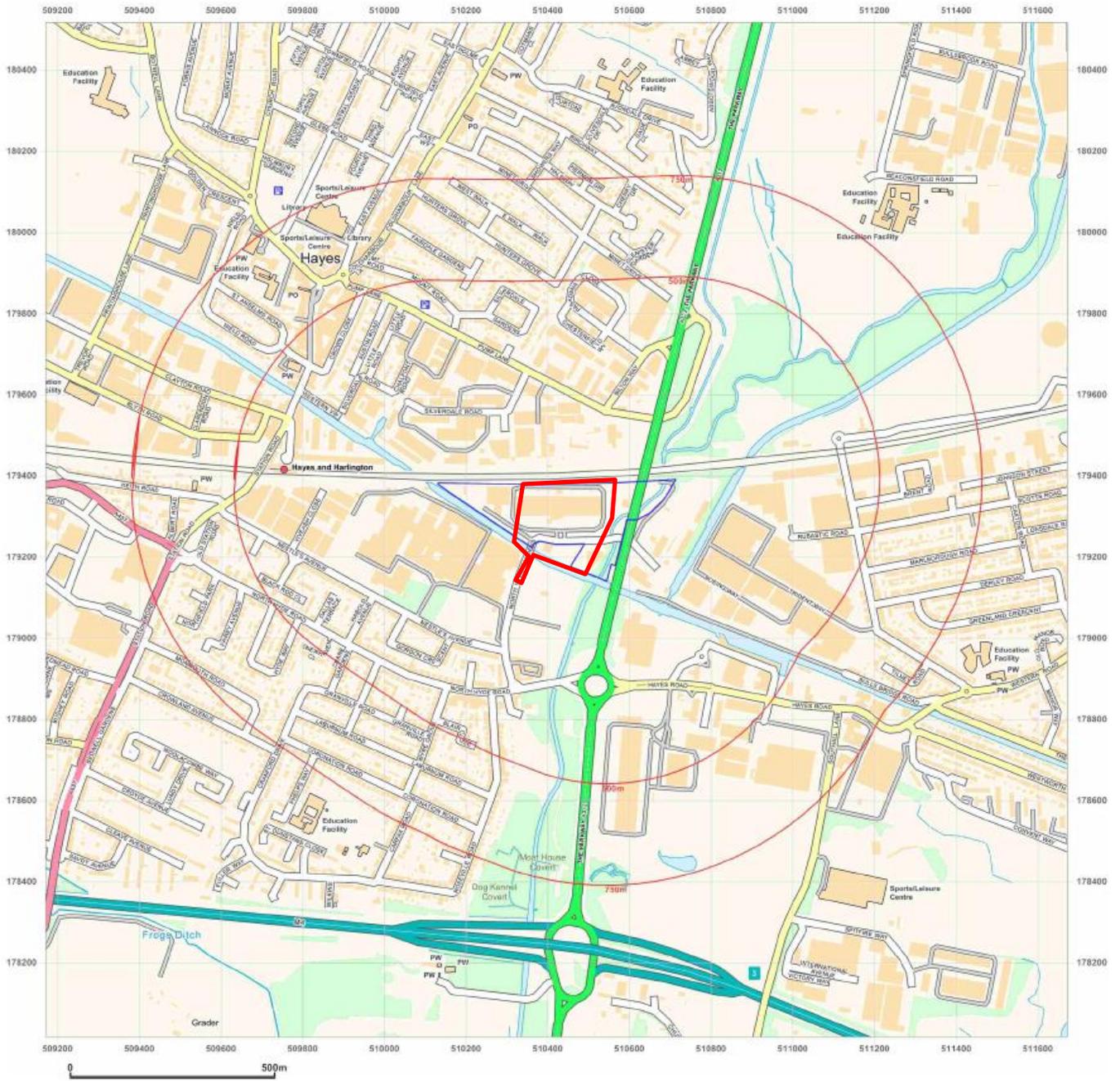
Title: 1973



Title: 1983



Title: 2002



Title: 2014

APPENDIX 4: ENVIRONMENTAL DATA

## 4.0 ENVIRONMENTAL DATA

## 4.1 Environmental Data

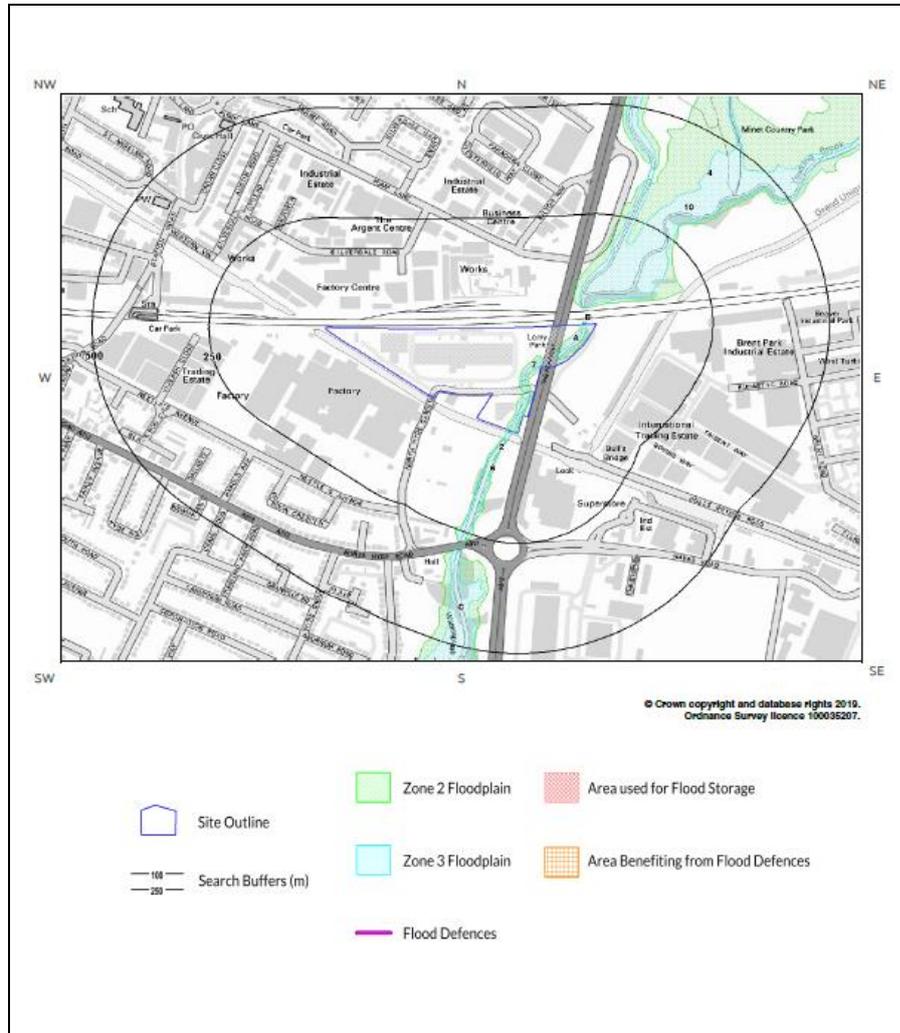
4.1.1 The following information has been ascertained from publicly available Environment Agency, BGS, Local Authority and NRPB records.

Environmental Records	On site	0-250m	Description
Discharge Consents	0	3	These relate to records approximately 10m north for miscellaneous discharge to land, 85m south and 95m south of the site from trade discharges to the Yeading Brook.
Pollution Incidents to controlled waters	1	7	The onsite record relates to a minor impact to water in 2001. The offsite records relate to minor impacts to water from oils and spills with record dates between 2002-2003.
Registered landfill or other waste disposal sites	2	2	Records have been identified for the site accepting inert, commercial and household waste onsite around 1936. Two offsite landfills are 35m north and 50m southeast of the site.
Waste transfer sites	0	6	Six waste transfer stations have been identified within 250m of the site.
Part A(2) and B activities	2	0	Onsite records relate to Part B licences for BA and FM Conway sites. The BA record is now surrendered and the FM Conway record is for coating processes and cement. Due to the highly regulated nature of such licences, the presence of these is unlikely to represent a significant concern for the subject site.
Integrated Pollution Prevention and Control authorisations	0	2	This record relates to the Nestle site. However, it has now been surrendered.
Licensed radioactive substances	0	0	Not Applicable (N/A)
Enforcements, prohibitions or prosecutions	0	0	N/A
Fuel sites	0	0	N/A
Is the site in an area where there is a known risk of subsidence?	Records indicate that the area in general has a moderate risk of subsidence hazards as a result of shrinking/swelling of underlying clay. This should be accounted for in the future foundation and slab design of the proposed development.		
Is the site in a radon-affected area?	Less than 1% of homes are above the radon Action levels, as such, no radon protection measures are considered necessary.		

**4.2 Environment Agency**

4.2.1 The Environment Agency website indicates that part of the site immediately along the banks of the River Crane is located within a Zone 3 flood plain with an estimated annual probability of fluvial flooding of greater than 1 in 100 years. As such, there is a moderate to high risk of flooding along the watercourse and the banks itself. However, the majority of the site is in a Zone 1 flood plain, meaning the risk of flooding is less than 1 in 1,000 in any given year. As such, the site is considered to have a medium risk of flooding.

4.2.2



APPENDIX 5: ENVIRONMENTAL CONTEXT

## 5.0 ENVIRONMENTAL SETTING

### 5.1 Geology/Hydrogeology

5.1.1 Geological mapping from the BGS website and environmental data from Groundsure shows the geological sequence outlined below. Reference has been made to the Environment Agency (EA) Groundwater Vulnerability Map and Regional Appendices, to provide the following aquifer status descriptions.

Formation	Aquifer Designation	Hydrogeological Significance
Lynch Hill Gravel	Principal Aquifer	Potentially highly productive and able to support large abstractions for public potable supply and other purposes
London Clay	Unproductive Strata	Formation of negligible permeability that can only support minor abstractions (if any)

5.1.2 Artificial Ground, Langley Silt and Alluvium are also noted within 50m of the site.

5.1.3 A borehole record obtained from BGS records and located onsite indicates the ground conditions comprise Made Ground (clay with ash and clinker) to 4.0m bgl over Silty Clay to 4.5m bgl, over Sand and Gravel to 7.5m bgl over Clay to 19.45m bgl. Groundwater was identified at 4.0m bgl.

5.1.4 There is one licensed groundwater abstraction within 1km of the subject site. This is located approximately 530m southeast of the site for evaporative cooling by Virtus Hayes Limited.

5.1.5 The site is not located within a groundwater Source Protection Zone (SPZ) as designated by the Environment Agency.

### 5.2 Hydrology

5.2.1 The Yeading Brook/River Crane runs along the eastern boundary. The Grand Union Canal is located 10m south of the site. Surface water features in the vicinity of the subject site with water quality information are as follows:

Surface Water Feature	Quality*	Distance	Direction
River Crane	C	475m	South

\*Chemical water quality as classified under the EA's General Quality Assessment (GQA) Scheme.

5.2.2 No licensed surface water abstractions have been identified within a 1km radius of the site.

<b>5.3</b>	<b>Surrounding Land Uses</b>
5.3.1	The subject site is surrounded by industrial and commercial units.
5.3.2	No Areas of Outstanding Natural Beauty, Environmentally Sensitive Areas, Sites of Special Scientific Interest or Special Protection Areas are located within 1km of the site.

APPENDIX 6: REVIEW OF PREVIOUS REPORTS

## 6.0 REVIEW OF PREVIOUS REPORTS

<b>6.1</b>	<b>Reports Reviewed</b>
6.1.1	<p>A previous report has been made available for review:</p> <ul style="list-style-type: none"> <li>• Jomas Associates LTD, 2018. Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report for North Hyde Gardens, Hayes, UB3 4QR. Dated: May 2018. Ref: P1470J1364/SL.</li> </ul>
<b>6.2</b>	<b>Key Details</b>
6.2.1	The report produced by Jomas assessed the British Airways (BA) plot of land only.
6.2.2	<p>The report was prepared for Legal and General and the objectives of the study were:</p> <ul style="list-style-type: none"> <li>• To determine the nature and where possible, the extent of contaminants potentially present at the site;</li> <li>• To establish the presence of significant pollutant linkages, in accordance with the procedures set out within the Environment Agency (EA) report R&amp;D CLR11 and relevant guidance within the National Planning Policy Framework (NPPF);</li> <li>• To assess whether the site is safe and suitable for the purpose for which it is intended, or can be made so by remedial action; and,</li> <li>• To obtain geotechnical parameters to inform preliminary foundation design.</li> </ul>
6.2.3	A summary of a Desk Study report produced by Jomas in April 2018 was included within the report. Paragon have not seen this report and a summary of the information is listed below.
6.2.4	The site was identified by Jomas as being a disused engineering works, with earlier historical uses as creosoting works with railway and ground workings. A power station was shown by 1980s until 2002 where the engineering works (BA building) was shown. The report also lists the surrounding area as having brick fields, creosoting works, engineering works, factories between 1800s to 1920. Many of these were developed to large factories which remain present.
6.2.5	The geology of the site was noted from the British Geological Survey Map to comprise the Langley Silt and Lynch Hill Gravel superficial deposits over the London Clay Formation. Artificial deposits were also shown.
6.2.6	Jomas reviewed an Enviro-Insight Report which suggested the underlying superficial deposits are classified as a Principal Aquifer with unproductive strata beneath. In addition, no Source Protection Zones were present. The nearest water feature was noted to be the Yeading Brook, 16m south east of the site, with the Grand Union Canal, 30m south west of the site. The report states there are no Environment Agency Zone 2 or 3 floodplains within 250m of the site.

6.2.7	<p>Jomas completed an intrusive investigation between 23 and 24 May 2019 comprising:</p> <ul style="list-style-type: none"> <li>• 7No window sampling boreholes, drilled up to 6.0m below ground level (bgl), with associated in situ testing and sampling;</li> <li>• 3No cable percussion boreholes with associated in situ testing and sampling;</li> <li>• 8No in-situ California bearing ratio tests;</li> <li>• Laboratory analysis for chemical and geotechnical purposes; and</li> <li>• 4No return visits to monitor ground gas concentrations and groundwater levels have been completed.</li> </ul>
6.2.8	<p>The ground conditions were reportedly; Made Ground to 5.60m bgl, over sandy clayey gravel/gravelly sand to 6.00m bgl, over clay to the base of the boreholes at 15.45m bgl. Groundwater was identified at between 1.50m to 5.20m.</p>
6.2.9	<p>An Environmental Assessment was completed which comprised chemical analysis of soils. The results did not identify elevated levels of contaminants within soils, compared to generic screening criteria for a commercial end use. However, asbestos fibres were detected in 3 of 9 samples tested. These comprised loose chrysotile and amosite fibres with quantifications of &lt;0.001% by weight in each sample. As such soils were not considered as hazardous in terms of waste disposal. Based on this assessment Jomas suggested no remedial measures were necessary, however in areas of soft landscaping, it was recommended that the soils were replaced with approximately 450mm of imported clean subsoil and topsoil, placed on a membrane.</p>
6.2.10	<p>Groundwater sampling, analysis and assessment were completed by Jomas, and results did not identify a pollutant linkage to controlled waters.</p>
6.2.11	<p>A vapour risk assessment was completed, and based on the levels of contaminants identified in groundwater, a risk to end users of a commercial development was not identified.</p>
6.2.12	<p>A gas risk assessment was completed which indicated the site falls within Characteristic Situation 1, meaning no formal gas protection measures are considered necessary.</p>
6.2.13	<p>A number of buried obstructions prevented advancement of several proposed borehole locations in the central and eastern part of the site. It was recommended by Jomas that this area was re-assessed using trial pitting following demolition in order to confirm the absence of gross contamination in those areas.</p>
6.2.14	<p>Jomas indicated that the presence of further hotspots between sampling points cannot be ruled out and that should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.</p>

6.2.15	<p>A geotechnical assessment indicated that:</p> <ul style="list-style-type: none"> <li>• It is considered that conventional foundations are considered unsuitable for development due to the depth of Made Ground and it was suggested that a piled foundation solution within the underlying London Clay should be considered, alternatively ground improvement techniques could be used;</li> <li>• The final choice of floor slab type would depend on the foundation solution adopted and structural requirements;</li> <li>• Based on the results of chemical testing, the required concrete class for the site is DS-2 assuming an Aggressive Chemical Environment for Concrete classification of AC-2 within the Made Ground and DS-1 AC-1s in the natural strata in accordance with the procedures outlined in BRE Special Digest 1; and</li> <li>• Interim Advice Note 73/06 Revision 1 Design Guidance for Road Pavement Foundations, suggest that a minimum permitted design CBR of 7.4% is used and a note to increase this was outlined if proof rolling and / or ground improvement was to take place.</li> </ul>
6.2.16	<p>The report included a response from the London Fire Brigade following a tank enquiry at the site. The letter (Dated: 23 April 2018, Ref: 26/011675) states that there are no records of petroleum storage tanks on the site and no current license for petroleum storage.</p>
<b>6.3</b>	<b>Paragon Opinion</b>
6.3.1	<p>Based on our review of the above report, Paragon has identified a number of data gaps in regards to the above report and the potential for its development as a data centre with MV Energy Centres.</p>
6.3.2	<p>The report prepared by Jomas only accounted for the British Airways plot of land, and therefore, there is a substantial portion of the new development site that has not been accounted for. As such, an additional investigation is required on other areas of the site including Vodafone and Abellio. It is noted that Vodafone is currently vacant and investigation will be possible in the short term. However, Abellio West London remain in occupation within the active bus garage plot. Therefore, investigation of this plot may not be possible in the short term.</p>
6.3.3	<p>In addition, the assessment of the central and western areas identified shallow obstructions and boreholes were terminated early. Recommendations were made to complete a trial pitting exercise following demolition. Jomas completed a foundation assessment, but did not specify that these obstructions would require removal prior to piling.</p>
6.3.4	<p>As a result, an additional investigation is required to obtain data for the areas untested by Jomas.</p>

APPENDIX 7: CONCEPTUAL SITE MODEL

7.0 PRELIMINARY CONCEPTUAL SITE MODEL

Source	Receptor	Pathway	Risk
<b>On site</b>			
Contamination within Made Ground or near surface natural soils and groundwater including heavy metals, hydrocarbons (including volatile organics) and PAHs due previous activities at the site comprising tanks and a bus garage, a former engineering works, creosoting works, railway and ground workings.	Future site users	<b>Moderate risk:</b> Ingestion, inhalation and dermal contact with contaminated soils in areas of soft landscaped areas.	M
		<b>Moderate risk:</b> Inhalation of vapours from contaminated soils or groundwater below the site.	M
		<b>Moderate risk:</b> Migration of vapours along service pipes into the building fabric or permeation of contaminants to pipework materials cannot be discounted.	M
	Off site residents	<b>Low risk:</b> Residents 300m southwest are unlikely to be at risk form contaminants arising from the site as they will be cut off by the Grand Union Canal. The likelihood for migration to properties a similar distance to the northwest is minimal given the considerable distance to the properties and several other areas of industrial land in between.	L
		<b>Low risk:</b> Residents 300m southwest are unlikely to be at risk form contaminants arising from the site as they will be cut off by the Grand Union canal. The likelihood for migration to properties a similar distance to the northwest is minimal given the considerable distance to the properties and several other areas of industrial land in between.	L
	Construction workers	<b>Moderate Risk:</b> The risk of contaminants within the Made Ground impacting construction workers through ingestion, inhalation and dermal contact is moderate unless Personal Protective Equipment (PPE) and Risk Assessments and Method Statements are in place. Additional data is required on ground conditions to adequately protect ground workers.	M

Source	Receptor	Pathway	Risk
Explosive / asphyxiating gases and hydrocarbon vapours from within Made Ground.	Building and services	<b>Low to Moderate Risk:</b> Direct contact of building materials including foundations and buried services with contaminated soils and groundwater is low to moderate based on the potential for contaminated soils and groundwater to exist.	
	Vegetation / plants	<b>Low to Moderate Risk:</b> The risk from root uptake of phytotoxic contaminants within the underlying soils is low to moderate.	
	Principal Aquifer	<b>Moderate to High Risk:</b> Vertical migration of dissolved phase contaminants into the Lynch Hill Gravels cannot be discounted and there are several high-risk sources and landfilling on the site. There is no SPZ designation or abstraction however.	
	Local surface water bodies	<b>Moderate to High Risk:</b> Direct discharge or surface run off of contaminants to surface water features cannot be discounted based on the presence of a river onsite along the eastern boundary. Migration of dissolved phase contaminants into the Lynch Hill Gravels, which are likely to be in continuity with the river, cannot be discounted and there are several high-risk sources and landfilling on the site.	
	Internal building spaces and future users	<b>Moderate Risk:</b> The potential for migration of gases through soil pore space and to the surface from underlying Made Ground and historical ground workings cannot be discounted.	
	Construction workers	<b>Moderate Risk:</b> The risk of gas / vapour within the Made Ground impacting construction workers through inhalation is moderate unless Personal Protective Equipment (PPE) and Risk Assessments and Method Statements are in place. Additional data is required on ground conditions to adequately protect ground workers.	

<i>Off site</i>			
Contamination within Made Ground or near surface natural soils and groundwater including heavy metals, hydrocarbons (including volatile organics) and PAHs due previous activities off site including the creosoting works, railway, factories and engineering works.	Future site users	<b>Moderate risk:</b> Ingestion, inhalation and dermal contact with contaminated soils and vapour cannot be discounted due to the presence of residual contamination in Made Ground and the potential for these contaminants to remain exposed in soft landscaped areas.	M
		<b>Moderate Risk:</b> Inhalation of vapours from contaminated soils or groundwater below the site arising from off site.	M
		<b>Moderate risk:</b> Migration of vapours along service pipes into the building fabric or permeation of contaminants to pipework materials cannot be discounted.	M
	Construction workers	<b>Moderate Risk:</b> The risk of contaminants within the Made Ground impacting construction workers through ingestion, inhalation and dermal contact is moderate unless Personal Protective Equipment (PPE) and Risk Assessments and Method Statements are in place. Additional data is required on ground conditions to adequately protect ground workers.	M
	Building and services	<b>Low to Moderate Risk:</b> Direct contact of building materials including foundations and buried services with contaminated soils and groundwater is low to moderate based on the potential for contaminated soils and groundwater to exist.	L M
	Vegetation / plants	<b>Low to Moderate Risk:</b> The risk from root uptake of phytotoxic contaminants within the underlying soils is low to moderate.	L M

APPENDIX 8: EXTENT OF SURVEY AND LIMITATIONS

## EXTENT OF SURVEY AND LIMITATIONS

The report has been designed to identify potential source, pathway and receptor pollutant linkages by assessing the following:

- Current, former and proposed land uses on site including an inspection of the site and the immediate environs, information provided by the client on the current use of the site and a review of historical data
- Environmental sensitivity of the site location as determined by factors including geology, hydrogeology, surface watercourses and neighbouring land uses; and,
- Pertinent information provided by environmental regulators.

The risk assessment has been undertaken with due regards to Contaminated Land Guidance documents issued by the Department for Environment, Food and Rural Affairs (DEFRA) and its predecessors, British Standards Institute (BSI) the Royal Institution of Chartered Surveyors (RICS) and the American Society for Testing and Materials (ASTM) Standard E 1527-00.

Specific comment is made regarding the site's status under Part 2A of the Environmental Protection Act (EPA) 1990, which provides a statutory definition of Contaminated Land and as revised under The Contaminated Land (England) (Amendment) Regulations 2012. Unless specifically stated as relating to this definition, references to 'contamination' and 'contaminants' relate in general terms to the presence of potentially hazardous substances in, on or under the site.

This Environmental Phase 1 report is based on a review of available historical and environmental setting records, consultations with site representatives (where applicable), pertinent information provided from the client and regulatory consultations. The report covers all information made available to Paragon Building Consultancy Limited (Paragon).

The opinions given within this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. If additional information or data becomes available which may affect the opinions expressed in this report, Paragon reserves the right to review such information and, if warranted, to modify the opinions accordingly. Paragon reserves the right to charge additional fees for; un-anticipated second opinion reviewing of previous reports.

Paragon has been able to identify perceived risks based on the information reviewed and made available. No intrusive ground investigation work was carried out and, as such, actual risks have not been established. Actual risks can only be assessed following an intrusive investigation of the site.

This report is for your sole use, and consequently no responsibility whatsoever is undertaken or accepted to any third party for the whole or any part of its contents. Paragon accept no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned or an third party with whom an agreement has not been executed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Paragon, a charge may be levied against such approval.

## PARAGON ENVIRONMENTAL RISK ASSESSMENT

## RISK CLASSIFICATIONS

RISK RATING	DEFINITION
LOW	<p>The potential for liability in the future with respect to environmental considerations is considered negligible.</p> <p>No ground contamination investigation is advised.</p> <p>The likelihood of the Regulatory Authority requiring a ground contamination investigation at the site as part of the development is considered minimal.</p>
LOW TO MEDIUM	<p>The potential risk of liability associated with environmental considerations in the future is considered minimal. A ground contamination investigation may be considered to fully assess the level of perceived risk. This would include an intrusive soil, groundwater and ground gas contamination assessment, and possible remedial works. A minor likelihood exists for the Regulatory Authority to require a ground contamination investigation at the site as part of the development.</p>
MEDIUM	<p>The potential risk of liability associated with environmental considerations in the future exists.</p> <p>A ground contamination assessment is advised as part of the development to fully assess the level of perceived risk. This would include an intrusive soil, groundwater and ground gas contamination assessment, and possible remedial works. The potential exists for the Regulatory Authority to require a ground contamination investigation at the site as part of the development.</p>
MEDIUM TO HIGH	<p>A potentially significant risk of liability associated with environmental considerations in the future exists.</p> <p>The development of the site should proceed with caution. An intrusive ground contamination assessment is likely to identify contamination across the site that may require extensive remediation. A significant likelihood exists that the Regulatory Authority will require a ground contamination investigation at the site in the near future as part of the development.</p>
HIGH	<p>The risk of liability associated with environmental considerations in the future is considered high.</p> <p>An intrusive ground contamination assessment is likely to identify significant contamination across the site that may require extensive remediation. It is known that the Regulatory Authority will require a ground contamination investigation at the site as part of the development. Subsequent remedial works are considered likely.</p>