

Bradford Road, Manchester (Site code 0049)

Controlled Waters Gas Holder Infill
Acceptance Criteria

National Grid Property Holdings Limited

July 2022

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1. Introduction

1.1. General

Atkins Limited (Atkins) was commissioned by National Grid Property Holdings (NGPH) to establish Infill Assessment Criteria (IAC) for the infilling of a single below ground gas holder (Gas holder No. 2) following planned dismantling works at Bradford Road, Miles Platting, Manchester, M40 7BN (0049) herein referred to as 'the site'. A site location plan is presented as Figure 1.

This document presents the findings of the infill assessment, which has been produced in accordance with Atkins' offer of services, dated 22nd February 2022 and the NGPH Core Specification [1].

At this stage it is not known what material is to be used to infill the gas holders. Consequently, this assessment aims to develop Infill Acceptance Criteria (IAC) to facilitate the selection of appropriate infill material.

1.2. Background

The site is located off Bradford Road, Miles Platting, Manchester, M40 7BN and covers an area of approximately 2.5 hectares (ha). The site is owned by NGPH with a small area of land in the south leased to Cadent Gas Limited (CGL) which for the purposes of this assessment is considered off-site. No remediation is known to have been progressed on-site to date.

The site currently comprises a disused below ground gas holder, located in the north section of the site and measuring approximately 87 m in diameter. The land leased to CGL comprises a High-Pressure Compound.

Mapping indicates the site was historically associated with a larger gasworks complex extending to the east and south. Anecdotal information presented in previous reports made available to Atkins indicates the immediate off-site areas to the east and south currently comprising the Sports City Car Park were subject to remediation in the early 2000's.

1.3. Previous Reports

Intrusive investigative work has not been progressed for this offer of services. This report relies upon data provided in third party reporting that has been made available to Atkins. Reports reviewed as part of this assessment are listed below:

- Parkman, 1996, Ground Investigation at the Former Bradford Road Gasworks [2];
- Parkman-1996-Summary Review of Former Bradford Road Gasworks Site Manchester [3];
- WSP-2003-Factual Site Investigation Report-Surplus Land and Holder Site-Bradford Road-Manchester [4];
- WYG-2014-Ground Investigation Factual Report NGP Land-Bradford Road-Manchester [5];
- WYG-2017-Factual Preliminary Dismantling Assessment for Gasholder No. 2-Bradford Road Gasholder Station-Manchester [6];

1.4. Scope and Objectives

The primary objective of this report is to establish appropriate Infill Assessment Criteria (IAC) for material used in the infill of the below ground gas holder on site, such that it does not pose an unacceptable risk to controlled waters receptors. The assessment has been completed for proposed imported material only, as it is understood that there is no material present on site proposed for re-use.

In summary, the scope of this work comprises the following:

- modelling of determinant fate and transport processes; and
- derivation of site-specific gas holder IAC.

Material proposed to be managed under the Waste & Resources Action Programme (WRAP) protocol does not require risk-based assessment. Infill criteria for WRAP material may be developed

from a due diligence perspective, but are not required for protection of controlled waters as the product is already deemed inert as part of the WRAP process.

IAC developed within this DQRA have been done in line with CL:AIRE DoWCoP to support the proposed importation of natural infill material and its suitability for use within the on-site gas holder.

1.5. Assumptions and Limitations

In line with the scope presented in Section 1.3 the assumptions and limitations of this report are as follows:

- assessing risks to controlled waters from any other potential sources of contamination on the site are outside of the scope of this report;
- consideration of human health or geotechnical suitability of infill material is outside the scope of this report, considerations for these will be made during the works via the project works information package to be provided to contractors;
- the criteria produced for this report are specific to the site setting and environmental conditions at this site and criteria may vary at other gas holder sites;
- understanding of the ground conditions has been developed based on the findings of published geology, third-party ground investigations and investigations carried out by Atkins; the sources and the accuracy of the data provided by third parties are assumed to be correct and have not been verified by Atkins as a part of this report;
- at this stage, it is not known what materials are to be used to infill the gas holders. Therefore, where appropriate, this assessment has assumed conservative values for the infill material. When specific infill materials have been selected, a review should be undertaken to ensure that the IAC are appropriate for the material source and type with respect to both the physical parameters used in this assessment and the range of determinands which have been evaluated;
- the infilling of the gas holder, including the selection of appropriate infill material will be carried out in line with National Grid's core specification; and
- the assessment has assumed for the purposes of developing IAC, which ensure that the future activities carried out at the site will not pose a risk to controlled waters, that the material used to infill the tank is a potential ongoing source and that the gas holder walls and base do not provide any restriction to migration of leachate and/or groundwater.

2. Site Setting

2.1. Site Setting

A summary of the site status is presented in Table 2-1.

Table 2-1 - Summary of site setting

Site name	Bradford Road, Miles Platting, Manchester Site code 0049
Site details	Site address: Bradford Road, Miles Platting, Manchester, M40 7BN. NGPH Site code: 0049 Ordnance Survey (OS) Grid Reference: 386246, 398936. Site area: 2.50 ha A site location plan is provided as Figure 1.
Site ownership and occupation	The site is owned by NGPH. The site is a rectangularly shaped parcel in the north before elongating and narrowing in the south, A layout plan is provided as Figure 2. An area of land encapsulated by the NGPH site and situated in the south of the site is leased to Cadent Gas Limited (CGL). The site currently comprises a disused below ground gas holder, located in the northern site area. The land leased to CGL comprises high pressure gas compound.
History and structures	The site was historically associated with a larger gasworks complex, which extended to the south and east of the current boundary. A single, disused, below ground gas holder (Gas holder No. 2), which is approximately 87 m in diameter is located in the northern section of the site. The base of the gas holder is located at approximately 15.80 m below ground level (bgl). The gasworks operations ceased in the 1970's, after which the majority of above ground structures / plant were removed. Historical gasworks facilities present on-site included the gas holder, a siphon pit, railway sidings and boiler house in the north and a coke office, railway, retort houses, coal bunkers and mess rooms in the south. Atkins understand the off-site area previously comprising the wider gasworks site to the east and south was subject to remediation [5] and redevelopment in the early 2000's to accommodate the Sports City Car Park. Historical features are shown on Figure 3. No remediation is known to have been undertaken on-site to date.
Description of ground cover	Ground cover comprises approximately 65% hardstanding (25% gas holder, 40% hardstanding / tarmac) and 35% soft (15% gravel surfacing and 20% rough vegetation).
Adjacent land uses	The site is located within an area of mixed land use as summarised below: North: The A6010 is adjacent to the site with light industrial commercial properties and the Phillips Park Cemetery further afield. East: The Sports City Car Park is adjacent to the site with the Etihad Stadium and associated infrastructure further afield. South: The Sports City Car Park is adjacent to the site with the Ashton Canal located 230 m from the southern boundary. West: New Viaduct Street is adjacent to the site with light industrial / commercial properties further afield.

Foul and surface water drainage	Information on foul and surface water drainage as sourced from the previously completed Interpretive Preliminary Dismantling Assessment Report for Gasholder No.2 by WYG [7] is summarised below: The gas holder overflow points are located on the north-eastern sides of the gas holder located in the north of the site. There are three separate foul drain drainage routes. Two of the drainage routes flow south of the gas holder, join and flow west to join the combined system on Broxton Street. The third flows north from the interceptor, located on the north/north-east of the gas holder, to join the combined system in Alan Turing Way. There are also two storm drains, that flow in an approximately easterly direction, both flow towards the culverted River Medlock and combined sewer. A methane extraction plant is currently on site to reduce methane levels within the holder water, prior to the holder water being discharged to the outflow.
Site ground levels and surrounding topography	The site elevation ranges between approximately 51 m and approximately 60 m AOD. Ground level is highest in the northwest of the site where ground level was recorded between 59.20 m and 59.84 m AOD. An embankment separates the north-western corner and the area to the east, where the gasholder situated, and to the south where levels reduce to approximately 54.50 m AOD (Approximate 5 m reduction in ground level). The central site area to the east of the access road lies at a level of approximately 52.00 m to 52.50 m AOD prior to gently sloping downwards towards the southern boundary where levels were recorded between 51.00 m and 51.50 m AOD. Anecdotal information provided in previous third-party reports indicate the off-site Sports City Car Park adjacent to the east / south has a ground level that lies approximately 4 m above those of the original gasworks site [5].
Surface water features	The River Medlock is situated 130 m east of the site (at closest point) orientated southwest to northeast and flowing in a south-westerly direction towards Manchester City Centre before joining the River Irwell. The River Medlock is culverted beneath the Sports City Car Park prior to flowing openly again at an estimated distance of 270 m south of the site. The Ashton Canal is situated approximately 230 m south (at closest point) from the site, orientated northeast to south-west.
Published Geology	The published geology beneath the site is summarised below. Superficial deposits of Devensian Till are mapped across the entirety of the site. The mapped bedrock comprises the Pennine Upper Coal Measures Formation (PUCM) indicated by the BGS to comprise interbedded grey mudstone, siltstone and pale grey sandstone, commonly with coal seams.
Published Hydrogeology	Superficial Deposits: Devensian Till – secondary undifferentiated aquifer. Bedrock: Pennine Upper Coal Measures Formation– secondary A aquifer. Groundwater Source Protection Zones (SPZ): The site is not located within an SPZ. There are no SPZs located within 2.5 km of the site. No information has been reviewed on current abstraction wells in the vicinity of the site [5]. The nearest licensed groundwater abstraction is located 524 m to the north of the site and is operated by Hansen Quarry Products, although the permit end date is not supplied within previous factual reporting. Regional groundwater flow in the PUCM is reported to be in a westerly direction [5], [8].

2.2. Site Geology

The site geology encountered during historical site investigations is summarised in Table 2-2. Borehole and trial pit logs for the site are presented in Appendix A.

Table 2-2 - Summary of site geology

Stratum	Depth of upper surface (m bgl)		Base of Strata (m bgl)		Typical description
	m bgl	m AOD	m bgl	m AOD	
Made Ground	GL	59.20 – 51.50	0.50 – 1.00	51.26 – 54.36	Gravel composed of angular limestone, sandstone and concrete in the north. In the south of the site Asphalt and concrete the latter of which was locally reinforced and overlying a gravel subbase. Grey to brown and black gravel with variable clay, sand and cobble content including anthropogenic constituents such as concrete and brick. Generally Made Ground proven to <1.00 m bgl with a locally deep area of Made Ground recorded in BH3 adjacent to the southern site boundary.
Devensian Till	0.50 – 1.00	51.26 – 54.36	14.50 – 18.80	36.06 – 38.24	Predominantly recorded as a stiff sandy gravelly clay with rare cobbles or boulders. Lenses of firm Silt or sandy CLAY.
Pennines Upper Coal Measures	14.50 – 18.80	36.06 – 38.24	25.00 – 30.00*	24.86 – 27.74	Grey mudstone or siltstone with coal seams identified between 18.27 and 17.59 m bgl in the south and 21.26 and 21.49 m bgl in the north.

Base and thickness not proven during previous GI.

2.3. Gas Holder

The disused gas holder in the north-eastern area of the site is approximately 87 m in diameter. The base of the gas holder is recorded as approximately 15.80 m bgl (43.50 m AOD) [6] and is expected to extend into the Devensian Till, which was proven to 18.80 m bgl (36.06 m AOD).

It is assumed for the purpose of the assessment that the gas holder overflow points will be properly disconnected and decommissioned during future infilling works.

2.4. Site Hydrogeology

2.4.1. Groundwater Regime

Groundwater wells have been installed at the site within both the Glacial Till and the Pennine Upper Coal Measures.

Atkins monitored groundwater levels in four boreholes across two rounds in March and April 2022. Groundwater monitoring results are presented in Table 2-3.

Table 2-3 - Atkins Groundwater Monitoring Results 2022

Location	Well response zone	GL	17/03/2022		12/04/2022	
			m bgl	m AOD	m bgl	m AOD
BH2	Till	52.23	4.45	47.78	4.16	48.07
BH102	Till	52.26	1.56	50.7	1.39	50.87
RBH101	PUCM	54.86	15.91	38.95	16.04	38.82
RBH102	PUCM	52.74	1.98	50.76	3.69	49.05

Groundwater levels in monitoring wells installed within the Glacial Till ranged between 47.78 m and 50.87 m AOD. Groundwater levels recorded in wells installed within the PUCM were between 38.82 m and 50.76 m AOD.

Historical groundwater levels generally identified two separate water bodies, groundwater in the Glacial Till between 47.82 m – 51.02 m AOD and groundwater in the PUCM between 36.36 m - 41.36 m AOD.

The Superficial Deposits were recorded as predominantly cohesive in previous ground investigations and so the recorded groundwater within these deposits is likely to be discontinuous and restricted to localised granular pockets.

The levels recorded by Atkins in RBH101 screening the PUCM indicate the strata is likely to be saturated with groundwater and confined by the overlying cohesive Superficial Deposits. Given the thickness of low permeability cohesive deposits confining the PUCM, there is considered to be a degree of hydraulic separation between the perched water in the Superficial Deposits and groundwater in the bedrock.

The levels recently recorded by Atkins in RBH102 in the south of the site (49.05 m and 50.76 m AOD) are considered anomalous when compared to levels recorded historically and unlikely to be representative of the groundwater in the PUCM. This is supported by previous monitoring of RBH102 in 2015 where groundwater levels were recorded between 36.36 m and 37.15 m AOD.

2.4.2. Groundwater Flow Direction and Hydraulic Gradient

Groundwater levels obtained from the site during historical monitoring indicate that groundwater in the PUCM is generally flowing in a westerly direction. Groundwater level monitoring undertaken by Atkins was not able to establish a groundwater flow direction due to the limited number of wells in each stratum.

A hydraulic gradient in the PUCM of between 0.004 to 0.016 was calculated based upon groundwater monitoring data from 2015.

2.4.3. Hydraulic Conductivity

Hydraulic conductivity testing has not been undertaken as part of the recent Atkins groundwater monitoring. Information on hydraulic conductivity as presented in historical reports made available to Atkins is summarised below:

- WSP 2015 Factual report referenced the Parkman 2002 Groundwater Risk Assessment Report where permeability (hydraulic conductivity) of the solid geology coal measures was measured and recorded between 1.52E-6 to 6.84E-6 m/s.

In the absence of site specific hydraulic conductivity values for the Devensian Till a representative literature value of 9.12E-10 m/s [9] has been adopted for the strata and utilised within the modelling in Section 4.

2.4.4. Site Hydrology

The River Medlock is situated 130 m east of the site orientated southwest to northeast and flowing in a south westerly direction towards Manchester City Centre before joining the River Irwell. The River Medlock is culverted beneath the Sports City Car Park south-east of the site prior to flowing openly again 270 m south of the site.

The surface water level in the River Medlock where it is culverted below the Sports City Car Park 130 m east of the site is at a level of approximately 50 m AOD.

Groundwater in the Glacial Till is considered likely to be discontinuous and restricted to localised granular pockets and it is considered unlikely that it is providing significant base flow to the Medlock.

Regional groundwater flow in the PUCM is mapped in a westerly direction with groundwater recorded at a level of between 38.95 m and 38.85 m AOD in recent monitoring. As such, hydraulic continuity between groundwater in the PUCM and the River Medlock is considered to be highly unlikely.

According to the Environment Agency website [10] the River Medlock was last classified in 2019 as having moderate ecological quality and failing on chemical quality.

The Ashton Canal is situated approximately 238 m south (at closest point) from the site, orientated northeast to southwest. The feature is a canal system and considered likely to be engineered, lined, and isolated from groundwater. Moreover, topographical data sourced from previous reporting suggests the Ashton Canal is situated above the ground level of the site and as such continuity between superficial or bedrock groundwater and the canal is also considered unlikely.

3. Initial Conceptual Model

Land contamination is evaluated through the identification and assessment of potential contaminant linkages (PCLs). The approach adopted involves the development of a conceptual site model (CSM) to summarise sources of contamination, possible migration / exposure pathways and potential receptors that may exist at the site, and subsequently identifies PCLs. This assessment considers PCLs to controlled waters receptors only.

For the purposes of this assessment the potential future infill materials, which will be deposited within the gas holders, have been considered as the sole potential contamination source. The identified relevant PCLs are presented on Figure 5.

3.1. Potential Pathways

The internal base of the below ground gas holder has been recorded as approximately 15.80 m bgl. The geology on site indicates that the base of the gas holder is unlikely to extend into the Pennines Upper Coal Measures.

Therefore, this assessment and associated modelling have assumed that the source material, and any water that subsequently accumulates within the filled gas holder, is only in direct connection with the Devensian Till beneath the site. The Devensian Till is considered the primary pathway for migration from the gas holder to the Pennines Upper Coal Measures.

The gas holder overflow drainage system will be disconnected during the decommissioning works and therefore has not been considered as a potential pathway.

3.2. Potential Controlled Waters Receptors

The Superficial Deposits are classified by the EA as a secondary undifferentiated aquifer, however, groundwater within the unit is not considered to be the primary receptor itself as it is considered to have limited resource potential. This is based on the limited overall thickness and limited sandy/gravelly bands recorded in previous GI resulting in limited specific storage. Moreover, it is considered likely that any abstraction would be associated with the PUCM and local properties in the wider area are likely to be supplied by mains water supply.

The surface of the River Medlock where it is culverted below the Sports City Car Park 130 m east of the site is at a level of approximately 50 m AOD. Regional groundwater flow in the PUCM is mapped in a westerly direction with groundwater recorded at a level of between 38.95 and 38.85 m AOD in recent monitoring. As such, hydraulic continuity between groundwater in the PUCM and the River Medlock is considered to be unlikely.

For the purpose of this infill assessment the PUCM aquifer is considered to be the primary controlled water receptor.

4. Import Assessment Criteria

4.1. Methodology

Given the structure of the former gas holder, the geology beneath the site and the recorded groundwater levels, infill materials at the base of the holder are considered likely to be in contact with the cohesive Glacial Till. IAC have been derived to be protective of controlled waters on this basis.

The development of the IACs has considered current guidance including the Water Framework Directive (WFD) [12], which acts to prevent hazardous substances from entering groundwater and limit the entry of non-hazardous pollutants into groundwater to avoid pollution, deterioration in the status of groundwater body and to prevent sustained and upward trends in pollutant concentrations in groundwater.

The IACs developed are intended to be applied to material imported under DoWCoP [13] e.g., clean naturally occurring material or hub and cluster material. The IAC are intended to support such that material imported is unimpacted by anthropogenic contamination. Naturally occurring soils may include concentrations of metals that may exceed adopted regulatory criteria (ie. Drinking Water Standards) but are unlikely to pose an actual risk to controlled waters. Therefore, a distinct approach has been taken for potential contaminants that are likely be naturally occurring and potential contaminants that are from anthropogenic sources.

Three specific approaches to define assessment criteria have therefore been developed based on potential contaminants of concern as follows:

- naturally occurring substances;
- potentially anthropogenic non-hazardous substances; and
- potentially anthropogenic hazardous substances.

4.2. Naturally occurring substances

To develop a comprehensive set of IAC values protective of controlled waters, IAC values for naturally occurring (i.e. not expected to be elevated from gas works land use), non-hazardous compounds have been aligned to background levels.

By aligning these to background levels it's expected that any inputs into the surrounding water environment would not result in a significant and sustained upward trend in concentrations of these determinants in line with the Water Framework Directive.

The IAC values have been obtained by calculating the mean concentration + two standard deviations of each determinant using the available site data.

The calculated IACs for naturally occurring substances are summarised in Table 4-1, with the full calculations presented in Appendix B.

Table 4-1 - Infill Acceptance Criteria (IAC) for Naturally occurring Substances

Determinants	Number of samples	Standard deviation (SD)	Mean	Soil IAC (mg/kg)
Arsenic	18	11.50	12.16	35.17
Cadmium	18	0.18	0.24	0.60
Chromium (total)	18	126.58	53.60	306.76
Lead	18	151.60	77.30	380.50
Nickel	18	13.66	36.81	64.12

Risk to human health, hazardous waste classification and geotechnical suitability of the infill material should be considered separately and is not included as part of this assessment.

4.3. Potentially anthropogenic gas works non-hazardous contaminants

The derivation of IAC for potentially anthropogenic non-hazardous gas works contaminants has been undertaken using Golder Associates ConSim. A precautionary approach has been to develop IAC values taking a risk-based approach in line with EA guidance.

ConSim v2.5, is a contaminant fate and transport model developed on behalf of the Environment Agency by Golder Associates [14]. ConSim utilises a range of contaminant transport and hydrogeological equations to model contaminant transport from a defined source (in soil, soil-leachate, or groundwater) to a defined compliance point and to predict contaminant concentrations. SSAC can then be calculated based on the attenuation factors derived by the model and compared to measured concentrations recorded at the site.

The assessment has modelled the base of Gasholder No.2 in the Devensian Till.

When specific infill materials have been selected, a review of these assumptions should be undertaken to ensure that the IAC are appropriate to the material source and type with respect to both the physical parameters used in this assessment and the range of determinants which have been evaluated. Input parameters are presented in Appendix C.

4.3.1. Determinands and Water Quality Standards

The Drinking Water Standards (DWS) have been adopted within the model and are considered protective of drinking water supply associated with the PUCM Secondary Aquifer.

A summary of the chemical determinands with the relevant DWS for non-hazardous substances is presented in Table 4-2 below.

Table 4-2 - Summary of Determinants and associated DWS

Determinant	DWS mg/l
Total Cyanide	0.05
Phenol	0.05

4.3.2. Soil/Water Partition Coefficient

Soil/water partition coefficient values (K_d) for determinants have been estimated from literature values. K_d values are often presented as ranges within literature sources due to the soil chemistry and physical properties.

4.3.3. Non-hazardous Anthropogenic Compounds IAC

The Level 3 modelling results for the potentially anthropogenic non-hazardous substances (cyanide (total) and phenol) indicate modelled concentrations at the receptor that calculate soil-leachate SSAC greater than 1E+10 mg/l for both compounds and as such there is considered to be a negligible risk to groundwater. Model outputs are presented in Appendix D.

Compounds and the modelled travel times are presented in Table 4-3.

Table 4-3 - Determinant Travel Times

Determinant	Level 3 Travel Time
Total Cyanide	159
Phenol	159

4.4. Hazardous substances.

In line with the WFD IAC soil values for hazardous compounds, which are not commonly naturally occurring, have been derived by utilising the Environment Agency P20 worksheet to back calculate corresponding soil criteria from compound laboratory detection limits (LOD) or MRVs (where available). TPH compounds have also been assessed in this manner, although not classified as hazardous (according to Groundwater Directive 2006/118/EC [14]).

Soil-leachate LOD or MRV (benzene and tetrachloroethylene) values have been multiplied by the dilution factor upon entry to the aquifer calculated within the Level 2 assessment completed above, a value of 3.36.

These criteria are detailed in Table 4-4.

Table 4-4 - Summary of Hazardous Determinands

Determinand	Soil IAC (LOD) (mg/kg)	Soil-leachate IAC (mg/l)
Benzene	0.0041	
Anthracene	0.0031	0.00003
Fluoranthene	0.011	0.00003
Benzo(a)pyrene	0.05	0.00003
Tetrachloroethylene	0.001	
Trichloroethene	0.00004	0.00003
Aliphatic >C5-C6	0.05	-
Aliphatic >C6-C8	0.21	-
Aromatic >C5-C7	0.004	-
Aromatic >C7-C8	0.011	-
Aromatic >C8-C10	0.07	0.0033
Aromatic >C10-C12	1.14	0.033
Aromatic >C12-C16	2.28	0.033

5. Conclusions and Recommendations

Based on the methodology presented in Section 4, infill assessment criteria have been developed in line with current guidance (Table 5-1) for use under DoWCoP for import of clean naturally occurring material.

Infill material should be sampled and analysed in accordance with National Grid's Core Specification [1]. IAC for both soils and leachate have been developed, where appropriate. Volatile organic compounds volatilise during soil-leachate analysis and as a result the derivation of IACs for those compounds is considered inappropriate and is omitted from Table 5-1)

Table 5-1 - Infill Acceptance Criteria (IAC)

Determinants	Soil IAC (mg/kg)	Soil-leachate IAC (mg/l)	Naturally occurring haz/non-haz
Asbestos	Detection	-	Hazardous (>0.1%)
Arsenic	35.17	-	Naturally occurring
Cadmium	0.60	-	Naturally occurring
Chromium (total)	306.76	-	Naturally occurring
Lead	380.50	-	Naturally occurring
Nickel	64.12	-	Naturally occurring
Benzene	0.0041	-	Hazardous
Anthracene	0.0031	-	Hazardous
Benzo(a)pyrene	0.011	0.00003	Hazardous
Fluoranthene	0.05	0.00003	Hazardous
Tetrachloroethylene	0.001	-	Hazardous
Trichloroethene	0.00004	0.00003	Hazardous
Aliphatic >C5-C6	0.05	-	Hazardous
Aliphatic >C6-C8	0.21	-	Hazardous
Aromatic >C5-C7	0.004	-	Hazardous
Aromatic >C7-C8	0.011	-	Hazardous
Aromatic >C8-C10	0.07	0.0033	Hazardous
Aromatic >C10-C12	1.14	0.033	Hazardous
Aromatic >C12-C16	2.28	0.033	Hazardous

n/a – TPH bands are not classified as hazardous or non-hazardous compounds under WFD JAGDAG.

Once the source of infill material has been identified, a review should be undertaken to confirm that the IAC are appropriate with respect to both the physical parameters used in this assessment and the list of determinants assessed.

These criteria do not apply to compliant material identified and utilised under the WRAP Protocols.

The IAC developed within this report do not consider risks to human health. Similarly, this assessment does not consider the geotechnical suitability of infill materials.

6. References

- [1] National Grid Public Holdings (NGPH) Limited, Assessment and Remediation Core Specificaliton, 2016.
- [2] Parkman, "Ground Investigation at the Former Bradford Road Gasworks;," 1996.
- [3] Parkman, "Summary Review of Former Bradford Road Gasworks Site Manchester," 1996.
- [4] WSP, "Factual Site Investigation Report-Surplus Land and Holder Site-Bradford Road-Manchester," 2003.
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Figures

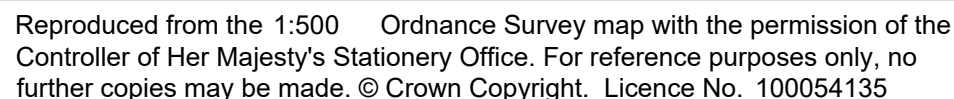
Figure 1 – Site Location Plan

Figure 2 – Site Layout Plan

Figure 3 – Historical Structures

Figure 4 – Ground Investigation Locations

Figure 5 – Conceptual Site Model Plan for gas holder infill



 NATIONAL GRID PROPERTY HOLDINGS
BOUNDARY

 HIGH PRESSURE COMPOUND CADENT
GAS LTD OWNED

P01	23/05/22	FOR INFORMATION	CW	MC	
Rev.	Date	Description	By	Chk'd	App'd


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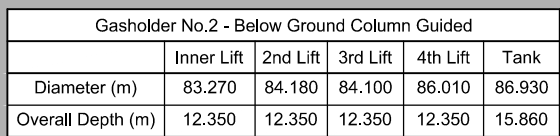
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1000

Drawing Number	FIGURE 1	Revision	P01
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 NATIONAL GRID PROPERTY HOLDINGS
BOUNDARY
 HIGH PRESSURE COMPOUND CADENT
GAS LTD OWNED
 GRAVEL
 VEGETATION
 EXISTING STRUCTURES

[illegible]

P01	23/05/22	FOR INFORMATION	CW	MC	
Rev.	Date	Description	By	Chk'd	App'd

Drawing Status	FOR INFORMATION	Suitability	S2
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Project Title

NGPH BRADFORD ROAD
DEMOLITION AND INFILLING

Drawing Title

SITE LAYOUT PLAN

Scale 1:750	Designed AD	Drawn CW	Checked MC	Authorised DC
Original Size A1	Date 23/05/2022	Date 23/05/2022	Date 23/05/2022	Date 23/05/2022

Drawing Number	FIGURE 2	Revision	P01
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 NATIONAL GRID PROPERTY HOLDINGS
BOUNDARY

 HIGH PRESSURE COMPOUND CADENT
GAS LTD OWNED

	1893
	1908
	1922
	1948
	1951
	1956
	1958
	1974
	1992

1893

A1.	UNKNOWN STRUCTURE
A2.	UNKNOWN STRUCTURE
A3.	RAILWAY
A4.	UNKNOWN STRUCTURE
A5.	APPROXIMATE LINE OF CULVERTED RIVER MEDLOCK

1908
B1. UNKNOWN STRUCTURE

1922
C1. GASHOLDER (OPERATIONAL)
C2. AREA OF UNDERGROUND INLET TO GASHOLDER

1948
D1. COKE OFFICE
D2. RAILWAY
D3. UNKNOWN STRUCTURE
D4. UNKNOWN STRUCTURE
D5. UNKNOWN STRUCTURE
D6. HORIZONTAL RETORT HOUSE
D7. RAILWAY EXTENSION
D8. HORIZONTAL RETORT HOUSE
D9. UNKNOWN STRUCTURE
D10. OVERHEAD TANKS
D11. TANK
D12. RAILWAY
D13. CANTEN & MESS ROOM

1951
E1. RAILWAY

F1.	RETORT HOUSE D
F2.	UNKNOWN STRUCTURE
F3.	RETORT HOUSE C
F4.	COOLING TOWER & PUMP HOUSE
F5.	VERTICAL RETORT HOUSE
F6.	CAL PLANT
F7.	UNKNOWN STRUCTURE
F8.	UNKNOWN STRUCTURE
F9.	POTENTIAL EFFLUENT TREATMENT / STORAGE
F10.	MESS ROOM
F11.	BOILER ROOM
F12.	MESS ROOM
F13.	UNKNOWN STRUCTURE
F14.	UNKNOWN STRUCTURE

1958

- G1. COAL BUNKER
- G2. TAR & LIQUOR STORAGE WELL (1878-81)
- G3. UNKNOWN STRUCTURE
- G4. POTENTIAL EFFLUENT TREATMENT / STORAGE

1974
H1. SERVICES TO PLANT
H2. SERVICES TO PLANT
H3. EFFLUENT TANK
H4. INTERCEPTORS
H5. BOILER HOUSE

1992
11. SAXON STREET HIGH PRESSURE PRS COMPOUND

NOTES:

1. THE MAJORITY OF HISTORICAL OFF SITE STRUCTURES ARE NOT INCLUDED ON THIS DRAWING. ONLY THOSE ADJACENT TO OR CROSSING THE SITE BOUNDARY.
2. THE LOCATION OF HISTORICAL STRUCTURES VARIES BETWEEN NATIONAL GRID ARCHIVE DRAWINGS & ORDNANCE SURVEY MAPS.

[illegible]

P01	23/05/22	FOR INFORMATION	CW	MC	
Rev.	Date	Description	By	Chk'd	App'd

Drawing State

FOR INFORMATION

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Project Title

NGPH BRADFORD ROAD
DEMOLITION AND INFILLING

Drawing Title

HISTORICAL STRUCTURES

Scale 1:750	Designed AD	Drawn CW	Checked MC	Authorised DC
Original Size A1	Date 23/05/2022	Date 23/05/2022	Date 23/05/2022	Date 23/05/2022
Drawing Number FIGURE 3				Revision P01

CLASSIFICATION - Baseline (Low Risk)

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KEY:

	NATIONAL GRID PROPERTY HOLDINGS BOUNDARY
	HIGH PRESSURE COMPOUND CADENT GAS LTD OWNED

 TRIAL PIT
 CABLE PERCUSSION BOREHOLE
 CABLE PERCUSSION BOREHOLE WITH
 ROTARY FOLLOW-ON

 TRIAL PIT
 BOREHOLE
 HAND DUG PIT

NOTE:
BH102S NOT INSTALLED

[illegible]

P01	23/05/22	FOR INFORMATION	CW	MC	
Rev.	Date	Description	By	Chk'd	App'd

Drawing Status FOR INFORMATION	Suitability S2
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Project Title

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DEMOLITION AND INFILLING

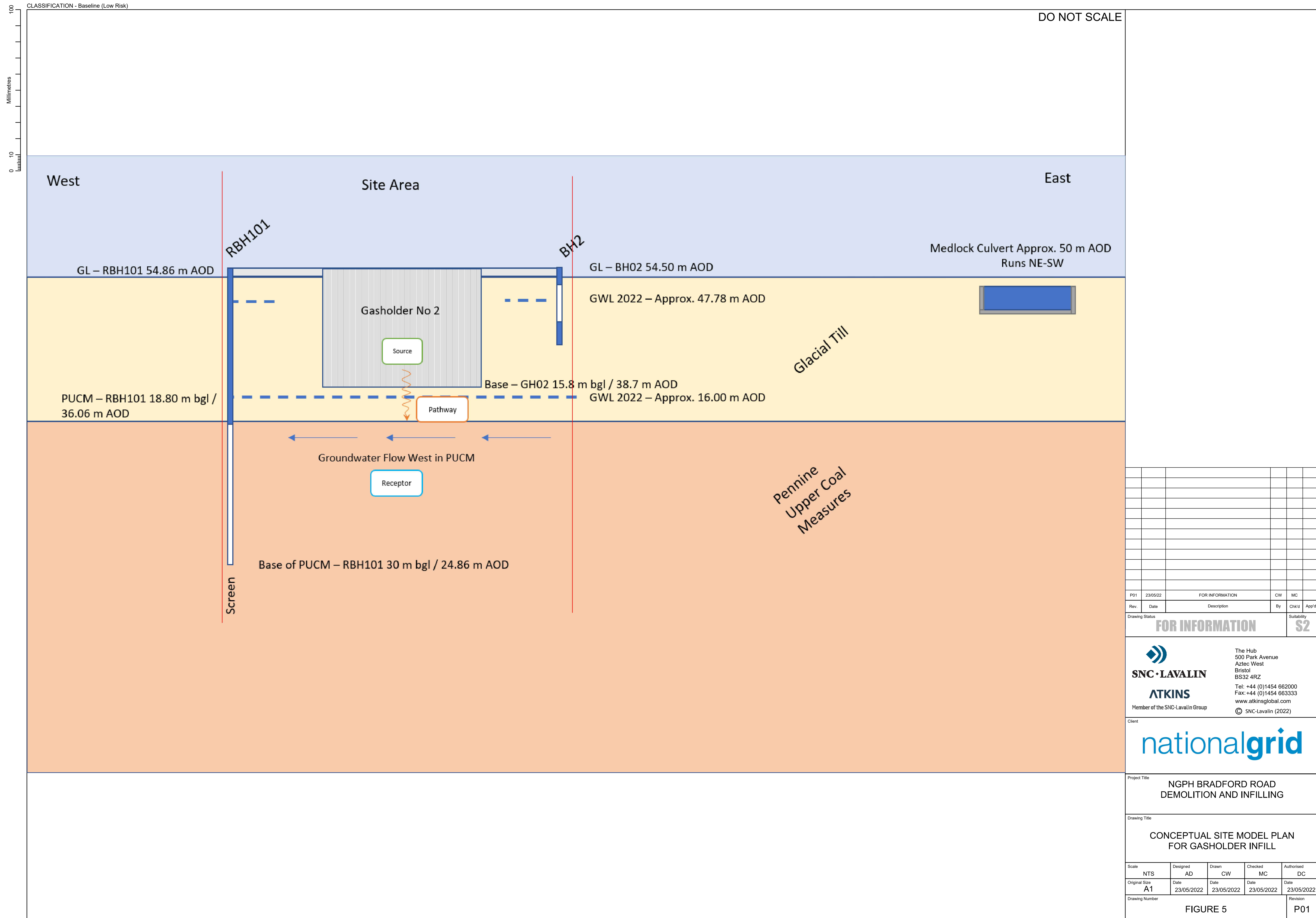
GROUND INVESTIGATION LOCATIONS

Scale 1:750	Designed AD	Drawn CW	Checked MC	Authorised DC
Original Size A1	Date 23/05/2022	Date 23/05/2022	Date 23/05/2022	Date 23/05/2022

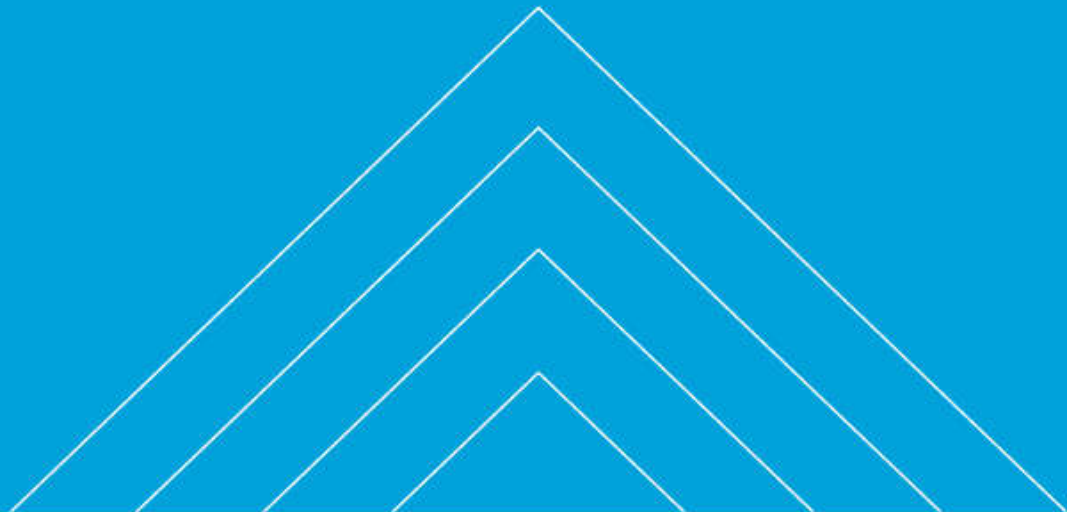
Drawing Number	FIGURE 4	Revision	P01
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Internal Project Number:	
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Appendices



Appendix A. Borehole Logs

PROJECT Bradford Road Gasworks				BOREHOLE No BH01				
CLIENT SecondSite Property Holdings Ltd				DATE 10 June 2003				
METHOD Dynamic sampling/rotary				PROJECT No 13010222				
GROUNDWATER		DEPTH	DESCRIPTION	LEGEND	LEVEL	SAMPLES & TESTS		SPT
STRIKE	WELL	(m)			(mAOD)	DEPTH	TYPE	N
		0.30	TOPSOIL: Dark brown slightly silty fine SAND. Frequent roots and rootlets.		-0.30	0.30	D 01	
		0.60	MADE GROUND: Brown gravelly fine to coarse SAND. Gravel is angular fine to coarse red brick. Occasional cobbles of brick.		-0.60	0.60		
		0.70			-0.70			
		1.00	MADE GROUND: Soft brown CLAY. Occasional gravel of red brick.		-1.00			
			Firm to stiff brown CLAY. Rare sub rounded fine to medium gravel of sandstone.			1.50	D 02	
			Stiff dark brown slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded fine to coarse. Sand is fine to medium.			2.00		
		2.45			-2.45			
			Stiff brown slightly sandy slightly gravelly CLAY. Gravel is blue-grey angular to rounded fine to coarse sandstone. Occasional pockets of medium sand.					
		4.30			-4.30	4.30	D 03	
			Very stiff brown gravelly CLAY. Gravel is blue-grey subangular fine to medium sandstone.			4.80		
		6.50			-6.50			
		8.80	No Recovery.		-8.80			
			Very stiff brown sandy gravelly CLAY. Gravel is sub rounded fine to coarse sandstone. Rare cobbles of sandstone.					
		10.22	End of Borehole at 10.22 m		-10.22			
KEY Sample Types : U - Undisturbed D - Disturbed B - Bulk W - Water SPT - SPT Spoon Water Levels : Water Strike Water Level In Situ Tests : S - Standard Penetration Test C - Cone Penetration Test				REMARKS No groundwater encountered No visual/olfactory evidence of contamination.				
EASTING 0.00		NORTHING 0.00		GROUND LEVEL (mAOD)		WSP ENVIRONMENTAL		
LOGGED BY		SCALE 1:65		Sheet 1 of 1				

PROJECT Bradford Road Gasworks				BOREHOLE No BH02			
CLIENT SecondSite Property Holdings Ltd				DATE 10 June 2003			
METHOD Dynamic sampling/rotary				PROJECT No 13010222			
GROUNDWATER		DEPTH	DESCRIPTION	LEGEND	LEVEL	SAMPLES & TESTS	
STRIKE	WELL	(m)			(mAOD)	DEPTH	TYPE
			MADE GROUND: Firm brown CLAY. Rare angular to rounded fine to medium gravel of brick and clinker.			0.30 0.60	D 01
		1.10	Stiff brown slightly sandy CLAY. Occasional gravel of sub rounded fine sandstone.		-1.10	1.50 2.00	D 02
		2.45	Stiff brown slightly sandy slightly gravelly CLAY. Gravel is rounded fine to coarse sandstone. Localised pockets of medium sand.		-2.45		
		4.30	Stiff brown gravelly CLAY. Gravel is grey sub angular to sub rounded fine to medium sandstone.		-4.30	4.30 4.60	D 03
		8.50	End of Borehole at 8.50 m		-8.50		
KEY Sample Types : U - Undisturbed D - Disturbed B - Bulk W - Water SPT - SPT Spoon Water Levels : ☒ Water Ghyre ☒ Water Level In Situ Tests : S - Standard Penetration Test C - Cone Penetration Test				REMARKS No groundwater encountered. No visual or olfactory signs of contamination.			
EASTING		NORTHING		GROUND LEVEL (mAOD)		WSP ENVIRONMENTAL	
0.00		0.00					
LOGGED BY		SCALE					
CR		1:65		Sheet 1 of 1			

PROJECT Bradford Road Gasworks				BOREHOLE No BH03				
CLIENT SecondSite Property Holdings Ltd				DATE 12 June 2003				
METHOD Dynamic sampling/rotary				PROJECT No 13010222				
GROUNDWATER		DEPTH	DESCRIPTION	LEGEND	LEVEL (mAOO)	SAMPLES & TESTS		SPT N
STRIKE	WELL	(m)				DEPTH	TYPE	
			MADE GROUND: Brown gravelly fine to coarse SAND of ash. Gravel is angular to rounded fine to coarse brick, clinker and timber.					
		3.20	MADE GROUND: Slightly clayey slightly gravelly fine to coarse SAND. Gravel is angular fine to medium brick and ceramics		-3.20			
		3.80			-3.80			
		4.00	MADE GROUND: Soft to firm dark grey and black slightly clayey sandy angular to subrounded fine to medium GRAVEL of ceramics, coal and shale. Sand is medium. Odours of hydrocarbons.		-4.00	D 01		
		4.70	MADE GROUND: Soft to firm with depth dark grey/green mottled black sandy slightly gravelly CLAY. Gravel is rounded fine timber.		-4.70			
			MADE GROUND: Soft dark grey very gravelly CLAY. Gravel is rounded fine brick. Strong odours of hydrocarbons.					
		6.75	Loose light brown SAND & GRAVEL. Sand is fine to coarse. Gravel is angular to sub rounded fine to medium flint & sandstone.		-6.75	D 02		
		7.30			-7.30			
		8.00	Firm brown slightly gravelly, sandy CLAY. Gravel is sub rounded fine to medium sandstone.		-8.00			
		8.40	Firm mottled grey sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded sandstone. Sand is medium.		-8.40			
		8.50	Soft orange/yellow sandy very gravelly CLAY. Gravel is fine sub angular to sub rounded fine sandstone.		-8.50	D 03		
			Weak dark grey sandy very clayey SHALE. (COAL MEASURES)		-9.00			
		9.00	End of Borehole at 9.00 m		-9.00			
KEY Sample Types : U - Undisturbed D - Disturbed B - Bulk W - Water SPT - SPT Spoon Water Levels :  Water Strike  Water Level In Situ Tests : S - Standard Penetration Test C - Cone Penetration Test				REMARKS No groundwater encountered.				
EASTING 0.00		NORTHING 0.00		GROUND LEVEL (mAOO)		WSP ENVIRONMENTAL		
LOGGED BY CR		SCALE 1:65		Sheet 1 of 1				

WYG ENVIRONMENT Ground Engineering Services Arndale Court, Headingley, Leeds. LS6 2UJ. Tel. 0113 278 7111 Fax. 0113 275 0623					Exploratory Hole Number RBH101																																											
					Final																																											
Project : Bradford Road, Manchester Project Number : A074754-28 Client : National Grid Property Holdings Ltd Method : Dynamic Sampling/Rotary Cored/Open Hole Co-ordinates : 386680.04E - 399270.28N Level :54.86m AOD					Hole Information <table border="1"> <tr> <th>From</th> <th>To</th> <th>Method</th> <th>Diameter</th> </tr> <tr> <td>0.00m</td> <td>1.50m</td> <td>Inspection Pit</td> <td>-</td> </tr> <tr> <td>1.50m</td> <td>12.00m</td> <td>Dynamic Sampler</td> <td>107mm</td> </tr> <tr> <td>12.00m</td> <td>13.50m</td> <td>Rotary Cored</td> <td>76mm</td> </tr> <tr> <td>13.50m</td> <td>18.50m</td> <td>Rotary Open Hole</td> <td>120mm</td> </tr> <tr> <td>18.50m</td> <td>23.70m</td> <td>Rotary Cored</td> <td>76mm</td> </tr> <tr> <td>23.70m</td> <td>30.00m</td> <td>Rotary Open Hole</td> <td>120mm</td> </tr> </table>				From	To	Method	Diameter	0.00m	1.50m	Inspection Pit	-	1.50m	12.00m	Dynamic Sampler	107mm	12.00m	13.50m	Rotary Cored	76mm	13.50m	18.50m	Rotary Open Hole	120mm	18.50m	23.70m	Rotary Cored	76mm	23.70m	30.00m	Rotary Open Hole	120mm	Scale 1:50 Sheet 1 of 3 Logged By : RLP Checked By : BH Start Date : 09/01/2013 Finish Date : 11/01/2013											
From	To	Method	Diameter																																													
0.00m	1.50m	Inspection Pit	-																																													
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23.70m	30.00m	Rotary Open Hole	120mm																																													
Strata Description					Legend	Depth (m) (AOD)	Samples & In Situ Testing <table border="1"> <tr> <th>Depth (m)</th> <th>Type</th> <th>Results/Remarks</th> </tr> </table>		Depth (m)	Type	Results/Remarks	Casing Diameter	Water Strikes	Backfill / Installation																																		
Depth (m)	Type	Results/Remarks																																														
MADE GROUND: Moss and grass over brown and dark brown slightly sandy clayey GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse brick, concrete and clinker. Cobbles are angular to subangular brick and concrete.						0.50 (54.36)	0.40 0.40	ES1 D2	PID=0.00ppm																																							
Firm locally laminated greyish brown locally with black veining slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to medium mudstone, sandstone and occasional coal.						1.40 (53.46)	1.20	ES3	PID=0.00ppm																																							
Stiff brown locally mottled light brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to medium mudstone, sandstone and occasional coal.							3.50	D4	PID=0.00ppm																																							
From 3.80m to 4.10m bgl becoming very stiff.																																																
From 4.10m to 11.80m bgl becoming hard.							4.50-5.50	B5	PID=0.00ppm																																							
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
																																																
Remarks / Observations: Continued next sheet 1. Inspection pit hand excavated to 1.50m bgl prior to drilling. 2. Groundwater not observed during drilling. 3. Upon completion 50mm diameter gas/groundwater monitoring standpipe installed to 30.00m bgl. 4. Minirae 2000 PID readings taken on samples, results in parts per					Dynamic Sampling Runs <table border="1"> <tr> <th>From</th> <th>To</th> <th>Diameter</th> <th>Recovery</th> </tr> <tr> <td>1.50</td> <td>2.50</td> <td>117mm</td> <td>100%</td> </tr> <tr> <td>2.50</td> <td>3.50</td> <td>117mm</td> <td>100%</td> </tr> <tr> <td>3.50</td> <td>4.50</td> <td>107mm</td> <td>100%</td> </tr> <tr> <td>4.50</td> <td>5.50</td> <td>107mm</td> <td>100%</td> </tr> <tr> <td>5.50</td> <td>11.80</td> <td>97mm</td> <td>100%</td> </tr> <tr> <td>11.80</td> <td>12.00</td> <td>97mm</td> <td>20%</td> </tr> </table>				From	To	Diameter	Recovery	1.50	2.50	117mm	100%	2.50	3.50	117mm	100%	3.50	4.50	107mm	100%	4.50	5.50	107mm	100%	5.50	11.80	97mm	100%	11.80	12.00	97mm	20%	Groundwater <table border="1"> <tr> <th>Depth Struck</th> <th>Rising To</th> <th>Time (mins)</th> <th>Remarks</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>				Depth Struck	Rising To	Time (mins)	Remarks				
From	To	Diameter	Recovery																																													
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5.50	11.80	97mm	100%																																													
11.80	12.00	97mm	20%																																													
Depth Struck	Rising To	Time (mins)	Remarks																																													
					SPT Hammer Ref : SPT Energy Ration (Er) :																																											

Tel. 0113 278 7111 Fax. 0113 275 0623

RBH101

Final



Co-ordinates : 386680.04E - 399270.28N Level : 54.86m AOD

From	To	Method	Diameter
0.00m	1.50m	Inspection Pit	-
1.50m	12.00m	Dynamic Sampler	107mm
12.00m	13.50m	Rotary Cored	76mm
13.50m	18.50m	Rotary Open Hole	120mm
18.50m	23.70m	Rotary Cored	76mm
23.70m	30.00m	Rotary Open Hole	120mm

Finish Date : 11/01/2013

Strata Description

Legend

Depth (m)
(AOD)

Samples & In Situ Testing		
Depth	Type	Results/Remarks

Casing Diameter	Length of Casing in Feet	Weight of Casing in Lbs	Weight of Casing in Tons
4 1/2"	100	1,100	0.61
5"	100	1,500	0.83
5 1/2"	100	1,900	1.05
6"	100	2,300	1.27
6 1/2"	100	2,700	1.49
7"	100	3,100	1.71
7 1/2"	100	3,500	1.93
8"	100	3,900	2.15
8 1/2"	100	4,300	2.37
9"	100	4,700	2.59
9 1/2"	100	5,100	2.81
10"	100	5,500	3.03
10 1/2"	100	5,900	3.25
11"	100	6,300	3.47
11 1/2"	100	6,700	3.69
12"	100	7,100	3.91
12 1/2"	100	7,500	4.13
13"	100	7,900	4.35
13 1/2"	100	8,300	4.57
14"	100	8,700	4.79
14 1/2"	100	9,100	5.01
15"	100	9,500	5.23
15 1/2"	100	9,900	5.45
16"	100	10,300	5.67
16 1/2"	100	10,700	5.89
17"	100	11,100	6.11
17 1/2"	100	11,500	6.33
18"	100	11,900	6.55
18 1/2"	100	12,300	6.77
19"	100	12,700	6.99
19 1/2"	100	13,100	7.21
20"	100	13,500	7.43
20 1/2"	100	13,900	7.65
21"	100	14,300	7.87
21 1/2"	100	14,700	8.09
22"	100	15,100	8.31
22 1/2"	100	15,500	8.53
23"	100	15,900	8.75
23 1/2"	100	16,300	8.97
24"	100	16,700	9.19
24 1/2"	100	17,100	9.41
25"	100	17,500	9.63
25 1/2"	100	17,900	9.85
26"	100	18,300	10.07
26 1/2"	100	18,700	10.29
27"	100	19,100	10.51
27 1/2"	100	19,500	10.73
28"	100	19,900	10.95
28 1/2"	100	20,300	11.17
29"	100	20,700	11.39
29 1/2"	100	21,100	11.61
30"	100	21,500	11.83
30 1/2"	100	21,900	12.05
31"	100	22,300	12.27
31 1/2"	100	22,700	12.49
32"	100	23,100	12.71
32 1/2"	100	23,500	12.93
33"	100	23,900	13.15
33 1/2"	100	24,300	13.37
34"	100	24,700	13.59
34 1/2"	100	25,100	13.81
35"	100	25,500	14.03
35 1/2"	100	25,900	14.25
36"	100	26,300	14.47
36 1/2"	100	26,700	14.69
37"	100	27,100	14.91
37 1/2"	100	27,500	15.13
38"	100	27,900	15.35
38 1/2"	100	28,300	15.57
39"	100	28,700	15.79
39 1/2"	100	29,100	16.01
40"	100	29,500	16.23
40 1/2"	100	29,900	16.45
41"	100	30,300	16.67
41 1/2"	100	30,700	16.89
42"	100	31,100	17.11
42 1/2"	100	31,500	17.33
43"	100	31,900	17.55
43 1/2"	100	32,300	17.77
44"	100	32,700	17.99
44 1/2"	100	33,100	18.21
45"	100	33,500	18.43
45 1/2"	100	33,900	18.65
46			

Water Strikes

Backfill / Installation

Boulder of red SANDSTONE.

Very stiff grey brown slightly sandy gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse mudstone and coal. Cobbles and boulders are angular sandstone.

Below 13.50m bgl becoming very gravelly.

Very stiff grey slightly gravelly clayey SILT. Gravel is angular fine to coarse mudstone.

Extremely weak thinly to thickly laminated grey MUDSTONE grading to very stiff slightly gravelly clay.
Discontinuities are subhorizontal, closely spaced, planar to undulating, smooth and locally clay infilled.
From 19.32m to 19.45m bgl non intact. Recovered as clayey gravel.

Remarks / Observations: Continued next sheet
million (ppm).

Dynamic Sampling Runs

From	To	Diameter	Recovery
1.50	2.50	117mm	100%
2.50	3.50	117mm	100%
3.50	4.50	107mm	100%
4.50	5.50	107mm	100%
5.50	11.80	97mm	100%
11.80	12.00	97mm	20%

Groundwater

Depth Struck	Rising To	Time (mins)	Remarks
SPT Hammer Ref : SPT Energy Ration (Er) :			

Tel. 0113 278 7111 Fax. 0113 275 0623

Final



Co-ordinates : 386680.04E - 399270.28N Level : 54.86m AOD

From	To	Method	Diameter
0.00m	1.50m	Inspection Pit	-
1.50m	12.00m	Dynamic Sampler	107mm
12.00m	13.50m	Rotary Cored	76mm
13.50m	18.50m	Rotary Open Hole	120mm
18.50m	23.70m	Rotary Cored	76mm
23.70m	30.00m	Rotary Open Hole	120mm

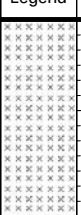
Finish Date : 11/01/2013[illegible]

1. Inspection pit hand excavated to 1.50m bgl prior to drilling.
2. Groundwater not observed during drilling.
3. Upon completion 50mm diameter gas/groundwater monitoring standpipe installed to 30.00m bgl.
4. Minirae 2000 PID readings taken on samples, results in parts per

From	To	Diameter	Recovery	Depth Struck	Rising To	Time (mins)	Remarks
1.50	2.50	117mm	100%				
2.50	3.50	117mm	100%				
3.50	4.50	107mm	100%				
4.50	5.50	107mm	100%				
5.50	11.80	97mm	100%				
11.80	12.00	97mm	20%				
				SPT Hammer Ref : SPT Energy Ration (Er) :			

WYG ENVIRONMENT Ground Engineering Services Arndale Court, Headingley, Leeds. LS6 2UJ. Tel. 0113 278 7111 Fax. 0113 275 0623					Exploratory Hole Number RBH102																																					
					Final																																					
Project : Bradford Road, Manchester Project Number : A074754-28 Client : National Grid Property Holdings Ltd Method : Dynamic Sampling/Rotary Cored/Open Hole Co-ordinates : 386524.89E - 399090.44N Level :52.74m AOD					Hole Information <table border="1"> <tr> <th>From</th> <th>To</th> <th>Method</th> <th>Diameter</th> </tr> <tr> <td>0.00m</td> <td>1.50m</td> <td>Inspection Pit</td> <td>-</td> </tr> <tr> <td>1.50m</td> <td>4.50m</td> <td>Dynamic Sampler</td> <td>107mm</td> </tr> <tr> <td>4.50m</td> <td>12.00m</td> <td>Rotary Open Hole</td> <td>120mm</td> </tr> <tr> <td>12.00m</td> <td>13.50m</td> <td>Rotary Cored</td> <td>76mm</td> </tr> <tr> <td>13.50m</td> <td>14.50m</td> <td>Rotary Open Hole</td> <td>120mm</td> </tr> <tr> <td>14.50m</td> <td>22.50m</td> <td>Rotary Cored</td> <td>76mm</td> </tr> <tr> <td>22.50m</td> <td>25.00m</td> <td>Rotary Open Hole</td> <td>120mm</td> </tr> </table>				From	To	Method	Diameter	0.00m	1.50m	Inspection Pit	-	1.50m	4.50m	Dynamic Sampler	107mm	4.50m	12.00m	Rotary Open Hole	120mm	12.00m	13.50m	Rotary Cored	76mm	13.50m	14.50m	Rotary Open Hole	120mm	14.50m	22.50m	Rotary Cored	76mm	22.50m	25.00m	Rotary Open Hole	120mm	Scale 1:50 Sheet 1 of 3 Logged By : RLP Checked By : BH Start Date : 15/01/2013 Finish Date : 17/01/2013	
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22.50m	25.00m	Rotary Open Hole	120mm																																							
Strata Description					Legend		Depth (m) (AOD)																																			
MADE GROUND: Soft dark brown slightly gravelly sandy slightly organic CLAY with roots and rootlets. Sand is fine to coarse. Gravel is very angular to angular fine to coarse brick and concrete.							0.40																																			
MADE GROUND: Greyish brown very angular to subangular concrete COBBLES and BOULDERS with a little gravel and some sand and clay. Sand is fine to coarse. Gravel is very angular to angular fine to coarse brick and concrete. Cobbles are very angular to subangular brick and concrete.							0.60 (52.34) (52.14)																																			
Firm to stiff grey brown slightly gravelly slightly sandy CLAY with rare rootlets and gravel sized fragments of shell. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse sandstone, chert, mudstone and rare coal.							1.00																																			
							2.00-2.50																																			
							2.20																																			
							2.50																																			
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Remarks / Observations: Continued next sheet 1. Inspection pit hand excavated to 1.50m bgl prior to drilling. 2. Upon completion 50mm diameter gas/groundwater monitoring standpipe installed to 24.50m bgl.					Dynamic Sampling Runs <table border="1"> <tr> <th>From</th> <th>To</th> <th>Diameter</th> <th>Recovery</th> </tr> <tr> <td>1.50</td> <td>2.50</td> <td>117mm</td> <td>100%</td> </tr> <tr> <td>2.50</td> <td>3.50</td> <td>117mm</td> <td>100%</td> </tr> <tr> <td>3.50</td> <td>4.50</td> <td>107mm</td> <td>100%</td> </tr> </table>				From	To	Diameter	Recovery	1.50	2.50	117mm	100%	2.50	3.50	117mm	100%	3.50	4.50	107mm	100%																		
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WYG ENVIRONMENT Ground Engineering Services Arndale Court, Headingley, Leeds. LS6 2UJ. Tel. 0113 278 7111 Fax. 0113 275 0623					Exploratory Hole Number RBH102																																					
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Soft grey mottled brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse sandstone, chert, mudstone and occasional coal.							10.80 (41.94)																																			
Assumed zone of core loss.							11.50 (40.64)																																			
Soft grey mottled brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse sandstone, chert, mudstone and occasional coal.							12.00 (39.24)																																			
Extremely weak grey to brownish grey SILTSTONE. (Recovered as very silty/clayey gravel. Gravel is angular to subrounded fine to coarse).							12.10 (38.24)																																			
Assumed zone of core loss.							12.10 (37.54)																																			
Extremely weak grey to brownish grey SILTSTONE. (Recovered as silty/clayey gravel. Gravel is angular to subrounded fine to coarse).							12.10 (37.24)																																			
Assumed zone of core loss.							12.10 (36.77)																																			
Very weak grey brown and light grey SILTSTONE.							12.10 (35.74)																																			
Very weak to weak black vitreous COAL.							12.10 (35.47)																																			
Very weak to weak dark grey SILTSTONE. Discontinuities are subhorizontal, very closely to closely spaced, planar to undulating, smooth and clay infilled.							12.10 (35.15)																																			
Assumed zone of core loss.							12.10 (34.64)																																			
Non intact. Recovered as dark grey GRAVEL. Gravel is angular to subangular fine to coarse siltstone.							12.10 (34.24)																																			
Weak thickly laminated grey and light grey SILTSTONE. Discontinuities are subhorizontal, closely spaced, undulating, smooth and occasional clay infilled.							12.10 (33.94)																																			
Weak to medium strong dark grey SILTSTONE. Discontinuities							12.10 (32.74)																																			
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are subhorizontal, closely spaced, undulating, smooth and partially clay infilled. From 21.00m to 21.08m bgl Non intact. Recovered as greyish brown gravelly silty clay.								<table border="1"> <tr> <th>Depth (m)</th> <th>TCR</th> <th>SCR</th> <th>RQD</th> <th>FI</th> <th>Casing Diameter</th> <th>Water Strikes</th> <th>Backfill / Installation</th> </tr> <tr> <td>20.45</td> <td>70</td> <td>45</td> <td>11</td> <td>10</td> <td>20.45</td> <td></td> <td></td> </tr> <tr> <td>20.50</td> <td></td> <td></td> <td></td> <td>NI</td> <td>20.50</td> <td></td> <td></td> </tr> <tr> <td>20.70</td> <td></td> <td></td> <td></td> <td>>25</td> <td>20.70</td> <td></td> <td></td> </tr> <tr> <td>21.00</td> <td></td> <td></td> <td></td> <td>NR</td> <td>21.00</td> <td></td> <td></td> </tr> <tr> <td>21.08</td> <td></td> <td></td> <td></td> <td>NI</td> <td>21.08</td> <td></td> <td></td> </tr> <tr> <td>21.35</td> <td></td> <td></td> <td></td> <td>>25</td> <td>21.35</td> <td></td> <td></td> </tr> <tr> <td>21.70</td> <td></td> <td></td> <td></td> <td>15</td> <td>21.70</td> <td></td> <td></td> </tr> <tr> <td>21.90</td> <td>93</td> <td>20</td> <td>0</td> <td>NR</td> <td>21.90</td> <td></td> <td></td> </tr> <tr> <td>22.00</td> <td></td> <td></td> <td></td> <td>NI</td> <td>22.00</td> <td></td> <td></td> </tr> <tr> <td>22.50</td> <td></td> <td></td> <td></td> <td></td> <td>22.50</td> <td></td> <td></td> </tr> <tr> <td>25.00</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		Depth (m)	TCR	SCR	RQD	FI	Casing Diameter	Water Strikes	Backfill / Installation	20.45	70	45	11	10	20.45			20.50				NI	20.50			20.70				>25	20.70			21.00				NR	21.00			21.08				NI	21.08			21.35				>25	21.35			21.70				15	21.70			21.90	93	20	0	NR	21.90			22.00				NI	22.00			22.50					22.50			25.00							
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Appendix B. Calculations for Non-hazardous substances

Statistical Analysis - Natural Compounds										SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	PUCM																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Laboratory Sample Reference										10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/2003	10/02/200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Appendix C. Model Input Parameters

Project: Bradford Road IAC

Project Number:

Project Details

Title: Bradford Road IAC

Project Number:

Prepared By: AD

Date: 2022-05-26 09:56:31

Client Name: NGPH

Comments:

Consim version 2.05

Simulation Level

Level 3

Simulation Parameters

Iterations 1001

Timeslices:1000000

Water Quality Standard

Lowest Value Selected from UK and EU Drinking Water Standards

Project: Bradford Road IAC

Project Number:

Source

Gasholder 2

Dry Bulk Density [g/cm³] SINGLE(1.59)

Air Filled Porosity [fraction] SINGLE(0.2)

Water Filled Porosity [fraction] SINGLE(0.1)

Thickness [m] SINGLE(15.8)

Fraction of Organic Carbon [%] SINGLE(0.01)

Contaminated Land

Constant Source Term

Overall Unsaturated Zone Thickness [m] SINGLE(1e-030)

Infiltration

Infiltration [mm/year] SINGLE(105)

Source Inventory:

Cyanide (Total)

Measured as Total Concentration in Soil

Concentration [mg/kg] SINGLE(1)

Organic

koc [ml/g] SINGLE(80)

Calculate kd

Henry's Law Constant SINGLE(4.18e-011)

Maximum Solubility [mg/l] SINGLE(10000)

Phenol

Measured as Total Concentration in Soil

Concentration [mg/kg] SINGLE(1)

Organic

koc [ml/g] SINGLE(83)

Calculate kd

Henry's Law Constant SINGLE(2.62e-005)

Maximum Solubility [mg/l] SINGLE(93000)

Project: Bradford Road IAC

Project Number:

Unsaturated Pathway: Unsaturated Pathway 1

Active

Porous Medium

Thickness [m] SINGLE(1e-030)

Dry Bulk Density [g/cm³] SINGLE(1.66)

Vertical Dispersivity [m] SINGLE(0.03)

Fraction of Organic Carbon [%] SINGLE(0.01)

Water Filled Porosity [fraction] SINGLE(0.3)

Unsaturated Conductivity [m/s] SINGLE(1e-009)

Unsaturated Pathway Contaminants

Cyanide (Total)

koc [ml/g] SINGLE(80)	Calculate kd
Simulate Degradation in Dissolved Phase only	
Half-life [years] SINGLE(1)	

Phenol

koc [ml/g] SINGLE(83)	Calculate kd
Simulate Degradation in Dissolved Phase only	
Half-life [years] SINGLE(0.27)	

Project: Bradford Road IAC

Project Number:

Aquifer Pathway

Thickness [m] SINGLE(20)
Dry Bulk Density [g/cm³] SINGLE(1.59)
Fraction of Organic Carbon [%] SINGLE(0.001)
Calculated Mixing Zone Thickness
Hydraulic Conductivity [m/s] SINGLE(1e-006)
Effective Porosity [fraction] SINGLE(0.3)
Hydraulic Gradient SINGLE(0.014)
Groundwater Flow Direction (degrees), 270.00
Longitudinal Dispersivity [m] SINGLE(25)
Lateral Dispersivity [m] SINGLE(2.5)

Contaminant Inventory

Cyanide (Total)
koc [ml/g] SINGLE(80) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(1)

Phenol
koc [ml/g] SINGLE(83) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(0.27)

Project: Bradford Road IAC

Project Number:

Receptor

Gasholder 2 Receptor	X -5.000000	Y -0.000000
250 m Non-haz CP	X -250.000000	Y 77.000000

Input Correlations

No Correlations

Appendix D. Model Outputs

Project: Bradford Road IAC

Project Number:

Gasholder 2 - Cyanide (Total)

Concentration at Source [mg/l] - 1000000 years

05% of values less than 14.1057	10% of values less than 14.1057	25% of values less than 14.1057
50% of values less than 14.1057	75% of values less than 14.1057	90% of values less than 14.1057
Minimum 14.1057s than 14.1057	Maximum 14.1057	
Mean 14.1057	SD 2.24311E-006	Variance 5.03156E-012

Project: Bradford Road IAC

Project Number:

Gasholder 2 - Phenol

Concentration at Source [mg/l] - 1000000 years

05% of values less than 14.0457	10% of values less than 14.0457	25% of values less than 14.0457
50% of values less than 14.0457	75% of values less than 14.0457	90% of values less than 14.0457
Minimum 14.0457s than 14.0457	Maximum 14.0457	
Mean 14.0457	SD 2.06336E-006	Variance -4.25747E-012

Project: Bradford Road IAC

Project Number:

Gasholder 2 - Cyanide (Total)

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0es less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0es less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Project: Bradford Road IAC

Project Number:

Gasholder 2 - Phenol

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0es less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0es less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Project: Bradford Road IAC

Project Number:

Gasholder 2 - Cyanide (Total)

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000000 years

05% of values less than 14.1057	10% of values less than 14.1057	25% of values less than 14.1057
50% of values less than 14.1057	75% of values less than 14.1057	90% of values less than 14.1057
Minimum 14.1057s than 14.1057	Maximum 14.1057	
Mean 14.1057	SD 3.22345E-006	Variance 1.03906E-011

Project: Bradford Road IAC

Project Number:

Gasholder 2 - Phenol

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000000 years

05% of values less than 14.0457	10% of values less than 14.0457	25% of values less than 14.0457
50% of values less than 14.0457	75% of values less than 14.0457	90% of values less than 14.0457
Minimum 14.0457s than 14.0457	Maximum 14.0457	
Mean 14.0457	SD 2.2695E-006	Variance 5.15065E-012

Project: Bradford Road IAC

Project Number:

Gasholder 2 - Cyanide (Total)

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000000 years

05% of values less than 4.20326	10% of values less than 4.20326	25% of values less than 4.20326
50% of values less than 4.20326	75% of values less than 4.20326	90% of values less than 4.20326
Minimum 4.20326s than 4.20326	Maximum 4.20326	
Mean 4.20326	SD 7.32056E-007	Variance 5.35906E-013

Project: Bradford Road IAC

Project Number:

Gasholder 2 - Phenol

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000000 years

05% of values less than 4.18536	10% of values less than 4.18536	25% of values less than 4.18536
50% of values less than 4.18536	75% of values less than 4.18536	90% of values less than 4.18536
Minimum 4.18536s than 4.18536	Maximum 4.18536	
Mean 4.18536	SD 5.21224E-007	Variance -2.71675E-013

Project: Bradford Road IAC

Project Number:

Cyanide (Total)

Unretarded Travel Time to Gasholder 2 Receptor [years]

05% of values less than 0	10% of values less than 0	25% of values less than 0.501968
50% of values less than 11.0397	75% of values less than 20.0092	90% of values less than 26.2167
Minimum 0.0es less than 28.4706	Maximum 30.3241	
Mean 11.6114	SD 9.9516	Variance 99.0343

Retarded Travel Time to Gasholder 2 Receptor [years]

05% of values less than 0	10% of values less than 0	25% of values less than 0.504096
50% of values less than 11.0865	75% of values less than 20.094	90% of values less than 26.3278
Minimum 0.0es less than 28.5914	Maximum 30.4527	
Mean 11.6607	SD 9.99379	Variance 99.8759

Project: Bradford Road IAC

Project Number:

Phenol

Unretarded Travel Time to Gasholder 2 Receptor [years]

05% of values less than 0	10% of values less than 0	25% of values less than 0.501968
50% of values less than 11.0397	75% of values less than 20.0092	90% of values less than 26.2167
Minimum 0.ies less than 28.4706	Maximum 30.3241	
Mean 11.6114	SD 9.9516	Variance 99.0343

Retarded Travel Time to Gasholder 2 Receptor [years]

05% of values less than 0	10% of values less than 0	25% of values less than 0.504176
50% of values less than 11.0882	75% of values less than 20.0972	90% of values less than 26.332
Minimum 0.ies less than 28.5959	Maximum 30.4575	
Mean 11.6625	SD 9.99538	Variance 99.9075

Project: Bradford Road IAC

Project Number:

Cyanide (Total)

Concentration at Gasholder 2 Receptor [mg/l] - 1000000 years

05% of values less than 0.000108171	10% of values less than 0.000251503	25% of values less than 0.00100064
50% of values less than 0.00646901	75% of values less than 0.080743	90% of values less than 0.501737
Minimum 4.09878E-010 0.934987	Maximum 2.46707	
Mean 0.147753	SD 0.358654	Variance 0.128632

Project: Bradford Road IAC

Project Number:

Phenol

Concentration at Gasholder 2 Receptor [mg/l] - 1000000 years

05% of values less than 5.14164E-008	10% of values less than 1.39912E-007	25% of values less than 1.35398E-006
50% of values less than 3.09445E-005	75% of values less than 0.00247576	90% of values less than 0.0648675
Minimum 1.79526E-010 0.22748	Maximum 1.38762	
Mean 0.0366886	SD 0.137576	Variance 0.0189272

Project: Bradford Road IAC

Project Number:

Cyanide (Total)

Unretarded Travel Time to 250 m Non-haz CP [years]

05% of values less than 122.402	10% of values less than 124.592	25% of values less than 130.982
50% of values less than 141.52	75% of values less than 150.49	90% of values less than 156.697
Minimum 119.881s than 158.951	Maximum 160.804	
Mean 140.839	SD 11.6306	Variance 135.271

Retarded Travel Time to 250 m Non-haz CP [years]

05% of values less than 122.921	10% of values less than 125.12	25% of values less than 131.538
50% of values less than 142.12	75% of values less than 151.128	90% of values less than 157.361
Minimum 120.39ss than 159.625	Maximum 161.486	
Mean 141.437	SD 11.6799	Variance 136.42

Project: Bradford Road IAC

Project Number:

Phenol

Unretarded Travel Time to 250 m Non-haz CP [years]

05% of values less than 122.402	10% of values less than 124.592	25% of values less than 130.982
50% of values less than 141.52	75% of values less than 150.49	90% of values less than 156.697
Minimum 119.881s than 158.951	Maximum 160.804	
Mean 140.839	SD 11.6306	Variance 135.271

Retarded Travel Time to 250 m Non-haz CP [years]

05% of values less than 122.94	10% of values less than 125.14	25% of values less than 131.559
50% of values less than 142.143	75% of values less than 151.152	90% of values less than 157.386
Minimum 120.409s than 159.65	Maximum 161.512	
Mean 141.459	SD 11.6818	Variance 136.464

Project: Bradford Road IAC

Project Number:

Cyanide (Total)

Concentration at 250 m Non-haz CP [mg/l] - 1000000 years

05% of values less than 5.73988E-015	10% of values less than 8.89439E-015	25% of values less than 2.94722E-014
50% of values less than 1.87381E-013	75% of values less than 1.275E-012	90% of values less than 4.6235E-012
Minimum 2.01113E-015 7.42157E-012	Maximum 1.84179E-011	
Mean 1.40294E-012	SD 2.79969E-012	Variance 7.83827E-024

Project: Bradford Road IAC

Project Number:

Phenol

Concentration at 250 m Non-haz CP [mg/l] - 1000000 years

05% of values less than 1.20887E-030	10% of values less than 2.93911E-030	25% of values less than 3.64844E-029
50% of values less than 1.40702E-027	75% of values less than 9.94207E-026	90% of values less than 1.21664E-024
Minimum 0.les less than 3.20579E-024	Maximum 1.38683E-023	
Mean 5.02812E-025	SD 1.59721E-024	Variance 2.55107E-048

Project: Bradford Road IAC

Project Number:

Aquifer Flow [m³/yr]

Gasholder 2

05% of values less than 440.801	10% of values less than 440.801	25% of values less than 440.801
50% of values less than 440.801	75% of values less than 440.801	90% of values less than 440.801
Minimum 440.801s than 440.801	Maximum 440.801	
Mean 440.801	SD 0.000101812	Variance 1.03656E-008

Consim output									IAC	
	WQS	Input concentration	source concentration	base of unsaturated zone diluted concentration	250m CP concentration	Travel time	Soil factor	Leachate factor	Soil	Leachate
	mg/l	mg/kg	mg/l	mg/l	mg/l	Years	input souce/CP	source conc/cp	mg/kg	mg/l
Determinand										
Cyanide	0.05	1	1.41E+01	4.19E+00	7.42E-12	202.416	1.35E+11	1.90E+12	6.74E+09	9.50E+10
Phenol	0.05	1	1.40E+01	4.19E+00	3.21E-24	202.49	3.12E+23	4.38E+24	1.56E+22	2.19E+23
					grey = for information only as determinand hazardous		level 2 calc only			
					Hazardous require level 2 only					
					Level 2 dilution factor upon entry to aquifer=					
					3.37E+00					

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