Ruirside Development Limited

42A Parkgate Street

Preliminary Site Assessment

265381-00

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Executive Summary

Arup was appointed by Chartered Land to prepare a Preliminary Site Assessment (PSA) of the site at No. 43 Parkgate Street, Dublin 8.

The objective of PSA was to identify areas of contamination within the Parkgate Street site, prepare a preliminary Conceptual Site Model (CSM) for the site in the context of future development of the site, establish if there are any potentially unacceptable risks to current or future site users and set out the rationale for the scope of a detailed site investigation.

The site is located on the banks of the River Liffey and was raised with the construction of the quay wall in the 1800s. Since then, the site has been used for a number of industrial activities. It is currently used as a store for Hickey's since 1976. It is proposed that site will be developed in the future for the construction of a mixed-used development comprising of commercial and residential units.

The PSA is a desk-based study and used a number of information sources including previous ground investigation reports, publicly available data sources and information gained from site walkovers and interviews with staff who have worked on the site since the 1970s.

The desk study concludes that there are a number of potential sources of contamination on site, particularly in the made ground where previous environmental soil and groundwater testing have shown petroleum hydrocarbons, polycyclic aromatic hydrocarbons and heavy metal contamination. Much of the contamination may be linked to previous site activities such as the iron works and printing. A recent asbestos survey in early 2019 showed that many of the buildings contain asbestos materials which is typical given the age of the buildings and the construction practices of that time.

A preliminary CSM was developed which identified the potential pathways for contamination on site including the made ground, gravel strata and groundwater flow. Potential receptors of the contamination on site include the current site staff, future site users as well as the groundwater and the River Liffey estuary. Pollutant linkages were highlighted where a source, pathway and receptor could be identified. Such pollutant linkages pose a potential risk to receptors including future site users.

The CSM also identified information gaps where additional information is required to confirm the potential pollutant linkages and the potential risks. The PSA concludes with a number of recommendations for the next steps that should be taken to confirm the findings of the PSA by carrying out a ground investigation.

EPA Contaminated Land & Groundwater Risk Assessment Methodology		Report Reference	Report Date	Status
STAGE 1: SITE CHARACTERISATION & ASSESSMENT				
1.1	**PRELIMINARY SITE ASSESSMENT**	265381-00_Preliminary Site Assessment Final	15 May 2019	Draft
1.2	**DETAILED SITE ASSESSMENT**			
1.3	**QUANTITATIVE RISK ASSESSMENT**			
STAGE 2: CORRECTIVE ACTION FEASIBILITY & DESIGN				
2.1	**OUTLINE CORRECTIVE ACTION STRATEGY**			
2.2	**FEASIBILITY STUDY & OUTLINE DESIGN**			
2.3	**DETAILED DESIGN**			
2.4	**FINAL STRATEGY & IMPLEMENTATION PLAN**			
STAGE 3: CORRECTIVE ACTION IMPLEMENTATION & AFTERCARE				
3.1	**ENABLING WORKS**			
3.2	**CORRECTIVE ACTION IMPLEMENTATION & VERIFICATION**			
3.3	**AFTERCARE**			

1 Introduction

1.1 Project Contractual Basis and Personnel Involved

Arup have been commissioned by Chartered Land to prepare a Preliminary Site Assessment PSA for the Hickey site at No. 43 Parkgate Street, Dublin 8.

Historic Ground Investigations (GI) across the site are presented in Appendix A. Gaps have been identified in the historic reports and a further stage of GI is set out in Table 8. A Detailed Site Assessment (DSA) will follow on from this recommended GI incorporating the findings of that investigation into the Conceptual Site Model (CSM) presented in this report.

The Arup personnel working on the project are summarised in **Table 1**.

Table 1: Arup Personnel

Personnel	Experience
EurGeol Eoin Wyse, BSc, PGeo,	Eoin Wyse has 14 years' experience in contaminated land. He has extensive experience in site assessment and the management of contaminated land. He is a Professional Geologist and is on the IGI Register of Professional Qualified Geoscientists/Competent (in respect of environmental risk assessment for regulated and unregulated waste disposal and contaminated land).
Alexandra Fleming BSc, MSc	Alexandra has 4 years' experience as an environmental consultant with a masters focusing on land contamination. She has assisted in the preparation of a number site assessment reports.
EurGeol Gerry Baker, MSc, BA, PGeo	Gerry Baker has 17 years' experience in the field of hydrogeology. His main areas of expertise are in groundwater modelling (conceptual, analytical and numerical) and hydrogeological risk assessment. He is a Professional Geologist and is on the IGI Register of Professional Qualified Geoscientists/Competent (in respect of environmental risk assessment for regulated and unregulated waste disposal and contaminated land).

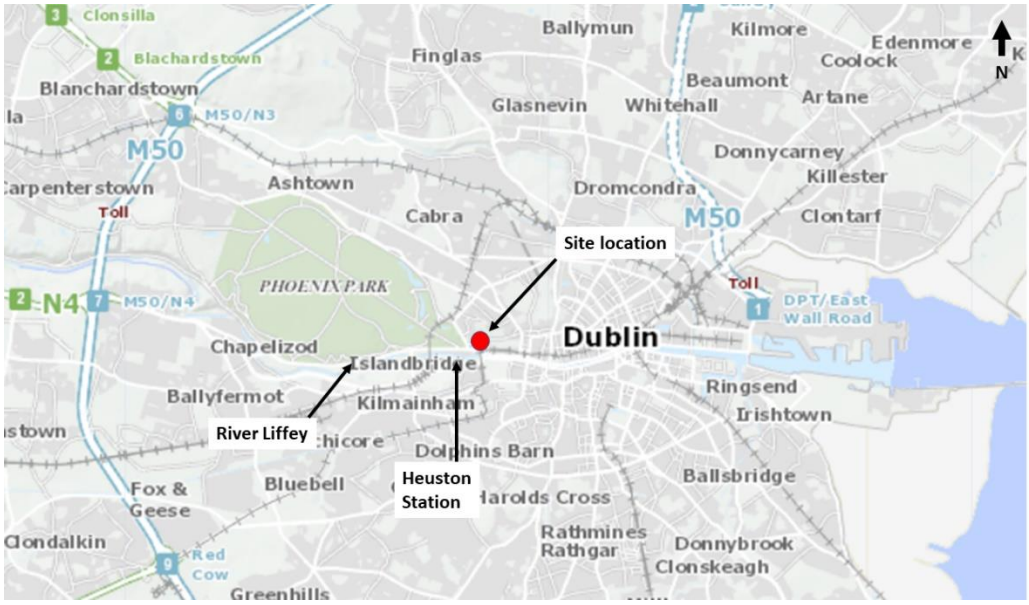
1.2 Background Information

This report is a PSA of the Hickey Fabrics Ltd site at No. 43 Parkgate House, Parkgate Street, Dublin 8. The site is located on the north bank of the River Liffey approximately 7 kilometres east and upstream of the River Liffey discharge point to the Irish Sea, refer to **Figure 1** below.

The land has been reclaimed from the River Liffey estuary and the ground level raised in the early 1800s for industrial use. For most of the 1800s an iron works operated on the site followed by a wool worsted (1900-1910), munitions factory (1916-1919), government store (1920-1930) and printing works (1930-1970s) until Hickeys took over the site to use as a store.

The site is currently in use as a store for the Hickeys businesses, Hickeys Fabrics and Home Focus. The site is owned by Chartered Land and currently leased to Hickeys Fabrics from the 1970s to the present day.

Figure 1: Site location at 43 Parkgate Street, Parkgate Road, Dublin 8. | Source GeoHive/Ordnance Survey Ireland | Not to scale



Arup has previously prepared two reports regarding the geo-environmental conditions of the site in 2003 and 2006. These reports are discussed in further detail in Section 2.1.2 and Section 5. In August 2018, Arup were asked by Delaston Limited, Quadrant Real Estate Advisors LLC and lender (QREA Ireland DAC) along with The Davy Platform ICAV, (together, the "Addressees") to review the previous geotechnical and environmental assessment by Arup (2006), as discussed above comment on any legislative or technical changes which may have an impact on the redevelopment of the site.

Following on from this review, Arup were asked to prepare a PSA for the site with respect to the potential for land contaminations risks associated with the current site and future users based on the proposed development

This PSA has been prepared in accordance with the following guidance:

- *Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites* [1], Environmental Protection Agency 2013; and
- *Code of Practice, Environmental Risk Assessments for Unregulated Waste Disposal Sites*[2] (EPA, 2007), (referred to as the 'CoP').

[1] EPA (2013) Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. Available at: https://www.epa.ie/pubs/advice/waste/contaminatedland/contaminatedland/Guidance_on_the_Management_of_Contaminated_Land_and_Groundwater_at_EPA_Licensed_Sites_FINAL.pdf

[2] EPA (2007) Code of Practice, Environmental Risk Assessments for Unregulated Waste Disposal Sites. Available at: https://www.epa.ie/pubs/advice/waste/waste/EPA_CoP_waste_disposal_sites.pdf

1.3 Project Objectives

The objectives of this PSA Report are to:

- Identify areas of contamination within the Parkgate Street site based on the historically available data;
- Present the preliminary CSM for the site in the context of future development of the site;
- Establish if there are any potentially unacceptable risks to current or future site users; and
- Set out the rationale for the scope of a detailed site investigation.

1.4 Scope of Works

The scope of works involves the preparation of a stage 1 contaminated land PSA in accordance with the EPA template ('Stage 1 Template for Preliminary Site Assessment Report[3]') and the CoP[4] (EPA, 2007)

This includes:

- A review of published information regarding the former activities on the site;
- A review of the results of previous site investigations and assessments available on the public register;
- A review of previous site investigations and site assessments previously prepared by Arup;
- Site walkover;
- Development of a preliminary CSM (See Appendix B); and
- Design of an intrusive site investigation to further refine the Preliminary CSM.

In undertaking this assessment, the project will consider past activities and land uses.

A summary of key background information and previous reports prepared in relation to the site is included throughout this report where relevant and in line with EPA guidance listed above.

[3] EPA (2013) Management of Contaminated Land & Groundwater at EPA Licensed Sites (http://www.epa.ie/pubs/advice/waste/contaminatedland/contaminatedland/)
[4] EPA (2007) Code of Practice, Environmental Risk Assessments for Unregulated Waste Disposal Sites. Available at: https://www.epa.ie/pubs/advice/waste/waste/EPA_CoP_waste_disposal_sites.pdf

2 Source Audit Findings – Production and Operational History

2.1 Source of Information

2.1.1 Publicly Available Information

The following sources of information were reviewed:

- Bing Maps, aerial photography.
- Google Maps, aerial photography.
- GeoHive/Ordnance Survey Ireland, historic mapping including:
  - Historic 6 Inch Cassini (1830s-1930s);
  - Historic 6 inch (1837-1842);
  - Historic 25 inch (1888-1913); and
  - Aerial Imagery, Ordnance Survey Ireland (1995).
- Geological Survey of Ireland (GSI) - Geological maps of the site area produced by the Geological Survey of Ireland including:
  - Quaternary geological maps;
  - Bedrock mapping;
  - Groundwater Data Viewer;
  - Karst Database;
  - Geotechnical Data Viewer; and
  - Goldmine.
- Environmental Protection Agency – EPA soil and subsoil database; licensed industrial and waste facilities database and water quality records.
- National Parks and Wildlife Service (NPWS) - Protected ecological sites.
- Dublin City Development Plan 2016-2022 (2016) Dublin City Council.
- Dublin City Council Planning Application Database.

Ground investigation data is included as **Appendix A** to this report and discussed in Section 5.

2.1.2 Previous Reports

The following previous site investigations have been used to inform this report:

- Arup Consulting Engineers (2003) Site Investigation Report, Parkgate Street Development for Hickeys Fabrics & Co. Ltd., refer to **Appendix A**.
- Arup Consulting Engineers (2006) Geotechnical and Environmental Assessment Report for Hickeys Fabrics & Co. Ltd., refer to **Appendix B**.

- Historical ground investigation reports from the GSI's Goldmine and the Geotechnical Data Viewer databases, refer to Section 5 for further detail.

2.1.3 Site Visits

Arup staff visited the site on a number of occasions between January and April 2019 and spoken with those who work on the site. The purpose of the site walkovers was to identify potential sources of contamination and inform the design of an intrusive site investigation.

Previous site walkovers were also undertaken by Arup staff in August 2002 and this information was also use in this report. The site visits identified a number of features on the site which are described in Section 3.5 below. A number of photographs are presented in **Appendix C**.

3 Source Audit Findings – Production and Operational History

3.1 Current Site Operations

The site is currently under the ownership of Chartered Land and has been leased to Hickey Fabrics since 1976 until the present day. It is currently used as a warehouse for the Hickey Fabrics and Hickey at Home Focus retail businesses. Refer to **Figures 7** and **8** in **Appendix E**.

This section describes the current site operations in the context of potential contamination.

3.1.1 Storage Tanks

In 2002, a site reconnaissance was conducted by Arup with a site representative from Hickey Fabrics Ltd. This information was included in the 2003 site assessment report by Arup and is summarised below unless otherwise stated. More recent walkovers including in May 2019 have been carried out and the findings are presented below.

There are three Underground Storage Tanks (USTs) located beneath the site. One UST is located adjacent to the garage/paint room (No.1) and is no longer in use according to site staff. The UST No.1 may have been operated through a pump which still stands in the garage, refer to **Photograph 9** in **Appendix C**. It is believed that the UST No.1 was used for diesel fuel for the vehicles of the former print works.

The second UST (No.2) is still in operation and is located adjacent to the old generator room, refer to **Figure 7**. The tank was originally used for the site generator (located in the old generator room), but the system was later changed, and it is currently used to fuel the boiler located in the boiler house No. 2 (refer to Figure **7**). The generator is no longer in use.

A third UST is believed to be located in front of the warehouse according to staff on site, however the exact location is unknown. According to a Hickey's staff member, the tank was not operated by Hickeys since they took over the site in 1976.

Pressure tests carried out in 2005 on both tanks showed that there were no significant leaks (Arup, 2005). It is not known whether any testing on the USTs have been carried out since. Details of the USTs are summarised below:

Table 2: Underground storage tanks (UST) details

Tank ID	Location	Capacity	Year Installed (approx.)
UST No.1	Adjacent to garage	300 Gallons (1,365 litres)	Pre-1976
UST No.2	In front of generator building	5,000 Gallons (22,730 litres)	Pre-1976
UST No.3	Unconfirmed location.	Unknown	Unknown

Four Above-ground Storage Tanks (AST's) are located on the site, refer to **Figure 7** in **Appendix E** and **Table 3** below. Three (No. 1, 2 and 4) are currently used to store heating oil for the buildings. The fourth tank (AST No. 5) is located in the south-eastern tip of the warehouse building, Refer to Figure7 in **Appendix E**. The fifth AST (AST No. 5) was located adjacent to the old office/residence but has been removed but the tank pedestals (concrete blocks) remain.

The Historic 25 inch Map (1888-1913) notes a 'Tank' located in front of the new warehouse. It is not clear whether this is an AST or UST, refer to **Figure 3** below.

Table 3: Above-ground Storage Tanks (AST) details

Tank ID	Location	Capacity	Year Installed (approx.)
AST No.1	North side of boiler house No.1	Plastic 300 Gallons (1,365 litres)	< 25 years ago
AST No.2	South side of boiler house No.1	Plastic, 300 Gallons (1,365 litres)	< 25 years ago
AST No.3	Adjacent to old office / residence. The tank has since been removed.	Unknown – Tank pedestals remain in place. Refer to Photograph 6 in Appendix C.	Unknown
AST No.4	Inside boiler house No.2.	Metal – 100 gallons	Unknown
AST No.5	Southeast tip if site within the New Warehouse	Metal 1,800 Gallons (8,000 litres). Refer to Photograph 13 in Appendix C.	1976

3.1.2 Former Office/Residence

This building was constructed around 1820 as the house of the Phoenix Iron Works manager/owner. It is now vacant and unused. The interior has deteriorated significantly. The building is listed in the National Inventory of Architectural Heritage (NIAH)[5]. Refer to **Figure 5** in **Appendix E**.

3.1.3 Garage/Paint Room

This building covers an area of approximately 50m^2 and has a concrete floor. The fuel pump from UST No.1 is located inside the garage (**Photograph 9**, **Appendix C**).

[5] National Inventory of Architectural Heritage (NIAH), Registration No. 50060347. Available at: http://www.buildingsofireland.ie/niah/search.jsp?type=record&county=DU&regno=50060347

The asbestos survey carried out in January 2019 identified cement slates on the roof that contain asbestos material (chrysotile), refer to **Section 5.2.4** and **Appendix F** for the asbestos survey report (2019). Small amounts of oil staining around the fuel pump were observed from outside during the 2002 site walkover. Refer to **Figure 5** in **Appendix E**.

3.1.4 Old Generator Room

This building covers an area of approximately 80m^2 and has a concrete floor which in partly tiled. It is currently used as a maintenance shop and for storage of miscellaneous items. According to Hickey Fabrics Ltd, the building formerly housed two large generators and an electricity board that was located on the east interior wall. The generator provided electricity to the site and a conduit/channel cut approximately 0.3 metres into the floor runs through the length of the building in an east-west direction. This conduit is covered with wooden slats and a small portion that was accessed for visual observation showed no signs of staining or odours during the 2002 site inspection by Arup, refer to **Photograph 14** in **Appendix C**. Behind the wall upon which the electricity board was housed are three small storage rooms that connect to the old storage area. Refer to **Figure 5** in **Appendix E**.

3.1.5 Boiler Houses

There are two boiler houses located on site; one adjacent to the former office/residence (No. 1) and the second is adjacent to the main warehouse (No. 2), refer to **Photograph 11** and **Photograph 12** in **Appendix C** and **Figure 5** in **Appendix E**. A photograph of the boiler house (No. 2), west and adjacent to the warehouse, taken in 2002, show staining on the walls of the building, (**Photograph 11**).

3.1.6 Old Storage Area

The old storage area covers approximately 760m^2 and comprises between eight to ten storage rooms located on ground floor and first floor level. The ground floor is concrete, and the upper floors are constructed in timber. The rooms are currently used for storage of furniture and clothes. Access to this portion of the site is from outer doors located adjacent to the boiler house (No.2) and from the interior of the 'new warehouse'. No storage tanks were identified in this area. Refer to **Figure 5** in **Appendix E**.

3.1.7 New Warehouse

This building covers over one half of the total surface area of the site i.e., approximately 2,500m^2. The Hickey Fabric's offices are located in the northwest corner of this building, adjoining Parkgate Street. The remaining area of the warehouse is open plan with an elevated ceiling and is currently used for the storage and display of fabrics. Access to this warehouse is from the site parking area, through the old storage area and a pedestrian access door at the south-eastern tip of the building.

One above ground storage tank (AST No. 3) is located at the south-eastern tip of this building adjacent to the pedestrian access door. A former train track once operated along the south boundary of this building, adjacent to the River Liffey. Refer to **Figure** ? in **Appendix E**.

According to information provided by Hickey Fabrics Ltd. this building housed the main elements associated with the former print works, which operated at the site. The main printing machine was located in the centre of the warehouse and lead melting for the print press was conducted along the north-eastern boundary wall.

3.2 Previous Site Operations

A history of the site was prepared by in the Arup Consulting Engineers (2003) and is summarised in **Table 4** below.

Table 4: Summary of site history at No. 43 Parkgate Street

Date	Site History
Early 1800s	2-5m of fill was used to raise the levels across the site above the River Liffey floodplains.
1800s – 1890 (approximate)	Phoenix and Royal Iron Works As shown on Figure 2, the Historic Map 6 Inch Colour (1837-1842)
c.1820	Construction of the Phoenix Iron Works manager's house located the in the north-west of the site. Listed under the National Inventory of Architectural Heritage (NIAH), Reg. No. 500060347.
c. 1895	Construction of the electricity sub-station east of the site. Listed under the National Inventory of Architectural Heritage (NIAH), Reg. No. 500060350
1900 - 1910	Woollen worsted manufacturing by Knightsbridge Mills
March 1916 – March 1919	Ireland National Shell Factory, Dublin, manufacturing 9.2 inch shells and fuses.
1920-1930	Government Stores
1930 -1970s	Printing works, refer to Figure 5 As shown in OSi Cassini 6 inch (1830s – 1930s)
Mid 1970s - Present	Hickey Fabrics warehouse.

Directly to the west of the site currently lie No.'s 41 and 42 Parkgate Street. Historic maps show that this site was also part of the Phoenix Iron Works (**Figure 2**, Historic Map 6 inch, 1837-1842) and later the Lucan Dairy Depot (**Figure 4**, OSi Cassini 6 inch).

Further west of the site along Conyngham Road, was the location of a chemical works around the early 1800s; no further information about these works was found. A chemical factory was also noted on the northern side of Parkgate Street, the use of which was recorded as chemical manufacturing and chemical importing at various times.

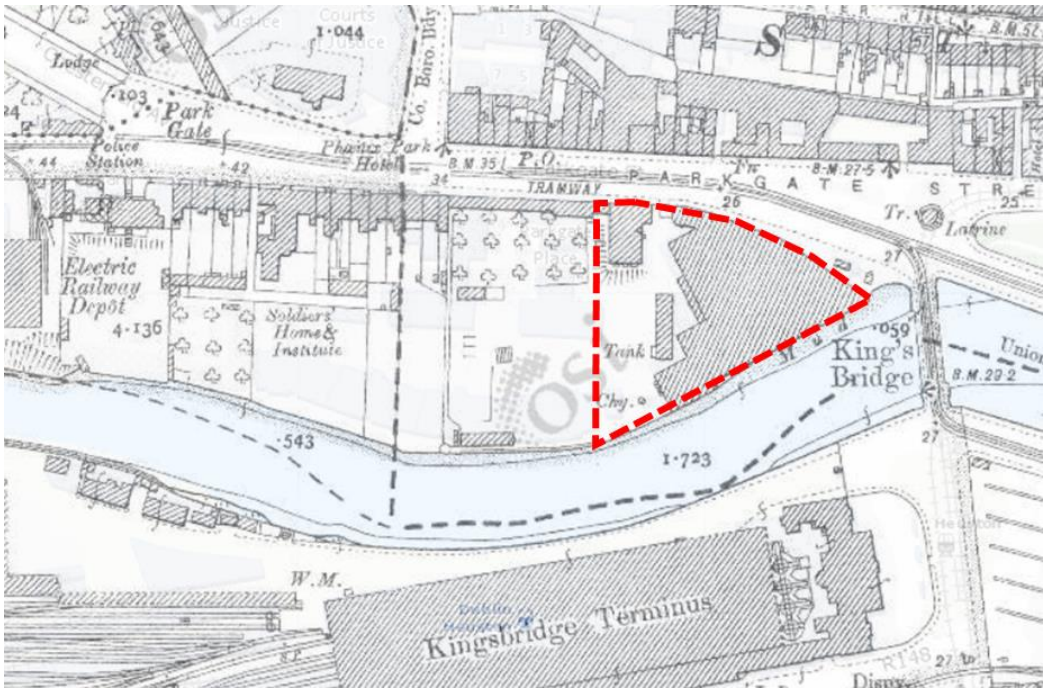
The iron works were in operation from approximately the 1880s to 1890. Following the iron works the site was used as a mill under Knightsbridge Mills from approximately 1900-1910.

Figure 3 shows that in the past, the site was in proximity to several other garages and depots (bus and electric railway), both on Conyngham Road and on the northern side of Parkgate street. Within the site, a tank and chimney are noted on the map.

During World War I, the site was used for the manufacture of munitions for the British Army from mid-1915 until 1919 when operations ceased, refer to **Photograph 1** below, from the Imperial War Museum archives. The site was then used as a government store until the 1930s when the printing works began.

Figure 2: Historic Map 6 inch (1837-1842) showing the approximate site boundary | Source GeoHive, Ordnance Survey Ireland | Not to scale

Figure 3: Historic Map 25 inch (1888-1913) showing the approximate site boundary | Source GeoHive, Ordnance Survey Ireland | Not to scale



Photograph 1: Photograph of the National Shell Factory on the River Liffey at Parkgate Street, c.1917-1919. | Source Imperial War Museum © IWM

Figure 4: Historic Map 6 inch Cassini (1830s-1930s) showing the approximate site boundary | Source GeoHive, Ordnance Survey Ireland | Not to scale

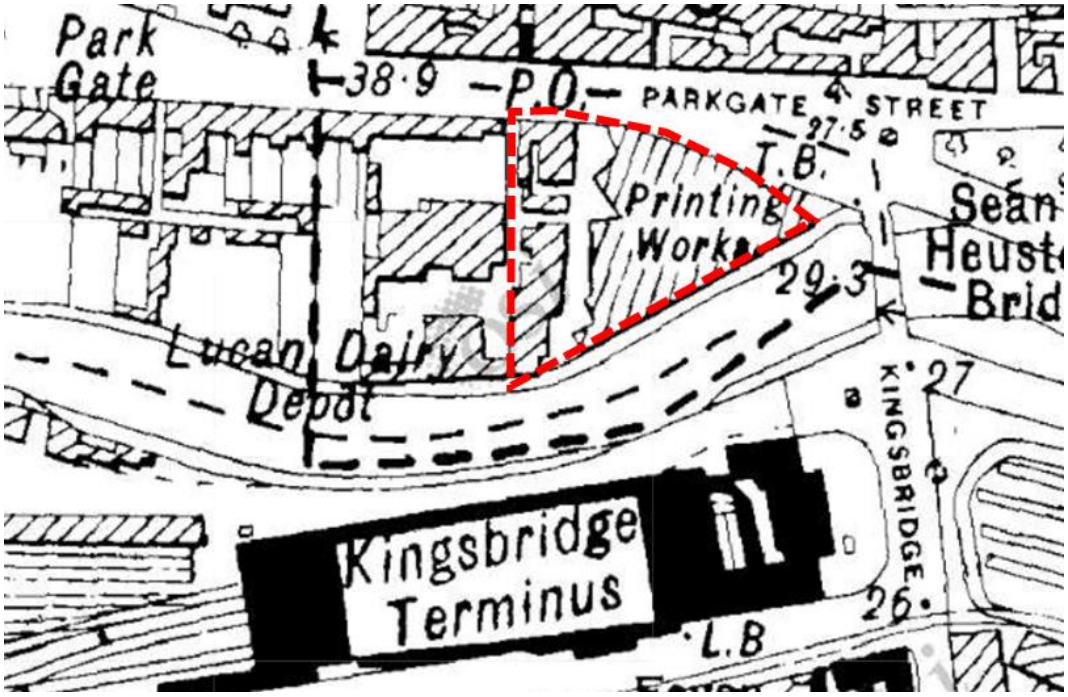


Figure 4 shows that the warehouse has been extended and the site is used as a printing works (1930s-1970s). The Lucan Dairy Depot is shown to be located west of the site at the time this map was created.

Hickey Fabrics took ownership of the site in the 1970s and it has since been used as a warehouse for Hickey's stock up until the present day.

3.3 Other Features and Events

Information procured by Arup from Dublin City Council, during a previous desk study (Arup, 2003), shows that a soil and groundwater investigation and remediation was conducted at the former adjoining Maxol station at No. 42 Parkgate Street, refer to **Figure 7** in **Appendix E**. Office blocks are now built of the site. The former Maxol station extended from Parkgate Street to the quay wall of the River Liffey. A Hickey staff member recalls that storage tanks were located in the area near the quay wall and trucks accessed this area, presumably to unload/fill. It was observed that at the time this tank farm and unloading/filling area was at a lower ground level than the Hickeys site. The Parkgate Complex apartments were built on this area of the site at No. 42 Parkgate Street and are located on an underground car park.

A report entitled 'Environmental Review and Remediation Proposal' dated June 1997, and subsequent correspondences indicate that on-site sources/events that contributed to soil and groundwater contamination include 'a major petroleum leakage', former packaging operations, leakages from AST's and heavy lube oil storage. Groundwater samples taken from monitoring wells within 10m of the Hickey site boundary showed values of volatile organic compounds (VOCs) of up to 9,850µg/l (MW5 located to the southwest corner of the Hickey site) (Arup, 2006).

The planning application (Ref 1728/97) made by Asondale Developments for No.42 Parkgate Street for the mixed-use development included the demolition of the Maxol Service Station. The development was granted planning in March 1998 and part of the planning conditions included the remediation of the site in advance of construction to the 1994 Dutch S Standards for soil (mineral oils (50 mg/kg dry material); PAH's - total of 10 (1 mg/kg dry material) and BTEX (each 0.05 mg/kg)) and ground water (mineral oils (50 µg/l), 10 individual P.A.H.'s as listed and BTEX (each to 0.2 µg/l)). The developer was required under planning to obtain certification that each sub-site of the site complied with the specified standards before development.

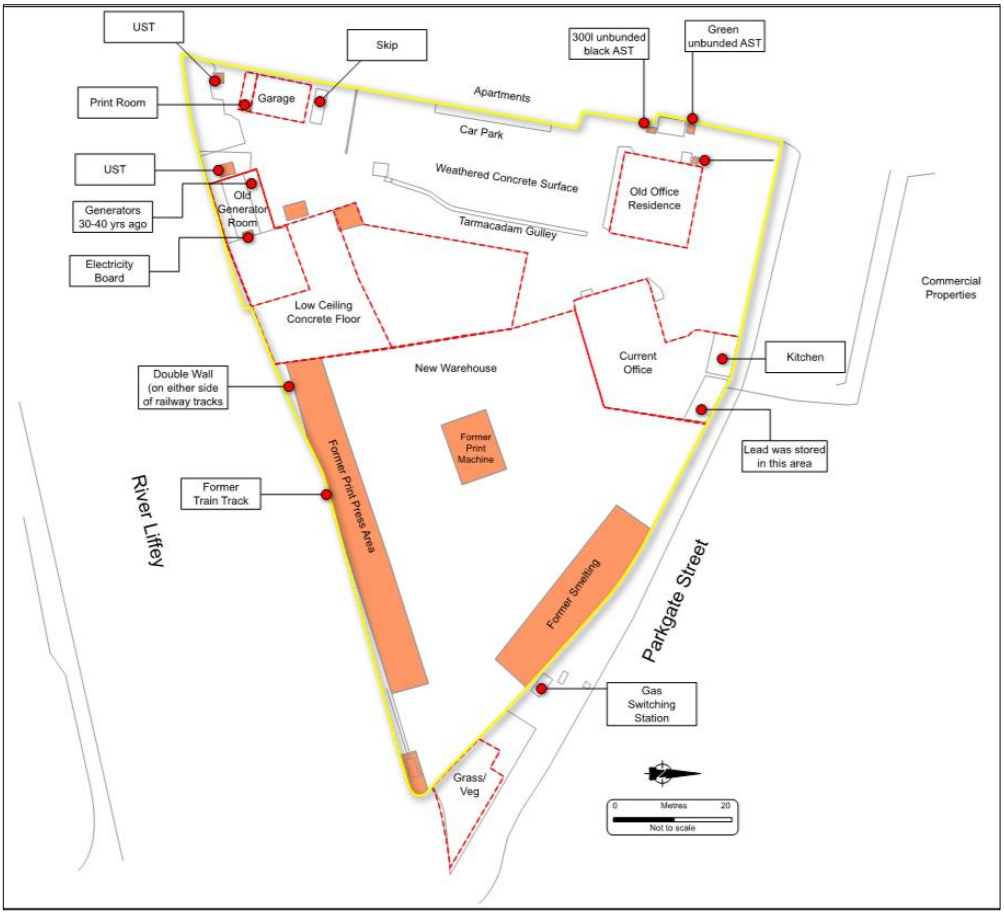
3.4 Chemicals of Potential Concern

This section summarises the contaminants of concern associated with the previous activities on the site and information gathered during site walkovers, refer to **Table 5**. Refer to **Figure 2** to **5** for the location of the historic activities.

Table 5: Chemicals of potential concern identified during the desk study

Activity	Source	Contaminant(s)
Land reclamation	Fill was used on site to raise the ground levels from 2-5m above the original. Unknown sources of fill. Potentially river dredge material.	Unknown Potentially high organic content.
Phoenix Iron Works (1800s – 1890)	Iron making, casting, rolling and finishing	Heavy metals (including Fe, Pb, Al, Cr, Cu, Mn, Mo, Ni, Sn, V and Zn) Polycyclic aromatic hydrocarbons (PAHs)
Electricity Substation (c.1895-Present)	Electrical transformers	Polychlorinated Biphenyls (PCBs)
Woolen Worsted (1900-1910)	Dying fabric, bleaching. Machinery maintenance	Organic compounds
Munitions factory (March 1916-1919)	*"Chemical works: Explosives, propellant and pyrotechnics manufacturing works"*	Nitric and sulphuric acids Organic solvents (e.g. acetone); Organic compounds (e.g. hexamine, toluene or glycerine); and Fuels (liquid hydrocarbons) Inorganic compounds (e.g. ammonium nitrate, sodium nitrate) Metals (lead, copper).
Printing Works (1930s - 1970s)	Printing metals, lead smelting, machinery maintenance.	Metals (including Fe, Pb, Al, Cr, Cu, Mn, Mo, Ni, Sn, V and Zn)
Maxol Garage (1970-1990s)	Fuel leak from an underground storage tank (unconfirmed)	Diesel or petrol
Heating system (1970's to present)	Above ground storage tanks (5), refer to Table 4.	Kerosene fuel
Fuel storage (1970's to present)	Underground (3) ground storage tanks, refer to Table 3.	Diesel to refuel vehicles.

Figure 5: Summary of the location of the historical activities on the site. | Not to scale.



3.5 Planning History

In 2006, a planning application was submitted to Dublin City Council (DCC) for a mixed use residential and commercial development at No.43 Parkgate Street (Planning Ref. 3613-06). As part of that planning application, Arup prepared the planning report which included a geotechnical and environmental assessment of the site. This report incorporated the results of the site investigation carried out under the direction of Arup and presented in the 2003 report. The planning application was granted by DCC in December 2006.

The planning permission (Planning Ref. 3613-06) in was subsequently appealed and overturned by An Bord Pleanála (ABP) in September 2007 (Case Ref. PL29N.221587) on two grounds as stated in the Inspector's Report,

1. In relation to the location of the proposed development "*on a significant visual connection running from the City Quays to the Phoenix Park and Wellington Monument*", the Inspector's Report stated that "[T]*he proposed development would therefore, seriously injure the amenities of the area and be contrary to proper planning and sustainable development in the area*."

2. In relation to the proposed part demolition of a protected structure (riverside stone wall) and to relocate a protected structure (entrance stone arch) within the site, "…… [T]*he proposed development would, therefore, interfere with a view or prospect of special amenity value which it is necessary to preserve, would seriously injure the amenities of the area and be contrary to proper planning and sustainable development of the area*."

4 Site Environmental Setting

The following section describes the site and environmental settings of the site in a local and regional context. The relevant **Figure 7** to **20** are presented in **Appendix E** of this report.

4.1 Site Location

The site is located on the original floodplain of the River Liffey. The site is approximately 7km east of the River Liffey discharge point to the Irish Sea. There is one main access point to the site, from Parkgate Street. Access through the stone arch is not permitted. The public do not have access to the site.

The River Liffey forms the southern boundary of the site and Parkgate Street runs parallel to the northern site boundary. Sean Heuston Bridge (Luas crossing and pedestrian only) is located 20m of the east tip of the site, refer to **Figure 7** in **Appendix E**. The Frank Sherwin Bridge which permits vehicular access to the southside of the Liffey is located approximately 100m further downstream of the site. Refer to **Figure** ? in **Appendix E**. A Dublin Bikes Stand is located on Parkgate Street and in proximity to the northern boundary of the site. A substation is located adjacent to the northern boundary at the eastern tip of the site. There is a small cluster of trees located at the eastern boundary of the site which are separated from the footpath by railings.

The site is located in a built up urban environment. West of the site is an apartment complex, Parkgate Complex, and commercial office buildings at Parkgate Place, presently occupied by Transport Infrastructure Ireland (TII). Parkgate street is lined with two and three storey buildings used for retail and potentially some residential apartments over the ground floor retail units.

Significant landmarks in proximity to the site include the Criminal Courts and Phoenix Park, located approximately 200m north-east of the north-western tip of the site. East of the site is Collins Barracks. Heuston Station opposite the southern boundary site, on the southern bank of the River Liffey.

4.2 Regional Geology and Hydrogeology

4.2.1 Geology

According to the GSI database, the site is underlain with the Lucan Formation, dark limestone and shale. Due to proximity of the site to the River Liffey, there is a strong likelihood of glacial and alluvial gravels also being present. Refer to **Figure ?** in **Appendix E**.

4.2.2 Soils and Subsoils

According to the EPA soil map, the soils and subsoils in the vicinity of the site are described as made ground. Tills derived from limestone are also shown to be in the vicinity as well as an Alluvium channel to the northwest of the site as indicated by the EPA Soil and sub-soils databases respectively. Refer to **Figures 10** and **11** in **Appendix E**.

The GSI GeoUrban Depth to Bedrock database indicates that the bedrock is overlain by 5-10m of tills and/or alluvium as well as made ground. Refer to **Figure 17** in **Appendix E**.

4.2.3 Hydrogeology

The GSI Groundwater Data viewer shows that the site is located on a Locally Important (LI) aquifer that is moderately productive in local zones. Under the Water Framework Directive (WFD), groundwater bodies (GWB) have been identified for each river basin district. The WFD classification has four aquifer types: karst, productive fissured, poorly productive and sand and gravel. The site is classified as being located on a poorly productive aquifer. Refer to **Figure 12** in **Appendix E**.

4.2.3.1 Groundwater Recharge

Recharge is the amount of rainfall that replenishes the aquifer. It is a function of the effective rainfall, the permeability and thickness of the subsoil and the aquifer characteristics.

According to the GSI groundwater recharge database, the recharge to the area is 68mm/yr which accounts for approximately 20% of the effective annual rainfall (341mm/yr) over the area. The maximum recharge capacity for the area is 200mm/yr. Refer to **Figure 13** in **Appendix E**.

4.2.3.2 Aquifer Vulnerability

Aquifer vulnerability is a relative measure of the susceptibility of groundwater in the bedrock aquifer to contamination by human activities. This depends on the aquifer's intrinsic geological and hydrogeological characteristics.

The vulnerability is determined by the permeability of any overlying deposits. For example, bedrock with a thick, low permeability, clay-rich overburden is less vulnerable than bedrock with a thin, high permeability, gravelly overburden.

According to the GSI database, the groundwater vulnerability under the site is low in the northern side of the site to moderate vulnerability in the southern half of the site. Refer to **Figure 14** in **Appendix E**.

4.2.4 Sensitive Features – Groundwater Dependent Habitats

Groundwater dependent ecosystems are defined as habitats or species that are dependent on groundwater to maintain the environmental supporting conditions required to sustain that habitat and/or species.

The National Parks and Wildlife Service (NPWS) database was consulted to establish whether there are areas with national or international important ecological sites in proximity to the study site. Under the Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC), Member States are required to establish a Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites includes Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

There are no European sites, within 1km of the site. The closest European ecological site is the South Dublin Bay and River Tolka Estuary SPA (site No. 004024) and the South Dublin Bay SAC (site No. 000210) which are approximately 7km downstream of the site, in Dublin Bay. Refer to **Figure 15** in **Appendix E**.

In Ireland, areas considered nationally important for the habitats present or holds species of plants and animals who habitat needs protection, are granted protection under the Wildlife (Amendment Act) 2000. Such areas may be designated Natural Heritage Areas (NHAs) or proposed NHAs (pNHAs). Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation. There are no NHAs or pNHAs within 1km of the site. The nearest downstream NHA or pNHA is the South Dublin Bay pNHA (site code 000210) which includes lands that are part of the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA.

4.2.5 Sensitive Features – Groundwater Abstractions

Based on the GSI database there is one well listed within 1km of the centre of the site. The exact location is unclear as the well location in the GSI database is only accurate to 500m however North Brunswick Street is recorded as the address, which is approximately 750m north east from the site boundary. This well is reported as having a 'good' yield of 393m^3/day and understood to be drilled for industrial use. The source of water is from bedrock which is reported to be 2.5mbgl. Refer to **Figure 16** in **Appendix E**.

The site is not located over or in the vicinity of a groundwater supply protection area or National Federation of Group Water Schemes source protection zones.

4.3 Site Geology and Hydrogeology

Site specific geological information is summarised from the report by Arup Consulting Engineers (2003) which contains the result of the geotechnical and environmental assessment.

4.3.1 Soils and Geology

Records show that between 2-5 metres of fill (man-made deposits) was placed on the original ground around the flood plain to raise ground levels to present day elevations (Arup, 2003).

A summary of the stratigraphy of the ground conditions is presented in **Table 6**. It should be noted that all geotechnical site investigation took place in the yard to the western end of the site. The presence of the main building prevented further geotechnical investigation in the remainder of the site.

Table 6: Ground Stratigraphy Summary for No.43 Parkgate House. Source: Arup Consulting Engineers (2003)

Stratum	Thickness (m)	Max. depth to top of stratum (mOD Malin) (approximate)
MADE GROUND consisting of clayey sandy gravel with bricks, cobbles and ash.	2.0 – 4.0	Ground level (3.3 – 4.8mOD)
* Sandy CLAY – soft to firm / stiff sandy CLAY	* 0.5 – 2.0	* 0.8mOD
* SILT – soft grey SILT	1.0 – 4.0	*1.0mOD
GRAVEL – medium dense sandy fine to coarse	1.0 – 4.0	-0.16mOD
* SILT - soft grey SILT	*0.3	*-2.4mOD
GRAVEL – medium dense sandy fine to coarse sub rounded GRAVEL	*0.7	*-2.7mOD
LIMESTONE – strong to locally moderately strong thickly to locally thinly bedded, grey to dark grey fine-grained LIMESTONE fresh to locally moderately weathered.	4.5m +	-3.43mOD

* The above sequence represents the general order of occurrence of the strata below ground surface; however, one or more of the units may be absent at specific locations/

As discussed in **Section 3.2**, the site levels are known to have been raised 2-5m from the original ground level, using fill in the 1800s. This was reflected in the ground conditions; the fill (made ground) was shown to be of varying thickness across the area of the site investigated. The made ground comprised of bricks, cobbles and ash in a clayey sandy gravel matrix.

According to the Dublin Depth to Bedrock mapping (GSI), bedrock is approximately 5-10mbgl and 10-15mbgl for the southern section of the site, refer to **Figure** ? in **Appendix E**.

Gravels were noted as being encountered across the site. The SI (Arup, 2003) confirmed the presence of the limestone bedrock underlying the site as per the GSI database, refer to **Appendix A**.

These gravels may be associated with a meltwater channel that flowed from north-west to south-east to the River Liffey, potentially flowing through the site towards the river channel as shown from the EPA soil mapping. Refer to Figures 10 and 11 which show the alluvium channel to the north-west of the site.

4.3.2 Hydrogeology

Based on the logs from the 2003 GI by IGSL (**Appendix A**), there are likely to be two main aquifers in the area around the study site; the limestone bedrock and overlying gravel stratum.

The limestone bedrock was noted as being highly fractured in nature, which will have effect of causing a localised increase in permeability and storage capacity.

Three in-situ variable head permeability tests were performed in the gravel strata on each of the 3 No. boreholes (BH1, BH5, BH7) tested on three dates (17, 27 & 30 March 2003) by IGSL with the water escaping so quickly that measurements could not be made. This suggests the material to have a permeability in of approximately 10^{-4} m/s.

The groundwater gradient in the upper gravel aquifer at low tide is believed to be south to southeast, towards the River Liffey.

Three rounds of ground gas and groundwater level monitoring was carried out over almost three weeks (18 days) on site during the 2003 GI by IGSL. No tidal information was presented. Borehole logs recorded water strikes at depths of between 4.0 and 4.5mbgl approximately and standing water levels of between about 2.4 and 3.7mbgl with no tidal information presented.

Boreholes carried out by Site Investigations Limited in November 1973 (GSI Report No. 760), on the adjoining land, west of the site, revealed water strikes at depths of between 4.3mbgl and 4.6mbgl approximately and standing water levels of between about 4.3mbgl and 4.9mbgl with no tidal information presented. Water levels may fluctuate on a seasonal basis and may be found at depths deeper or shallower, depending on rainfall and surrounding hydrogeological conditions. Refer to **Figure 20** in **Appendix E** for the borehole locations.

4.3.3 Hydrology and Water Quality

The local water body is the River Liffey, which forms the southern boundary of the site and discharges into the sea approximately 7km downstream to the east. The site is adjacent to a section of the river referred to as the Liffey Estuary Upper as a transitional water body.

The Water Framework Directive (2000/60/EC) requires that all member states achieve good water status in all waters (rivers, lakes, groundwater, estuarine and coastal waters). The overall water quality status for the River Liffey Estuary Upper is classed as ‘moderate’ for the most recently reported monitoring period (2010-2015) under the WFD monitoring programme. The Directive runs in six-year cycles and the second cycle therefore runs from 2016-2021.

4.4 Other Sensitive Features

4.4.1 Licensed Industrial Sites

Diageo Ireland (St. James Gate) (Licence No. P0301-04) at Victoria Quay is the nearest licensed industrial site, approximately 130m south-east of the site. Refer to **Figure 18** in **Appendix E**.

4.4.2 Licensed Waste Facilities

There are no licensed waste facilities is proximity to the site. The nearest waste facility is Sita Environmental Ltd (Licence No. W0035-01) on Sheriff Street Upper, Dublin 1, approximately 3.7km east of the site. Refer to **Figure 18** in **Appendix E.**

4.4.3 Geological Heritage Sites

There are no geological heritage sites (GHS) within the site boundary. The nearest GHS is the Phoenix Park (Code DC009) which is listed as a County Geological Site and recommended for Geological Natural Heritage Area. Refer to **Figure 19** in **Appendix E**.

5 Previous Sampling, Monitoring and Assessment

This section reviews the environmental testing carried out on site as well as materials and substances noted during site walkovers to be stored and used on the site that may contain chemicals of potential concern.

5.1.1 Site Investigations Ltd. (1973) Site Investigation

The GSI online databases, Goldmine and the Geotechnical Data Viewer were checked for historical site investigations within or in proximity to the site. A site investigation (SI) was carried out in November 1973 by Site Investigations Ltd. for Joseph McCullough & Associates at Parkgate Street (GSI Report No. 760). The investigation consisted of 3 No. shell and auger boreholes (BHs 1 to 3) and was undertaken in November 1973. The boreholes were located to the west and northwest of the existing building near the site boundary. The logs reveal the subsurface to consist of 2.4 to 6.1m of FILL overlying natural ground. The underlying soil was found to be quite variable, with layers of silt, sand, gravel and clay (with shells and organics) all encountered. Refer to **Appendix C** and **Figure 20** in **Appendix E**.

5.1.2 Caltex Site Investigation – Report ID 256

The GSI online databases, Goldmine and the Geotechnical Data Viewer showed that 3 No. boreholes were dug adjacent to the site (GSI Report No. 256). The boreholes were dug on the lands to the west of the site. The company name is recorded as Caltex which may be related to the Maxol garage that was located approximately where these boreholes were dug, refer to Figures **8** (location of the former Maxol garage) and **20** (borehole locations) in **Appendix E**.

The records do not show who the carried out the drilling or the technique used, maximum depths recorded were recorded as being between 2.74 to 7.01mbgl.

5.1.3 Arup Consulting Engineers (2003) Geotechnical and Environmental Assessment Report

Arup Consulting Engineers (now Arup), prepared a geotechnical and environmental assessment report in 2003 for No. 43 Parkgate Street.

The ground investigation works were carried out by IGSL Limited (IGSL) in December 2002 under the direction of representatives from Arup Consulting Engineers, Dublin (Arup). The GI consisted of 8 No. shell and auger boreholes (No. 1 to 7, and 8B) and 16 No. window samples (No. 1 to 8, 9B and 10 to 16). Refer to **Appendix A**.

During the GI works, environmental soil sampling was carried out. Analyses were carried out for the purposes soil disposal. However, these tests were carried out before Waste Acceptance Criteria set out in the Council Decision (2003/33/EC) of the Landfill Directive was finalised. The Council Decision (2003/33/EC) specifies a sample preparation of leachates as according to the CEN method. The method used during the 2002 SI was that of the NRA method. While the correct sample preparation was not carried out for waste characterisation, the results serve to indicate the potential chemicals of concern on site.

The following organic contaminants were observed to be present in the soils:

- Mineral Oil – Associated with diesel, turpentine, and fuel oil;
- Polycyclic Aromatic Hydrocarbons (PAHs) – Formed through the incomplete combustion of fossil fuels, typically found in ash and clinker. Also, a component of petrol.

Furthermore, the following heavy metals were detected within the soils associated with the lead works and potentially the print works. The following metals were noted to be present in the made ground:

- Arsenic;
- Chromium;
- Copper;
- Lead; and
- Zinc.

Concentrations of these metals were found to exceed the Dutch Intervention Values (DIV). The DIV values were used in Holland as Generic Assessment Criteria for sites and represented concentrations above which there would be an unacceptable risk to human health and the environment, assuming a final use of residential and including for potential plant uptake. DIV exceedances of arsenic and chromium were isolated to one sample respectively. Elevations of copper was noted in 3 No. samples which exceeded the DIV threshold (190mg/kg Cu) while 6 No. samples contained concentrations of lead that exceeded the DIV threshold (530mg/kg Pb). These exceedances were located within the top 2-3m (0-3mbgl) across the site, refer to **Table 7** below.

Table 7: Samples Exceeding the Dutch Intervention Values for Soil

Metals	DIV (soil) mg/kg	No. of DIV exceedances for Soil
Arsenic	76	WS12 0.5mbgl-1.0mbgl, 126.0mg/kg
Chromium III/VI	180/78	WS15 0.5-1.0mbgl, 848mg/kg (Total Cr)
Copper	190	WS4 1.5-2.0mbgl, 191mg/kg WS11 0.5-1.0mbgl, 403mg/kg WS15 0.5-1.0mbgl, 299mg/kg
Lead	530 mg/kg	WS2 0.5-1.0mbgl, 946mg/kg WS3 0.5mbgl, 1031mg/kg

Metals	DIV (soil) mg/kg	No. of DIV exceedances for Soil
		WS4 1.5-2.0mbgl, 552mg/kg WS11 0.5-1.0mbgl, 625mg/kg WS12 0.5-1.0mbgl, 981mg/kg WS15 0.5mbgl-1.0mbgl, 710mg/kg

One groundwater sample was taken from a borehole adjacent to the River Liffey quay wall in south-western corner of the site (BH1 at 3.5mbgl). The water sample was analysed using gas chromatography and showed to contain hydrocarbons (188.3mg/l) for petrol rage organics (>C_{10}). The laboratory analysis identified the hydrocarbons as 'possible gasoline residues'.

As mentioned in **Section 4.3.2**, three rounds of ground gas and water level monitoring was carried out in 2003 (25 February and 3 & 15 March 2003).

Carbon dioxide was detected at a number of locations (maximum concentration of 2.3% CO_2) and methane was detected at one location only (WS5 3.3-3.9% CH_4) over the three rounds of monitoring. The previous report assessed the concentrations against CIRIA 149, however methodology this is now obsolete.

The water level monitoring results are discussed in **Section 4.3.2**.

5.1.4 Arup Consulting Engineers (2006) Geotechnical and Environmental Assessment

In March 2006, at the request of Hickey Fabrics & Co. Ltd., Arup Consulting Engineers completed a Geotechnical and Environmental Assessment of the Hickey & Co. Ltd. Fabrics Wholesale, located at No. 43 Parkgate House, Parkgate Street, Dublin 8.

The principal aims of the site assessment were to:

a) Evaluate the environmental and geotechnical setting of the site including local geology and hydrogeology;

b) Investigate the ground conditions of the site including an assessment for subsurface contamination;

c) Provide information from which likely contaminant pathway-receptor relationships can be identified;

d) Evaluate environmental and geotechnical options relating to the site development in accordance with relevant legislation;

e) Assess the geotechnical conditions across the site and provide recommendations for foundations, excavations, gas control measures, dewatering and further investigative work.

The following items were noted:

Two underground storage tanks were noted to be in use on the site in 2006 (as discussed in **Section 3.1.1**). These were used for the storage of petrol for delivery vehicles which were refuelled on site from pumps located in the garage. A further third storage tank was noted to be potentially on site. The location of this tank was unknown and was noted to represent a potential source of ground contamination beneath the site.

The report noted four AST on site. Three were used for the storage of heating oil and the fourth tank was noted to be out of use. There was evidence of a fifth tank (likely AST No. 3, refer to Figure 7) with the concrete pedestals still in place. This assessment also highlighted the likely presence of asbestos sheeting in the roof tiles of the garage building.

The old generator room was also described. This was used at that time as a maintenance shop. The room previously housed two generators. There was no evidence of major contamination present in this area.

The two boiler houses were also inspected. One was noted to contain an AST 1.5m above the floor level of the building (boiler house No.2 and AST No.4, refer to **Figure 7**). This AST was used for the temporary storage of oil for the generators. Evidence of spills and hydrocarbon contamination was noted with staining observed on some of the walls. Refer to **Photograph 11** in **Appendix C**.

There was also a comment about “fibrous lagging material that was possibly asbestos containing” covering some of the pipework.

5.2 Results of Previous Site Sampling, Monitoring and Assessment

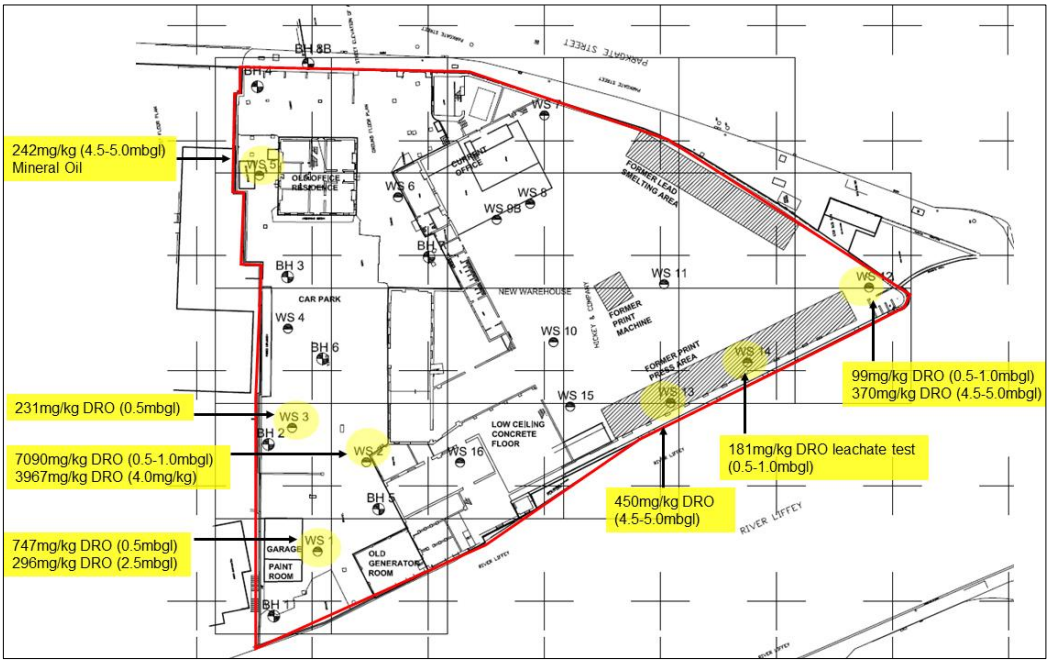
A review of the results of the environmental soil and water testing from the 2003 Arup report was carried out and is summarised below. The results of the testing are largely in line with the potential contaminants identified in Section 3.6 on review of the site activities.

5.2.1 Hydrocarbons

A review of the environmental soil testing results showed hydrocarbons present in the made ground and natural material in the south-western and southern areas of the site, particularly adjacent to the boiler house No. 2 (WS2), refer to **Figure 21** below. Hydrocarbons in these areas may be attributed to the storage of fuel and boilers.

Hydrocarbons were detected at a number of locations along the western site boundary. This may be associated with the ASTs and USTs that historically stored gas, oil and fuels on the site. The north-western section of the boundary is adjacent to the former Maxol station site where a historic spill was reported to have occurred (as discussed in **Section 3.2.1**), refer to **Figure 21** below.

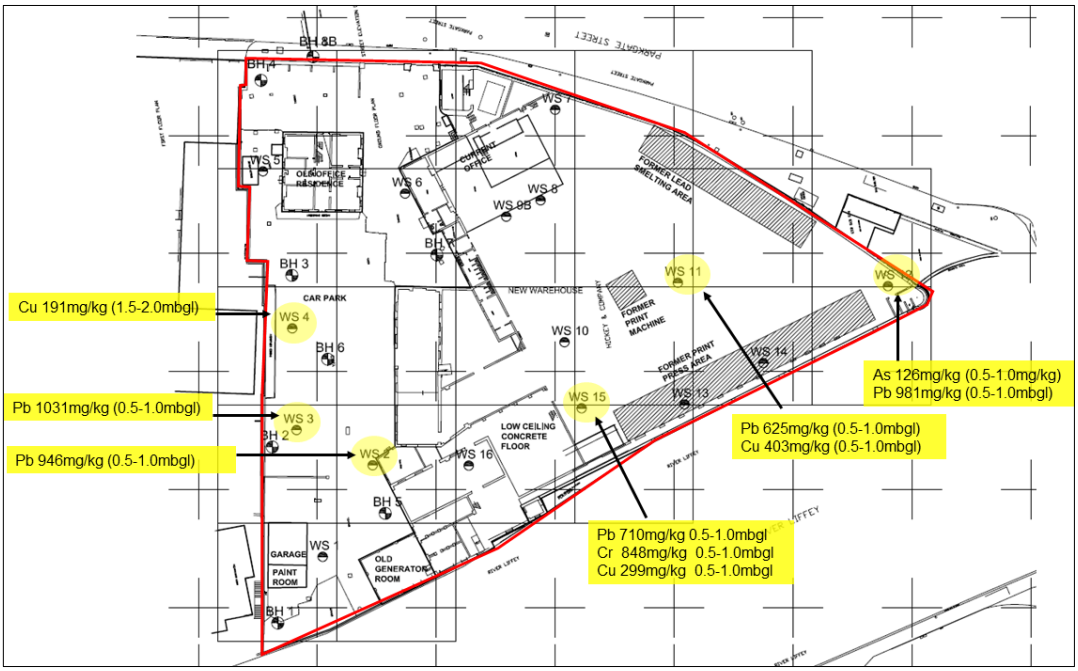
Figure 21: Hydrocarbon concentrations from the GI (IGSL, 2002)



5.2.2 Heavy Metals

A review of the environmental soil testing results showed lead cadmium, arsenic and copper in soil samples across the southern half of the site that exceeded the DIV, as discussed in **Section 5.1.3**. Refer to **Figure 22** below.

Figure 22: Metal concentrations from the GI (IGSL, 2002)



5.2.3 Polycyclic Aromatic Hydrocarbons

A review of the environmental soil testing results showed polycyclic aromatic hydrocarbon (PAH) compounds were detected in in the made ground across the site. The laboratory results reported the results for the sum of 19 PAH compounds and concentrations ranged from 0.13mg/kg to 18.9mg/kg. Refer to **Appendix A**.

5.2.4 Asbestos

An asbestos survey was carried out on the site in by Phoenix Environmental Safety Ltd. The site was surveyed over three days January (24th) and March (23rd & 28th) 2019, refer to **Appendix F**.

A number of asbestos containing materials (ACM) were found in the new warehouse, old storage area and the former residence/office. Examples of ACM identified on site included cement replacement tiles in the roof, rope seals, thermal insultation on pipe work (boiler house and sprinkler room), floor tiles and bitumen adhesives (main factory floor), toilet cisterns, cement pipes and cement board. Refer to the survey report in **Appendix F** for further detail.

6 Summary, Conclusions and Recommendations

6.1 Summary and Conclusions

A desk-based study and site visits were undertaken to investigate potential contamination at the Hickey site, No. 43 Parkgate Street, Dublin 8. Information gathered during this exercise showed a number of features with potential for causing contamination on site. Previous site activities such as the unknown source infill material and industrial activities such as the iron works, wool worsted, munitions factory and printing works have potential to have impacted upon soil and groundwater beneath the site. The site walkovers identified a number of features of the current site layout that may also impact the local environment.

A previous ground investigation in 2002 and desk based geo-environmental assessment in 2006 were carried out under the direction of Arup. The results of the 2002 ground investigation provide an indication of areas of the site which have been affected by the industrial history of the site and neighbouring sites. This largely reflects those areas of potential contamination identified during the desk study. A review of the information and data available highlights gaps where we have insufficient information to carry out a robust assessment.

The groundwater regime on site is unknown as well as the interaction between the River Liffey estuary and groundwater. The desk study and site walkovers have identified a number of potential sources of groundwater contamination but there is insufficient information to provide a level of certainty in relation to potential environmental risk.

6.2 Preliminary Conceptual Site Model

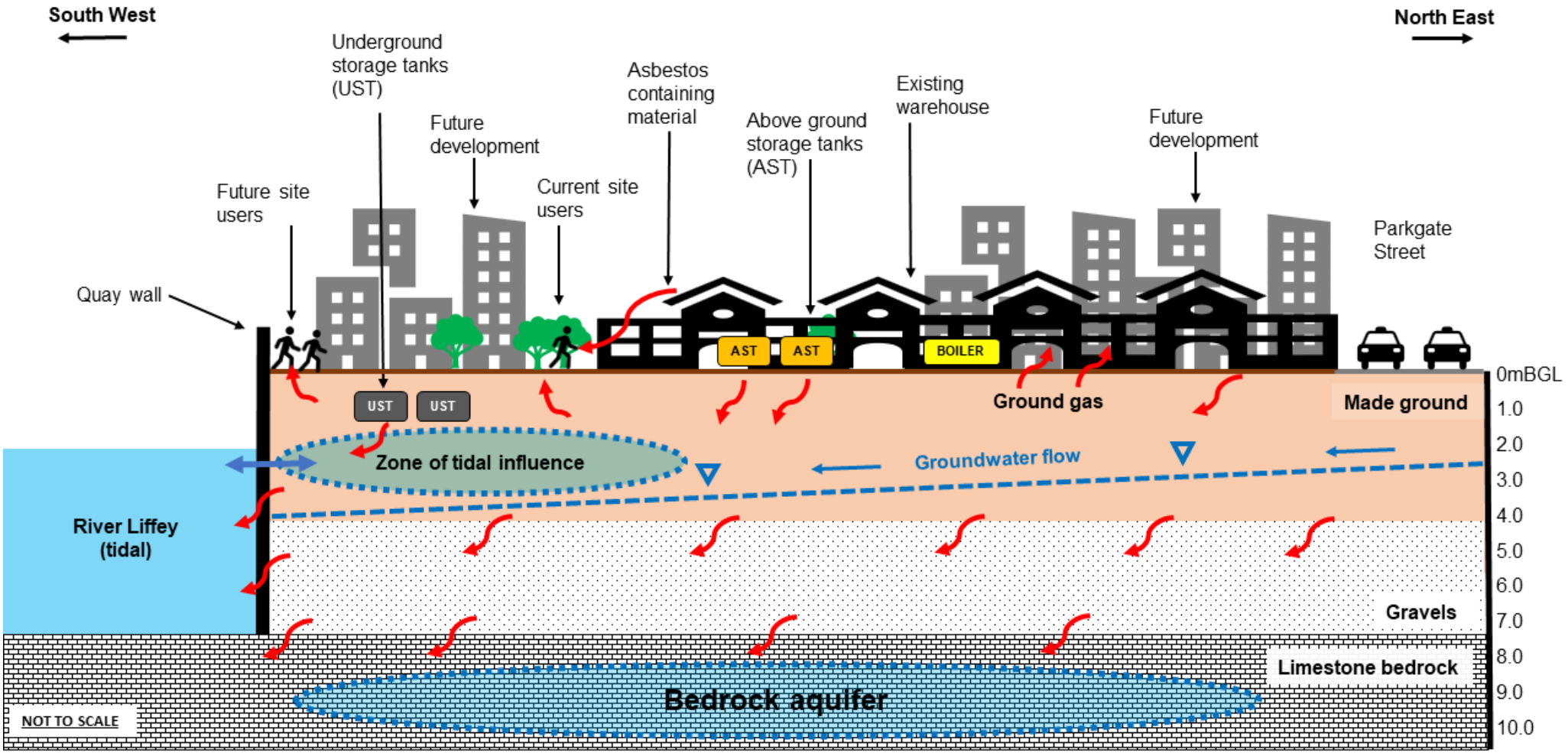
Based on a review of previous site reports and the desk study, a preliminary CSM has been prepared that highlights the key receptors, pathways and potential source(s) of contamination. Based on the EPA guidance[6] (2013), where a complete source-pathway-receptor scenario exists there is a potential pollutant linkage and a potential risk to the specific receptor can be identified.

The CSM is presented in **Figure 23** below. The CSM shows a diagram of a cross-section of the site, south-west to north-east between the River Liffey and Parkgate Street. The CSM considers the future development on site which is likely to be mixed-use with commercial or retail on the ground floor and residential or commercial on upper floors. It is assumed that there will be limited green space within the future development that will be used by site users and residents.

Section 6.2.1 to **6.2.3** outlines the potential sources, pathways and receptors on site as illustrated in Figure 23, the preliminary CSM.

[6] EPA (2013) Management of Contaminated Land & Groundwater at EPA Licensed Sites (http://www.epa.ie/pubs/advice/waste/contaminatedland/contaminatedland/)

Figure 23: Preliminary Conceptual Site Model for No. 43 Parkgate Street, Dublin 8 | Not to scale



6.2.1 Potential Sources of Contamination

The following potential sources of contamination were identified:

- Made-ground of unknown origin;
- Above ground storage tanks;
- Underground storage tanks;
- Historical contamination from former Maxol station (adjoining the site);
- Asbestos containing materials in the soil.

6.2.2 Potential Pathways

The following potential pathways were identified:

- Direct exposure of contamination in the made ground (ingestion, inhalation and dermal contact);
- Percolation of recharge through the unsaturated made ground to the groundwater in the made ground;
- Percolation of liquid contaminants through the made ground to the gravel layer;
- Percolation of liquid contaminants through the made ground and gravel layer to the underlying bedrock;
- Groundwater flow through the made ground and quay wall;
- Groundwater flow through the gravel layer and the quay wall; and
- Movement of ground gas through the unsaturated made ground.

6.2.3 Potential Receptors

The principal receptors highlighted in the PSA are:

- Demolition and construction workers;
- Site users (current and future including employees, residents, etc.);
- Groundwater in the made ground;
- Groundwater in the gravel layer;
- River Liffey;
- Irish Sea.

6.2.4 Pollutant Linkages

The Sources, Pathways and Receptors (SPRs) identified above have been identified during the desk study, previous GI results and information gathered during the site walkovers. The results of the ground investigation will validate the potential sources of contamination identified in **Section 6.2.1**.

As discussed in **Section 6.2**, where a complete Source-Pathway-Receptor linkage exists there is a potential risk to the specific receptor identified in the linkage. Considering the CSM outlined above and presented in **Figure 8**, Table 8 presents the SPR linkages identified for the current site use and proposed development of the site.

Table 8: Identified Pollutant Linkages for the No. 43 Parkgate Street, Dublin 8

Source	Pathway	Receptor
Made ground Above ground storage tanks Underground storage tanks Historical contamination from neighbouring sites i.e. former Maxol station.	Direct contact (ingestion, inhalation and dermal contact).	Demolition and construction workers, Irish Water site operators and current site users.
	Migration of ground gas though the permeable unsaturated zone.	Current buildings, demolition and construction workers and the proposed development.
	Percolation of recharge through the unsaturated made ground.	Groundwater in the made ground.
	Percolation of dissolved phase or liquid contaminants through the made ground.	Groundwater in the gravel layer.
	Percolation of dissolved phase or liquid contaminants through the made ground and gravel layer.	Bedrock aquifer (Lucan Formation, dark limestone and shale).
	Groundwater flow in the made ground through the quay wall.	River Liffey estuary and Irish Sea.
	Groundwater flow in the gravel layer through the quay wall.	River Liffey estuary and Irish Sea.
Asbestos containing materials in the existing building	Direct contact (ingestion, inhalation and dermal contact).	Current site users, demolition and construction workers and future site users.

6.3 Recommended Way Forward

An investigation is proposed to inform a detailed land contamination assessment and confirm the findings of the previous site investigation. The investigation will assess the extent of contamination identified in previous site investigations in the soil and groundwater. In summary the investigation comprises:

- 18 No. window samples to depths of up to 4mBGL
- 5 No. cable percussion boreholes to depths of up to 8mBGL
- 5 No. rotary follow-on to cable percussion holes to 15mBGL
- 7 No. groundwater monitoring installations.
- 3 No. gas monitoring installations.

- Geotechnical, geochemical and environmental sampling and laboratory testing.

A copy of the specification for site investigation is presented in **Appendix D**. A figure showing the indicative locations is presented in Drawing 002 in **Appendix D**. The proposed site investigation programme may be altered during the site investigation as the extent of the potential areas of contamination is established. A summary of the ground investigation locations and the proposed objectives is presented in **Table 9** below.

Table 9: Summary of the proposed ground investigation locations and objectives

Works	Location and Objective	Historic Contamination
18 No. window samples to depths of up to 4mbgl	Locations – across the site. Objective: Environmental testing of made ground and natural material to 4mbgl for potential contamination associated with historic site activities (iron works, wool worsted, printing works, munitions), features on site (AST's and UST's) and reported past incidents (spill at former Maxol station) as identified in the previous SI (2002) and during the desk study.	Hydrocarbons (DRO/Min. Oil, BTEX and PAHs) Metals Potential physical hazards (asbestos) have been identified in the buildings on site.
5 No. cable percussion boreholes and follow on rotary coring to 15mbgl	Locations – across the site but not within the warehouse building (inaccessible to rig). Objective: Environmental testing of made ground and natural material to 8mbgl for potential contamination associated with historic site activities (iron works, wool worsted, printing works, munitions), features on site (AST's and UST's) and reported past incidents (spill at former Maxol station) as identified in the previous SI (2002) and during the desk study.	Hydrocarbons (DRO/Min. Oil, BTEX and PAHs) Metals Potential physical hazards (asbestos) have been identified in the buildings on site.
Environmental testing of groundwater samples	Location – Boreholes across the site. Objective: Assess groundwater contamination in the gravel response zone and the tidal influence on the groundwater within the site.	Hydrocarbons (DRO/Min. Oil, BTEX and PAHs) Dissolved metals
4 No. rounds of groundwater monitoring	Location: In all 5 No. boreholes. Objective: Assess the up and down gradient groundwater and tidal influence of the River Liffey estuary on the groundwater.	N/A
4 No. rounds of gas monitoring	Location: In 3 No. boreholes. Objective: Assess ground gas generation on site from underlying the made ground.	Landfill gas (methane and carbon dioxide) from made ground.

Consistent with the 2013 EPA guidance, the information from the site investigation will be used to refine the conceptual site model and inform a detailed site assessment (DSA). This will consider the impact of the elevated concentration on nearby receptors and establish if any remediation is necessary for the purpose of the proposed development.

Should any contamination be proven it may be necessary to carry out a quantitative risk assessment (QRA) to establish the impacts of the development or need for remediation.

7 References

Arup Consulting Engineers (2003) Site Investigation Report, Parkgate Street Development for Hickeys Fabrics & Co. Ltd.

Arup Consulting Engineers (2006) Geotechnical and Environmental Assessment Report for Hickeys Fabrics & Co. Ltd.

Dublin City Development Plan 2016-2022 (2016) Dublin City Council.

EPA (2007) Code of Practice, Environmental Risk Assessments for Unregulated Waste Disposal Sites. Available at: https://www.epa.ie/pubs/advice/waste/waste/EPA_CoP_waste_disposal_sites.pdf

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Appendix A

Site Investigation Report, Arup (2003)

A1 Site Investigation Report, Arup (2003)

Appendix B

Geo-environmental and Geotechnical Assessment, Arup (2006)

B1 Geo-environmental and Geotechnical Assessment, Arup (2006)

Appendix C

Site Photographs

C1 Site Photographs

Photograph 2: Site entrance, Parkgate Street, looking north-east

Photograph 3: Warehouses, looking south-east to the River Liffey

Photograph 4: (Panoramic aspect) Quay wall and southern site boundary on the River Liffey, looking north-west

Photograph 5: Above ground storage tank (No.1) at the western boundary, looking west

Photograph 6: Above ground storage tank (No.2) at the western boundary, looking north

Photograph 7: Former location of former location of an above ground storage tank (No. 3) adjacent to the former office/residence. Photo taken by Arup in August 2002. Area no longer accessible

Photograph 8: Garage/paint room in south-western corner of the site, looking west

Photograph 9: Disused pump at the garage/paint room

Photograph 10: Sub-station (protected structure) on Parkgate Street, looking north-east

Photograph 11: Boiler house No. 2 (Photography taken in 2002)

Photograph 12: Boiler house No. 2 (Photography taken in May 2019)

Photograph 13: Access point for underground storage tank adjacent to the old generator room

Photograph 14: Old generator room (right) adjacent to the quay wall looking east

Photograph 15: Above ground storage tank (No. 5) located in the south-eastern tip of the new warehouse

Appendix D

Ground Investigation Specification 2019

D1 Ground Investigation Specification 2019

Chartered Land

43, Parkgate Street – Phase 1 GI

Specification and Bill of Quantities for Ground Investigation

GSP-001_265381

Issue 2 | 1 February 2019

Job number 265381

Ove Arup & Partners Ireland Ltd

Arup
50 Ringsend Road
Dublin 4
Ireland
www.arup.com

ARUP

Document Verification

ARUP

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Document title		Specification and Bill of Quantities for Ground Investigation			**File reference**
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		Signature			
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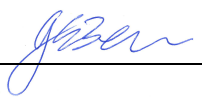
		Name	Emer O'Connor	Jaime Bevin	Jaime Bevin
		Signature			
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			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

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Figure 1: Site location
Figure 2: Site plan showing positions of exploratory holes.

Appendices

Appendix A

Rates for Geotechnical and Other Personnel

Appendix B

Health and Safety Risk Assessments

Short Description of the Investigation

The ground investigation works are required as part of the design for a proposed new mixed-use development on the site of Hickeys at Parkgate House, Dublin 8.

Existing buildings are still present on site and will be in place for the duration of the site investigation. A portion of the work will be undertaken within the existing building.

The Ground Investigation (GI) shall comprise of 18 no. window sample holes to a depth of 4m below ground level (BGL) or practical refusal, and six cable percussive boreholes with rotary core follow on. The cable percussive boreholes are located around the perimeter of the building and aim to recover samples of the overburden and specifically the gravels anticipated at the site as well as to prove rockhead levels. Two slit trenches are proposed to map services in the footpath to the north of the building.

The investigation also includes *in situ* testing, sampling, groundwater and gas installations, groundwater and ground gas monitoring, laboratory testing (including contamination/waste classification testing) and final factual reporting including electronic data (AGS).

Works will need to take place both internally and externally around the existing building. As such there are access, egress and headroom restrictions.

Accordingly, it is a requirement of the tender that the Contractor views the site before submission of their tender to walk the site and assess access, egress and headroom restrictions.

The Specification shall be Specification and Related Documents for Ground Investigation in Ireland published by Engineers Ireland First Edition (2006), with information, amendments and additions as described in the Schedules. Where there is conflict between the information given in the schedules and the Specification or standards referred to in the Specification, the requirements of the Schedule shall take precedence.

The works shall be carried out in accordance with the relevant Eurocodes, where applicable, that are current on the date of invitation to tender.

Form of Tender

(NOTE: The Appendix forms part of the Tender)

SHORT DESCRIPTION OF INVESTIGATION

The Investigation in connection with the project at 43 Parkgate St, Dublin 8.

FORM OF TENDER

(Note: The Appendix Forms Part of the Form of Tender)

To: (Note: Tenders to be returned by email to:

Jaime Bevin

jaime.bevin@arup.com

To whom it may concern,

Having examined the Drawings, Conditions of Contract, Specification and Bill of Quantities for the execution of the above-mentioned Works (and the matters set out in the Appendix hereto) we offer to construct and complete the whole of the said Works in conformity with the said Drawings, Conditions of Contract, Specification and Bill of Quantities for the sum as may be ascertained in accordance with the said Conditions of Contract.

We undertake to complete and deliver the whole of the Site Operations comprised in the Contract within the times stated in the Appendix hereto.

If our tender is accepted we will, if required, provide security for the proper performance of the Contract as stipulated in the Conditions of Contract and the Appendix hereto.

Unless and until a formal Agreement is prepared and executed this Tender together with your written acceptance thereof, shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any tender you may receive.

Yours faithfully,

Signature .....

Address .....

.....

.....

Date .....

Encl. one set of tender documents.

Form of Tender (Appendix)

(NOTE: Relevant clause numbers are shown in brackets)

Appendix - Part 1 (to be Completed Prior to the Invitation of Tenders)

1.	Name of the Employer (Sub-clause l(l)(m))	Chartered Land
	Address:	Usher House Main Street Dundrum Dublin 14
2.	Name of the Engineer (Sub-clause l(l)(n))	Ove Arup Ireland Limited (Arup)
	Address:	50 Ringsend Road Dublin 4.
3.	Defects Correction Period (Sub-clause l(l)(j))	Not required
4.	Number and type of copies of Drawings to be provided (Sub-clause 6(l)(b))	Zero
5.	Contract Agreement (Clause 9)	Not required
6.	Performance Security (Sub-clause 10(1))	Not required
	Amount of Security (if required) to be 0 % of Tender Total	
7.	Maximum excess for insurance of Works, *etc*. (Sub-clause 25(2))	
	Employers Liability	€13,000,000
	Public Liability	€6,500,000
	Contractors All Risk – To value of Contract	
8.	Works Commencement Date (if known) (Sub-clause 41(1))	To be agreed at contract award.
9.	Time for Substantial Completion (Clause 43) EITHER for the whole of the Works OR for Sections of the Works (Sub-clause l (l)(x)) b	
		9 weeks
	Section A: Fieldwork	4 weeks
	Section B: Laboratory Testing	3 weeks from end of fieldwork
	Remainder of the Works	2 weeks

10. Liquidated damages for delay (Clause 47)

	Per week
OR for Section A (as above)	€3,000
Section B (as above)	€1,500
The Remainder of the Works(as above)	€1,500

11. Vesting of materials goods or Plant not on Site (Sub-clauses 54(1) and 60(1)(c) (if required by the Employer)[d] N/A

12. Method of measurement adopted in preparation of Bills of Quantities

(Clause 57)[e]

"The method of measurement is defined in the Specification and attached Bill of Quantities".

13. Percentage of the value of goods and materials and Plant to be included in Interim Certificates (Sub-clause 60(2)(b) NA)

14. Minimum amount of Interim Certificates (Sub-clause 60(3)) N/A

15. Rate of retention ((recommended not to exceed 5%) (Sub-clause 60(5)

0% (see clause 71, particular conditions herein)

16. Limit of retention (% of Tender Total) (Sub-clause 60(5) (Recommended not to exceed 3%)

0% (**see clause 71, particular conditions herein**)

Bank whose Base Lending Rate is to be used (Sub-clause 60 7)[f] Bank of Ireland

17. Requirement for prior approval by the Employer before the Engineer can act. DETAILS TO BE GIVEN AND CLAUSE NUMBER STATED (Sub-clause 2(l)(b)[r].

a) If not stated is to be completed by Contractor in Part 2 of the Appendix.
b) To be complete if required, with brief description. Where Sectional completion applies the item for "the Remainder of the Works" must be used to cover the balance of the Works if the Sections described do not in total comprise the whole of the Works.
c) Delete where not required
d) (If used) Materials goods or Plant to which the Clauses apply must be listed in Part 1 (Employer's option) or Part 2 (Contractor's option).

e) Insert here any amendment or modification adopted if different from that stated in Clause 57.

f) If there is any requirement that the Engineer has to obtain prior approval from the Employer before he can act full particulars of such requirements must be set out above.

Appendix - Part 2 (to be Completed by Contractor)

1. Time for Substantial Completion (Clause 43) (if not completed in Part I of the Appendix)

   ~~EITHER for the whole of the Works ..... weeks~~

   ~~OR for Sections of the Works (Sub-clause 1(l)(x) (as detailed in Part 1 of the Appendix)~~

   ~~Section A .... weeks~~

   ~~Section B .... weeks~~

   ~~Section C .... weeks~~

   ~~Section D..... ..... weeks~~

   ~~The Remainder of the Works ..... weeks~~

2. Vesting of materials goods or Plant not on Site (Sub-clauses 54(1) and 60(1)(c) (at the option of the Contractor - seed in Part 1)

   NA

3. Percentage(s) for adjustment of PC sums (Sub-clauses 59(2)(c) and 59(5)(c) (with details if required).

Conditions of Contract

1. General

The Conditions of Contract referred to in the Tender shall be:

"Institution of Engineers of Ireland Conditions of Contract for Works of Civil Engineering Construction, Fourth Edition 1995, Second Publication January 1998", modified and added to as follows:

Sub-Clause 1 (1 (dd)

Clause 1 (1) (dd) is deleted and substituted by the following:

"Works" means the Permanent Works together with the Temporary Works which include the ground investigation(s) field laboratory and office works and preparation and submission of the report(s) to the Engineer

Sub-Clause 14(1) (a)

In line 1 delete "21 days" and substitute "10 days".

Sub-Clause 15(1)

In lines 2 and 7 delete "construction" and substitute "execution".

Sub-Clause 21(1)

In line 3 after "Works" add "samples test results information and records obtained".

Sub-Clause 42(2)(a)

In line 4 delete "construction" and substitute "execution".

Sub-Clause 42(2)(b)

In line 3 delete "construction" and substitute "execution".

Clause 57

Clause 57 is deleted and substituted by the following:

"The method of measurement is defined in the Specifications and attached Bill of Quantities".

2. Particular Conditions

Clause 71

No more than 80% of each payment certificate shall be paid until the final factual report and final AGS data has been submitted to and agreed by the Engineer.

1 Specification

The Specification shall be Specification and Related Documents for Ground Investigation in Ireland published by Engineers Ireland (2006), with information, amendments and additions as described in the Schedules.

Schedule 1. Information

Schedule 2. Exploratory holes

Schedule 3. Engineer's facilities

Schedule 4. Specification amendments

Schedule 5. Specification Additions.

2 Schedules

2.1 Schedule 1: Information

2.1.1 Name of Contract

The Contract is to be called Hickeys, Parkgate Street.

The Client's name and address are:

Chartered Land
Usher House
Main Street
Dundrum
Dublin 14

The site occupiers name and address are:

Hickey and Co. Ltd Chartered Land
Parkgate House
42 Parkgate Street
Dublin 8

Access to the site should be arranged through the following contact:

Jamie Bevin,

jamie.bevin@arup.com

Phone number: +353 1 233 4455

Notification should be made to the engineer prior to gaining access to the exploratory hole locations identified in Schedule 2.

2.1.2 Description of Site

The site is located at Parkgate House, 43 Parkgate Street, Dublin 8, 313725.17E, 234393.74N in Irish Grid co-ordinates and its location is shown on Figure 1.

Based on the project-specific desk study, the ground elevation to the north of the site is approximately 4mOD while street level on Parkgate Street is approximately 6mOD.

Existing buildings are still present on site and will be in place for the duration of the site investigation.

The site lies on the original floodplain of the River Liffey. The desk study indicates that ground levels at the site would have been significantly lower in the past. Previous ground investigations at the site have shown 2.0 to 5.0m of fill was placed on original ground to raise ground levels to current elevations.

The desk study has shown the site to be a greenfield site until the early 1800's. From the early 1800s to present day the site has had different uses including iron manufacturing, worsted wool manufacturing, printing works, ESB Sub-Station and Hickeys Warehouse.

As shown on Figure 1, the site is bounded by the river Liffey to the south and the Sean Heuston Bridge crosses the Liffey to the east of the site. Parkgate Place a mixed-use office and residential development lies to the west and Parkgate Street bounds the site to the north.

2.1.3 Main Works Proposed and Purpose of this Contract

The site is proposed for a mixed-use development with buildings ranging from seven to eighteen storeys in height.

The main purpose of this ground investigation is: a Phase One investigation of the following:

- To verify the underlying stratigraphy.
- To provide preliminary geoenvironmental and geotechnical information for the site.
- To determine the presence of any contaminants in the underlying soils and groundwater.
- To obtain information and monitor the groundwater and ground gases beneath the site.
- To provide geotechnical information for the preliminary design phase of the project.

2.1.4 Scope of Investigation

Exploratory hole locations are shown on Figure 2. The ground investigation shall consist of the following:

- 18 No. window samples to depths of up to 4m below ground level (BGL) or until practical refusal is encountered within and around the existing building. There is currently 5.0m headroom clearance within the existing building and the floor slab will require coring in advance of the works.
- 5 No. cable percussion boreholes with SPTs at 1m intervals to depths of up to 15m BGL or until practical refusal (i.e. N>50 and protracted chiselling) is encountered.
- 5 No. rotary follow on to cable percussion holes to 15mBGL or 4.5m of intact core recovery.
- 7 No. groundwater monitoring installations.
- 3 No. gas monitoring installation.
- Geotechnical, geochemical and environmental sampling and laboratory testing.

- Factual report and digital data (AGS).

2.1.5 Geology and Ground Conditions

The following assessment of the geology of the site and ground conditions has been inferred from available information. No assurance is given to its accuracy.

Table 1: Geology and Ground Conditions

Strata	**Top Level (mBGL)**	**Thickness Range (approx.) (m)**
Made Ground	Ground Level	2.5 - 4.0m
Soft clay/silt	2.0 - 3.0m	0.3 - 2.0m
Medium dense gravel	2.5-4.0m	3.0-4.0m
Dense gravel	6.3 - 7.0m	2.0-3.0m
Boulder clay	Unknown	Unknown
Limestone	Ranges between 6-10m	N/A

The River Liffey is tidally influenced at the site location. The desk study indicates that the groundwater level lies approximately 3.0 to 4.5mBGL.

2.1.6 Schedule of Drawing(s) and Documents

Figure 1 – Site location

Figure 2 - Site plan showing positions of exploratory holes.

2.1.7 Particular Contract Restrictions

The three cable percussive boreholes are located around the footprint of the existing building. BH101, BH102 and BH103 are located within the yard and carpark outside the west side of the building. BH104 and BH105 are located on the footpath and a grassed area along the north side of the building. These exploratory holes will require slit trenches in advance of the works to map out services and assess suitable locations for drilling. Road opening licenses and traffic management will be required for these locations.

The internal window samples may be made in any order. However, once an exploratory hole has commenced, it shall be completed continuously and without undue delay. It is intended that concrete coring shall be carried out in advance of the window sampling to provide free access to the locations.

The contractor shall include provision for limited headroom rigs and for the management of exhaust fumes arising from operating within a building. Adequate lengths of flexible ducting and extraction fans should be included to allow the works to proceed safely.

The current building contains shelves and pallets of fabrics, curtains, sheets etc that must be protected from the works.

A protective screen/barrier will be required around each of the internal exploratory locations to protect the warehouse fabrics and fittings from dust / dirt/slurry etc. A method statement detailing how this will be undertaken will be required in advance of any works.

It is a requirement of the tender that the Contractor views the site before submission of their tender to walk the site and assess access, egress and headroom restrictions.

Viewing the site will familiarise the Contractor with access restrictions and site constraints.

A detailed methodology for works within the building shall be outlined in the tender submission.

Exploratory hole locations are shown on Figure 2.

2.1.8 Particular General Requirements (Section 3)

Working hours

Work in the yard and car park areas may take place on site between the hours of 8.00am and 6.00pm, Monday to Friday, with the approval of the tenant. Work outside these hours may take place only with the prior agreement of the Engineer (Clause 3.8).

The concrete coring and window sampling within the warehouse will require weekend working. Item coverage for this is contained in the Bill of Quantities.

Services

Utility records will be required from known services to assist in the location of their respective existing services and utilities. The Contractor shall obtain and confirm from all such authorities, detailed records of their services and amenities in proximity to the works. The Engineer will supply the Contractor with copies of all available records (For Information Only).

The Contractor shall co-ordinate its activities with the Utility Companies (in particular with Bord Gais and ESB), or any other agency or Person whether or not specifically mentioned in the Contract, that may be working on or adjacent to the Site if such co-ordination is necessary, for the safe and proper completion of the works.

The Contractor shall not physically interfere with any existing Utility Service without the prior consent of the Utility Company.

The Consultant shall at all times comply with any special requirements of the relevant Utility Company and co-ordinate if any site attendances are required by the Utility Company.

The Contractor shall at all times keep the Utility Companies informed of its programme of works and will give reasonable notice in writing to the relevant Utility Company of any physical work the Contractor proposes to carry out at or in the vicinity of any existing Utility Service.

The Consultant shall take any and all measures reasonably required by the Utility Companies for the protection of their Utility Services during the progress of the Services, for the prevention of damage or interruption of the supply of such services.

A scan shall be undertaken prior to commencing all exploratory locations to check for the presence of unknown services using a Cable Avoidance Tools (CAT). Internal coring shall be sufficient to allow insertion of a CAT into the exploration opening.

Reinstatement

All reinstatement shall be to the requirements of Clause 3.9.

Professional attendance and other personnel

Full-time professional attendance on Site is required especially during any weekend work. The Contractor is responsible for providing his own supervision to ensure the requirements of the Specification are met (Clause 3.12).

The Contractor shall provide a Geotechnical Engineer/Engineering geologist with a minimum of 5 years geotechnical experience who shall be approved by the Engineer but this approval may be withdrawn at any time.

A Curriculum vitae shall be issued to the Engineer at least 2 weeks prior to commencement on site for approval. They shall be present at all times during the works and be responsible for logging of the rock and soil cores. They shall co-ordinate the work of the other Logging Engineers, ensuring continuity and quality of the description and approach to testing in the field and involved in the investigation.

The supervision requirements of Clause 3.24 (b) shall be followed.

The Contractor shall nominate a Project Supervisor for construction in accordance with the Safety, Health & Welfare at Work (Construction) Regulations 2013 and shall prepare a Safety & Health Plan for the project (Clause 3.26).

The Contractor shall prepare a Safety & Health Plan for the project (Clause 3.26) in accordance with the Safety, Health & Welfare at Work (Construction) Regulations 2013. This item may be revised following award.

Accuracy of exploratory locations

All exploratory locations shall be surveyed to OS Datum and ITM co-ordinates. The accuracies specified for setting out (Clause 3.14) and levelling (Clause 3.15) are appropriate.

Contaminated soil

The desk study for the site and surrounding area revealed the past uses at the site to include industrial activity such as iron manufacturing, worsted woollen manufacturing and printing works. There are underground and above ground storage tanks present at the site used to store petrol and heating oil. Therefore, there is a high likelihood of encountering potentially contaminated soils. There is also a potential risk of encountering asbestos at the site.

The *Guidance for Safe intrusive investigation of Contaminated Land (BDA, 2008)* designation of the site is YELLOW.

With regards to asbestos in soil (AIS) or encountering asbestos containing material (ACM), the Contractor shall comply with the guidance and methods described in Site *Investigation Asbestos Risk Assessment, For the protection of Site Investigation and Geotechnical Laboratory Personnel* (AGS, 2013) and complete the required safety risk assessments set out in that guidance.

Rough sleepers are currently located in areas to the north of the site so the contractor shall be vigilant for their presence or any drug paraphernalia, needles etc.

Traffic Management

The Contractor shall be responsible for the proper control of traffic and arrange his operations so that obstruction to traffic is minimised.

The following exploratory locations require the development of traffic and pedestrian safety and management measures (in accordance with Clause 3.22):

- BH-104 is located in the Parkgate Street footpath area north of the existing building in an area between a Bus Stop and Dublin Bike Stand. The area contains a high density of services and requires a slit trench (ST101) in advance of drilling to finalise the location and prove it is free of services.
- BH-105 is located in a fenced grassed area at the eastern corner of the site. There are currently rough sleepers in this area. If they cannot be vacated an alternative location along the Parkgate Street footpath will be selected. The area also contains a high density of services and requires a slit trench (ST102) in advance of drilling to finalise the location and prove it is free of services.

The Contractor is required to provide and maintain adequate traffic and pedestrian safety and management measures to safeguard the public and site works during the execution of the works.

The Contractor shall arrange his operations so that obstruction to traffic is minimised. Where any such obstruction is required for the satisfactory progress of the works, the Contractor shall consult with the Engineer about the situation, in advance of commencing the work.

The traffic management plans must comply, where possible, with the requirements and/or recommendations outlined in Chapter 8 of the Department of Transport Temporary Traffic Measures and Signs for Roadworks (2010) and The Guidance for the Control and Management of Traffic at Road Works (Second Edition - 2010) prepared by the Local Government Management Services Board.

The Contractor is responsible for liaising with all relevant stakeholders (i.e. Dublin City Council, Garda Síochána, and Emergency Services). The Contractor is responsible for determining the particular requirements of the relevant stakeholders to apply for, execute closures and the implementation of any such traffic management regimes as may be necessary to facilitate the execution of the Works.

The Contractor is responsible for obtaining and completing all licenses (i.e. Dublin City Council Road Opening Licence) and permits for undertaking of access and permissions for the works. Confirmation of receipt of permission must be provided to the Investigation Supervisor in advance of the respective works.

The traffic management as set up on site shall be supervised on a full time basis by a competent person with CSCS in SLG qualification or equivalent approved as a minimum.

Five days, minimum, prior to the commencement of each traffic/pedestrian management phase of the Works, the Contractor shall submit the relevant detailed traffic management plans to the Investigation Supervisor.

The Contractor shall be responsible for the maintenance of all public roads, site access roads and temporary diversions within the site until the traffic management is fully removed from the site location.

The Contractor shall provide and maintain access to all existing properties and facilities adjacent to the Works.

In the event of a traffic accident occurring adjacent to the works area, the Contractor shall immediately contact An Garda Síochána, the Investigation Supervisor and Dublin City Council.

The Contractor shall liaise with all businesses/organizations, land owners and residents affected by the Works, ensuring that minimal disturbance is caused and access to such is not impeded.

Quality Management System/Health & Safety

The Contractor is required to work to a Quality Management system established in accordance with ISO 9000 (Clause 3.23). Details shall be provided prior to the commencement of work on site.

All activities performed during the course of work undertaken by the Site Investigation Contractor on this Contract shall be in accordance with the requirements of the Safety, Health and Welfare at Work Act 2005, and the Safety, Health and Welfare at Work (Construction) Regulations, 2013 (S.I. No. 291 of 2013), and any amendment thereof.

Geotechnical Soil and Rock Logging

All logging of soil and rock samples including sub sampling shall be undertaken on site.

Soil descriptions should clearly provide the main characteristics of the soil prior to secondary or tertiary aspects, as detailed in BS EN ISO 14688-2.

The size, colour, orientation and any other salient features of all elements of the soil should be described in full

Rock shall be examined and described on site by a Contractors Geotechnical or Engineering Geologist Representative. Logging shall be in accordance with BS5930 incorporating amendment No. 1 and the recommendations of the Engineering Group of the Geological Society Working Party Report 'The Logging

of Rock Cores for Engineering Purposes' (1970). Drill breaks shall be differentiated from natural joints and fractures and so marked in the recovered cores.

The Engineer will comment on the draft log within one week of receipt. The Contractor shall incorporate these comments and re-issue the Draft log within one week of receiving comments from the Engineer.

Where exploratory holes are formed with two or more methods, the geotechnical borehole log shall be reported as a single log.

Sub-contractors

The Contractor shall list all Sub-Contractors they propose to use during the investigation including but not limited to:

- Laboratories proposed for the testing of samples.

It shall be the responsibility of the Contractor to satisfactorily supervise all Sub-Contractors working on the project both in terms of quality of work and programme.

Photography requirements (clause 3.25)

Colour photographs are required. Where a digital camera is used, an electronic copy of the photographs, in either *.jpg or *.bmp format, shall be submitted to the Engineer.

Factual Reports – Reporting Requirements

A draft and final Factual Report is required for this contract which should be AGS compatible to allow import and manipulation. Before each report is finalised, consultation shall take place with the Engineer on the format and layout of the report.

These reports shall be the responsibility of the Contractor's Geotechnical or Engineering Geologist Representative of suitable experience who shall be approved by the Engineer. The curriculum vitae of the Contractor's Geotechnical or Engineering Geologist Representative shall be included with the documentation submitted with this tender.

Programme

The Contractor shall prepare and outline programme of work with their tender submission indicating their earliest start date and estimated timeframe for completion of fieldwork, laboratory work and completed factual report submission, based on the quantities contained in the Bill of Quantities and weekend working requirements. This programme shall be submitted for the approval of the Engineer. Such a timeframe shall be agreed prior to award of contract and shall not be extended without the approval of the Engineer.

Therefore, it is of particular importance that the Contractor accurately considers the volume of work in conjunction with their other work commitments.

2.1.9 Particular Borehole Requirements (Section 4)

Any of the methods for making boreholes scheduled in Clause 4.1 are permitted. The minimum nominal casing diameter shall be 150mm.

At ground level before boring commences, the initial casing diameter shall be sufficiently large to ensure that the borehole can be completed to its scheduled depth.

Where boulders, rock and other hard strata are encountered, percussion boring using a chisel shall take place in an attempt to penetrate the obstruction and break it up sufficiently for fragments to be recovered and identified. A detailed record shall be kept of the time spent chiselling and the rate of penetration through the obstructing object. The maximum time spent chiselling at any one obstruction shall be two hours unless expressly permitted by the Engineer.

A sufficient supply of water is required for boring and SPT testing through the gravel strata.

Backfilling of boreholes with soil arisings is not permitted (Clause 4.6). All boreholes shall be backfilled with cement bentonite grout, following the requirements of Appendix I, with standpipes and piezometers together with their response zones installed at the depths specified in Schedule 2.

A borehole remaining open overnight shall be covered. Before the first sample of the new day is taken the boring shall be advanced for at least 0.3m.

2.1.10 Particular Rotary Drilling Requirements (Section 4.4)

The rock core diameter shall be at least 86mm (PQ). Approximate depths of rotary core holes are provided in Schedule 2. The Contractor shall demonstrate that the proposed equipment is capable of coring the underlying bedrock in an efficient manner. Rotary follow on is required for BH101-BH105, and a minimum of 4.5m of intact rock core is required. Rotary core drilling shall produce cores of not less than the required diameter (Schedule 1) throughout the core length and 100% core recovery in any single run should normally be obtained. Core recovery less than 90% in any drill run will not normally be acceptable unless the Engineer is satisfied that more than 90% recovery is impracticable under the prevailing conditions utilising the core specified.

If in the opinion of the Engineer more than 90% recovery can be achieved, the Contractor, after consultation with the Engineer, shall take measures to improve core recovery.

Core is required from all rotary drilling operations, unless explicitly not stated as being required in Schedule 2. Where core is not required, the diameter of the open hole will be adequate for the collection of core of the requisite diameter at greater depth.

2.1.11 Particular Pit and Trench Requirements (Section 5)

The Contractor shall excavate inspection pits of sufficient size for the location of underground services if he believes they are necessary (Clause 5.1).

The use of machine excavators are permitted (Clause 5.2).

Observation pits shall have the minimum dimensions specified in Clause 5.4.

Pits and trenches shall be backfilled using excavation plant in the manner specified in Clause 5.7.

Artificial lighting shall be used where necessary when taking photographs of pits and trenches (Clause 5.9).

Particular Slit Trench Requirements

The Contractor shall excavate slit trenches of sufficient size for the location and identification of underground services (Clause 5.1), typically 0.5m wide by 1.2m to 1.5m deep) to finalise locations of BH104 and BH105.

The use of machine excavators to excavate slit trenches are not permitted. Slit trenches are to be hand dug. Observation pits shall have the minimum dimensions specified in Clause 5.4. Use of concrete cutters /consaw and small excavators with breaker is permitted to break up and penetrate through road pavement layers.

Pits and trenches shall be backfilled using excavation plant in the manner specified in Clause 5.7 which states “backfilling of the pits will be carried out as soon as practical with material replaced at a similar depth as encountered. The backfill shall be compacted in such a manner using excavation plant as to minimise any subsequent depression at the ground surface.” Road Surface and pavement reinstatement to be to original condition.

The location, diameter and invert level of all services are to be recorded and presented on slit trench records. All elevations will be established by levelling to an accuracy of ± 0.01m. All locations will be established to an accuracy of ± 0.1 m. All locations shall be surveyed to OS Datum and Irish Transverse Mercator.

Artificial lighting shall be used where necessary when taking photographs of pit and trenches (Clause 5.9).

Contractor shall submit a detailed method statement and detailed risk assessments for the slit trenching and trial pit works.

Implementation of all necessary health and safety measures and environmental measures in connection with the slit trench investigation, in accordance with relevant legislation and guidelines is to be followed. This is to include pricing in the tender for adequate supervision for excavations in the vicinity of gas mains, electrical cables and all other services.

The Contractor will familiarise themselves with access restrictions and surface ground conditions at the location of each survey before the beginning of the site works. Notification should be made to the Engineer, prior to gaining access to the site.

A preliminary site examination shall be undertaken in conjunction with the Engineer prior to commencement of the works, to confirm the slit trench locations.

The Contractor shall provide full time, on-site Engineer(s) with experience in the methods employed.

Where required, any additional operators provided on site by the Contractor shall be experienced in the system(s) to be used, and all labour and equipment necessary to prepare access and to carry out the work.

The Contractor shall employ the most appropriate and effective techniques, plant and equipment to complete the work.

The Contractor shall provide a detailed description of the proposed equipment, staff, field techniques and data processing method (including methods of data quality estimation and interpretation) and programme for the works for approval by the Engineer prior to commencement of the work.

All works are to be carried out in accordance with a quality management system to be submitted to the Engineer for approval before the commencement of the Works such as ISO 9001.

2.1.12 Particular Sampling Requirements (Section 6)

Open tube samples are to have a 100mm internal diameter (Clause 6.3(a)). Sample tubes shall be made of steel or aluminium. Plastic lining tubes shall not be used in substitution for steel or aluminium sampling tubes. Soil samples shall be at least 300mm long.

The sampling and testing frequency shall be as stated in Clause 6.5 with the following additions:

- For boreholes in clay/gravel soils, an SPT shall be taken at 1m intervals.
- For boreholes in Made Ground and granular soil, a bulk disturbed sample shall be taken at 1m intervals.

All samples shall be removed from the site of the boreholes at the end of each day's work and shall be protected from frost damage or excessive heat by being stored on or near the site in a structure which is under cover and secure from interference. All samples shall be removed from the site so as to reach the laboratory within four days of being taken.

The borehole ID, depth range and top of the sample shall be clearly labelled on the sample in such a way that it will not be damaged during transit.

The sample size etc. for ground contamination testing shall be commensurate with the range of analyses to be carried out (Clause 6.6).

Samples shall not be disposed of until 28 days after submission of the approved final report. The Engineer shall be given notice of at least 1 week before the disposal of samples (Clause 6.10).

Environmental sampling method (Soils)

Environmental sampling will be carried out in the made ground and underlying stratum at each exploratory hole location.

All samples for contamination/WAC testing shall be taken on site by or under the supervision or direction of an environmental scientist, geo-environmental engineer or geochemist meeting the requirements.

Only laboratory supplied containers to be used (laboratory to specify containers required).

Environmental and groundwater samples are to be taken where specified by the Engineer.

Environmental sampling of soils and groundwater will be in accordance with BS 10175:2011 and A1:2013 Code of Practice for Investigation of Contaminated Sites. The Contractor will ensure that site personnel are provided with latex gloves and appropriate PPE for environmental sampling.

A cool box is to be provided on-site for storing samples for environmental testing. Samples are to be kept cool and out of direct sunlight. Environmental samples are to be transported to the laboratory as soon as possible, therefore couriers shall be arranged early in the day if environmental samples to be submitted. Standard lab provided "Chain of Custody" forms are to be used for all samples submitted. Samples are to be scheduled for specified analyses immediately on submission to laboratory, as specified by the Engineer.

The laboratory is to be informed that all laboratory test schedules and results are to be emailed to Arup (eoin.wyse@arup.com).

All analyses are to be performed by a laboratory accredited to ISO 17025 with detection limits as per the Soil Testing Suites (attached in BOQ, Item I and Section 6).

The Contractor shall provide a copy of the CV of the designated environmental person to collect samples from the site and a recent history of investigation undertaken by him/her. Failure to produce a suitably qualified person for the role may affect the award of the tender. Submission of an up to date CV for the Environmental scientist who will collect all environmental samples on site is a requirement of the tender.

Environmental sampling method (groundwater)

Following development of the groundwater installations, samples of the groundwater shall be collected in accordance with "Water quality - Sampling. Guidance on sampling of groundwaters" (BS ISO 5667-11:2009). An indicative list of chemicals to be tested for in the groundwater are specified in Section 7, however the final determinants to be tested for will be selected by Arup at the point of scheduling the samples.

Environmental testing

All untested contamination samples and remaining sample portions shall be retained for 28 days from receipt at the laboratory.

Untested samples for WAC analysis shall be retained for 28 days after submission of the approved final report.

2.1.13 Particular Insitu Testing Requirements (Section 7)

The following insitu tests scheduled in Clause 7.3 shall be carried out:

Boreholes:

Standard penetration tests (SPT)

SPTs shall be carried out at 1m intervals in accordance with BS EN ISO 22476-3.

SPTs shall be carried out as specified in Clause 6.5, (the water surface and casing levels in the borehole at the time of the test shall be reported).

SPTs will be carried out in boreholes just before the recovery of samples covering the tested zone. When an SPT test is carried out, the Contractor shall record and include in his Report the blow count for each 75mm increment of penetration (or part-thereof).

SPTs shall be undertaken using the split spoon sampler in cohesive soils (including clayey glacial deposits) and a solid cone in granular/stony soils. Water should be used when required. In certain soil types (i.e. granular material) it may be necessary to carry out the penetration test with the borehole filled with water to ground level to overcome the head of water causing "blowing" of the granular soil. Further additional procedures may be required to prevent "blowing" during drilling, including use of alternative tools.

- SPTs at intervals specified in Clause 6.5 and Schedule 1 (the water surface and casing levels in the borehole at the time of the test shall be reported).

When an SPT test is carried out, the Contractor shall record and include in his Report the blow count for each 75mm increment of penetration (or part-thereof).

2.1.14 Particular Instrumentation and Monitoring Requirements (Section 8)

Groundwater

Water levels in boreholes during boring/drilling shall be measured at the beginning and end of each shift or other rest periods (Clause 8.1.2).

Standpipes are required to be installed at depths and locations identified in Schedule 2 (Clause 8.2.1).

After the completion of the fieldwork period and until submission of the draft factual report, the Contractor shall return to site once a week to measure the water level in each and every standpipe (four visits in total).

The Contractor shall give one day's notice of his visit to all occupiers of land on which standpipes are situated (Clause 8.6).

Standpipe/Piezometer cover types are specified in Schedule 2 (Clause 8.4).

Ground Gas Monitoring

Ground gas monitoring is required. General requirements for ground gas monitoring are specified in Annex 9.

The requirements for the frequency of ground gas monitoring and the frequency of sampling of ground gas from gas/gas-groundwater installations are to be outlined by the engineer.

For post-fieldwork gas monitoring, the Contractor shall in advance of each visit give notice of at least 1 working day to all occupiers of land on which the relevant gas monitoring installations are situated.

The Contractor shall provide in the factual report valid calibration certificates for the gas monitoring apparatus used.

Existing Groundwater Monitoring Wells

Groundwater monitoring wells were installed at 17 No. locations as part of an earlier 2002 ground investigation, both externally and externally.

The contractor will be required to locate, open up and repair existing covers, where old installations can be located or are feasible to be monitored, as required to allow for continued monitoring and sampling (if required). Locations will be supplied by the Engineer.

At each location, an initial groundwater level is to be taken. The well is then to be purged and monitoring is to take place as per requirements of any new monitoring installations.

2.1.15 Particular Daily Report Requirements (Section 11)

Grid north may be taken as magnetic north.

Report requirements for further testing shall be as specified (if at all) in Schedule 5.

2.1.16 Particular Laboratory Testing Requirements (Section 12)

Laboratory testing schedules

The Contractor is required to prepare a blank test schedule (Clause 12.2), giving on one axis the following information:

- borehole number
- sample number
- sample type

- sample depth

and on the other axis the following standard laboratory tests shall be listed:

- Moisture content
- Atterberg Limits
- Particular size distribution by Wet sieving
- Particular size distribution by pipette
- Specific gravity of soil particles
- Organic matter content
- Three blank columns for other tests.

These draft schedules sheets are to be submitted to the Engineer with the preliminary logs, required under Clause 13.1.

Contamination Testing

Tests provided in Section 6 (Soil Testing Suite) and Section 7 (Groundwater Testing Suite) will be carried out on samples selected by the Engineer.

2.1.17 Particular Reporting Requirements (Section 13)

The locations of the exploratory holes should be related to National Grid Coordinates (Clause 13.2.2).

Digital data are required (Clause 13.4 and Appendix III).

An interpretative report is not required (Clauses 13.5 and 13.7). No additional information is required in the factual report (Clause 13.6).

PDF documents shall be generated from native files where possible and not scanned.

Preliminary borehole/intrusion records:

Preliminary borehole records shall be delivered to the Engineer within one week of completion of the exploratory hole and shall include all of the above and shall incorporate:

- The results of the in situ testing including the factual results e.g. N value = 11 and factual results are 1, 2, 2, 3, 2, 4.
- The results of the visual/manual examinations of samples conducted by the Contractors Geotechnical or Engineering Geologist Representative in accordance with BS5930.
- Details of any waste observed in the made ground along with any visual or olfactory evidence of contamination
- Details of groundwater observations.
- Depths, sample numbers, types of samples.

- Co-ordinates as established during setting out.

Final records:

Final Records shall include:

- Strata description with variations noted.
- All the above previously specified.
- Co-ordinates of each exploration location related to OS control (Clause 13.2.2).
- Ground level at each exploration related to Malin Head Ordinance Datum (Clause 13.2.2)).
- Photographs of cores, and other items as per specification.
- Soil and rock logging shall conform to BS5930 and ISRM.

Factual Reports – Reporting Requirements:

The Contractor shall provide the draft Factual Report for approval and final Factual Report to the Engineer in paper and digital format. The contents of the draft and Final Factual Reports shall be compiled in accordance with Clause 13.6 of the Specification.

Water level and gas monitoring information shall be provided in Microsoft Excel format or similar.

In relation to water level monitoring the data provided shall be fully compensated for climatic fluctuations and corrected for elevation. The data shall be presented in a continuous records of water level monitoring for each borehole. In addition raw data (uncompensated and not corrected for depth) shall also be provided.

The draft and final Factual Report shall include:

- Marked up drawings showing exact position of boreholes, samples, probes and other features.
- Groundwater and gas monitoring records.
- Digital colour prints of rock cores, trial pits, grab samples and other soil materials of interest to the Engineer with typed locations and descriptions and as per amendments to clause 3.25.
- A complete statement of all test results including probe and all laboratory test results.

Digital Data

The Contractor shall provide exploratory hole, in situ test, groundwater monitoring and laboratory test data in AGS digital form as agreed by the Engineer. The files shall not be compressed.

The data shall be prepared in accordance with a recognised Quality Assurance system and shall be in accordance with the Association of Geotechnical Specialists (AGS) format for Electronic Transfer of Geotechnical Data from Ground Investigations (4th Edition, 2004).

Preliminary digital data shall be provided with the draft report such that digital data is available for all data and results on hard paper copies within the draft report.

For each data file, the index shall detail:

- The file name, including the extension_AGS‘.
- The date and time the file was created.
- A general description of the data contained in each file.

Auto CAD plan drawings showing the locations of the exploratory holes shall be submitted along with an x-ref showing the same.

A copy of the Contractor’s factual reports text shall be supplied electronically and all required graphs and tables shall be supplied in Microsoft Excel format. A final combined PDF copy of the report, graphs and tables shall also be supplied.

All environmental test results have to be provided as pdf, crosstab and excel files.

2.2 Schedule 2: Exploratory Holes (locations shown on Drawing 2)

Hole No.	Type*	Scheduled depth (m)	National Grid Co-ords (Provisional)	Remarks (e.g. type of standpipe/piezometer cover and whether fence protection required etc.)
BH101	CP with RC follow on	15	TBC	CP to top of rock, followed by minimum 4.5m of intact rock recovered by RC. Environmental sampling of Made Ground and natural material to a depth of 8m SPT Testing in O/B at 1m intervals. Groundwater installation with response zone in Gravel (flush protective cover).
BH102	CP with RC follow on	15	TBC	CP to top of rock, followed by minimum 4.5m of intact rock recovered by RC. GW and gas monitoring to be installed (flush protective cover). Environmental sampling of Made Ground and natural material to a depth of 8m.
BH103	CP with RC follow on	15	TBC	CP to top of rock, followed by minimum 4.5m of intact rock recovered by RC.

Hole No.	Type*	Scheduled depth (m)	National Grid Co-ords (Provisional)	Remarks (e.g. type of standpipe/piezometer cover and whether fence protection required etc.)
				Environmental sampling of Made Ground and natural material to a depth of 8m SPT Testing in O/B at 1m intervals. Groundwater installation with response zone in Gravel (flush protective cover).
BH104	CP with RC follow on	15	TBC	CP to top of rock, followed by minimum 4.5m of intact rock recovered by RC. GW monitoring to be installed. Environmental sampling of Made Ground and natural material to a depth of 8m SPT Testing in O/B at 1m intervals. Groundwater installation with response zone in Gravel (flush protective cover). Traffic Management required, safe diversion for pedestrians/cyclists around the works area required
BH105	CP with RC follow on	15	TBC	CP to top of rock, followed by minimum 4.5m of intact rock recovered by RC. Environmental sampling of Made Ground and natural material to a depth of 8m SPT Testing in O/B at 1m intervals. Traffic Management required, safe diversion for pedestrians/cyclists around the works area required
ST101	ST	1.2m deep by 6m	TBC	Slit trench across footpath perpendicular from building to kerb. Identification, size and depth of all existing services / utilities including location of gas and ESB. Traffic Management required, safe diversion for pedestrians/cyclists around the works area required
ST102	ST	1.2m deep by 10m	TBC	Slit trench across grassed area perpendicular from building to kerb. Identification, size and depth of all existing services / utilities including location of gas and ESB. Traffic Management required, safe diversion for pedestrians/cyclists around the works area required
WS101 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.

Hole No.	Type*	Scheduled depth (m)	National Grid Co-ords (Provisional)	Remarks (e.g. type of standpipe/piezometer cover and whether fence protection required etc.)
WS102 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS103 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS104 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS105 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS106	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS107	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS108	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS109 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS110	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS111	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS112	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS113 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS114 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS115 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS116 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.

Hole No.	Type*	Scheduled depth (m)	National Grid Co-ords (Provisional)	Remarks (e.g. type of standpipe/piezometer cover and whether fence protection required etc.)
WS117	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.
WS118 (Internal)	WS	4	TBC	Environmental sampling of Made Ground and natural material at 1m intervals commencing at 0.5mBGL.

* BH - borehole
RC - rotary borehole (core to be recovered)
ST – Slit Trench
WS - Window Sample

2.3 Schedule 3: Engineer's Facilities

Not required.

2.4 Schedule 4: Specification Amendments

2.4.1 Clause 3.10

Insert in line 2 after "reported".

"immediately and under no circumstances longer than 24 hours from the receipt of the complaint".

2.4.2 Clause 3.27

Add: new Clause 27 **Standing Time**

"The Engineer shall be notified immediately that standing time starts to be incurred. The duration of standing time shall be agreed with the Engineer."

2.4.3 Clause 6.12

Add: new Clause 6.12 Sampling of Contaminated Ground

Environmental sampling of soils and groundwaters will be in accordance with BS10175:2011 and A1:2013 Code of Practice for Investigation of Contaminated Sites.

The Contractor will ensure that site personnel are provided with latex gloves and appropriate PPE for environmental sampling. Sampling locations are as outlined above. A cool box is to be provided on-site for storing samples for environmental testing. Samples are to be kept cool and out of direct sunlight. Only laboratory supplied containers to be used (laboratory to specify containers required).

Environmental samples are to be transported to the laboratory as soon as possible of sampling, therefore couriers shall be arranged early in the day if environmental samples to be submitted. Standard lab provided “Chain of Custody” forms are to be used for all samples submitted. Samples are to be scheduled for specified analyses immediately on submission to laboratory, as specified by the Engineer. The laboratory is to be informed that all laboratory test schedules and results are to be emailed to Arup (Eoin.Wyse@arup.com). All analyses are to be performed by a laboratory accredited to ISO17025 with detection limits as per Arup Disposal Suite (attached in BOQ, Item I1 and I2). The Contractor shall provide a copy of the CV of the designated environmental person to collect samples from the site and a recent history of investigation undertaken by him/her. Failure to produce a suitably qualified person for the role may affect the award of the tender.

Submission of an up to date CV for the Environmental scientist who will collect all environmental samples on site is a requirement of the tender

2.5 Schedule 5: Specification Additions

N/A.

3 Bill of Quantities for Ground Investigation

3.1 Preamble

a) In this Bill of Quantities the sub-headings and item descriptions identify the work covered by the respective items. The exact nature and extent of the work to be performed shall be ascertained by reference to the Conditions of Contract, the Specification and the Schedules and Appendices to the Specification, as appropriate. The rates and prices entered in the Bill of Quantities shall be deemed to be the full inclusive value of the work covered by the several items, including the following unless stated otherwise.

Supervision, labour and all costs in connection therewith.

The supply of materials, goods, storage, facilities and services, and all costs in connection therewith, including wastage and delivery to site.

Plant and all costs in connection therewith.

Fixing, erecting and installing or placing of materials and goods in position.

All temporary works.

All general obligations, requirements, liabilities and risks involved in the execution of the investigation as set forth or implied in the documents on which the tender is based.

Establishment charges, overheads and profit.

Bringing plant and sampling and in situ testing equipment to the site of each exploratory hole; erecting, dismantling and removing on completion.

Removal of all equipment and services from site on completion.

b) All items not deleted from Section A of the Bill of Quantities (General items and provisional sums) shall be priced and all items in subsequent sections against which quantities are entered shall be priced.

c) Where rates are not priced they shall have €0.00 placed against them.

d) Professional attendance associated with the description of cores and samples and other duties as required by the Contract shall be included in the appropriate rates. When full time professional attendance on site is required in accordance with Clause 3.12 this shall be paid for under Item A3 of the Bill of Quantities.

e) The item for photograph shall allow for the standing time of associated plant, and supply of negative, enprints and bound volume.

f) Rates for moving plant and equipment to the site of each exploratory hole shall allow for the formation of access routes and making - good access routes and working areas on completion as required by the Contract.

g) The rates for moving rotary drilling plant to the site of each hole shall include for setting up over a previously formed borehole.

h) Payment for forming exploratory holes shall be based on:

- Full thickness of strata investigated and described in accordance with the Specification,
- Depths measured from ground level,
- Depth measured from original ground level where an inspection pit has been excavated,
- Rotary drilling required to extend boreholes which cannot penetrate further by means of cable percussion is measured from the base level of the cable percussion formed borehole,
- Core recovery of at least 90% in any core run, unless the Engineer is satisfied it cannot be achieved,
- Volume calculated as measured length x measured depth x specified width for trial and observation trenches.

i) Rates for forming exploratory holes shall allow for:

- Casing installation, where necessary, and removal,
- Dealing with surface water,
- Backfilling with natural material recovered from borehole unless otherwise indicated in Schedule 1,
- Supply of daily report and preliminary log,
- Disposal off site of excavated material not required for reuse,
- Reinstatement of surface in areas other than paved areas and lawns where a special rate applies.

j) Standing time shall be measured as the duration of time for which plant, equipment and personnel are standing on the instruction of the Engineer or in accordance with the Contract. Standing time shall be paid for interruption of the formation of exploratory holes to record groundwater entry in accordance with Clause 8.1. The rates for standing time shall allow for:

- Plant equipment and personnel,
- Consequential costs,
- Changes in the programme of working,
- Recording information and preparing daily report.

k) The rates for hourly provision of pitting and trenching crews and equipment at locations as directed by the Engineer shall allow for compliance with the requirements of the Contract, including preparation of records.

l) The rates for sampling and in situ testing shall allow for the standing time of associated plant.

Where in situ testing is paid for on an hourly basis, the time measured shall be the actual time taken to carry out the test in accordance with the Engineer's instruction and/or the Specification but excluding the time taken to erect and dismantle test equipment where this is itemised separately.

m) The rates for installation of instruments shall allow for:

- Clearing and keeping hole free of unwanted materials,
- All costs associated with equipment, installation, specified seals, surround, backfill materials excluding backfill below the instrument,
- Proving correct functioning,
- Time required to install instrument,
- The rate for installation shall not allow for standing time more than 30 minutes awaiting instructions from Engineer. If waiting more than 30 minutes from time of notification, standing time shall be paid to the Contractor.

n) The rates for testing shall include for:

- The supply of a copy of the preliminary test results to the Engineer,
- The cost of moisture content or density determinations where they form part of the test.

o) The rates for recording of water level or gas measurement shall allow for notices of re-entry to the Engineer, owners or occupiers affected by the location or access route.

p) Appendix A to the Bill of Quantities (Rates for geotechnical and other personnel) shall be priced. The rates given will be used by the Engineer to make an initial estimate of costs where applicable of employing the Contractor's staff in accordance with Clause 3.13 of the Specification.

q) Items for the supply of the master and copies of the interpretative report shall exclude costs covered by Appendix A to the Bill of Quantities.

r) The rate for securing and leaving a trail pit or observation pit shall be the length of fencing installed and shall allow for installation and removal.

3.2 Units of Measurement

The following abbreviations shall be used for the units of measurements:

Millimetres	:	mm
Metre:	:	m
Kilometres	:	km
Square millimetres	:	mm^2
Square metre	:	m^2

Cubic metre	:	m^3
Square metre per day	:	m^2/day
Kilogramme	:	kg
Tonne	:	t
Sum	:	sum
Number	:	nr
Hour	:	h
Week	:	wk
Vehicle week	:	v.wk
Item	:	item
Day	:	day
Specimen day	:	sp.day

3.3 Preamble Amendments and Additions

The following clauses are amended or added to the preamble:

Clause (a): Add at end of Clause:

Reinstatement.

Clause (d): Add after "... with the description of cores and samples", the following, “the logging of pits and trenches”

Clause (i): Add after "....and removal"
“and for any casing not recovered”

Clause (m): Add after "... below the instrument"
“and surface terminal (if appropriate)”

Clause (n): Add to end of Clause:

- the time of the personnel carrying out the test.

Additional Clause (s):

The rates for observation pits and trenches shall allow for all necessary shoring and shoring crew. For all hand-dug pits and trenches, the rates shall allow for working within a properly shored excavation. The size of a hand-dug pit or trench shall be sufficient to allow the excavation to be progressed to its scheduled depth. The rates for all pits and trenches should allow for the excavator, driver and technical assistant to log the pit and trench, take samples and carry out tests.

Additional Clause (t):

The rates for performing laboratory tests of long duration shall include for all costs incurred whilst working outside normal hours.

Additional Clause (u):

Quantities associated with Items A7 and A8 will be reimbursed at cost on production of receipts.

4 Bill of Quantities Works Items

The following pages constitute the Bill of Quantities.

Number	Item description	Unit	Quantity	Rate	Amount €
A	**General items and Provisional Sums**				
A2a	Establish on site all plant, equipment and services for boreholes (including winder sampler)	sum	1		
A2b	Establish on site all plant, equipment and services for rotary drilling	sum	1		
A2c	Establish on site all plant, equipment and services for Slit Trenches	sum	1		
A2d	Establish on site all plant, equipment and services for sampling	sum	1		
A2e	Establish on site all plant, equipment and services for in-situ testing	sum	1		
A2f	Establish on site all plant, equipment and services for instrumentation and monitoring	sum	1		
A3	Full time professional attendance by the Contractor's Engineer/Engineering Geologist (as per Category 2.2)	Sum	1		
A4	Establish the location and elevation of the ground at each exploratory hole	sum	20		
A4.1	Prepare and level ground at location of each exploratory hole	sum	20		
A11	Traffic safety and management, Provision of traffic management for works to comply with statutory authority requirements. To include for preparation, submission and approval of TM plans. To include for any specialist sub-consultant costs.	sum	1		
A11a	Application and associated costs for Road Opening Licenses and traffic permits.	sum	1		
A12	One master copy of the Factual report	sum	1		
A16	Digital data (including AGS)	sum	1		
A17	Photographs	nr	51		
A18	Provision of water supply for works	sum	1		
A19	Provision of insurances required	sum	1		
A20	Perform Role of PSCS	sum	1		
A21	Carry out duties and responsibilities under Health and Safety Regulations	sum	1		
A23	Disposal of excess material in accordance with current Waste Management Legislation	Sum	1		
	Total Section A Carried to Summary				

Number	Item description	Unit	Quantity	Rate	Amount €
B	**Boreholes**				
B1	Move boring plant and equipment to the site of each exploratory hole, check location for services and set up	nr	5		
B3	Break out surface obstruction where present at exploratory borehole	nr	5		
B4	Excavate inspection pit not exceeding 1.2m depth to check for services	nr	5		
B5	Advance borehole between existing ground level and 10m depth	m	40		
B8	Advance borehole through hard stratum or obstruction	hr	7.5		
B9	E/O backfill borehole with cement / bentonite other than using natural material	m	20		
B10	Standing time for borehole plant, equipment and crew	hr	R/O		
B11	Reinstatement of paved areas to original condition at hole location	nr	5		
B12	Provide all traffic management and Herras Fencing (as required) for boreholes including pedestrian / cycle lane management	nr	5		
	Window Sampling				
B13	Move open tube sampling (min 100mm, diameter) plant and equipment to the site of each window sample, check location for services and set up	nr	18		
B13a	E/O Item B13 for providing screen / barrier around works area to protect warehouse fabrics and fittings from dust / dirt / slurry etc	nr	11		
B13b	E/O Item B13 for week end work	nr	11		
B14	Stitch core concrete surface where present at window sample	nr	18		
B15.1	Advance window sample between existing ground level and 4m depth	m	72		
B17	Advance window sample through hard stratum or obstruction	hr	9		
B18	Reinstate borehole to Engineers specification	nr	18		
B19	Standing time for window sample plant equipment and crew	hr	R/O		
	Total Section B Carried to Summary				

Number	Item description	Unit	Quantity	Rate	Amount €
C	**Rotary Drilling**				
C1	Move rotary drilling plant and equipment to the site of each exploratory drillhole, check location for services and set up	nr	5		
C4	Break out surface obstructions where present at exploratory borehole	nr	5		
	Drilling without obtain cores				
C5	Rotary drill in materials other than hard strata at the specified diameter, from which cores are not required, between existing ground level and 10m depth	m	10		
C6	As Item C5 but between 10m and 20m	m	r/o		
	Drilling to obtain cores				
C16	Rotary drill in hard strata to obtain cores of the specified diameter between existing ground level and 10m depth	m	5		
C17	As Item C16 but between 10m and 20m depth	m	25		
	General				
C21	Backfill drillholes with cement/bentonite grout other than using natural material	sum	20		
C22	Core box to be retained by client	nr	10		
C23	Standing time for rotary drilling plant, equipment and crew	hr	3		
C32	Reinstatement of paved areas to original condition at hole location	nr	5		
C33	Provide all traffic management and Herras Fencing (as required) for boreholes including pedestrian / cycle lane management	nr	5		
	Total Section C Carried to Summary				

Number	Item description	Unit	Quantity	Rate	Amount €
D	**Pits and Trenches**				
	Inspection pits				
D1	Excavate inspection pit by hand to 1.2m depth and check location for services at location of all proposed boreholes or window samples	nr	23		
D2	Extra over Item D1 for breaking out surface obstructions	R/O			
	Slit Trenches (for Services)				
D3	Move equipment to the site of each Slit Trench and check location for services including CAT Scan	nr	2		
D7	Excavate Slit Trench by hand between existing ground level and 1.2m depth (0.6 m width)	m^3	12		
D8	As Item D7 but between 1.2 m and 1.5m depth	m^3	3.0		
D10	Extra over item D7 for breaking out / saw-cutting surface obstructions (e.g. blacktop, concrete footpath / cycle lane) along entire length of trench	nr	2		
D11	Standing time for Slit Trenching equipment and crew	h	2		
D15	Reinstatement of all Slit Trenches (like for like – lawn, concrete, blacktop) to original condition along entire length of trench	nr	2		
D17	Provide all traffic management and Herras Fencing (as required) for slit trenches including pedestrian / cycle lane management	nr	2		
	Total Section D Carried to Summary				

Number	Item description	Unit	Quantity	Rate	Amount €
E	**Sampling**				
E1	Small disturbed sample	nr	92		
E2	Bulk disturbed sample	nr	58		
E9	Environmental Sample - soil (containers as specified by the laboratory)	nr	105		
E10	Environmental Sample - groundwater (containers as specified by the laboratory)	nr	6		
	Total Section E Carried to Summary				

Number	Item description	Unit	Quantity	Rate	Amount €
F	**Insitu Testing (According to BS1377: Part 9: 1990)**				
F1.1	Standard penetration test in borehole at commencing depth less than 20m	nr	24		
F2.1	Standard penetration test in rotary drillhole at commencing depth less than 20m	nr	R/O		
F9	Set up and dismantle rising head permeability test in borehole	nr	4		
F11	Carry out permeability test in borehole	nr	4		
	Total Section F carried to Summary				

Number	Item description	Unit	Quantity	Rate	Amount
					€
G	**Instrumentation and Monitoring**				
	Standpipes and Piezometers				
G1	Backfill exploratory hole with cement/bentonite grout below standpipe or standpipe piezometer	m	33		
G2.1	Standpipe – Slotted	m	7.5		
G2.2	Standpipe – Plain	m	25.5		
G4.1	Gas monitoring standpipe – Slotted	m	9		
G4.2	Gas monitoring standpipe - Plain	m	1.5		
G5	Protective cover (flush)	nr	9		
G8	Reading of water level in each standpipe, standpipe piezometer or pneumatic piezometer during fieldwork period	nr	1		
G8.1	Locate, open up, repair existing historic installations where they can be located or are feasible to be monitored. Purge and monitor during fieldwork period	sum	1		
G9	Gas measurement in each gas monitoring standpipe during fieldwork period	nr	1		
G12	Visit site to make readings of water level and gas flow in all standpipes (including historic installations) and piezometers after completion of fieldwork period	nr	4		
	Total Section G Carried to Summary				

Number	Item description	Unit	Quantity	Rate	Amount €
H	**Laboratory Testing**				
H1	**Classification (According to BS1377: Part 2: 1990)**				
H1.1	Moisture content	nr	80		
H1.2	Liquid limit, plastic limit and plasticity index	nr	30		
H1.8	Particle size distribution by wet sieving	nr	30		
H1.11	Sedimentation by hydrometer	nr	20		
H2	**Chemical and Electrochemical (According to BS1377: Part 3: 1990)**				
H2.3	Sulphate content of acid extract from soil.	nr	10		
H2.4	Sulphate content of water extract from soil.	nr	10		
H2.10	Total Sulphur	nr	5		
H6	**Shear Strength (Total Stress) (According to BS1377: Part 7: 1990)**				
H6.4	Shear strength of a set of three 60mm x 60mm square specimens by direct shear, test duration not exceeding 1 day per specimen	nr	4		
H6.6	Shear strength of a single 300mm x 300mm square specimen by direct shear, test duration not exceeding 1 day per specimen	nr	4		
H8	**Rock Testing (As specified in BS5930:1999, Table 11)**				
H8.13	Uniaxial compressive strength		10		
H8.18	Determination of point load strength of rock specimen		15		
	Total Section H Carried to Summary				

Number	Item description	Unit	Quantity	Rate	Amount €
I	**Chemical Testing for Contaminated Ground**				
I1	Arup Disposal suite (soils) (See Attached Sheet)	nr	84		
I2	Groundwater suite (groundwater) (See Attached Sheet)	nr	6		
	Total Section I Carried to Summary				

5 Summary of Bill of Quantities

Section		**€**
A.	General items and provisional sums	
B.	Boreholes	
C.	Rotary drilling	
D.	Pits and trenches	
E.	Sampling	
F.	In situ testing	
G.	Instrumentation and monitoring	
H.	Laboratory testing	
I.	Chemical testing for contaminated ground	
	Total from Annexes	
	Tender Sum	
	Total tender sum (including 10% contingency)	
	VAT % - Fieldwork	
	VAT % - Laboratory/reporting work	
	Total tender sum including contingency and VAT	

The above total tender sum represents the amount required for the complete execution of the Works in full compliance with the terms of the Contract, Specification, Drawings and Bills of Quantities and no extra will be allowed for want of knowledge in this respect.

Signed: Date:

…… ……

for

……

(Name of Tenderer)

6 Item I1 – Soil Testing Suite

TEST	METHOD DETECTION LIMIT
Leachate Sample	
CEN Leachate Generation L/S 10: 1	
As	0.02mg/kg
Ba	0.5mg/kg
Cd	0.004mg/kg
Cr	0.5mg/kg
Cu	0.5mg/kg
Hg	0.0005mg/kg
Mo	0.05mg/kg
Ni	0.1mg/kg
Pb	0.5mg/kg
Sb	0.05mg/kg
Se	0.05mg/kg
Zn	0.5mg/kg
Chloride	10mg/kg
Fluoride	0.1mg/kg
Sulphate Soluble	30mg/kg
Total Phenols by HPLC	0.10mg/kg
Dissolved Organic Carbon	20mg/kg
Total Dissolved Solids	500mg/kg
Soil Sample – Total Pollutant Content	
pH	Unitless
Asbestos Screen – confirmation of presence, quantification if present	
Total organic Carbon	0.10%
PCB (7 congeners)	1ug/kg
TPHCWG with BTEX by GC FID	1mg/kg
Mineral Oil	1mg/kg
PAH (Speciated 17) by GC MS, including Coronene	1ug/kg
LOI	0.1%
Metals:	
As	Low level
Ba	Low level
Cd	Low level

TEST	METHOD DETECTION LIMIT
Cr (III and VI speciated)	Low level
Cu	Low level
Hg	Low level
Mo	Low level
Ni	Low level
Pb	Low level
Sb	Low level
Se	Low level
Zn	Low level
Note: Testing to be priced on 10 working day turnaround for return of results.	

7 Item I2 – Groundwater Testing Suite

TEST	METHOD DETECTION LIMIT
Ca	0.05mg/I
Mg	0.05mg/I
Sodium	0.2mg/I
Potassium	0.2mg/I
Alkalinity	1mg/I
Chloride	1mg/I
Sulphate	3mg/I
Mn	1ug/I
Fe	1ug/I
Ammoniacal Nitrogen	0.2mg/I
Hexavalent Chromium	0.03mg/I
Nitrate	0.3mg/I
Phosphate	0.03mg/l
As	low level
Ba	low level
Cd	low level
Cr	low level
Cu	low level
Hg	low level
Mo	low level
Ni	low level
Pb	low level
Sb	low level
Se	low level
Zn	low level
Hg	low level
BTEX/PRO inc MTBE by GC-FID*	10ug/I
DRO/Min Oil (by calculation) by GC-FID	0.01mg/I
Volatiles – Modified USEPA 8260 (10ug/I)	1ug/I
SVOC – Modified USEPA 8270 (10ug/I)	1ug/I
BOD	2mg/I
COD	15mg/I
Total Dissolved Solids	50mg/I
Total Suspended Solids	10mg/I
Note: Testing to be priced on 10 working day turnaround for return of results	
*- If PROs <detection limits, omit VOC and SVOC analysis	

Figures

A4

Legend

Site Boundary

Kilometers

0 0.045 0.09 0.18

Issue	Date	By	Chkd	Appd
P1	01-02-16	EOC	EW	MF

ARUP
50 Ringsend Road
Dublin 4, D04 T6X0
Tel +353 (0)1 233 4455 Fax +353 (0)1 668 3169
www.arup.com

Client
Chartered Land

Job Title
43 Parkgate Street

Figure 2: Borehole Locations

Scale at A4
1:7,500

Job No
265381

Drawing Status
For Information Only

Drawing No
001

Issue
P1

MXD Location J:\265000\265381-00\4. Internal\4-03 Design\4-03-03 Infrastructure\GIS\1. Project Viewers\Hickeys Ltd..mxd

A3

Notes:

1) Locations are approximate only, To be confirmed prior to commencement of works following service check and agreement of tenant

2) Refer to Schedule 2 for groundwater and gas monitoring locations.

3) All internal window sample works to be undertaken during weekends

Legend

Cable Percussion Borehole with Rotary Core follow on Borehole

Window Sample Borehole

Slit Trench for services

Site Boundary

Issue	Date	By	Chkd	Appd
P2	2019.01.30	EOC	EW	JB

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50 Ringsend Road
Dublin 4
Tel +353 (0)1 233 4455 Fax +353 (0)1 668 3169
www.arup.com

Metres
0 12.5 25 50

Client
Chartered Land

Job Title
Hickeys Parkgate St.

GI Location Map

Scale at A3
1:1,000

Job No	Drawing Status
265381	**For Information Only**

Drawing No	Issue
002	**P2**

MXD Location: J:\265000\265381-00\4. Internal\4-03 Design\4-03-03 Infrastructure\GIS\1. Project Viewers\Hickeys Ltd..mxd

Appendix A

Rates for Geotechnical and Other Personnel

A1 Rates for Geotechnical and Other Personnel

Rates shall be entered for the various grades of staff listed, who will be employed by agreement with the Engineer in the preparation of any interpretative and advisory sections of the report, or employed for advisory work for the Engineer on site on the conduct of the investigation, in accordance with Specification Clause 3.13 and Schedule 1. This excludes the superintendence and technical direction required under the Conditions of Contract and the requirements of Clauses 3.12, 4.4.2, 5.3.6, 5.4.2, 6.5 and 7.11 which must be covered by the rates and prices entered in the main Bill of Quantities (see Clause 1 of the preamble to the Bill of Quantities).

Item	Item description	Unit	Rate
	Professional Staff		€
1	Technician	h	
2	Graduate Engineer/Geologist/Environmental scientist	h	
3	Graduate Engineer/ Geologist/Environmental Specialist with at least 3 years of relevant experience since graduation	h	
4	Chartered/Engineer/ Geologist/Environmental Specialist with at least 5 years of relevant experience since graduation	h	
5	Principal Chartered/Engineer/ Geologist/Environmental Specialist with at least 10 years of relevant experience since graduation.	h	
Expenses incurred by staff on site visits or who are resident by agreement with the Engineer			
7	Fare per kilometre from Contractor's premises and return for Items 1 and 2.	km*	
8	As above about for Items 3, 4 and 5.	km*	
9	All other expenses incurred in conjunction with a site visit where a return journey is made on the same day for Items 1 and 2.	visit	
10	As above but for Items 3, 4 and 5	visit	
11	All other expenses incurred in connection with visit where an overnight stay is necessary for Items 1 and 2.	night	
12	As above but for Items 3, 4 and 5	night	

* Where considered more appropriate, 'mile' may be used.

Estimate of costs under Appendix A to the Bill of Quantities for preparation of the interpretative report where required in Schedule 1:

€ ----------

Appendix B

Health and Safety Risk Assessments

HS1
Rev 11

ARUP

Hazard Identification and Risk Assessment
(Including Particular Risks & Other Significant Risks)

Job Number	265381-00
Page Number	1 of 4

Project	Parkgate House, Parkgate Street			**Design Issue or Element**		Site Investigation			
Stage	**Scheme Stage**			**Pre-Tender Stage**			**Other (Clarify)**		
	Name	Hand Initial	Date	Name	Hand Initial	Date	Name	Hand Initial	Date
Designer				Emer O'Connor	EOC	17/01/19			
Project Manager				Eoin Wyse / Jaime Bevin	EW / JEB	**02/02/19**			

	Hazard	**Design Mitigation measures**	**Other Possible Mitigation Measures (including measures by Contractor on site)**	**Residual Risk Assessment following mitigation measures**		
				Likelihood	**Severity**	**Risk Rating**
1	Risk of accident involving existing buried services	Inspection pits at all investigation locations have been allowed for in the Specification and Bill of Quantities. All available service drawings will be forwarded to the Contractor. Slit trenches specified in footpath area for BH104 & BH105 with high density of services. Slit trenches to be used to locate services and areas free of services to locate the boreholes	The Contractor to put in place all the necessary measures to mitigate the risk including but not limited to: Ensure that a competent and experienced operator is carrying out the work. The Contractor to obtain service drawings from all the service/utility providers in advance of the works commence and provide same to the engineer. Carry out C.A.T scan prior to drilling. Hand dig top 1.2m to confirm that location is free of underground services. Undertake slit trenching with appropriate approvals and attendance by Utility provider (ESB / Bord Gais)	L	H	M

Likelihood of Hazard occurring
L = Low (Seldom)
M = Medium (Reasonably Likely)
H = High (Certain/Nearly certain)

Severity of Harm
L = Minor Injury/Illness
M = Injury/Illness causing short term disability
H = Fatality or major injury/illness causing long term disability

Risk Assessment
L = Low Risk (No action)
M = Medium Risk (Action required unless good reason not to)
H = High Risk (Action required e.g. Design Change)

Refer to Arup Health & Safety Designer's Handbook and Detailed Design Project Flowchart for guidance on form sign off and issue to PSDP.

Risk Table	***Severity***		
Likelihood	**H**	**M**	**L**
H	H	H	M
M	H	M	L
L	M	L	L

	Hazard	Design Mitigation measures	Other Possible Mitigation Measures (including measures by Contractor on site)	Residual Risk Assessment following mitigation measures		
				Likelihood	Severity	Risk Rating
2	Access / Egress to exploratory hole locations Limited Headroom	A number of the locations are located internally. All tenderers to carry out site walkover prior to submitting priced Bill of Quantities to assess access, egress and headroom restrictions	When setting up over any locations ensure that there is adequate headroom to complete the works. Risk managed through location of boreholes and window samples.	L	M	L
3	Possibility of encountering contaminated ground.	No design mitigation. Specification requests Contractor to wear PPE. Based on Desk Study work, the Guidance for Safe intrusive investigation of Contaminated Land (BDA, 2008) designation of the site is YELLOW.	Employ suitable PPE for all staff. This should include but is not limited to: Latex gloves. Safety glasses. The Contractor to be vigilant for any excavated soils with deleterious material.	M	M	M
4	Risk associated with use of Heavy Equipment, Noise, • Risk of injury due to lifting heavy equipment or being hit by heavy equipment. • Exposure to excessive noise while chiselling.	The type of equipment used for drilling boreholes is standard in the industry, and is considered to be suitable for this purpose with adequate staff training to ensure safe work practices are put in place.	The Contractor to put in place all the necessary measures to mitigate the risk including but not limited to: All equipment to be operated by competent, experienced personnel who must exercise due care at all times. Ensure rigs are set up on stable ground. Provision of PPE which must be worn at all times. The drillers should wear adequate eye and ear protection while working.	L L	H M	M L

Likelihood of Harm
L = Low (Seldom)
M = Medium (Reasonably Likely)
H = High (Certain/Nearly certain)

Severity of Harm
L = Minor Injury/Illness
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H = Fatality or major injury/illness causing long term disability

Risk Assessment
L = Low Risk (No action)
M = Medium Risk (Action required unless good reason not to)
H = High Risk (Action required e.g. Design Change)

	Hazard	Design Mitigation measures	Other Possible Mitigation Measures (including measures by Contractor on site)	Residual Risk Assessment following mitigation measures		
				Likelihood	Severity	Risk Rating
5	Risks associated with the Movement of Plant or Equipment: • Risk of injury to public from accessing works area or due to movement of plant and equipment. • Risk of accident while entering or leaving the site (access/egress to/from site onto public road).	The plant and equipment normally used for boreholes is standard in the industry and is considered capable of safe usage by properly trained staff. Requirement for traffic safety and management, road opening licenses and requisite approvals has been allowed for in the Specification and Bill of Quantities.	The Contractor to put in place all the necessary measures to mitigate the risk: The Contractor is required to provide and maintain adequate traffic safety and management measures to safe guard the public and site works during the execution of the investigation works. Contractor to submit traffic management plan and apply for road opening license Ensure rigs are set up on stable ground. Provision of PPE which must be worn at all times.	L L	H H	M M
6	Risk associated with operating inside a building: • Falling materials from height. • Presence of sharp objects. • Uneven surface	The proposed exploratory locations are located away from areas of high risk. Use of artificial light when visibility is reduced.	The Contractor and the personnel to wear suitable PPE at all times. Assess all access routes and working areas and provide ramps / plywood etc as necessary	L L L	H M M	M L L
7	Working with diesel powered plant indoors-exhaust fumes and noises.	No design mitigation. Designer to liaise with tenant on opening up all external doors for additional ventilation	The Contractor is to include provision of flexible ducting, hosing and extraction fans to remove exhaust from the building. Ear protection to be provided to all staff.	L	L	L

Likelihood of Harm
L = Low (Seldom)
M = Medium (Reasonably Likely)
H = High (Certain/Nearly certain)

Severity of Harm
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H = Fatality or major injury/illness causing long term disability

Risk Assessment
L = Low Risk (No action)
M = Medium Risk (Action required unless good reason not to)
H = High Risk (Action required e.g. Design Change)

	Hazard	Design Mitigation measures	Other Possible Mitigation Measures (including measures by Contractor on site)	Residual Risk Assessment following mitigation measures		
				Likelihood	Severity	Risk Rating
8	Risk associated with drilling boreholes, • Trip hazard due to water and arisings from boreholes. • Non backfilling of holes, slipping on wet bentonite pellets. Borehole covers causing a trip hazard.	The engineer must locate, as far as practical, all boreholes away from access routes. Specification requires all works areas to be secured from access by the public	The Contractor to put in place all the necessary measures to mitigate the risk including but not limited to: • Prohibit access to relevant area of site to persons not involved in SI work. • Ensure that boreholes are excavated and backfilled immediately. • The area around the boreholes is to be cordoned off while works are in progress. The Contractor to ensure that water and arisings do not cause trip hazard or nuisance. The Contractor to ensure that all boreholes are properly reinstated and all arisings are removed from the site.	M M	L L	L L

Likelihood of Harm
L = Low (Seldom)
M = Medium (Reasonably Likely)
H = High (Certain/Nearly certain)

Severity of Harm
L = Minor Injury/Illness
M = Injury/Illness causing short term disability
H = Fatality or major injury/illness causing long term disability

Risk Assessment
L = Low Risk (No action)
M = Medium Risk (Action required unless good reason not to)
H = High Risk (Action required e.g. Design Change)

Appendix E

Figures

E1 Figures

Figure 7 Site Layout

Figure 8 Site and Surrounds

Figure 9 Regional Geology

Figure 10 EPA Soils

Figure 11 Regional Sub-soils

Figure 12 Aquifer Classification

Figure 13 Groundwater Recharge

Figure 14 Aquifer Vulnerability

Figure 15 Ecological Sites

Figure 16 Groundwater Abstraction

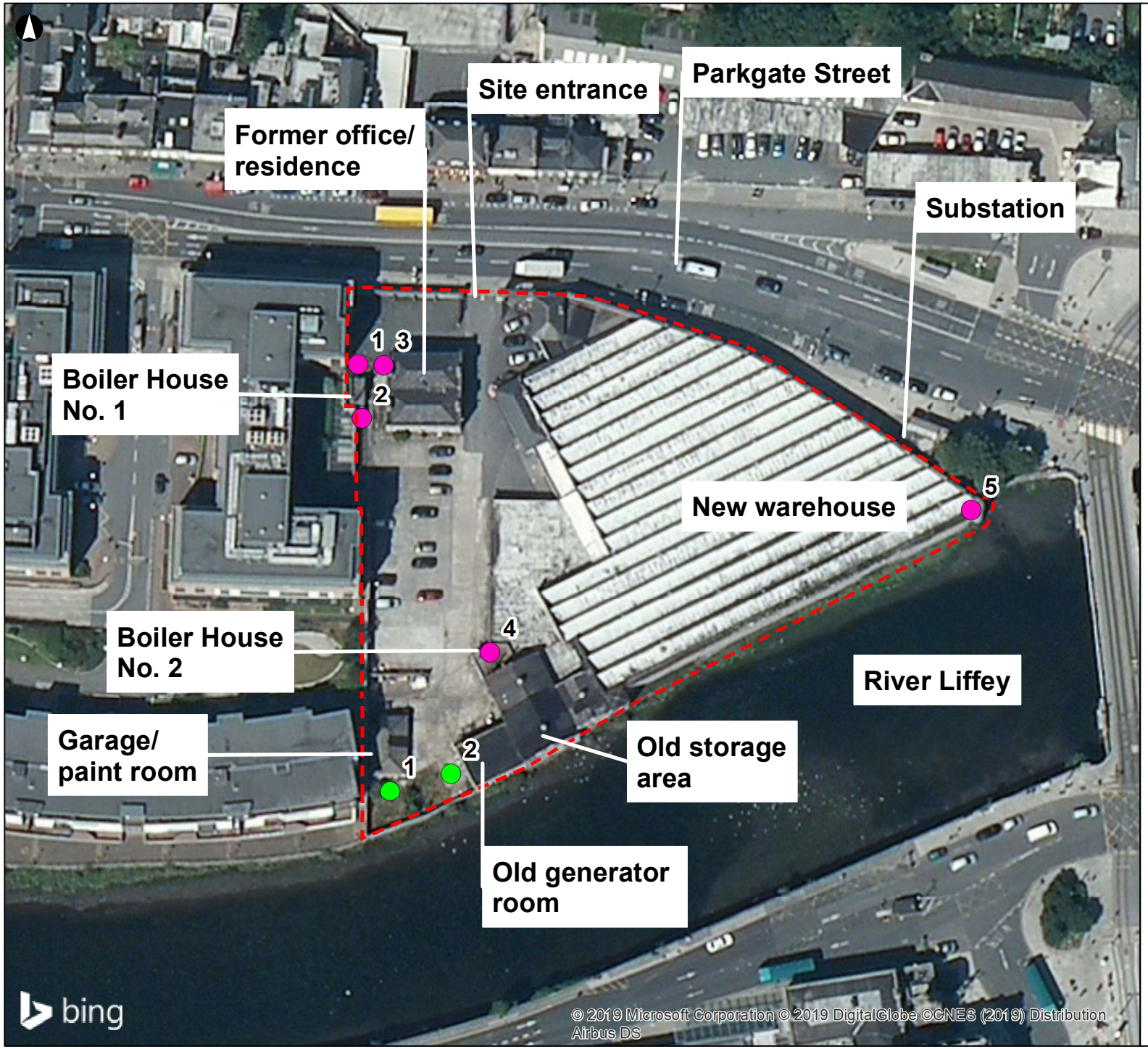
Figure 17 Depth to Bedrock

Figure 18 Licensed Industrial and Waste Sites

Figure 19 Geological Heritage Sites

Figure 20 Previous Geotechnical Investigations

A4



Site Boundary

Underground storage tanks (UST) No. 1 and 2

Above ground storage tanks (AST) No. 1 to 5

Metres

0 12.5 25 50

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Site Layout

Scale at A4

1:1,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

007

01/05/2019 14:36:06

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A4

Legend

Site Boundary

Former Maxol Service Station Footprint (approximate)

Metres

0 37.5 75 150

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Site and Surrounds

Scale at A4

1:3,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

008

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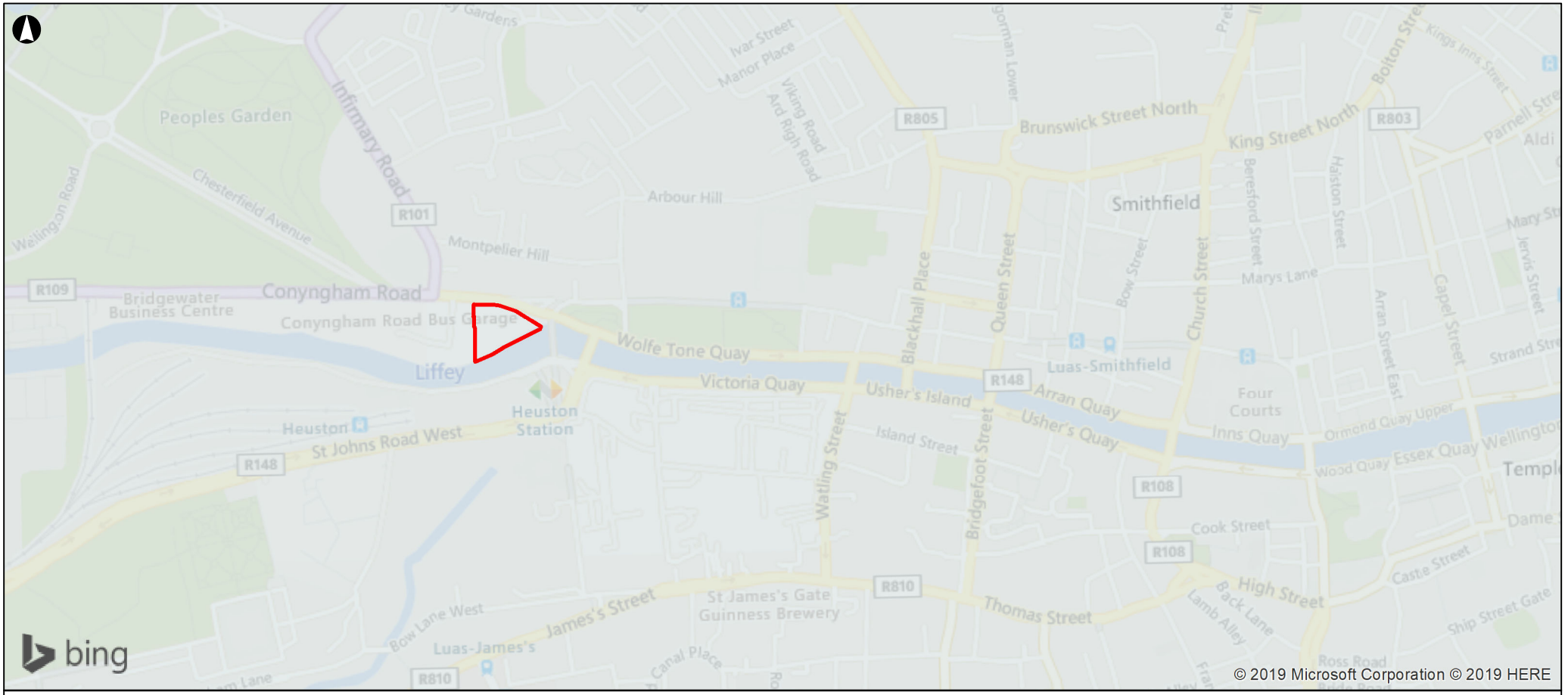
A4



Legend

Site Boundary

Site Boundary

Bedrock Units (Scale 1:100,000)

Lucan Formation

Metres

0 155 310 620

© Geological Survey Ireland

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street, Dublin 8

Drawing Title

Bedrock Geology

Scale at A4

1:10,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

009

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A4

Site Boundary

EPA Soils

Soil Type

- AlluvMIN - Mineral alluvium
- BminDW - Grey Brown Podzolics / Brown Earths Basic
- BminPD - Surface water Gleys / Ground water Gleys Basic
- BminSW - Renzinas / Lithosols
- Made Ground
- Water

Metres

0 155 310 620

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ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Regional Soils

Scale at A4

1:10,000

Role

Suitability

Preliminary

Arup Job No **265381-00**

Rev **P0**

Name

010

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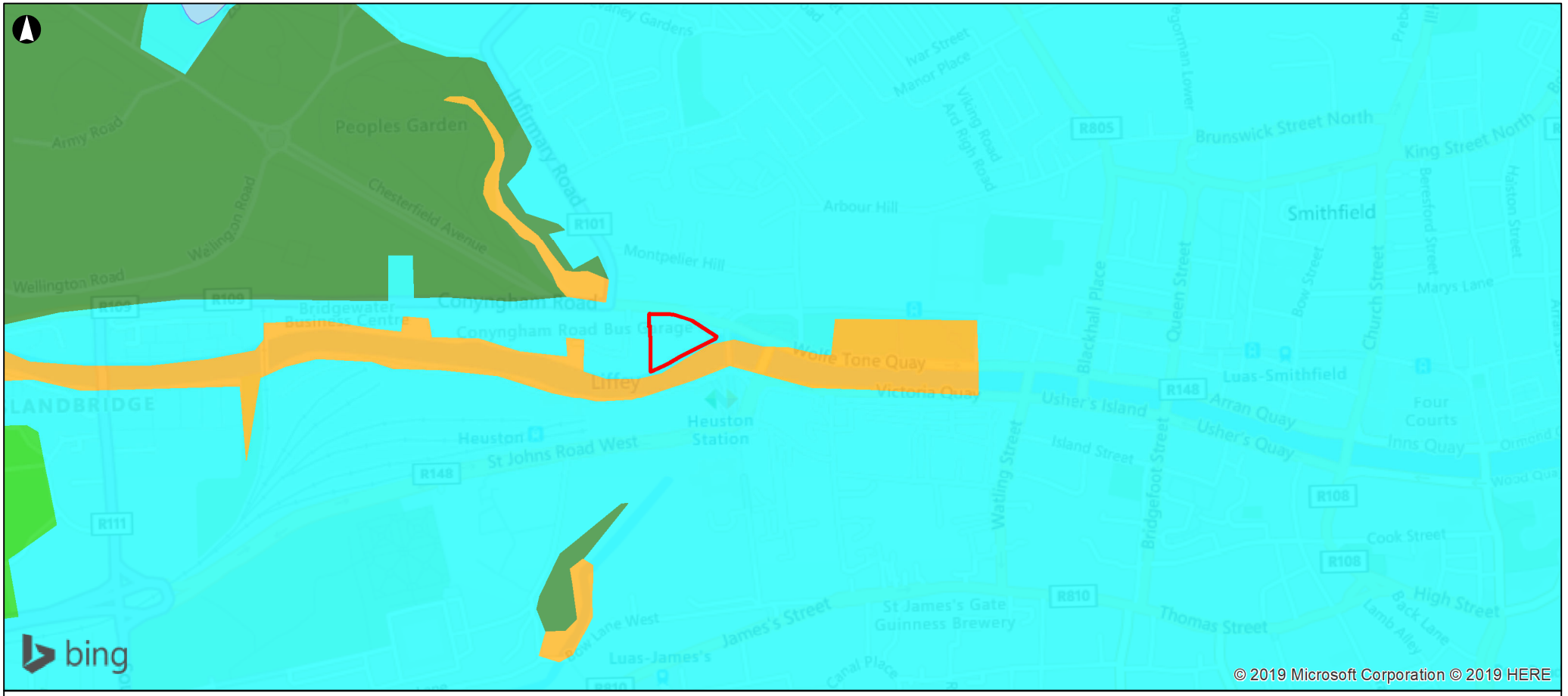

Legend

Site Boundary

EPA Subsoils

Parent Material

A - Alluvium undifferentiated gravelly

GLs - Limestone sands and gravels Carboniferous

Made ground

TLs - Limestone till Carboniferous

Water

Metres

0 155 310 620

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Drawing Title

Regional Sub-soils

Scale at A4

1:10,000

Role

Suitability

Preliminary

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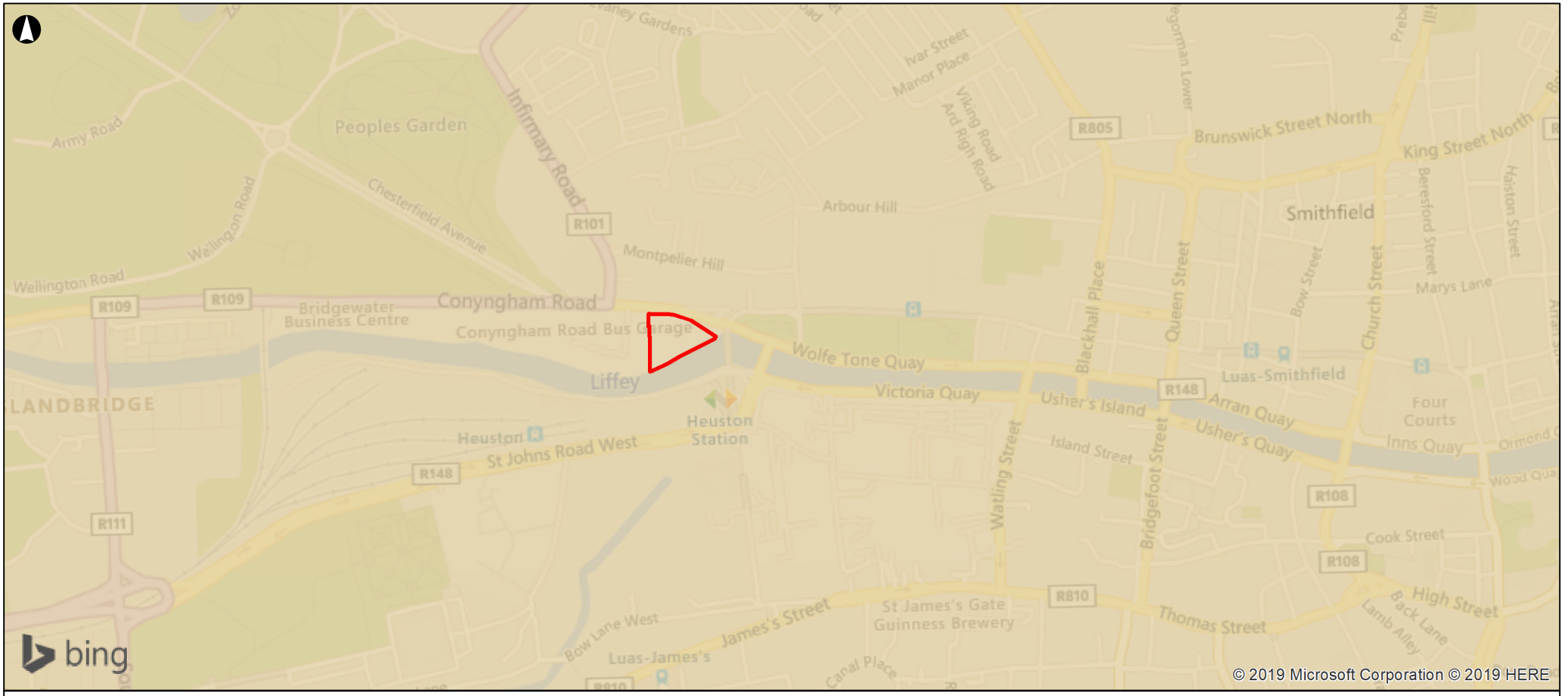

Legend

Site Boundary

Bedrock Aquifers

Aquifer Category

Locally Important Aquifer (LI)

Metres

0 155 310 620

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Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Aquife Classification

Scale at A4
1:10,000

Role

Suitability
Preliminary

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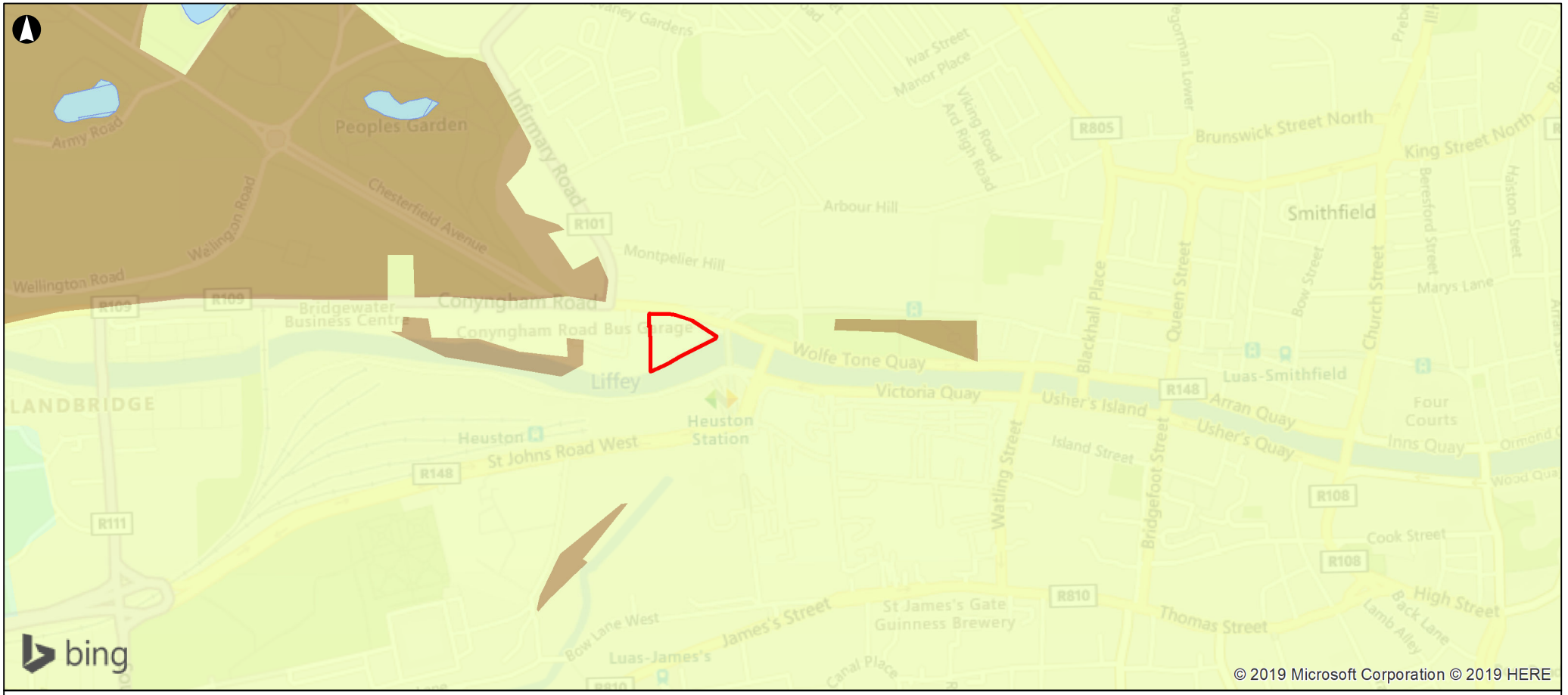

Legend

Site Boundary

National Groundwater Recharge Rates (mm/yr)

- 1-50 mm/yr
- 51-100 mm/yr
- 151-200 mm/yr
- Water

Metres

0 155 310 620

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50 Ringsend Road,
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Client
Chartered Land

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Groundwater Recharge

Scale at A4
1:10,000

Role

Suitability
Preliminary

Arup Job No
265381-00

Rev
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Name
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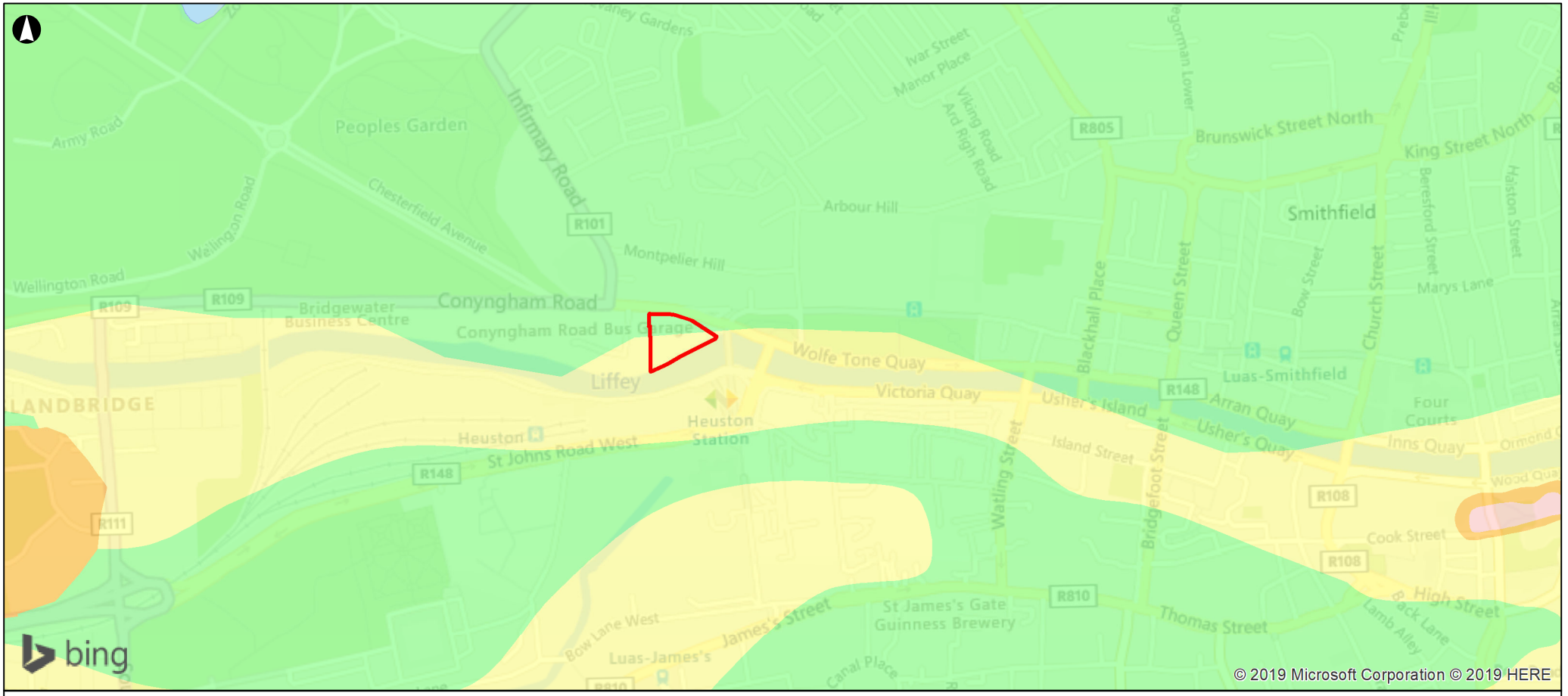

Legend

Site Boundary

Site Boundary

Aquifer Vulnerability

Extreme

High

Low

Moderate

Water

Metres

0 155 310 620

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Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Aquifer Vulnerability

Scale at A4

1:10,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

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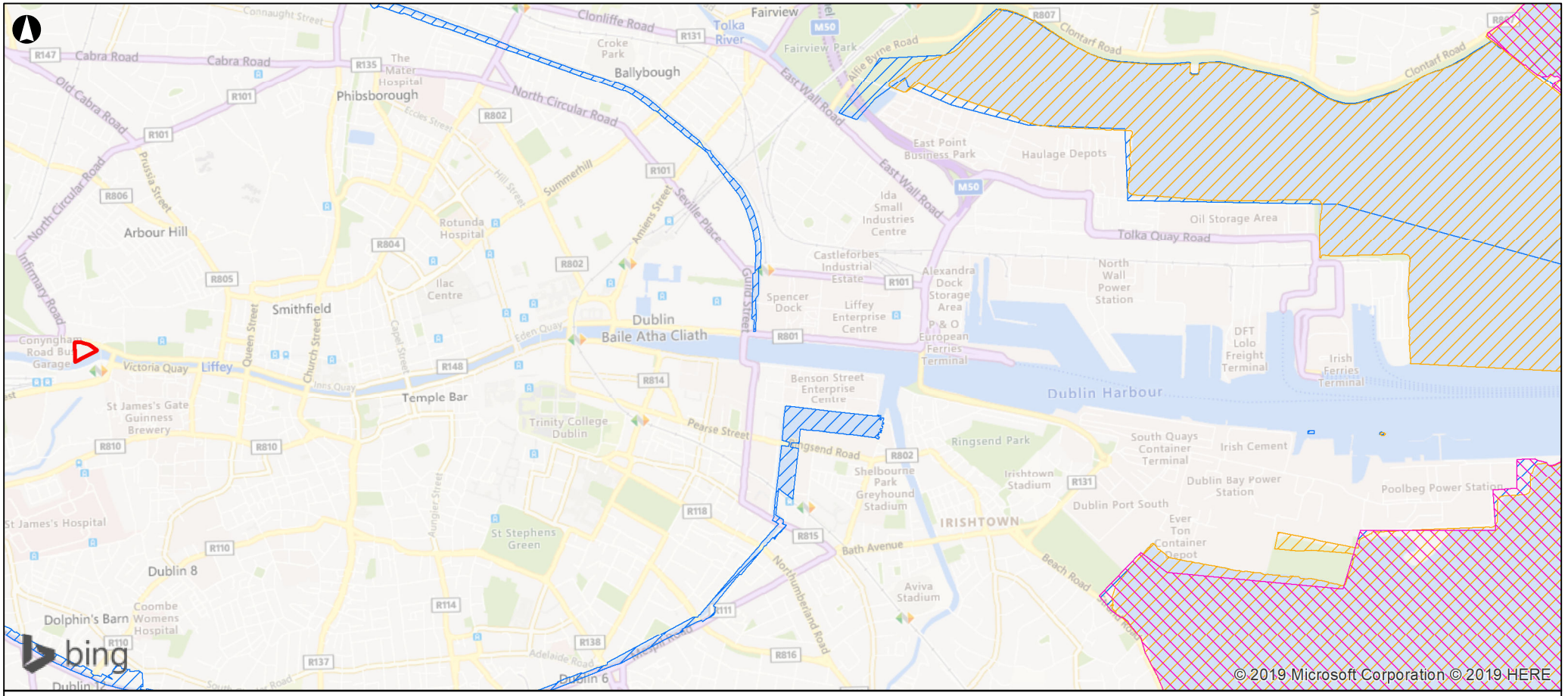

Legend

Site Boundary

Site Boundary

Special Area of Conservation (SAC)

Special Area of Conservation (SAC)

Metres

0 465 930 1,860

Special Protection Area (SPA)

Special Protection Area (SPA)

Proposed National Heritage Area (pNHA)

Proposed National Heritage Area (pNHA)

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50 Ringsend Road,
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Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Ecological Sites

Scale at A4

1:30,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

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Name

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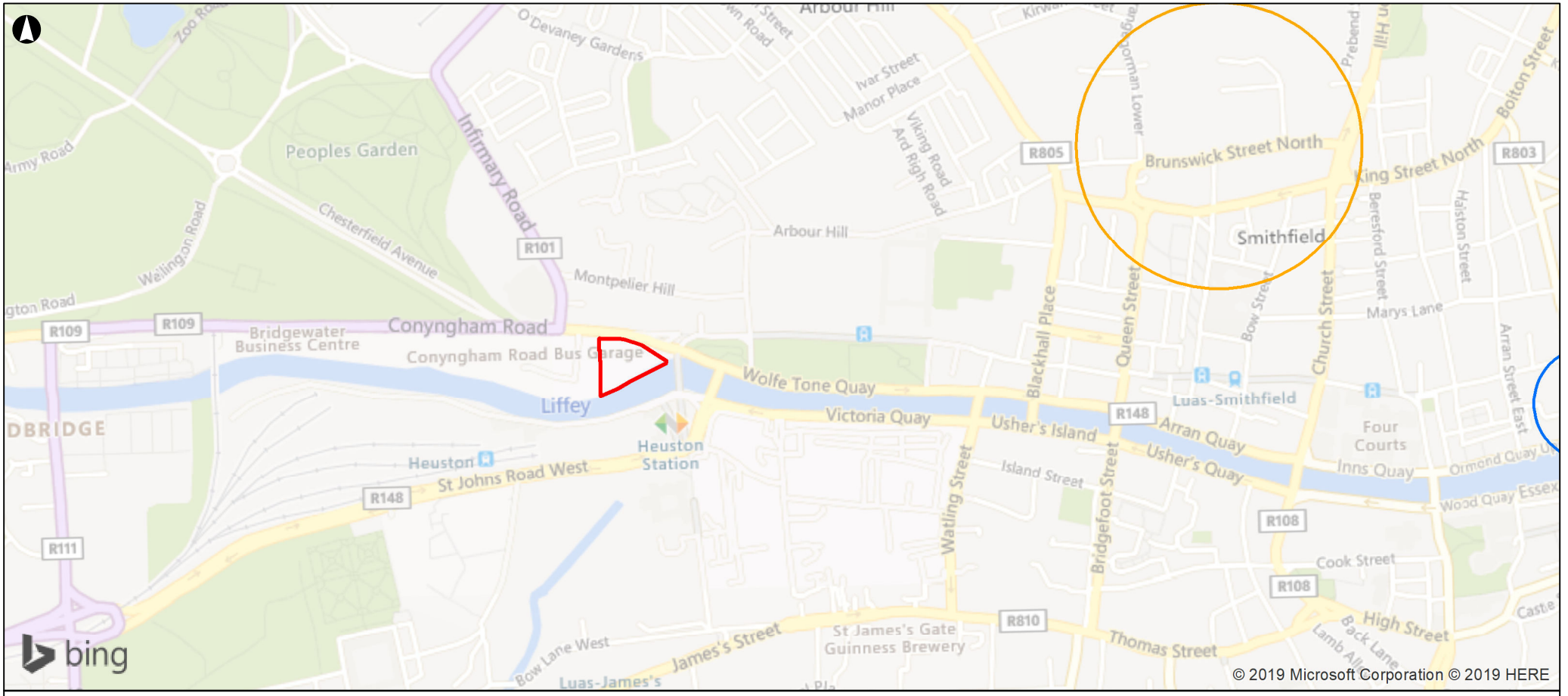

Legend

Site Boundary

Site Boundary

Wells (100-200m accuracy)

Wells (100-200m accuracy)

Metres

0 155 310 620

Wells (250-500m location accuracy)

Wells (250-500m location accuracy)

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Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Groundwater Abstraction

Scale at A4

1:10,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

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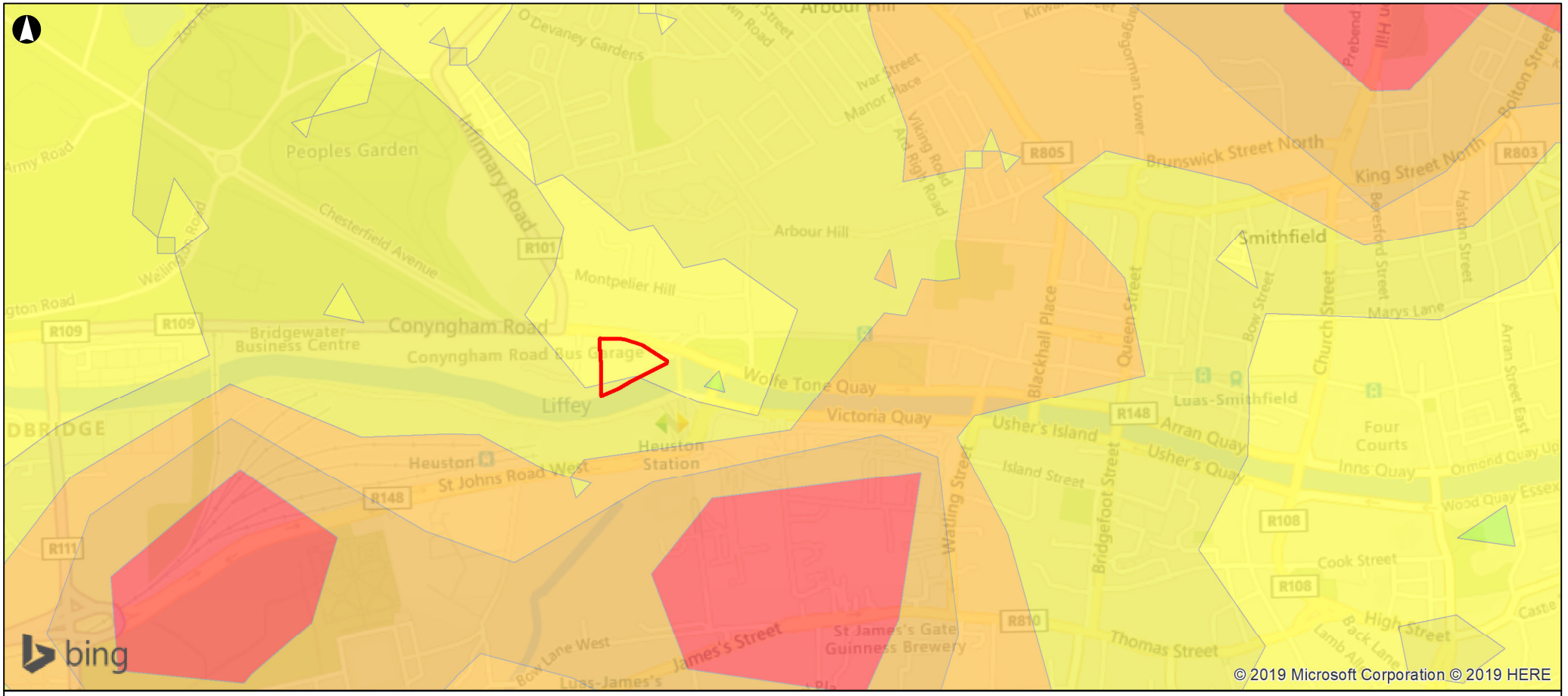

Legend

Site Boundary

Dublin Depth to Bedrock

RANGE

- 3 to 5m
- 5 to 10m
- 10 to 15m
- 15 to 20m
- 20 to 25m
- 25 to 30m

Metres

0 155 310 620

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Client
Chartered Land

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Depth to Bedrock

Scale at A4
1:10,000

Role

Suitability
Preliminary

Arup Job No
265381-00

Rev
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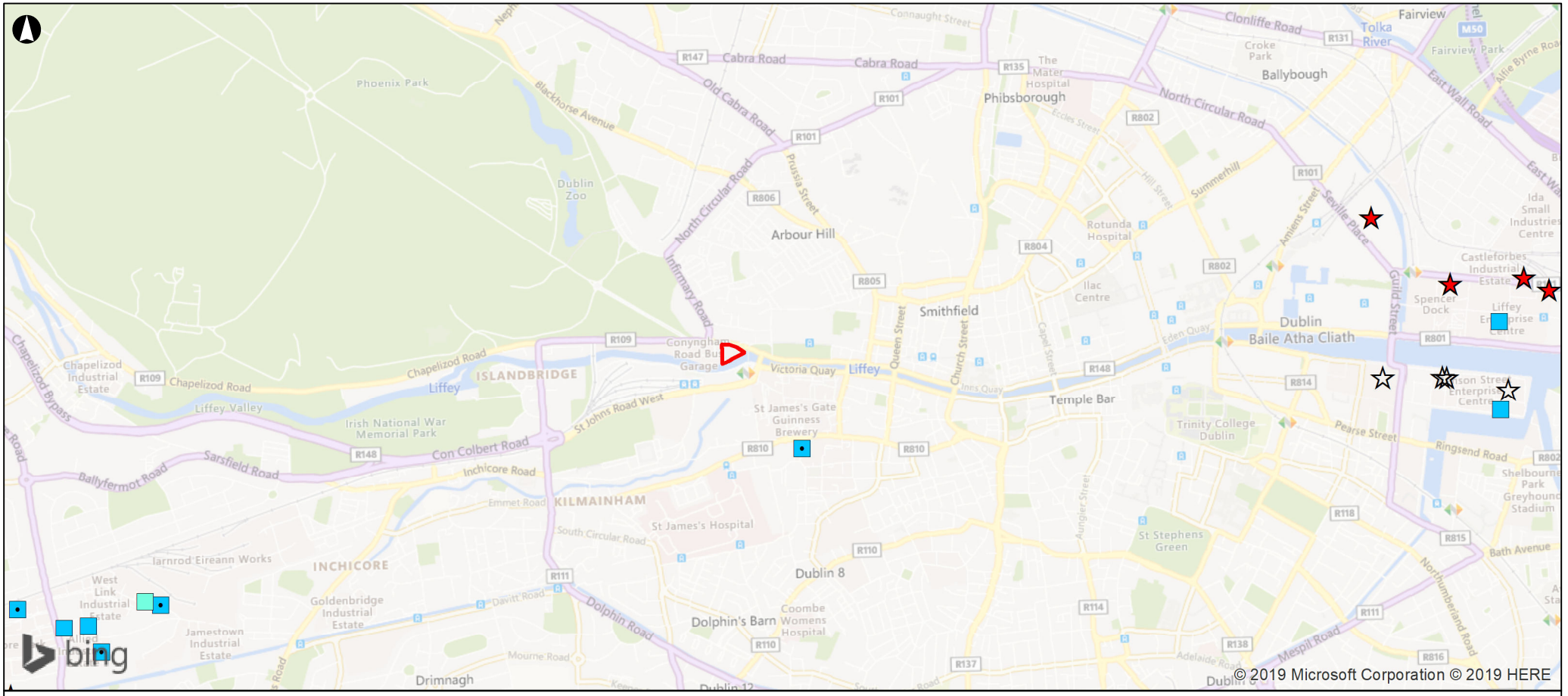

Legend

Site Boundary

Licensed Waste Facilities

Licence Status

★ Licensed

☆ Surrendered

Metres

0 465 930 1,860

Licensed IPC Facilities

Licensed

Surrendered

Licensed IPPC Facilities

Licence Status

Licensed

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P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Licensed Industrial and Waste Sites

Scale at A4

1:30,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

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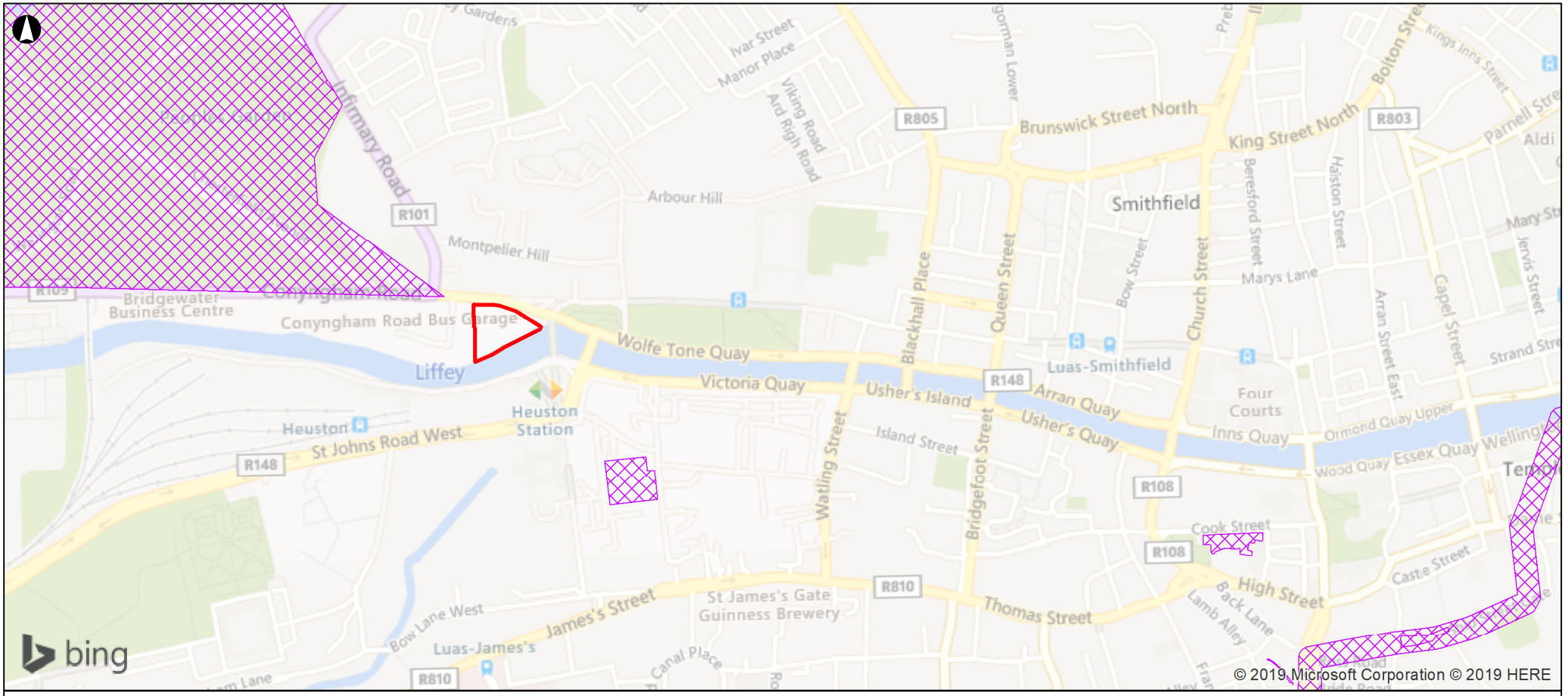

Legend

Site Boundary

Site Boundary

Sites of Geo Heritage Audited with Boundaries

Sites of Geo Heritage Audited with Boundaries

Metres

0 155 310 620

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ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Geological Heritage Sites

Scale at A4

1:10,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

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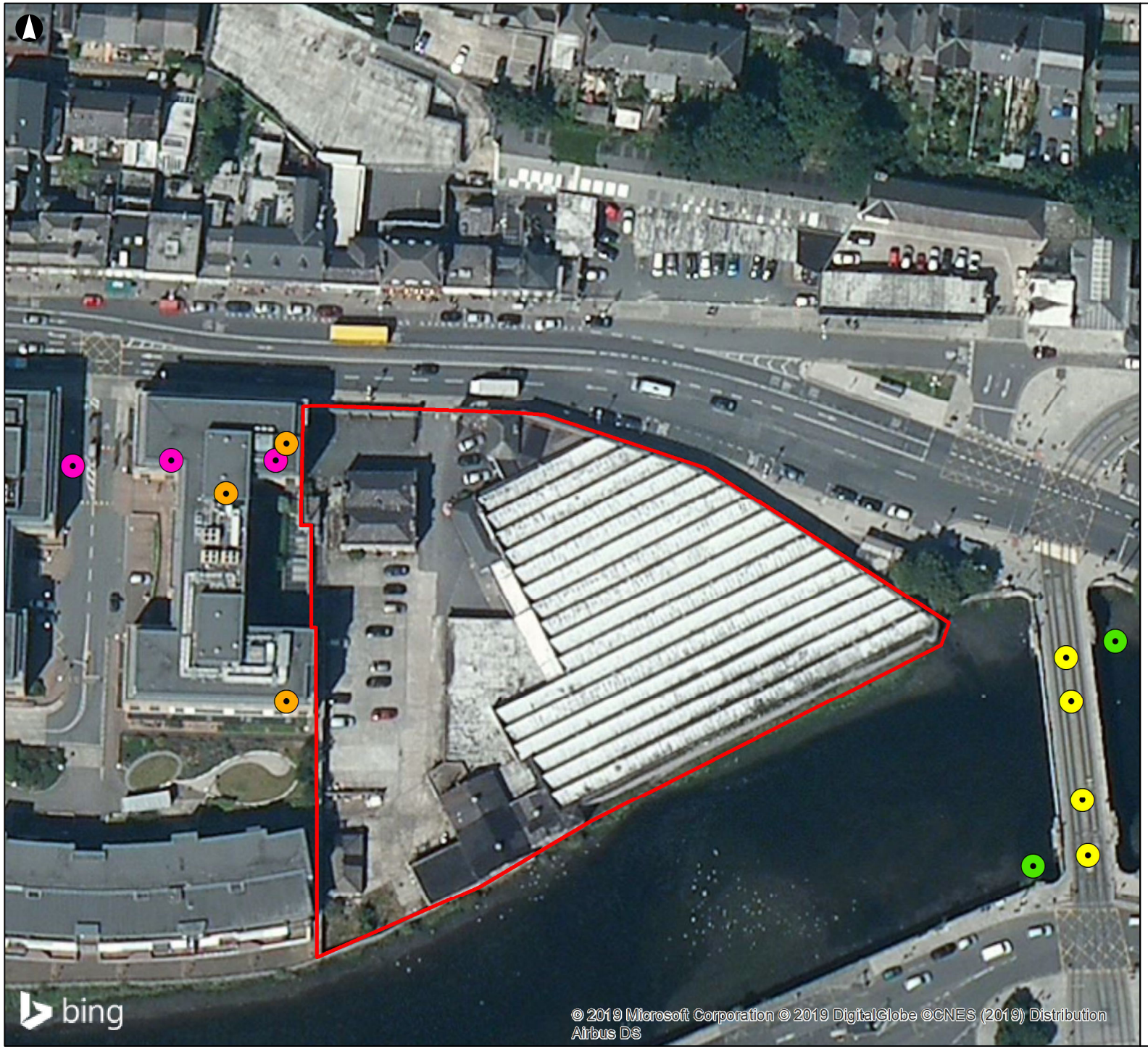

Site Boundary

GSI Boreholes

Geotechnical Report No.

- 256
- 410
- 760
- 2505

Metres

0 12.5 25 50

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Chartered Land

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street, Dublin 7

Drawing Title

National Geotechnical Borehole Database (GSI)

Scale at A4

1:1,000

Role

Suitability

Preliminary

Arup Job No **265381-00**

Rev **P0**

Name

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Appendix F

Asbestos Survey 2019

F1 Asbestos Survey 2019

Phoenix Environmental Safety Ltd.

ASBESTOS SURVEY REPORT

(Refurbishment / Demolition Survey)

Client: Delaston Limited,
C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Location: Parkgate House Site,
Parkgate Street, Dublin 8

Date: 29th March 2019

Report No. PE 19-312-V2

Phoenix
Environmental
Safety Ltd.

Graigueswood, Freshford, Co. Kilkenny
Tel: 056 8832414
Fax: 056 8832950
admin@phoenixenv.ie
www.phoenixenv.ie

Client Name: Delaston Limited, C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Property: Parkgate House Site, Parkgate Street, Dublin 8

Asbestos Survey Type: Refurbishment/Demolition Asbestos Survey

Survey Company: Phoenix Environmental Safety Ltd.

Surveyors: Jane Hickey & Andrew Hickey

Testing Laboratory: G&L Consultancy Ltd.

Date of Survey: 24th January, 23rd March & 28th March 2019

Date of Survey Report: 29th March 2019

Report issue: Draft

Signed: *Andrew Hickey* Date: 29th March 2019

This report cannot be used for contractual or engineering purposes unless this sheet is signed where indicated by Surveyor. The report must also be designated `final` on the signatory sheet.

Please note that Phoenix Environmental Safety Ltd. cannot be held responsible for the way in which the Client interprets or acts upon the results. The report must be read in its entirety including any appendices. Phoenix Environmental Safety Ltd. accepts no responsibility for sub-division of this report. All measurements in this report are approximate and therefore should not be used by the asbestos removal contractor for pricing purposes. The asbestos removal contractors should ascertain for themselves, by site measurements and inspection, the exact nature and extent of the work to be done.

The survey information should be used to help in the tendering process for removal of ACMs from the building before work starts. The survey report should be supplied by the client to designers and contractors who may be bidding for the work, so that the asbestos risks can be addressed. In this type of survey, where the asbestos is identified so that it can be removed (rather than to manage it), the survey does not normally assess the condition of the asbestos, other than to indicate areas of damage or where additional asbestos debris may be present. However, where the asbestos removal may not take place for some time, the ACMs' condition will need to be assessed and the materials managed.

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SUMMARY

Following a request made by Lafferty Architects & Project Managers, we have produced this Refurbishment/Demolition Asbestos Survey report of the Parkgate House Site, Parkgate Street, Dublin 8 with the aim of finding asbestos containing materials (ACMs) within the scope of the asbestos survey.

The scope of the asbestos survey was confined to all accessible areas of the existing factory building and an outbuilding at the rear of the site. No. 43 Parkgate Street was not surveyed as the building was unsafe to enter. All buildings on the site are due for complete demolition in the near future

During the asbestos survey of the Parkgate House Site, the following asbestos containing materials were detected in the following locations:

MAIN BUILDING – FACTORY FLOOR, OFFICES, STORES & PLANT ROOMS

- The main pitched roof area is currently covered in felt. Investigation works found natural slate debris within this void. It would be good practice to presume a small quantity of asbestos cement replacement slates may be present
- A small quantity of asbestos cement replacement slates where identified on the pitched roof areas (mainly natural slates)
- Asbestos rope seals are presumed behind the glazing bars of the north light windows on the pitched roof area over the main factory building
- Asbestos cement slates were identified on the roof over the meeting room (40 m^2 approx.)
- Asbestos containing felt was identified on the roof of Matts Workshop (80 m^2 approx.)
- Asbestos containing thermal insulation was identified on pipe work in the boiler house (10 linear meters approx.)
- Asbestos containing thermal insulation was identified on pipe work in the Sprinkler Room (7 linear meters approx.)
- Asbestos spark arrestors and rope seals were identified on older electrical equipment throughout the building
- Asbestos containing floor tiles and bitumen adhesive was identified on the main factory floor (3,200 m^2 approx.)
- Asbestos containing toilet cisterns were identified in the male toilets on the ground floor and disused toilets on the first floor (6 cisterns)

STORAGE BUILDING - REAR RIGHT-HAND SIDE

- Asbestos cement slates were identified on the roof of the rear storage building (70 m^2 approx.)
- Asbestos cement board was identified on the high-level diving wall in the rear storage building (20 m^2 approx.)
- Asbestos cement pipes were identified stored in the internal store room in the rear right-hand side storage building

PARKGATE HOUSE

- Asbestos containing thermal insulation was identified on the boiler and pipework in the external boiler room
- Asbestos rope was identified on the flue pipe joints in the external boiler room
- Asbestos cement replacement slates were identified mixed between the natural slates on the main roof

See Appendix C & F for more details

INTRODUCTION

Background

Asbestos has been used extensively in the building industry for over one hundred years and has proved to be an excellent product for a variety of uses, having many qualities such as insulation, fire and chemical resistance to name a few. Its suitability across a wide range of uses and its relatively cheap cost made it very popular, with over 3,000 different asbestos products having been recorded.

The use of asbestos containing materials (ACM's) was most prevalent between the 1950's and 1970's when it provided an economic, easy to use and versatile material. Unfortunately, given the constitution and make up of asbestos it can give rise to microscopic airborne fibres being released into the working environment. The fibres have carcinogenic properties caused by inhalation of the fibres which can get lodged in the lining of the lungs causing disease and death.

Scope & Purpose

Delaston Limited, C/O Chartered Land has commissioned Phoenix Environmental Safety Ltd. to undertake an asbestos survey of the Parkgate House Site, Parkgate Street, Dublin 8. The aim of the survey was to locate and identify the presence of asbestos containing materials (ACM's) or suspected ACM's. This report provides a record and assessment of the extent and characteristics of ACM's and is based on information made available on 24th January and the 23rd & 28th March 2019.

This particular survey comprised of a Refurbishment / Demolition Survey, carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, the Health and Safety Executive's (UK) guidance document HSG 264 (Asbestos: The Survey Guide) and HSG 227 (A Comprehensive Guide to managing Asbestos in Premises).

This means that:

- As far as reasonably practicable, locate and describe all ACM's in all reasonably accessible areas within the scope of the survey
- A sampling programme is undertaken to identify possible ACM's and estimates of the volumes and the surface areas of ACM made
- A record of the condition of the ACM's or where additional asbestos debris may be expected to be present is produced

Refurbishment / Demolition Surveys (formerly type 3 surveys)

This type of survey is necessary prior to any refurbishment (including "minor") or demolition work being carried out. These "refurbishment / demolition" surveys will be much more intrusive and destructive compared with management surveys as their intention is to locate all the ACMs so that they can be removed before the refurbishment or demolition takes place. Refurbishment/demolition surveys are required as necessary when the needs or use of the building changes and the fabric of the building will be disturbed or complex fixed plant and equipment are to be dismantled.

The purpose of the report is to:

- Enable the client to take appropriate precautions so that people who work at the Parkgate House Site during the forthcoming demolition works are not exposed to asbestos-related health risks
- Provide information to assist the client in developing and implementing an action plan before any refurbishment works or demolition is carried out

Presentation of Findings

Data Sheets

A series of data sheets have been prepared to provide assessments and recommendations for each of the locations where samples were taken. These data sheets are presented in Appendix C.

Figures

The schematic diagrams presented in Appendix F at the rear of this document shows the locations of all of the asbestos containing materials detected during the asbestos survey.

Caveats

All reasonable steps have been taken to ensure that the contents and findings of this report are true and accurate. Though as stated below, further undetected ACM's may still be present within the premises. The client should therefore be aware of his responsibilities for identifying, locating, removing and/or managing all ACM's within the premises, and for notifying the appropriate authorities where necessary.

Refurbishment / Demolition Surveys

This type of survey employs the use of destructive sampling techniques of an unfamiliar site. Although every effort is made to locate all asbestos containing materials, it is impossible to rule out the possibility that undiscovered asbestos materials may be present. If the building is to undergo major refurbishment or demolition, it is recommended that the persons carrying out the work are made aware of this and take sufficient precautions, as may be appropriate, to ensure the health and safety of their own employees and any other parties who may be affected by the works.

APPENDIX A

ASBESTOS MATERIALS IN BUILDINGS

Sprayed coatings applied in Ireland were typically a mixture of hydrated asbestos cement containing up to 85% asbestos, mainly amosite but crocidolite and mixtures have been used. Primarily used for anti-condensation and acoustic control and fire protection to structural steelwork. It is a friable material but if in a good condition and unlikely to be disturbed presents no immediate danger; however it is likely to release fibres, if disturbed especially during repair and maintenance work. As it ages the binding medium of sprayed asbestos may degrade with the consequent release of more fibres.

Thermal insulation to boilers, vessels, pipe work, valves, pumps etc also known as hand applied lagging. Lagging may have a protective covering of cloth, tape, paper, metal or a surface coating of cement. All types of asbestos may be found in lagging and the content can vary between 15 and 85% asbestos with the protective papers being up to 100% chrysotile. The likelihood of fibre release depends upon its composition, friability and state of repair, but it is particularly susceptible to damage and disturbance through maintenance work or the action of water leaks.

Asbestos insulating boards usually contain between 16 to 40% amosite, although boards may be found to contain other types of asbestos and in other quantities. Insulating boards were developed in the 1950s to provide an economical, lightweight, fire resisting insulating material. As insulation board is semi-compressed it is more likely to release fibres as a result of damage or abrasion. Work on asbestos insulation board can give rise to high levels of asbestos fibre.

Asbestos cement products as in roofing slates, wall cladding, permanent shuttering, flue, rain water and vent pipes generally contain 10 to 15% of asbestos fibre bounded in Portland cement, some flexible boards contain a small proportion of cellulose. All three types of asbestos have been used in the manufacture of asbestos cement. The asbestos fibres in asbestos cement are usually firmly bound in the cement matrix and will be released only if the material is mechanically damaged or as it deteriorates with age.

Ropes and yarns are usually high in asbestos content, approaching 100% and all three types of asbestos have been used in their manufacture. They were used as in the pipe lagging process and in pipe jointing and also for packing materials as in heat/fire resistant boiler, oven and flue sealing or anywhere thermal of fire protection was required. The risk of fibre release depends upon the structure of the material; bonded gasket material is unlikely to release asbestos but an unbonded woven material may give rise to high fibre release especially if when damaged or frayed.

Cloth thermal insulation and lagging, including fire resistant blankets, mattresses and protective curtains, gloves, aprons, overalls etc. All types of asbestos have been used in the manufacture but since the mid 60's the majority has been chrysotile, the content of which can be up to 100 %.

Millboard, paper and CAF gaskets usually have an asbestos content approaching 100% with all three types of asbestos being used in their manufacture. They were used for insulation of electrical equipment and for thermal insulation. Asbestos paper has been used as a laminate for fireproofing to various fibre panels. These materials are on some occasions not well bonded and will release asbestos fibres if subject to abrasion and wear.

Bitumen felts and coatings may contain asbestos either bound in the bitumen matrix or as an asbestos paper liner. These materials are not likely to present a hazard during normal installation or use, but should be removed and disposed of in compliance with any regulation applicable.

Thermoplastic floor tiles can contain up to 25% asbestos usually chrysotile, PVC vinyl floor tiles and unbacked PVC flooring normally 7-10% chrysotile and asbestos paper backed PVC flooring the paper backing may contain up to 100% chrysotile. Fibre release is not normally an issue but may occur when the material is cut or subjected to abrasion.

Textured coatings. Decorative coatings on walls and ceilings usually contain 3-5% chrysotile. Fibre release may occur when subjected to abrasion.

Mastics, sealants, putties and floor tile adhesives may contain small amounts of asbestos. The only possible risk is from sanding of hardened material when appropriate precautions should be taken.

Reinforced plastic and resin composites, used for toilet cisterns, seats, banisters, stair nosings, window seals, lab bench tops, brake shoes and clutches in machines. The plastics usually contain 1-10% chrysotile and were used in for example car batteries to improve the acid resistance. Resins may contain between 20 and 50% amosite, but because of its composition fibre release is likely to be low.

Asbestos Fibre Type Common

ASBESTOS FIBRE TYPE COMMON NAMES	
Chrysotile	**White Asbestos**
Amosite	**Brown Asbestos**
Crocidolite	**Blue Asbestos**
Fibrous Actinolite	**N/A**
Fibrous Anthophyllite	**N/A**
Fibrous Tremolite	**N/A**

APPENDIX B

RESULTS OF LABORATORY ANALYSIS

GRAIGUESWOOD,
FRESHFORD,
CO. KILKENNY

Phoenix Environmental Safety Ltd.

TEL: 056 8832414
FAX: 056 8832950
admin@phoenixenv.ie
www.phoenixenv.ie

ASBESTOS BULK IDENTIFICATION REPORT

Report no: PE19-163	Date of Issue: 28th January 2019

Client details:

Delaston Limited, C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Identification of asbestos content of suspected asbestos containing material stated to have been sampled from the following location/site:

Parkgate House Site, Parkgate Street, Dublin 8

No of Samples received: 17	Date of receipt of samples: 24.1.2019	Date of analysis: 28.1.2019

Methodology. Analysis of samples received was carried out in accordance with HSE Method MDHS 77/HGS 248 and documented in-house methods.
For samples received from the client and not sampled by Phoenix Environmental Safety Ltd.
This report is given in good faith on the basis of the samples and information received. Phoenix Environmental Safety Ltd. can take no responsibility for omissions, unrepresentative samples, inaccuracies or discrepancies in samples and information received.

TEST RESULTS

LAB. REF.	SAMPLE NO.	LOCATION	MATERIAL	ASBESTOS TYPE
S 01	BS 167658	Rear RHS Store – Roof	Cement slate	Chrysotile
S 02	BS 167659	Rear RHS Store - High Level Wall	Cement board	Chrysotile
S 03	BS 167660	Rear RHS Store – Debris	Cement pipes	Chrysotile + Amosite + Crocidolite
S 04	BS 167661	Rear Stores - Matts Workshop – Ceiling	Textured coating	No asbestos detected in sample
S 05	BS 167662	Boiler House – Pipework	Thermal insulation	Amosite
S 06	BS 167663	Boiler House – Pipework	Gasket	No asbestos detected in sample
S 07	BS 167664	Boiler House – Pipework	Gasket	No asbestos detected in sample
S 08	BS 167665	Pitched Roof Area – Debris	Cement slate	Chrysotile
S 09	BS 167666	Pitched Roof Area	Felt	No asbestos detected in sample
S 10	BS 167667	Meeting Room – Roof	Cement slate	Chrysotile
S 11	BS 167668	Sprinkler Room – Pipework	Thermal insulation	Chrysotile
S 12	BS 167669	Rear Store - Electrical Equipment – Spark Arrestor	Textile	Chrysotile
S 13	BS 167670	Rear Stores - Electrical Equipment - Doors	Rope	No asbestos detected in sample
S 14	BS 167671	Main Warehouse - Rear RHS	Floor tile & adhesive	Chrysotile
S 15	BS 167672	Main Warehouse - Far LHS	Floor tile & adhesive	Chrysotile
S 16	BS 167673	Warehouse - Front Area	Floor tile & adhesive	Chrysotile
S 17	BS 167674	Male W/C	Toilet cistern	Amosite

LABORATORY ANALYST	G&L Consultancy Ltd.	DATE:	28th January 2019

GRAIGUESWOOD,
FRESHFORD,
CO. KILKENNY

Phoenix Environmental Safety Ltd.

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ASBESTOS BULK IDENTIFICATION REPORT

Report no: PE19-297	Date of Issue: 26th March 2019

Client details:

Delaston Limited, C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Identification of asbestos content of suspected asbestos containing material stated to have been sampled from the following location/site:

Parkgate House Site, Parkgate Street, Dublin 8

No of Samples received: 14	Date of receipt of samples: 26.3.2019	Date of analysis: 26.3.2019

Methodology. Analysis of samples received was carried out in accordance with HSE Method MDHS 77/HGS 248 and documented in-house methods.
For samples received from the client and not sampled by Phoenix Environmental Safety Ltd.
This report is given in good faith on the basis of the samples and information received. Phoenix Environmental Safety Ltd. can take no responsibility for omissions, unrepresentative samples, inaccuracies or discrepancies in samples and information received.

TEST RESULTS

LAB. REF.	SAMPLE NO.	LOCATION	MATERIAL	ASBESTOS TYPE
S 01	BS 169201	X2	Felt	No asbestos detected in sample
S 02	BS 169202	Pitched slated roof beside main pitched felted roof (replacement slate)	Cement Slate	Chrysotile & Crocidolite
S 03	BS 169203	X3	Felt	No asbestos detected in sample
S 04	BS 169204	X5	Felt	No asbestos detected in sample
S 05	BS 169205	X6	Felt	No asbestos detected in sample
S 06	BS 169206	X7	Felt	No asbestos detected in sample
S 07	BS 169207	X8	Felt	No asbestos detected in sample
S 08	BS 169208	X9	Felt	No asbestos detected in sample
S 09	BS 169209	X10	Felt	No asbestos detected in sample
S 10	BS 169210	X11	Felt	No asbestos detected in sample
S 11	BS 169211	Flat roof at X12 (debris)	Cement slate	Chrysotile
S 12	BS 169212	X13	Felt	Chrysotile
S 13	BS 169213	Parkgate House – Main roof (replacement slate)	Cement slate	Chrysotile
S 14	BS 169214	Parkgate House – Boiler house – Boiler	Rope	No asbestos detected in sample

LABORATORY ANALYST	G&L Consultancy Ltd.	DATE:	26th March 2019

GRAIGUESWOOD,
FRESHFORD,
CO. KILKENNY

Phoenix Environmental Safety Ltd.

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ASBESTOS BULK IDENTIFICATION REPORT

Report no: PE19-312	Date of Issue: 29th March 2019

Client details:

Delaston Limited, C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Identification of asbestos content of suspected asbestos containing material stated to have been sampled from the following location/site:

Parkgate House Site, Parkgate Street, Dublin 8

No of Samples received: 3	Date of receipt of samples: 28.3.2019	Date of analysis: 29.3.2019

Methodology. Analysis of samples received was carried out in accordance with HSE Method MDHS 77/HGS 248 and documented in-house methods.

For samples received from the client and not sampled by Phoenix Environmental Safety Ltd.

This report is given in good faith on the basis of the samples and information received. Phoenix Environmental Safety Ltd. can take no responsibility for omissions, unrepresentative samples, inaccuracies or discrepancies in samples and information received.

TEST RESULTS

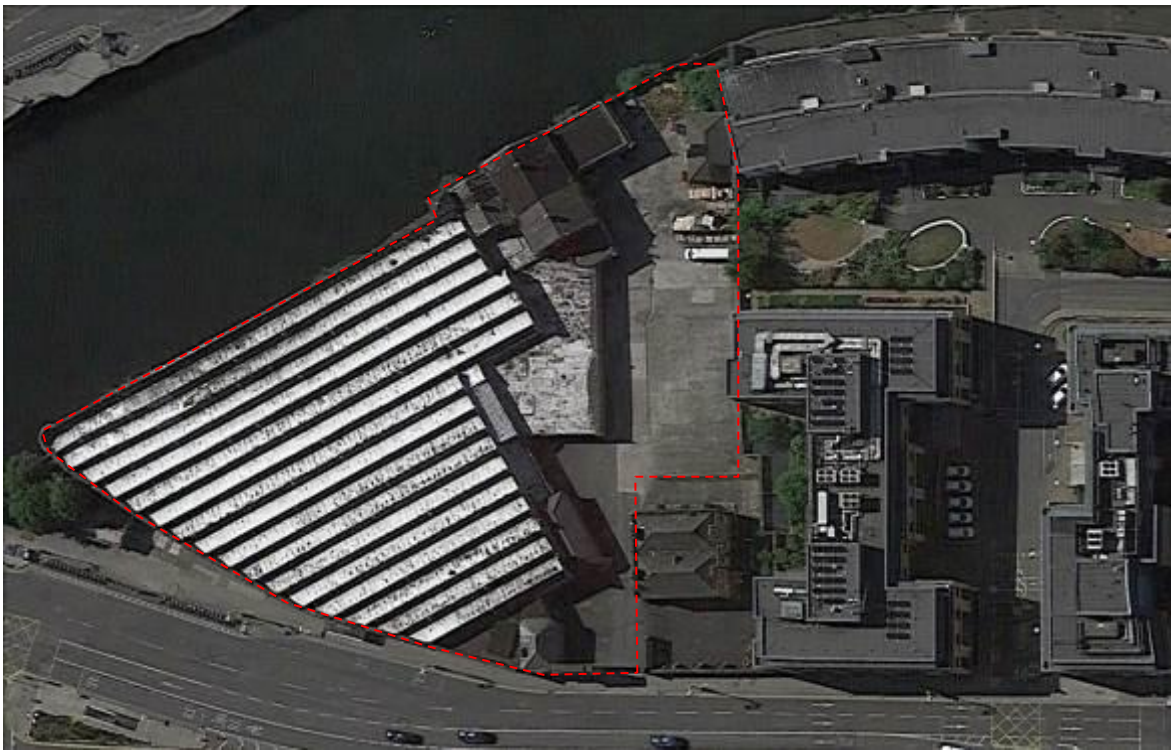
LAB. REF.	SAMPLE NO.	LOCATION	MATERIAL	ASBESTOS TYPE
S 01	BS 169304	Parkgate House – Boiler room - Boiler	Thermal insulation	Amosite
S 02	BS 169305	Parkgate House – Boiler room – pipework over boiler	Thermal insulation	Amosite
S 03	BS 169306	Parkgate House – Boiler room – Boiler flue	Rope	Chrysotile

LABORATORY ANALYST	G&L Consultancy Ltd.	DATE:	26th March 2019

APPENDIX C

ASBESTOS DATA SHEETS

Parkgate House Site, Parkgate Street, Dublin 8



PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory
Location	Pitched roof area
Extent/ Amount	Not quantified

Survey Date	24.1.2019	Sample No.	BS 167665
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement slate debris	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed & sealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement slate debris & replacement slates identified around the main pitched roof area contains Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The pitched roof area is currently covered in felt and it is possible that some asbestos cement replacement slates may be present between the felt and the timber lining board as natural slates can be found in this void. If cement slates are identified, they should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

DETAIL OF THE ASBESTOS CEMENT REPLACEMENT SLATES & DEBRIS

Natural slates present in the void between the felted roof and the lining boards beneath

View of the lining boards under the felted pitched roof

DETAIL OF THE ASBESTOS CEMENT REPLACEMENT SLATES & DEBRIS

Cement replacement slates identified on the rear roof beside the main pitched roof

Cement slates identified on the flat roof area

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory
Location	North light windows
Extent/ Amount	Not quantified

Survey Date	24.1.2019	Sample No.	N/A
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Rope seal (presumed)	Normal occupant activity	N/A
Extent of damage	Unknown	Likelihood of disturbance	N/A
Surface treatment	Sealed	Human exposure potential	N/A
Asbestos type	Chrysotile (presumed)	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

Asbestos rope seals are presumed behind the glazing bars of the north light windows on the pitched roof area over the main factory. Asbestos rope seals contain up to 100% asbestos fibres.

The asbestos rope seals are usually sealed between the glass and the glazing bars. The north light windows should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence. The windows should be sampled as soon as they have been removed

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Meeting room
Location	Roof
Extent/ Amount	40 m² approx.

Survey Date	24.1.2019	Sample No.	BS 167667
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement slates	Normal occupant activity	N/A
Extent of damage	Medium damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement slates identified on the roof over the meeting room contain Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement slates should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Boiler room
Location	Pipe work
Extent/ Amount	10 linear meters approx.

Survey Date	24.1.2019	Sample No.	BS 167662
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Thermal insulation	Normal occupant activity	N/A
Extent of damage	High	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Amosite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The thermal insulation identified on the pipe work in the main boiler house contains Amosite (brown) asbestos fibres. Thermal insulation can contain between 15 and 85% asbestos fibres

The asbestos thermal insulation should be removed under controlled conditions by a specialist asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Sprinkler room
Location	Pipe work
Extent/ Amount	7 linear meters approx.

Survey Date	24.1.2019	Sample No.	BS 167668
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Thermal insulation	Normal occupant activity	N/A
Extent of damage	High	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Amosite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The thermal insulation identified on the pipe work in the sprinkler room contains Amosite (brown) asbestos fibres. Thermal insulation can contain between 15 and 85% asbestos fibres

The asbestos thermal insulation should be removed under controlled conditions by a specialist asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory
Location	Electrical equipment
Extent/ Amount	Not quantified

Survey Date	24.1.2019	Sample No.	BS 167669
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Textile	Normal occupant activity	N/A
Extent of damage	Medium	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The textile spark arrestors and rope seals identified on the older electrical equipment throughout the main factory building contains Chrysotile (white) asbestos fibres. Asbestos textiles and rope seals contain up to 100% asbestos fibres

The textile spark arrestors and rope seals should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory
Location	Floor areas
Extent/ Amount	3,200 m² approx.

Survey Date	24.1.2019	Sample No.	BS 167671
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

MATERIAL ASSESSMENT		PRIORITY ASSESSMENT	
Product type	Floor tiles and adhesive	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Composite material	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A	

CONCLUSIONS AND RECOMMENDATIONS

The floor tiles and bitumen adhesive identified throughout the main factory floor contain Chrysotile (white) asbestos fibres. Thermoplastic floor tiles can contain up to 25% asbestos fibres, usually Chrysotile. Bitumen adhesives contain a small quantity of asbestos fibres

The floor tiles and bitumen adhesive should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory building
Location	Male W/C and 1st floor W/C
Extent/ Amount	6 cisterns

Survey Date	24.1.2019	Sample No.	BS 167674
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Toilet cisterns	Normal occupant activity	N/A
Extent of damage	Low damage	Likelihood of disturbance	N/A
Surface treatment	Composite material	Human exposure potential	N/A
Asbestos type	Amosite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The toilet cisterns identified in the ground floor male W/C and 1st floor disused W/C contain Amosite (brown) asbestos fibres. Resins products may contain between 20 and 50% asbestos fibres

The asbestos containing toilet cisterns should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-297
Building Ref.	Matt's Workshop
Location	Roof
Extent/ Amount	80 m² approx.

Survey Date	23.3.2019	Sample No.	BS 169212
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Felt	Normal occupant activity	N/A
Extent of damage	Medium damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The felt identified on the roof of Matt's Workshop contains Chrysotile (white) asbestos fibres. Asbestos felt contains small quantities of asbestos fibres

The felt should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Rear RHS Storage building
Location	Roof
Extent/ Amount	70 m² approx.

Survey Date	24.1.2019	Sample No.	BS 167658
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement slates	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement slates identified on the roof of the rear RHS storage shed contain Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement slates should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Rear RHS Storage building
Location	High-level internal wall
Extent/ Amount	20 m² approx.

Survey Date	24.1.2019	Sample No.	BS 167659
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

MATERIAL ASSESSMENT		PRIORITY ASSESSMENT	
Product type	Cement board	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A	

CONCLUSIONS AND RECOMMENDATIONS

The cement board identified on the high-level wall in the rear RHS storage shed contains Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement board should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Rear RHS Storage building
Location	Stored internally
Extent/ Amount	Not quantified

Survey Date	24.1.2019	Sample No.	BS 167660
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

MATERIAL ASSESSMENT		PRIORITY ASSESSMENT	
Product type	Cement pipes	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile + Amosite + Crocidolite	Maintenance activity	N/A
Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A	

CONCLUSIONS AND RECOMMENDATIONS

The cement pipes identified in the store room in the rear RHS storage shed contain Chrysotile (white), Amosite (brown) and Crocidolite (blue) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement pipes should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Andrew Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-312
Building Ref.	Parkgate House
Location	External Boiler Room
Extent/ Amount	Not quantified

Survey Date	28.3.2019	Sample No.	BS 169304
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Thermal insulation	Normal occupant activity	N/A
Extent of damage	High	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Amosite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The thermal insulation identified on the boiler and pipework over the boiler unit in the external boiler room of Parkgate House contains Amosite (brown) asbestos fibres. Thermal insulation can contain between 15 and 85% asbestos fibres

The asbestos thermal insulation should be removed under controlled conditions by a specialist asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Andrew Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-312
Building Ref.	Parkgate House
Location	External Boiler Room
Extent/ Amount	Not quantified

Survey Date	28.3.2019	Sample No.	BS 169306
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

MATERIAL ASSESSMENT		PRIORITY ASSESSMENT	
Product type	Rope	Normal occupant activity	N/A
Extent of damage	Medium	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
Material assessment score: N/A		TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The rope seals identified around the joints in the flue pipe in the external boiler room of Parkgate House contains Chrysotile (white) asbestos fibres. Asbestos textiles and rope seals contain up to 100% asbestos fibres

The rope seals should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Andrew Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-297
Building Ref.	Parkgate House
Location	Roof area
Extent/ Amount	Small amounts

Survey Date	23.3.2019	Sample No.	BS 169213
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement slate	Normal occupant activity	N/A
Extent of damage	Medium damage	Likelihood of disturbance	N/A
Surface treatment	None	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement replacement slates identified on the main roof of Parkgate House contains Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement slates should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

APPENDIX D

NON ASBESTOS CONTAINING MATERIALS

Felt on main pitched roof. No Asbestos Containing Materials (ACM's) detected

Natural slates on some rear roofs. No ACM's detected

NON ASBESTOS CONTAINING MATERIALS

Plasterboard ceiling boards under main pitched roof. No ACM's detected

Plasterboard ceilings in sprinkler room. No ACM's detected

APPENDIX E

NON ACCESSIBLE LOCATIONS

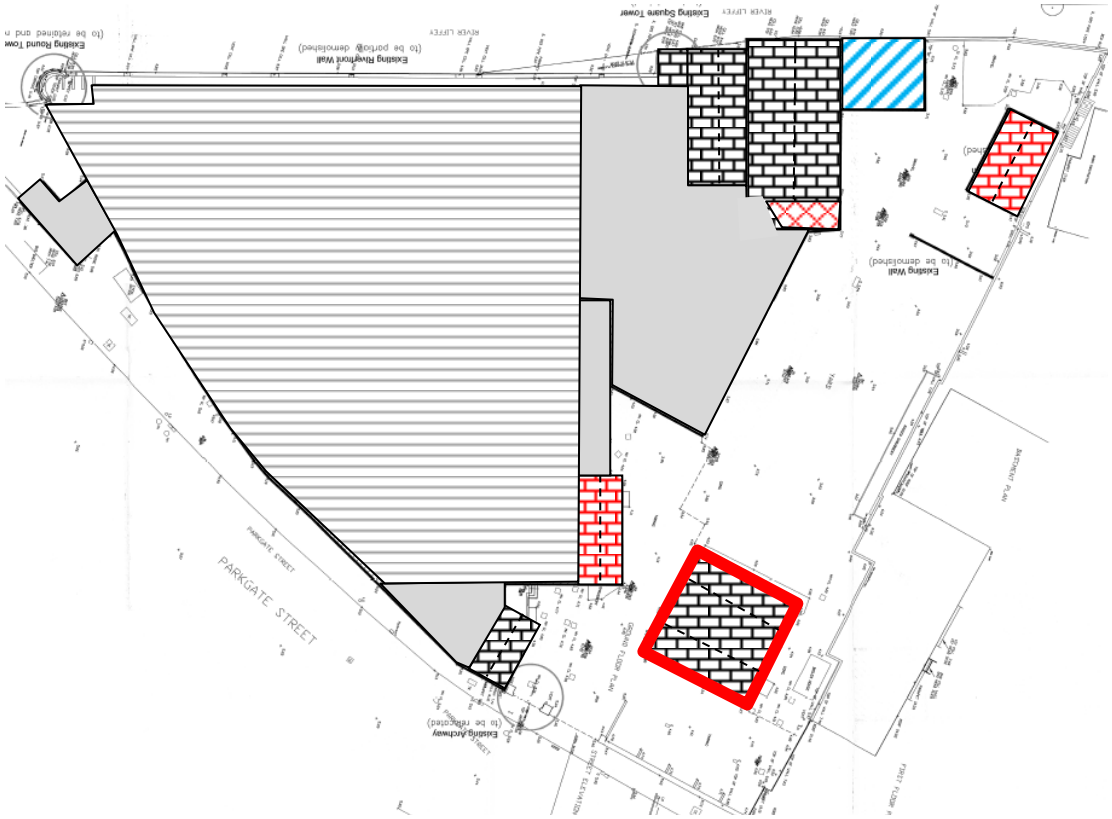
- The buildings were live and in use during the asbestos survey and intrusive surveying and sampling was curtailed in some areas. Some areas could not be inspected thoroughly such as office areas and meeting rooms
- Parkgate House was not surveyed – unsafe structure
- The ESB substation building was not surveyed
- No inspection of live electrical or mechanical plant or similar requiring the attendance of a specialist engineer was carried out
- No inspection of any areas requiring specialist access equipment other than telescopic ladder was carried out
- All contractors working on the site should always remain vigilant to the possibility that concealed asbestos containing materials may be present on site. If any suspect asbestos containing materials are uncovered during the course of the work, works must stop in that area and the suspect material should be sampled and analysed immediately for the presence of asbestos

APPENDIX F

FLOOR PLANS & LOCATION OF ASBESTOS CONTAINING MATERIALS

Schematic diagram only Not to scale 29th March 2019	Parkgate House Site, Parkgate Street, Dublin 8

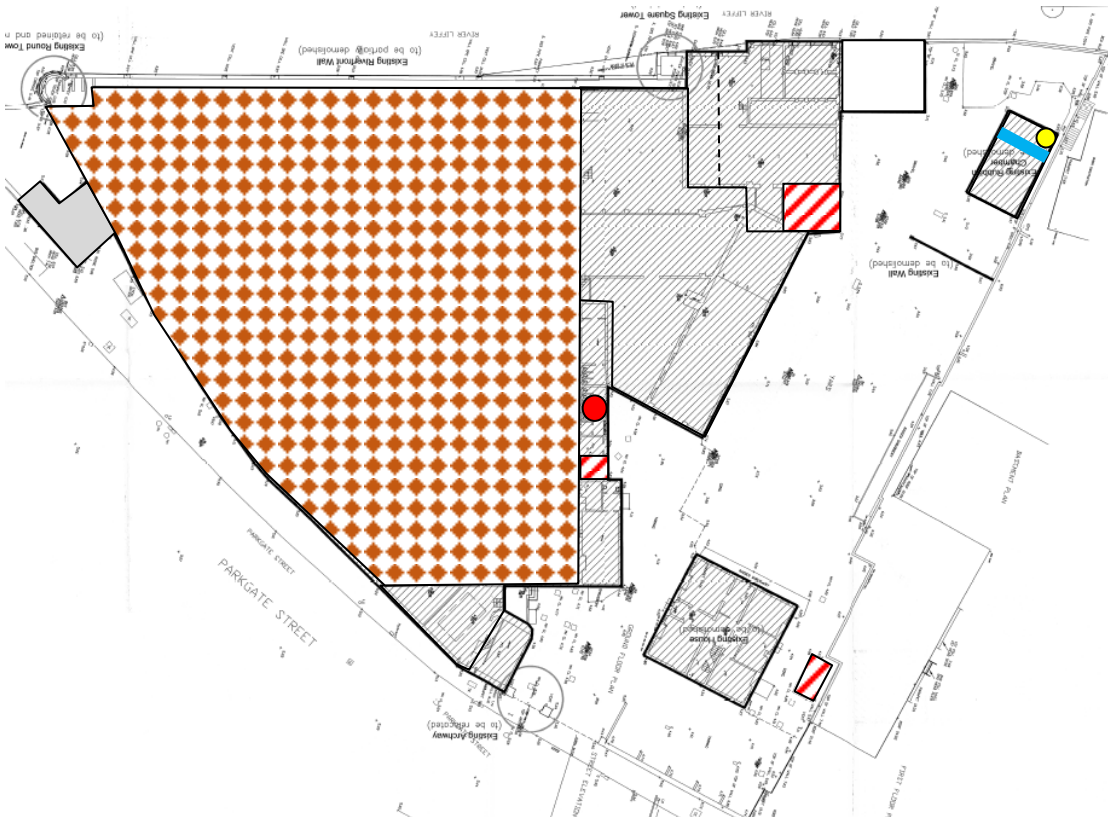
ROOF PLAN



	Areas where asbestos cement slates were identified
	Area where asbestos containing felt was identified
	Area where loose asbestos cement slates were identified
	Areas where asbestos cement replacement slates were identified (mainly natural slates on roof)
	Area with no safe internal access

Schematic diagram only Not to scale 29th January 2019	Parkgate House Site, Parkgate Street, Dublin 8

FLOOR PLAN



	Area where asbestos floor tiles and bitumen adhesive was identified
	Area where asbestos thermal insulation was identified
	Area where asbestos cement board was identified
	Area where asbestos cement pipes were identified
	Area where asbestos toilet cisterns were identified (ground & first floor)
	Note: asbestos textiles and rope were identified in older electrical & boiler equipment throughout