



**ESB Engineering and Major Projects**

# **Unidare - Whitehall (Site ID 29)**

Preliminary Environmental Site Assessment

602620 – R03 (02)

DECEMBER 2019





## EXECUTIVE SUMMARY

Following the submission of a proposal of works (reference: 602620, dated June 2019), RSK Ireland Limited (RSK) was instructed by ESB Engineering and Major Projects (the client) in July 2019 to carry out a Preliminary Environmental Site Assessment (PSA) at the site of an historic fluid filled cable leak at Griffith Avenue, Dublin 9 (the site). The site of the leak has been assigned a site ID number 29.

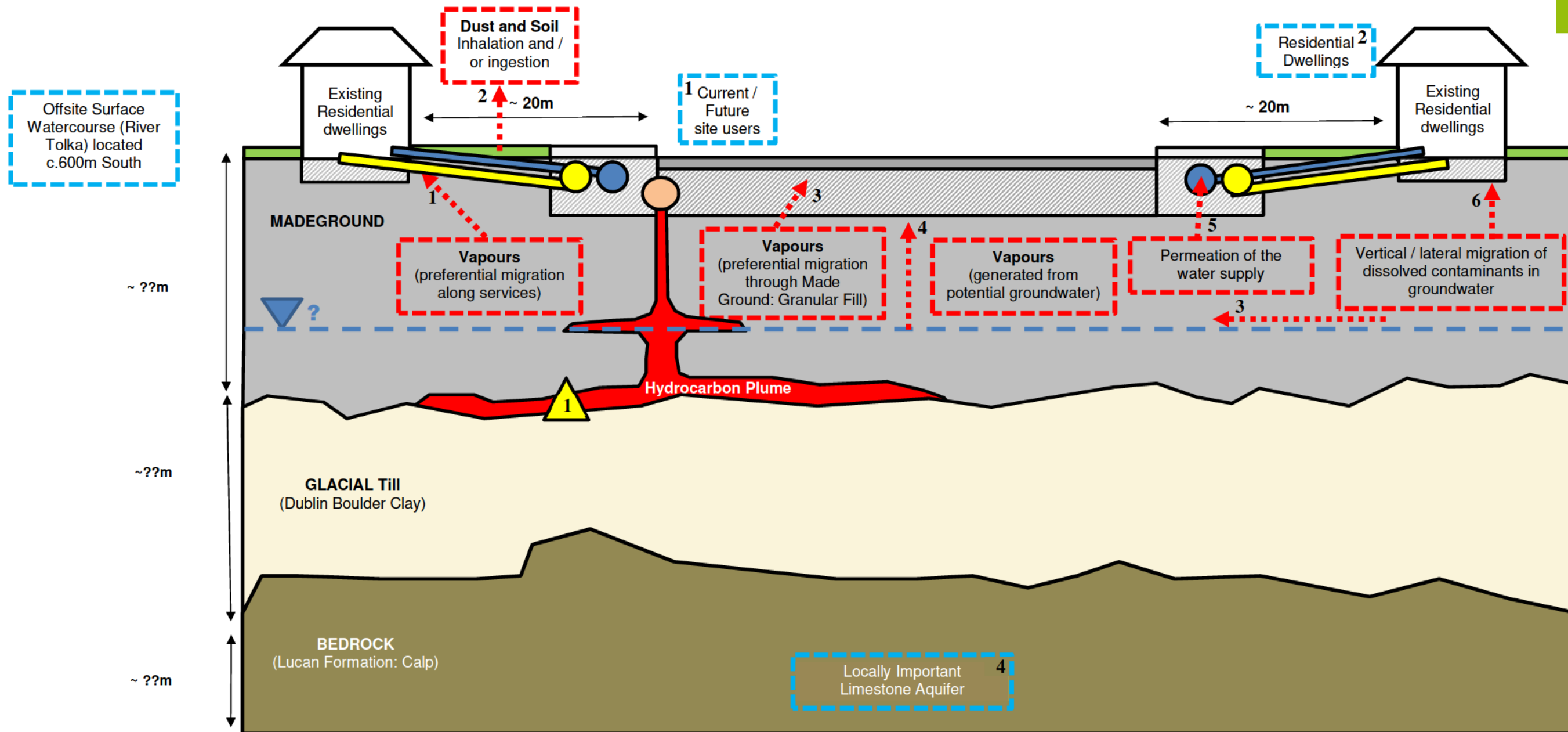
Historic information confirms that the area of the site has been subject to development since the 1930's and has been used for predominantly residential end uses, which are not considered to be significantly potentially contaminating. The surrounding land use is predominantly residential.

The site is the location of a leakage of cable fluid from a high voltage (HV) underground cable which occurred in early 2010. It is RSKs understanding that the fluid contained Linear Alkyl Benzene (LAB) and that the total fluid loss was approximately 450 litres.

The aim of the PSA is to assess potential impacts to human health and the environment from the leaked fluid, establish any potential environmental liabilities associated with contamination issues at the site due to leaked insulating fluids, to include a detailed source audit and desk-based hydrogeological assessment.

Following the completion of a risk evaluation for the identified pollutant linkages, the initial CSM has identified potential pollutant linkages with a risk class of **LOW** for all identified pollution linkages.

(29) Whitehall Indicative Leak Location - Graphical Conceptual Site Model



Potential Sources		Potential Pathways		Potential Receptors	
1	Hydrocarbon Plume	1	Preferential migration along services	1	Current / Future site users
		2	Dust and/or soil inhalation and/or ingestion	2	Residential dwellings
		3	Preferential migration through made ground (granular fill)	3	River Tolka (c.600m south; offsite)
		4	Vapour migration in potential groundwater	4	Locally Important Limestone Aquifer
		5	Permeation of the water supply		
		6	Vertical / lateral migration of dissolved contaminants in groundwater		

**Key:**

- Municipal Services
- Fluid Filled Cable
- Mains Water Service
- Gardens
- Potential Perched Water Level
- Footpath
- Road
- Granular Fill

EPA Contaminated Land & Groundwater Risk Assessment Methodology	Report Reference	Report Date	Status
<b>STAGE 1: SITE CHARACTERISATION &amp; ASSESSMENT</b>			
1.1	PRELIMINARY SITE ASSESSMENT  602620 R03 (02)  Paul Feely	16/12/2019	FINAL
1.2	DETAILED SITE ASSESSMENT		
1.3	QUANTITATIVE RISK ASSESSMENT		
<b>STAGE 2: CORRECTIVE ACTION FEASIBILITY &amp; DESIGN</b>			
2.1	OUTLINE CORRECTIVE ACTION STRATEGY		
2.2	FEASIBILITY STUDY & OUTLINE DESIGN		
2.3	DETAILED DESIGN		
2.4	FINAL STRATEGY & IMPLEMENTATION PLAN		
<b>STAGE 3: CORRECTIVE ACTION IMPLEMENTATION &amp; AFTERCARE</b>			
3.1	ENABLING WORKS		
3.2	CORRECTIVE ACTION IMPLEMENTATION & VERIFICATION		
3.3	AFTERCARE		



## RSK GENERAL NOTES

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**Project No.:** 602206 – R03 (02)

**Title:** Preliminary Environmental Site Assessment: Unidare - Whitehall (Site I.D. 29)

**Client:** ESB Engineering and Major Projects

**Date:** 16<sup>th</sup> December 2019

**Office:** Dublin

**Status:** **FINAL**

### Document Production/Approval Record

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Prepared by (consultant)	██████████		16/12/19	Principal Consultant	Insert here
Approved by (consultant)	██████████		16/12/19	Managing Director	10

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Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.



## **LIMITATIONS**

All objectives and outlined scope of works contained within the proposal of works (proposal reference 602620, dated June 2019) have been achieved and completed.

The comments given in this report and the opinions expressed are based on the information reviewed. However, there may be conditions pertaining at the site that have not been disclosed by the investigation and therefore could not be taken into account.

This report is subject to the RSK Ireland Limited service constraints given in Appendix A.

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## APPENDICES

Appendix A: Service constraints

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# 1 INTRODUCTION

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## 1.1 Project Contractual Basis and Personnel Involved

Following the submission of a proposal of works (reference: 602620, dated June 2019), RSK Ireland Limited (RSK) was instructed by ESB Engineering and Major Projects Ltd in July 2019 to carry out a Preliminary Environmental Site Assessment (PSA) at the site of an historic fluid filled cable leak at Griffith Avenue, Whitehall, Dublin 9 (the site). The site of the leak has been assigned a site ID number 29.

This report has been compiled by Paul Feely BSc, MSc, FGS (Principal Consultant with 15 years of experience) with the site walkover having been completed by Edward Byrne (Consultant) BSc, MSc (Consultant with 3 years of experience).

This report is subject to the RSK service constraints given in Appendix A.

## 1.2 Background Information

The site is the location of a leakage of cable fluid from a high voltage (HV) underground cable which occurred in early 2010. It is RSKs understanding that the fluid contained in the cable is Linear Alkyl Benzene (LAB) and that the total fluid loss was approximately 450 litres. It is also RSKs understanding that no previous investigations or monitoring has been undertaken at the subject site. The site location is shown on Figure 1.

The aim of the preliminary site assessment (PSA) is to assess potential impacts to human health and the environment from the leaked fluid, establish any potential environmental liabilities associated with contamination issues at the site due to leaked insulating fluids, undertake a detailed source audit and desk-based hydrogeological assessment.

## 1.3 Project Objectives

RSK will assess potential impacts associated with legacy cable fluid loss at the site. The PSA will determine the potential risks to human health and the environment at the leak location and potential areas of impact. The risk-based approach applied will be consistent with Irish regulations as well as the best practice document Guidance on the Management of Contaminated Land and Groundwater at EPA Licenced site.

In addition, risks will be assessed in accordance with CIRIA C552 and the outcome of the risk assessment will be used to determine any further actions that may be required to further inform the risk assessment.

The objectives of this assessment are to:

- Design a conceptual site model (CSM) for the site based on a review of historical information, environmental setting and a site walkover; and

- Obtain and review sufficient information regarding ground conditions from which risks to end-users and the environment can be assessed.

## **1.4 Scope of Work**

A scope of work has been devised to meet the objectives set out in section 1.3. The scope of works for the assessment included:

- A desk-based assessment to include a review of geological, hydrogeological and hydrological information and historical plans and completion of a site walkover;
- Review of information held by the Ordnance Survey of Ireland (OSI), Geological Survey of Ireland (GSI), Office of Public Works (OPW), Environmental Protection Agency (EPA), Trinity College Dublin (TCD) and Local Authority (Dublin City Council); and
- Produce an initial Conceptual Site Model (CSM) to identify and assess any potential pollution linkages assuming the ongoing commercial land use.

## 2 SOURCE AUDIT FINDINGS – PRODUCTION AND OPERATIONAL HISTORY

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### 2.1 Current Site Activities

The site of the historic cable leak is located beneath an area of roadway and or adjoining footpath at 430 Griffith Avenue, Whitehall, Dublin 9; approximately 20 metres southeast of the junction between Griffith Avenue and Saint Mobhi Road.

### 2.2 Previous Site Operations

A review of the site history was undertaken by assessing the available historical maps and aerial photos available from the ordinance survey of Ireland (OSI) geohive public viewer <http://map.geohive.ie/mapviewer.html> and the TCD map library.

The earliest available online OSI map dating from 1837-1842 (Figure 4) shows that the site and the surrounding land as being vacant fields, probably for agricultural use. Ballymun road is located approximately 150m west of the site. The nearest building to the site is a church, approximately 300m southwest of the site. The general surrounding area is comprised of agricultural fields with occasional buildings, assumed residential in use. There is a concentration of buildings approximately 400m southwest of the site, in the area which is Glasnevin today.

The TCD map from 1867 shows little change, a pond is located approximately 50m north of the site. The OSI online map from 1888-1913 (Figure 5) and TCD map from 1909 shows little change to the 1867 map.

The TCD map from 1938 (Figure 6) shows residential development along Griffith Avenue. The TCD map from 1973 shows further residential development to the north and a Steelworks is present approximately 200m to the north west, a tank is shown approximately 70m to the west. The TCD map from 1979 shows little change in the vicinity of the site, whilst the map from 1990 shows little change other than the absence of the steelworks to the north west.

The OSI aerial photos from 1995 to 2012 have also been reviewed. The resolution of the photography is poor, and it is not possible to identify building or property use. The surrounding land use appears to be predominantly residential. Little change is noted during this period in the site and surrounding area.

### 2.3 Chemicals of Potential Concern

As previously mentioned the site is the location of a historical leak of insulating fluid from a HV cable. Therefore, the main chemicals/contaminants of potential concern (COPC) at the site are the hydrocarbons comprising the insulating fluid which leaked. The fluid used to insulate the cables comprised Linear Alkyl Benzene (LAB).

LAB is a clear, colourless liquid with a mild petroleum odour. The European Chemicals Bureau produced a European Risk Assessment report with regards to LAB in 1999 <sup>(1)</sup>. The risk assessment concluded that there was a high margin of safety with regards to indirect human exposure via the environment, that LAB is not carcinogenic and is not toxic nor harmful. The overall result of the risk assessment was that 'there is at present no need for further information and/or testing of for risk reduction measures beyond those which are being applied already'.

The identified COPC are outlined in Table 2.1.

**Table 2-1: Contaminants of potential concern**

Potential Sources	COPC
HV Cable insulating fluid leak 2010	Linear Alkyl Benzene (LAB) Poly Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH) and Semi-Volatile Organic Compounds (SVOCs)

The properties of LAB as identified in the material safety data sheets (Appendix D) are outlined below;

LAB;

- Physical State : Liquid
- Colour : Colourless
- Odour : Odourless
- Boiling Point/range : 278 – 316 0C
- Flash Point (Close Cup) ( 0C.) : 140
- Vapour Density : 8.4 (Air = 1)
- Vapour Pressure @ 25 0C : 0.01 mmHg
- Evaporation Rate : NA
- Specific Gravity : 0.866 (Water = 1)
- pH : NA
- Solubility in Water : Insoluble
- Kinematic viscosity (@ 20°C: 4.0-4.2 mm<sup>2</sup>/s

## 3 SITE ENVIRONMENTAL SETTING

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### 3.1 General Introduction

The site is located at Griffith Avenue, Drumcondra, Dublin 9. The site is located approximately 2 km north of Dublin City Centre. The site is centred on Irish Grid reference O 15509 37833 at an altitude of approximately 36 m above ordnance datum.

A site walkover survey was carried out by RSK on 1<sup>st</sup> August 2019. The findings are summarised below. The site walkover photographs are included in Appendix B.

The indicative leak is located on Griffith Avenue, in a predominantly residential area of Whitehall. The indicative leak location is near the junction with St. Mobhi Road (R108). Detached / semi-detached properties with front and rear gardens bound the indicative leak location to the north and south. Griffith Avenue is also lined by mature trees and a band of grass which separates the footpath and the road.

The eastern extent of the survey area from the indicative leak location remains on Griffith Avenue, with residential houses with front and rear gardens to the north and south of the 200 m marker. Agricultural lands are located c.230m east of the indicative leak location.

The western extent of the survey area from the indicative leak location is located on Ballymun Road, with residential properties with gardens to the east, and St. Michael's School to the west. A number of commercial premises are located c.115 m northwest of the indicative leak location which have a portion of communal landscaping.

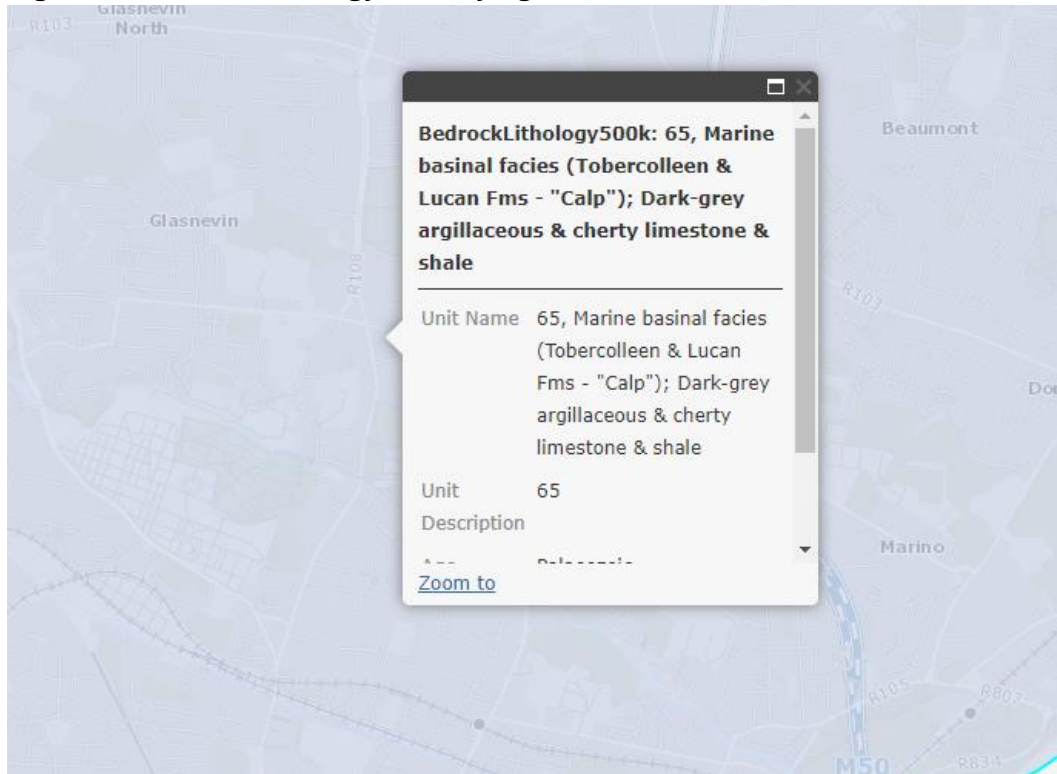
The site layout is shown on Figure 2. The area around the site is comprised primarily of commercial and residential land uses.

### 3.2 Regional Geology and Hydrogeology

#### 3.2.1 Geology

Information from the Geological Survey of Ireland (GSI) online mapping public viewer <https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228> indicates that the solid geology underlying the site is Calp, of the Lucan Formation, as shown in Figure 3.1 below. The Lucan formation comprises dark grey to black limestone and shale.

**Figure 3.1 Bedrock Geology Underlying Site**



The superficial geology underlying the area is made ground (urban). The made ground is underlain by glacial till comprising boulder clay.

RSK have undertaken a number of intrusive investigations in the North Dublin area. The glacial till encountered during intrusive works is dark brown to black, slightly gravelly clay also known as Dublin Boulder Clay which is highly impermeable. One example site where RSK encountered this geology is located at Upper Drumcondra Road <sup>(2)</sup> approximately 850m to the south east of the subject site.

The GSI has published borehole and trial pit records on-line. Although there are no available borehole/trial pits records for the subject site.

## 3.3 Hydrogeology

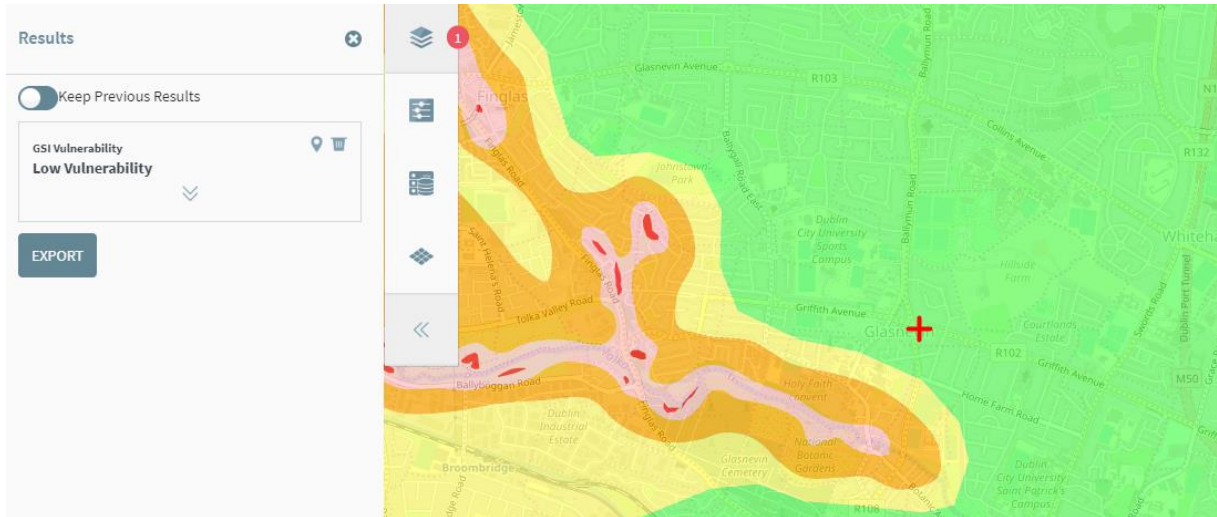
### 3.3.1 Aquifer characteristics

Information from the GSI Groundwater public viewer website <http://spatial.dcenr.gov.ie/imf/imf.jsp?site=Groundwater> indicates that the underlying bedrock is categorised as a locally important aquifer, that is an aquifer which is productive only in local zones. It is anticipated that perched groundwater may be

encountered in more permeable horizons within any made ground and superficial deposits.

Groundwater vulnerability is classified as Low at the site (see Figure 3.2 below). The EPA categorise the groundwater body as not at risk and water framework directive (WFD) monitoring (2010-2015) ranks the water quality as good.

**Figure 3.2 Groundwater Vulnerability at the Site**



### 3.3.2 Groundwater abstractions

The GSI public viewer indicates that there is a groundwater abstraction approximately 500m west-southwest of the site. The well use is unknown. Yields are 16.5 m<sup>3</sup>/day. The site is not located in a source protection area.

## 3.4 Hydrology

### 3.4.1 Surface watercourses

EPA mapping (available at <https://gis.epa.ie/EPAMaps/>) has been reviewed to identify potential receptor surface watercourses. The nearest surface watercourse is the Tolka river which flows in a west to east direction approximately 600 m south, downgradient of the site. The EPA indicate that water quality in the Tolka is at risk at this location and has an unassigned WFD status.

### 3.4.2 River Basin Management Plan

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The Water Maps viewer (available at <http://www.wfdireland.ie/maps.html>) is an integral part of the River Basin Management Plan and provides access to information

at individual waterbody level and at Water Management Unit level for all the River Basin Districts in Ireland.

No surface watercourses have been identified within 400m of the investigation area. The waterbody underlying the site is Tolka Lower, its status is described as bad, and it is noted to be at risk.

### **3.4.3 Site Drainage**

The site is sealed with tarmac and/or concrete. From reviewing the available information on site, all local surface water drainage discharges to the municipal drainage system on Griffith Avenue. Drawings have been requested from Dublin City Council (6<sup>th</sup> August 2019) and we are awaiting a response at the time of reporting.

### **3.4.4 Flood Risk**

The Office of Public works (OPW) interactive flood maps, available at <https://www.floodinfo.ie/map/floodmaps/>, contains no report of historic flooding of the site. An historic flood event was recorded approximately 0.6 km south-southwest of the site in the area of Tolka Botanic Avenue occurring on November 24<sup>th</sup> 1968. Two flood events were recorded on August 24<sup>th</sup>, 1986: one flood location is approximately 0.7 km southwest of the site, the other flood location is approximately 1 km southeast of the site.

The OPW Flood Map resource was consulted for additional information on the probability of flooding at the site. However, no information was available for the location of this site.

To accurately quantify the risk of flooding at this site, a site-specific Flood Risk Assessment (FRA) could be undertaken if deemed necessary.

## **3.5 EPA Licensed IPPC / Section 4 Discharges / Waste Facilities**

Information from the EPA website <https://gis.epa.ie/EPAMaps/> indicates that there are no IPPC or licensed waste facilities located within 1 km of the site. No section 4 discharges have been identified within 1 km of the site.

## **3.6 Sensitive land uses**

A 2km buffer zone for sensitive land uses has been used as RSK considers it reasonable to assume that significant impact is unlikely to receptors where surface water or groundwater migration is a potential pathway at this distance.

A search carried out using the National Parks and Wildlife website (<http://www.npws.ie/>) for the presence of any designated sites confirmed that there is no designated site within 2 km of the site.



### **3.7 Local Authority Information**

RSK have requested information from Dublin City Council on 6<sup>h</sup> August 2019 regarding any pertinent environmental issues that they are aware of on or adjacent to the subject site, however no response was issued from the Council at the time of reporting.

## 4 CONCEPTUAL SITE MODEL

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### 4.1 Summary: Initial Conceptual Model

The information presented in Sections 2 and 3 has been used to compile an initial conceptual model. The identified potential sources of contamination, associated contaminants and receptors have been considered with plausible pathways that may link them. The resulting potential pollutant linkages are considered in Section 4.1.4.

#### 4.1.1 Summary of potential contaminant sources

Potential sources and contaminants of concern are summarised in Table 4.1 below.

**Table 4.1: Potential sources and types of contamination**

Potential sources	Contaminants of concern
<b>On-site</b>	
Historic leak of HV cable insulating fluids	LAB insulating oil and potential breakdown products

#### 4.1.2 Sensitive receptors

Sensitive receptors at the site include:

- Current / future site users.
- Neighbouring site users and surrounding areas.
- Surface waters.
- Groundwater in bedrock.

Please note that construction workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures as required in the Safety, Health and Welfare at Work (Construction) Regulations 2013.

#### 4.1.3 Summary of plausible pathways

The plausible pathways are summarised below:

- Migration of hydrocarbon vapours in any permeable soils or along existing service runs from natural deposits or made ground.
- Vertical and lateral migration via groundwater.
- Preferential migration of contaminants in groundwater via underground service corridors.
- Permeation of water supply pipes.

- Inhalation of hydrocarbon vapours.
- Direct contact via soil and dust ingestion/inhalation from near surface soils and dermal contact with near surface soils.

#### 4.1.4 Potentially complete pollutant linkages

The outline conceptual model and an estimate of the risk associated with each linkage is summarised in Table 4.2 below. The risk classification has been undertaken in accordance with CIRIA C552 (Rudland et al., 2001), a summary of which is included in Appendix C.

**Table 4.2: Risk estimation for potentially complete pollutant linkages**

Potential source	Possible pathway	Potential receptor	Likelihood	Severity	Risk and justification
<b>Onsite</b> Contamination associated with historic leakage of HV cable insulating fluid containing LAB.	Inhalation of hydrocarbon vapours	Current / future site users & occupants of adjacent sites	Unlikely	Medium	<b>Low</b> The insulating fluid has a low volatility. The vapour pressure of LAB is 0.013 hPa @ 25°C There are no buildings built over the cable route reducing risks to residential and commercial human health receptors. The leak of insulating fluid occurred in the roadway or adjoining pathway and most likely in granular materials used in the construction. The granular material in the road and path construction pack will likely act as a preferential pathway for any vapours formed. In addition, the spillage occurred over 9 years ago, and the most volatile fractions of the fluid are likely to have partitioned and dissipated.
	Direct dermal contact or ingestion of hydrocarbons	Current / future site users & occupants of adjacent sites	Unlikely	Medium	<b>Low</b> The area of the insulating oil leak is under hard standing. Areas of soft landscaping adjacent to public pathways and on private property are unlikely to be impacted.
	Current / future site users & occupants of adjacent sites	Permeation of water supply pipes	Unlikely	Medium	<b>Low</b> Water will be moving rapidly and at high pressure in water supply pipes making it unlikely that permeation of the pipes will occur in significant or harmful concentrations.

Potential source	Possible pathway	Potential receptor	Likelihood	Severity	Risk and justification
	Vertical and lateral migration	River Tolka/ Underlying locally important aquifer	Unlikely	Medium	<p><b>Low</b></p> <p>It is unlikely that perched groundwater at the site is in continuity with the River Tolka. However, if we assume that it is, given the distance to the River Tolka (500m), it is highly unlikely that dissolved contamination at the site of the leak will affect surface water in the River Tolka given the processes of dispersion, dilution and biodegradation that will occur to any dissolved contamination over this distance.</p> <p>As discussed in section 3.2.1, the underlying till material has a relatively low permeability which would impede any vertical migration of any hydrocarbons to the underlying locally important aquifer.</p>

## 4.2 Risk Evaluation

Only potential source contamination related to the historic leak of HV cable insulating fluid containing LAB oil has been considered.

The initial CSM has identified potential pollutant linkages with a risk class of **LOW** for all identified pollution linkages.

## 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

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Historic information confirms that the area of the site has been subject to development since the 1930's and has been used only for residential end uses, which are not considered to be significantly potentially contaminating. The surrounding land use is predominantly residential.

The site is the location of a leakage of cable fluid from a high voltage (HV) underground cable which occurred in early 2010. It is RSKs understanding that the fluid contained Linear Alkyl Benzene (LAB) and that the total fluid loss was approximately 450 litres.

The aim of the PSA is to assess potential impacts to human health and the environment from the leaked fluid, establish any potential environmental liabilities associated with contamination issues at the site due to leaked insulating fluids, to include a detailed source audit and desk-based hydrogeological assessment.

Following the completion of a risk evaluation for the identified pollutant linkages, the initial CSM has identified potential pollutant linkages with a risk class of LOW for all identified pollution linkages.

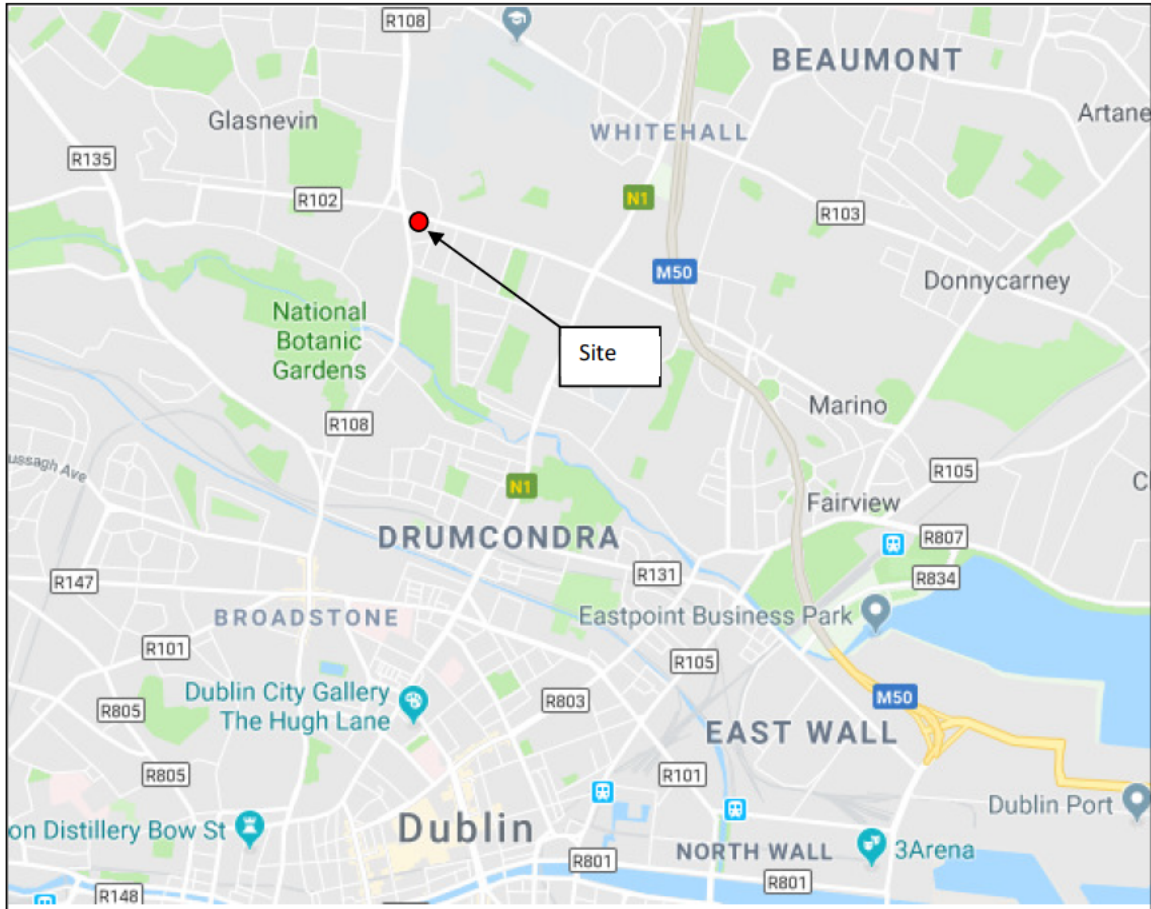
## 6 REFERENCES

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1. Petroleum Products in Drinking Water, Background Document for development of WHO guidelines for Drinking-water quality, 2008
2. RSK Limited, Environmental Site Assessment, 22321 R01, dated July 2006.
3. European Chemicals Bureau. European Union Risk Assessment Report for Benzene C<sub>10-13</sub> Alkyl Derivs, June 1997
4. CIRIA, C552, Contaminated Land Risk Assessment. A Guide to Good Practice , 2001.

# FIGURES

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Prepared For: ESB Engineering and Major Projects

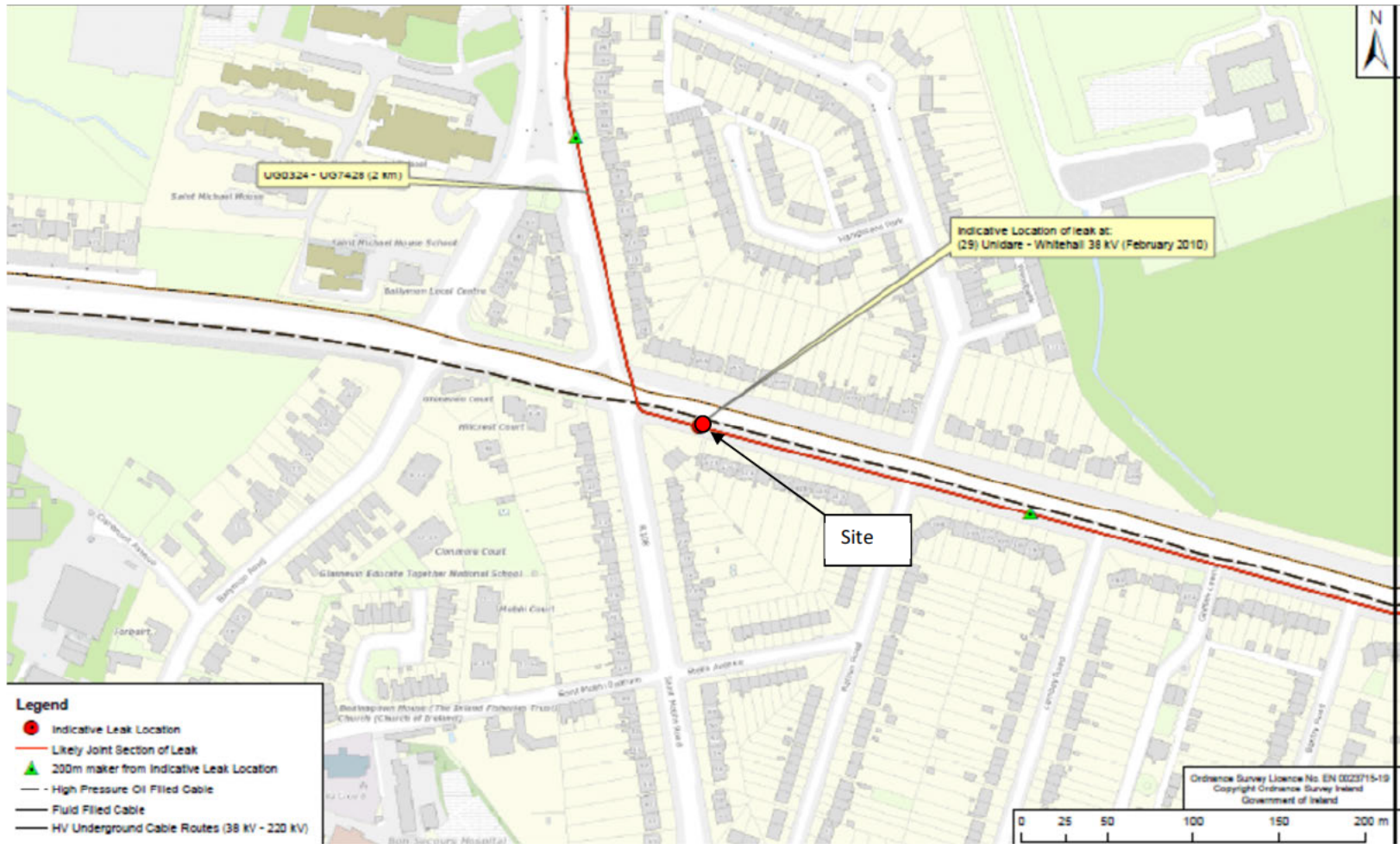
Project: Site # 29 - Unidare - Whitehall

Drawing Title: Figure 1 Site Location



Source: Google  
Date: 08/08/2019





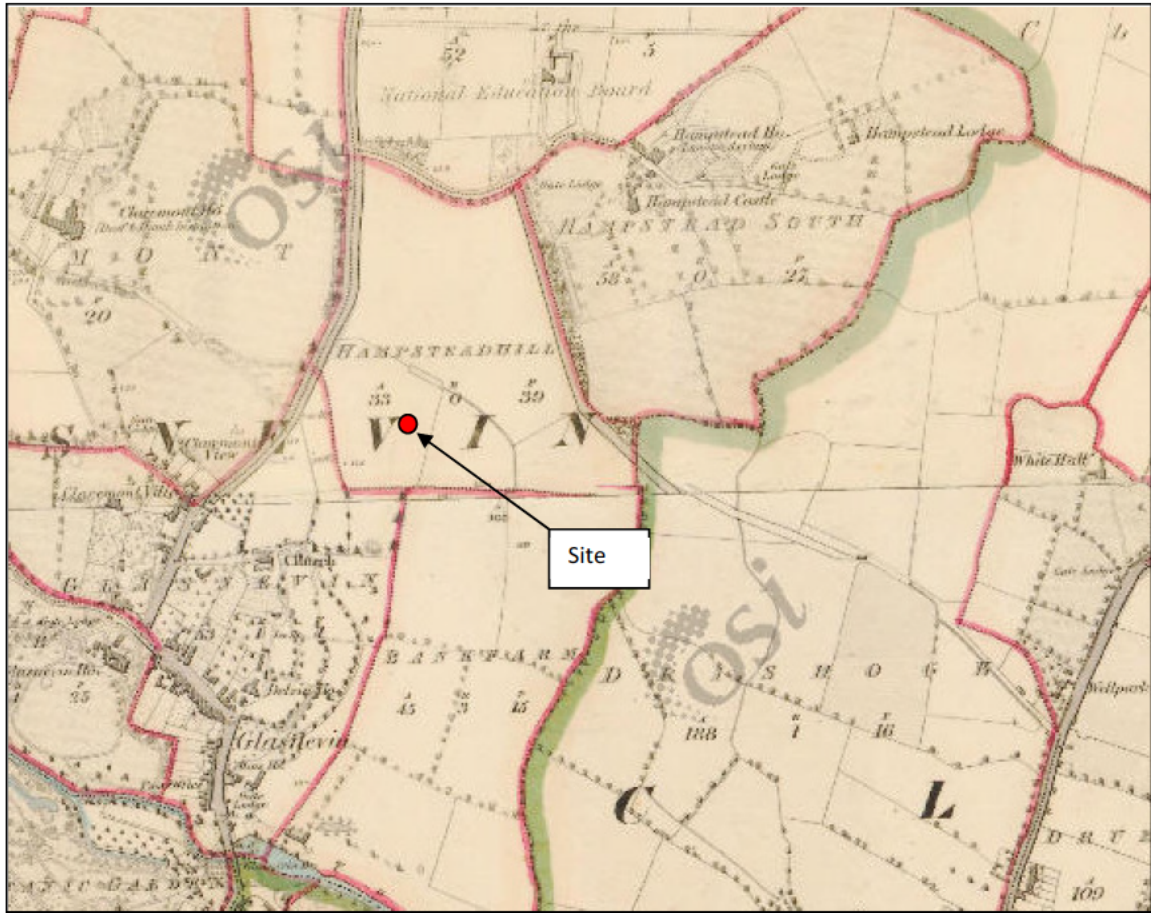
Prepared For: ESB Engineering and Major Projects

Project: Site # 29 - Unidare - Whitehall

Drawing Title: Figure 2 Site Layout Plan



Source: ESB Networks  
Date: 08/08/2019



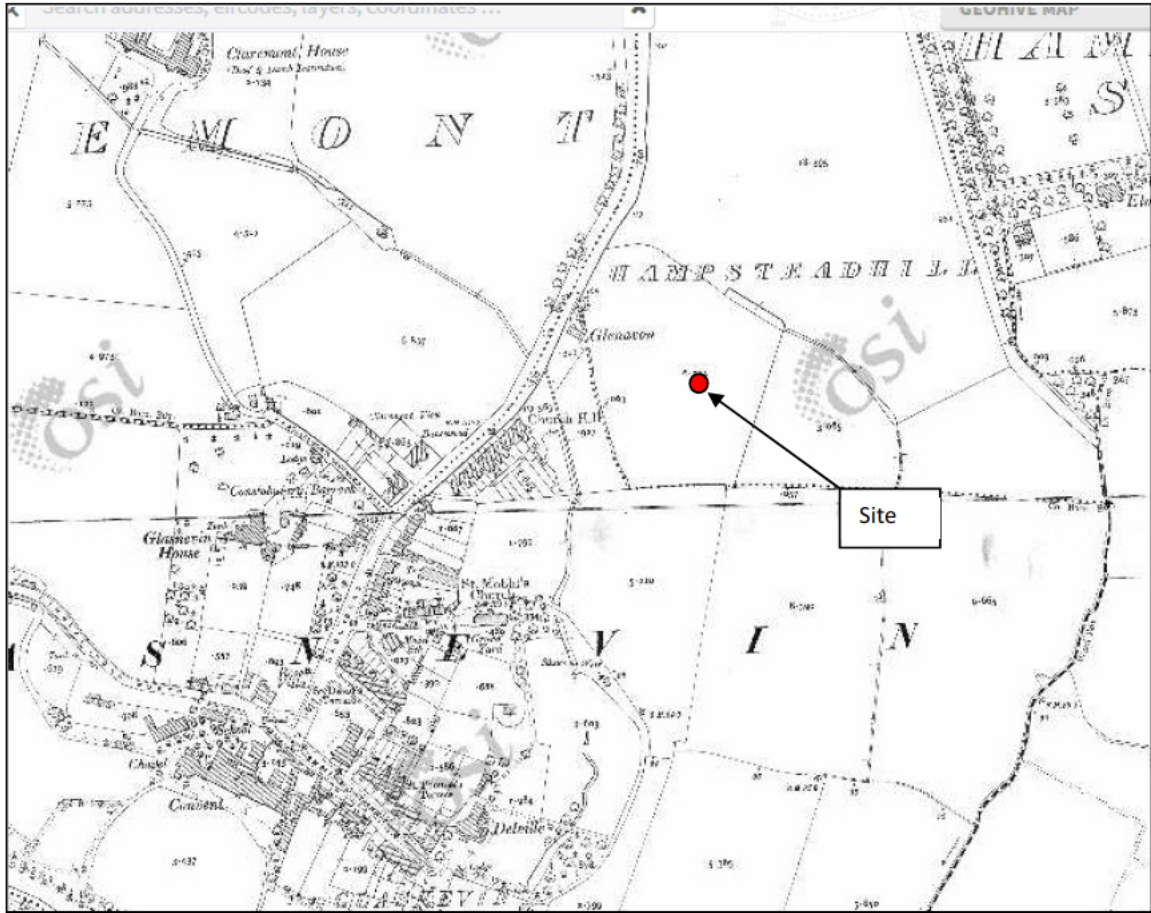
Prepared For: ESD Engineering and Major Projects

Project: Unidare - Whitehall

Drawing Title: Figure 3 - OSI Historic Map 1837-1842



Source: OSI (accessed via GeoHive)  
Date: 08/08/2019



Prepared For: ESB Engineering and Major Projects

Project: Site # 29 - Unidare - Whitehall

Drawing Title: Figure 4 OSI Historic Map 1888-1913



Source: GeoHive  
Date: 08/08/2019



Prepared For: ESB Engineering and Major Projects

Project: Site # 29 - Unidare - Whitehall

Drawing Title: Figure 5 TCD Historic Map 1938



Source: ESB Networks  
Date: 08/08/2019

# APPENDIX A

## SERVICE CONSTRAINTS

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### RSK ENVIRONMENT LIMITED SERVICE CONSTRAINTS

1. This report (the "Services") was compiled and carried out by RSK Ireland Limited (RSK) for ESB International Ltd (the "client") in accordance with the terms of a contract between RSK and the "client", dated July 2019. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable **Error! Reference source not found.** at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.
2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. **Error! Reference source not found.** Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Error! Reference source not found.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.
8. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.



# APPENDIX B

## PHOTOGRAPHS

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# PHOTOGRAPHIC LOG

**Client Name:**  
ESB Networks

**Site Location:**  
(29) Whitehall

**Site walkover**

**Photo No.**  
1

**Date:**  
Aug 2019

**Direction Photo taken:**

East

**Description:**

Marker (~200m east) from Indicative Leak location.

View from the junction of Lambay Road with Griffith Avenue. The street is bound on both sides with detached and semi-detached residential dwellings with gardens.

Communal green bands with mature trees line the footpaths.



**Photo No.**  
2

**Date:**  
Aug 2019

**Direction Photo taken:**

North

**Description:**

Marker (~200m east) from Indicative Leak location.

View from the junction of Lambay Road with Griffith Avenue. The street is bound on both side with detached and semi-detached residential dwellings with gardens.

Communal green bands with mature trees line the footpaths.





# PHOTOGRAPHIC LOG

**Client Name:**  
ESB Networks

**Site Location:**  
(29) Whitehall

**Site walkover**

**Photo No.**  
3      **Date:**  
Aug 2019

**Direction Photo taken:**

East

**Description:**

Marker (~200m east) from Indicative Leak location.

View of Griffith Avenue. The street is bound on both side with detached and semi-detached residential dwellings with gardens.

Communal green bands with mature trees line the footpaths.



**Photo No.**  
4      **Date:**  
Aug 2019

**Direction Photo taken:**

West

**Description:**

Marker (~200m east) from Indicative Leak location.

View of Griffith Avenue. The street is bound on both side with detached and semi-detached residential dwellings with gardens.

Communal green bands with mature trees line the footpaths.







# PHOTOGRAPHIC LOG

**Client Name:**  
ESB Networks

**Site Location:**  
(29) Whitehall

**Site walkover**

**Photo No.**  
5

**Date:**  
Aug 2019

**Direction Photo taken:**

West

**Description:**

Indicative Leak location.

View of Griffith Avenue.  
The street is bound on both side with detached and semi-detached residential dwellings with gardens.

Communal green bands with mature trees line the footpaths.



**Photo No.**  
6

**Date:**  
Aug 2019

**Direction Photo taken:**

East

**Description:**

Indicative Leak location.

View of Griffith Avenue.  
The street is bound on both side with detached and semi-detached residential dwellings with gardens.

Communal green bands with mature trees line the footpaths.





# PHOTOGRAPHIC LOG

**Client Name:**  
ESB Networks

**Site Location:**  
(29) Whitehall

**Site walkover**

**Photo No.**  
7

**Date:**  
Aug 2019

**Direction Photo taken:**

North

**Description:**

Indicative Leak location.

View of Griffith Avenue.  
The street is bound on both side with detached and semi-detached residential dwellings with gardens.

Communal green bands with mature trees line the footpaths.



**Photo No.**  
8

**Date:**  
Aug 2019

**Direction Photo taken:**

West

**Description:**

Indicative Leak location.

View of Griffith Avenue towards the junction of St Mobhi Road. Griffith Avenue is bound on both sides by





# PHOTOGRAPHIC LOG

**Client Name:**  
ESB Networks

**Site Location:**  
(29) Whitehall

**Site walkover**

**Photo No.**  
9

**Date:**  
Aug 2019

**Direction Photo taken:**

Southwest

**Description:**

Marker (~200m north) from Indicative Leak location.

View of commercial premises' and communal green space located on St Mobhi Road.



**Photo No.**  
10

**Date:**  
Aug 2019

**Direction Photo taken:**

West

**Description:**

Marker (~200m north) from Indicative Leak location.

View of St Michaels House (Special Education School) located on Ballymun Road; located within 200m of the indicative leak location.





# PHOTOGRAPHIC LOG

**Client Name:**  
ESB Networks

**Site Location:**  
(29) Whitehall

Site walkover

**Photo No.**  
11

**Date:**  
Aug 2019

**Direction Photo taken:**  
Southwest

**Description:**

Marker (~200m north) from Indicative Leak location.

View of St Michaels House (Special Education School) located on Ballymun Road; located within 200m of the indicative leak location.



**Photo No.**  
12

**Date:**  
Aug 2019

**Direction Photo taken:**  
South

**Description:**

Marker (~200m north) from Indicative Leak location.

View of St Mobhi Road from the 200m marker. Road is bound by residential properties with gardens to the east, a school and commercial premises to the west.



# APPENDIX C

## RISK ASSESSMENT METHODOLOGY

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CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. Under CLR11, three stages of risk assessment exist: preliminary, generic quantitative and detailed quantitative. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) pollutant linkages (source–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- **Highly likely:** the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- **Likely:** it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- **Low likelihood:** circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- **Unlikely:** circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- **Severe:** short term (acute) risk to human health likely to result in ‘significant harm’ as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in ‘Draft Circular on Contaminated Land’, DETR 2000)
- **Medium:** chronic damage to human health (‘significant harm’ as defined in ‘Draft Circular on Contaminated Land’, DETR 2000), pollution of sensitive water resources, significant

change in an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000)

- Mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- Minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the likelihood of an event occurring and its severity have been classified, a risk category can be assigned using the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- Very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required.
- High: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term.
- Moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.
- Low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild.

- Very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.



# APPENDIX D

## MATERIAL SAFETY DATA SHEETS

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## MATERIAL SAFETY DATA SHEET

### 1: IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Product Name: T 3788  
Application: Hollow-core Energy Cable Saturant  
Company: H&R ESP Ltd.  
Address: Matrix House  
North 4<sup>th</sup> Street  
Milton Keynes, MK9 1NJ  
United Kingdom

Telephone: +44 (0)1908 351 111      Fax: +44 (0)1908 351122

### 2: COMPOSITION / INFORMATION ON INGREDIENTS

Composition: Low viscosity compound based on a blend of linear alkyl benzenes that have side alkyl chains of 10 – 13 carbon atoms in length.

Synonyms: Linear Alkyl Benzenes  
Alkyl C10-C13, benzenes  
Benzene, C10-13-alkyl-deriv.  
Detergent Alkylate

Composition	EINECS number	CAS number	Symbol letters	Risk numbers	Concentration range
C10 – C13 Linear Alkyl Benzenes	267-051-0	67774-74-7	Not regulated		100%

All constituents of this product are listed in EINECS (European Inventory of Existing Commercial Chemical Substances) or ELINCS (European List of Notified Chemical Substances) or are exempt.

### 3: HAZARDS IDENTIFICATION

Classification of preparation: This product is not classified as a dangerous substance / preparation in accordance with The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3).

Physical and Chemical Properties: Not classified as flammable, but will burn. Avoid contact with strong oxidisers.

## Health Effects

### Skin:

Contact with the skin may cause irritation. Prolonged or repeated skin contact may cause drying of the skin, progressing to dermatitis. Symptoms may include itching, discolouration, swelling and blistering.

### Eyes:

Contact with the eyes may cause irritation. Symptoms may include reddening, swelling and impaired vision.

### Ingestion:

Ingestion of small amounts may cause nausea and vomiting.

### Inhalation:

Due to low volatility, this product should not present an inhalation hazard under ambient conditions. Exposure to vapour or mineral oil mists may irritate the mucous membranes and cause dizziness, headaches and nausea.

## Environmental Effects

No specific hazards under normal use conditions.

## **4: FIRST AID MEASURES**

### Inhalation:

Remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance and call a doctor. If breathing has stopped, administer artificial respiration.

### Skin contact:

Remove contaminated clothing and wash affected skin with soap and water. If persistent irritation occurs, obtain medical attention. If high pressure injection injuries occur, obtain medical attention immediately.

### Eye contact:

Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

### Ingestion:

Wash out mouth with water and obtain medical attention. DO NOT INDUCE VOMITING.

## **5: FIRE FIGHTING MEASURES**

### Suitable extinguishing media:

Carbon dioxide (CO<sub>2</sub>), dry chemical, foam or water spray.

### Unsuitable extinguishing media:

Do not use water jets.

### Special exposure hazards:

Combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including carbon monoxide, and unidentified organic and inorganic compounds.

### Special protective equipment:

Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

## 6: ACCIDENTAL RELEASE MEASURES

<u>Personal Precautions:</u>	Spilt product presents a significant slip hazard. Remove any sources of heat.
<u>Environmental Precautions:</u>	Prevent from spreading or entering into drains, sewers and watercourses by using inert absorbent material or other appropriate barriers. Inform local authorities if this cannot be prevented.
<u>Methods for cleaning up:</u>	Absorb liquid with inert absorbent material. Sweep up and remove to a suitable, clearly marked container for disposal in accordance with local and national regulations

## 7: HANDLING AND STORAGE

<u>Handling:</u>	Do not eat, drink or smoke whilst using this product. To avoid the possibility of skin disorders repeated or prolonged contact with products of this type must be avoided. It is essential to maintain a high standard of personal hygiene.
<u>Storage:</u>	Store in a cool place away from sources of heat and out of direct sunlight to avoid pressure build up. Do not store near oxidisers.

### Handling and Storage Materials and Coatings

<u>Suitable:</u>	Carbon steel, baked epoxy or Phenolic coatings, aluminium.
<u>Unsuitable:</u>	Natural rubber, Butyl rubber

## 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

<u>Occupational Exposure Limits:</u>	Not established.
<u>Engineering control measures:</u>	Use of local exhaust ventilation is recommended whenever this product is used in a confined space, is heated above ambient temperatures, or is agitated.
<u>Hygiene measures:</u>	Wash hands before eating, drinking, smoking and using the toilet. Gloves should be washed before being removed.
<u>Respiratory Protection:</u>	Normally not required if adequate ventilation is in place. Where concentrations in air may exceed the limits given in this section, it is recommended to use a half mask respirator to protect from over exposure by inhalation. Suitable filter material depends on the amount and type of chemicals being handled, but filter material suitable for organic vapours may be considered for use.
<u>Hand Protection:</u>	When handling this product it is recommended to wear chemical resistant gloves. Suggested materials for protective gloves include: PVC, Neoprene or similar.
<u>Eye Protection:</u>	Wear eye protection such as safety glasses, chemical goggles, or face shield if engineering controls or work practices are not adequate to prevent eye contact. Have suitable eye wash water available.

Skin Protection:

Wear impervious protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots, and complete facial protection depending on operations conducted.

**9: PHYSICAL AND CHEMICAL PROPERTIES**

General Information

Appearance: Clear, colourless liquid  
Odour: Mild petroleum odour

Health, safety and environmental information

pH: Not determined  
Boiling point/range: 280 °C  
Flash point: >135 °C  
Flammability: Non flammable  
Explosive properties: Not explosive  
Oxidising properties: Not applicable  
Vapour pressure at 20 °C: <0.02 kPa  
Density: 0.86 g/cm<sup>3</sup> at 20 °C typical  
Solubility in water: Insoluble  
Kinematic Viscosity at 20 °C: 4.0 – 4.5 cSt (4.0 – 4.5 mm<sup>2</sup>/s) typical  
Vapour density (Air=1): >1  
Evaporation rate: Not determined

Other information

Pour point: -60 °C typical  
Expansion coefficient: 0.0007 /°C typical  
Neutralisation value: 0.03 mg KOH g<sup>-1</sup> maximum

**10: STABILITY AND REACTIVITY**

Chemical stability:

This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure and will not polymerise.

Conditions to avoid:

Temperatures above 140 °C

Materials to avoid:

Strong oxidising agents, such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, peroxides etc, as this may present an explosion hazard.

Hazardous decomposition products:

Carbon monoxide and irritant fumes may be generated if this product is burned in an enclosed space.

## 11: TOXICOLOGICAL INFORMATION

<u>Basis for assessment:</u>	Toxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the toxicology of similar products.
<u>Acute toxicity:</u>	Oral LD50 expected to be >5000 mg/kg (rat) Inhalation LC50/4hr expected to be >1.8 mg/l (rat) Dermal LD50 expected to be >2000 mg/kg (rabbit)
<u>Corrosivity/irritation:</u>	
<u>Eye:</u>	May be slightly irritant
<u>Skin:</u>	May be slightly irritant
<u>Respiratory tract:</u>	If mists are inhaled, slight irritation of the respiratory tract may occur
<u>Skin sensitisation:</u>	Not expected to be a skin sensitiser
<u>Repeated-dose toxicity:</u>	Prolonged and/or repeated contact may lead to irritation and possibly dermatitis, especially under conditions of poor personal hygiene.
<u>Mutagenicity:</u>	Not expected to be a mutagen.
<u>Carcinogenicity:</u>	Not expected to be a carcinogen.
<u>Reproductive toxicity:</u>	The preparation has not been assessed at all for this end-point, so its hazardous property in this regard is not known.

## 12: ECOLOGICAL INFORMATION

<u>Basis for assessment:</u>	Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.
<u>Ecotoxicity:</u>	Poorly soluble mixture. Product is not expected to be ecotoxic to fish/daphnia/algae, or sewage bacteria. This preparation is expected to be removed in a wastewater treatment facility
<u>Mobility:</u>	Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
<u>Persistence and degradability:</u>	Readily biodegradable. Soils degradation – half life approx. 15 days. Natural waters degradation – half life approx. 4 – 9 days.
<u>Bioaccumulative potential:</u>	May have the potential to bioaccumulate

### 13: DISPOSAL CONSIDERATIONS

Disposal must be in accordance with local and national legislation.

<u>Unused Product:</u>	Dispose of through an authorised waste contractor to a licensed site. May be incinerated.
<u>Used/Contaminated Product:</u>	Dispose of through an authorised waste contractor to a licensed site. May be incinerated.
<u>Packaging:</u>	Dispose of through an authorised waste contractor. May be steam cleaned and recycled.

### 14: TRANSPORT INFORMATION

This product is not classified as dangerous for transport.

### 15: REGULATORY INFORMATION

Classification/Symbol: Not Regulated

*This preparation is not classified as Dangerous according to EU Directives*

This safety data sheet is intended to assist in compliance with the following UK legislation:

- Chemicals (Hazard Information and Packaging for Supply) Regulations 2002
- Control of Substances Hazardous to Health Regulations 2002.
- Health and Safety at Work, etc. Act 1974.
- Environmental Protection Act 1990
- Environmental Protection (Duty of Care) Regs. 1991
- COSHH essentials: Easy steps to control chemicals. Control of Substances Hazardous to Health Regulations

#### Further Guidance

*The following guidance notes are available from HMSO or HSE.*

Occupational exposure limits (EH 40). Effects of mineral oil on the skin (SHW 397).

Preventing dermatitis at work (INDG 233)

A step by step guide to COSHH assessment (HSG 97)

Assessing and managing risks at work from skin exposure to chemical agents (HSG 205)

The selection, use and maintenance of respiratory protective equipment: A practical guide (HSG 53)

Relevant EC Directives:

- Dangerous Substances Directive (DSD)
- Dangerous Preparations Directive (DPD)
- Safety Data Sheets Directive (SDSD)
- Health & Safety Framework Directive

## **16: OTHER INFORMATION**

This data sheet was prepared in accordance with Commission Directive 2001/58/EC and SI 2002 No. 1689 (CHIP 3)

### **Key References:**

- Chemicals (Hazard Information and Packaging for Supply) Regulations 2002
- The compilation of safety data sheets. Approved Code of Practice (third edition)
- Approved supply list (7<sup>th</sup> Edition). Information approved for the classification and labelling of substances and preparations dangerous for supply. Chemicals (Hazard Information and Packaging for Supply) Regulations 2002
- Approved classification and labelling guide. Chemicals (Hazard Information and Packaging for Supply) Regulations 2002. Guidance on regulations (Fifth edition).
- EH40/2005 Workplace Exposure Limits 2005
- COSHH essentials: Easy steps to control chemicals. Control of Substances Hazardous to Health Regulations
- European Inventory of Existing Commercial Substances (EINECS)

The data and advice given apply when the product is sold for the stated application or applications. The product is not sold as suitable for any other application. Use of the product for applications other than as stated in this sheet may give rise to risks not mentioned in this sheet. You should not use the product other than for the stated application or applications without seeking advice from us.

If you have purchased the product for supply to a third party for use at work, it is your duty to take all necessary steps to secure that any person handling or using this product is provided with the information in this sheet.

If you are an employer, it is your duty to tell your employees and others who may be affected of any hazards described in this sheet and of any precautions that should be taken.

We believe, in good faith and to the best of our knowledge that the preceding information is accurate. However, we give no guarantee or warranty in this respect. The information provided herein may not be adequate for all individuals and/or all situations. The purchaser/user of the product remains responsible for storing, using or dealing with the product safely and in accordance with all applicable laws and regulations.