



ESB Engineering and Major Projects

Francis Street – Camden Row (Site ID 33)

Preliminary Environmental Site Assessment

602620 – R01 (04)

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 Golden Lane, Dublin 8 (the site). The site of the leak has been assigned a site ID number 33.

Historic information confirms that the area surrounding the site has been subject to development since the 1830's and has been used only for residential / commercial (office & recreational) end uses, which are not considered to be significantly potentially contaminating.

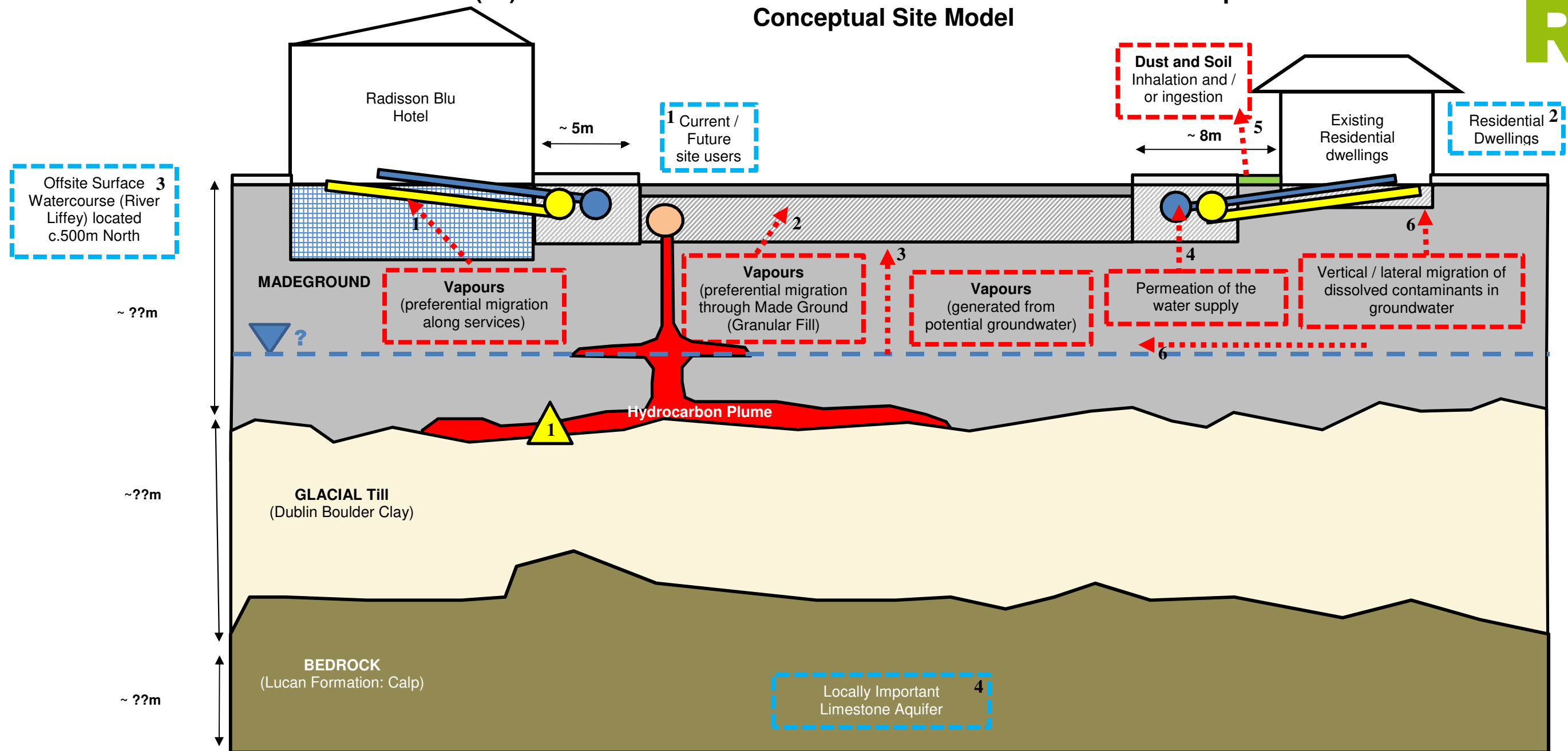
The site is the location of a leakage of cable fluid from a high voltage (HV) underground cable which occurred in early 2009. It is RSKs understanding that the fluid contained a mixture of Linear Alkyl Benzene (LAB) and Mineral Oil and that the total fluid loss was approximately 725 litres.

RSK also understands that an additional, similar leak of insulating fluid from a HV cable occurred approximately 45 metres east of the site. The off-site leak is identified by a site number 34. RSK understands that the leak at site 34 was also of insulating fluid comprising a LAB and mineral oil mixture and that the volume of leaked fluid was 755 litres. Conservatively, and for the purposes of this report RSK have assumed interaction between the two spills.

The aim of the PSA is to assess potential impacts to human health and the environment from the leaked fluid, both on-site and from site 34, and establish any potential environmental risks associated with contamination issues at the site due to leaked insulating fluids, to include a detailed source audit and desk-based hydrogeological assessment.

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

(33) Francis Street – Camden Row Indicative Leak Location - Graphical Conceptual Site Model



Potential Sources		Potential Pathways		Potential Receptors	
	Hydrocarbon Plume		Preferential migration along services		Current / Future site users
			Preferential migration through made ground (granular fill)		Residential dwellings
			Vapour migration in potential groundwater		River Liffey (c.500m north; offsite)
			Permeation of the water supply		Locally Important Limestone Aquifer
			Dust and/or soil inhalation and/or ingestion		
			Vertical / lateral migration of dissolved contaminants in groundwater		

Key:

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

EPA Contaminated Land & Groundwater Risk Assessment Methodology	Report Reference	Report Date	Status	
STAGE 1: SITE CHARACTERISATION & ASSESSMENT				
1.1	PRELIMINARY SITE ASSESSMENT	602620 R01 Paul Feely	16/12/2019	FINAL
1.2	DETAILED SITE ASSESSMENT			
1.3	QUANTITATIVE RISK ASSESSMENT			
STAGE 2: CORRECTIVE ACTION FEASIBILITY & DESIGN				
2.1	OUTLINE CORRECTIVE ACTION STRATEGY			
2.2	FEASIBILITY STUDY & OUTLINE DESIGN			
2.3	DETAILED DESIGN			
2.4	FINAL STRATEGY & IMPLEMENTATION PLAN			
STAGE 3: CORRECTIVE ACTION IMPLEMENTATION & AFTERCARE				
3.1	ENABLING WORKS			
3.2	CORRECTIVE ACTION IMPLEMENTATION & VERIFICATION			
3.3	AFTERCARE			



RSK GENERAL NOTES

Project No.: 602206 – R01 (04)

Title: Preliminary Environmental Site Assessment: Francis Street – Camden Row (Site I.D. 33)

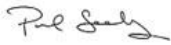
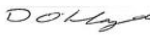
Client: ESB Engineering and Major Projects

Date: 16th December 2019

Office: Dublin

Status: **FINAL**

Document Production/Approval Record

	Name	Signature	Date	Position	% Input
Prepared by (consultant)	Paul Feely		16/12/19	Principal Consultant	90
Approved by (consultant)	David O'Hagan		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.

This work has been undertaken in accordance with the quality management system of RSK Ireland Ltd.



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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Figure 5: Historical Map 1909

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1 INTRODUCTION

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 (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 Golden Lane, Dublin 8 (the site). The site of the leak has been assigned a site ID number 33.

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 2009. It is RSKs understanding that the fluid contained a mixture of Linear Alkyl Benzene (LAB) and Mineral Oil and that the total fluid loss was approximately 725 litres. RSK also understands that an additional, similar leak of insulating fluid from a HV cable occurred approximately 45 metres east of the site, at the junction of Golden Lane, Stephen Street Upper and Longford Street and that the site is also identified by a site number 34. RSK understands that the leak at site 34 was also of insulating fluid comprising a LAB and mineral oil mixture and that the volume of leaked fluid was 755 litres. Conservatively, and for the purposes of this report RSK will assume interaction between the two spills.

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

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

2.1 Current Site Activities

The site of the historic cable leak is located beneath an area of roadway and or adjoining footpath at Golden Lane, Dublin 8, approximately 30 metres east of the junction between Golden Lane and Chancery Lane.

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 part of a built, urban environment. The site is identified as being on Golden Lane. However, it is not possible to identify individual buildings/premises or land use. A map from 1843 was examined in TCD which identified a graveyard approximately 80m to the north and Castle Barracks approximately 100m to the north east. The surrounding area is predominantly residential. TCD maps from 1864 and 1892 show little change at the site and surrounding area.

The OSI online map from 1888-1913 (Figure 5) shows a broadly similar street and building layout to the previous map (1837-1842). A saw mill is identified approximately 30 metres to the north of the site. TCD maps from 1939 show little change. A 'shirt and collar' factory is located approximately 60m to the south east.

The TCD map from 1973 shows that the terraced buildings present to the south and west have been cleared with McDonagh House flats (south) and Whitefriar Gardens flats (south east) constructed in their place. A large surface car park is located to the west where building clearance has occurred. The roads have been widened in the vicinity of the site. The TCD map from 1991 shows little change to the site or surrounding area.

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

2.3 Chemicals of Potential Concern

As previously mentioned the site, and neighbouring site 34, 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 mixture used to insulate the cables was a LAB and mineral oil mixture.

LAB is a clear, colourless liquid with a mild petroleum odour. LAB has a low volatility with a vapour pressure of 0.013hPa @25°C ⁽¹⁾.

Mineral oil is a liquid by-product of refining crude oil to make gasoline and other petroleum products. Mineral oil is a transparent, colourless oil, composed mainly of alkanes and cycloalkanes. Refined mineral oils such as those used in insulating fluid have a low volatility with a vapour pressure of <0.01hPa @20°C.

The identified COPC are outlined in Table 2.1.

Table 2-1: Contaminants of potential concern

Potential Sources	COPC
HV Cable insulating fluid leak 2009	Linear Alkyl Benzene (LAB) and Mineral Oil mixture. Poly Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH) and Semi-Volatile Organic Compounds (SVOCs)

The properties of LAB and Mineral Oil 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 mm²/s

Mineral Oil;

- Physical State: Liquid
- Colour: clear
- Flashpoint: 145°C
- Flammability – lower limit (vol%): 0.6
- Flammability – upper limit (vol%): 6.5
- Vapor Pressure (20°C): < 0.1 mm Hg
- Density (15°C): 888 kg/m³
- Evaporation Rate: Not available

- Solubility in water: Negligible
- Kinematic viscosity: 8.5 mm²/s

3 SITE ENVIRONMENTAL SETTING

3.1 General Introduction

The site is located at Golden Lane, Dublin 8. The site is located approximately 1km south west of Dublin City Centre. The site is centred on Irish Grid reference O 15366 33684 at an altitude of approximately 15m above ordinance datum.

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

The Indicative leak site is located to the immediate south of the Radisson Blu Hotel and north of McDonagh House residential flats on Golden Lane, Dublin 8. McDonagh flats have an area of communal landscaping which bounds the indicative leak location. Chancery lane Apartments are located to the northwest and Whitefriar Garden Flats are located to the southeast of the indicative leak location; both have areas of communal landscaping. St. Enda's Primary School is located c.55m southeast of the indicative leak location.

Lands to the west of the indicative leak location are predominantly residential. Houses bound Golden Lane to the north and south; a number of residential premises to the south of Golden Lane (c.75m west of indicative leak location) have grassed / vegetated private gardens.

The western extent of the survey from the indicative leak location is located on Bull Alley Street, with Liberties College to the north and St. Patrick's College park to the south. St. Patrick's Park was busy with pedestrians during the site walkover survey.

The east of the site is mixed residential / commercial. A construction site is located c.75m northeast of the indicative leak location, on the boundary with Stephen Street Upper. At the time of the site walkover temporary traffic lights were in use on the one-way street which has led to increased traffic in the area.

The eastern extent of the survey from the indicative leak location is located at the junction of Stephen Street Upper and Stephen Street Lower, which is busy with traffic and pedestrians. Stephen Street Lower is bound by restaurants /cafes with office accommodation above. Some construction works are ongoing to the west of the indicative leak location.

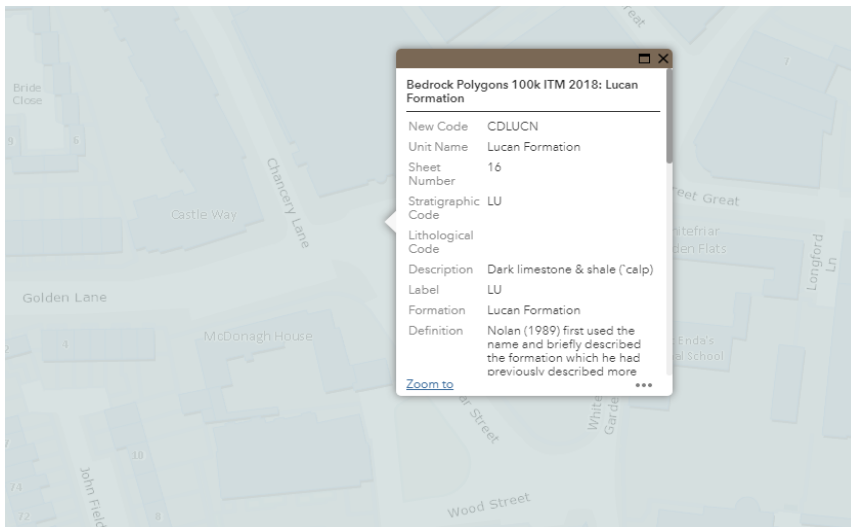
The site layout is shown on Figure 2. The area around the site is comprised primarily of commercial and residential land uses.

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 south city centre area of Dublin. 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 Adelaide Road ⁽²⁾ approximately 800m to the south 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.

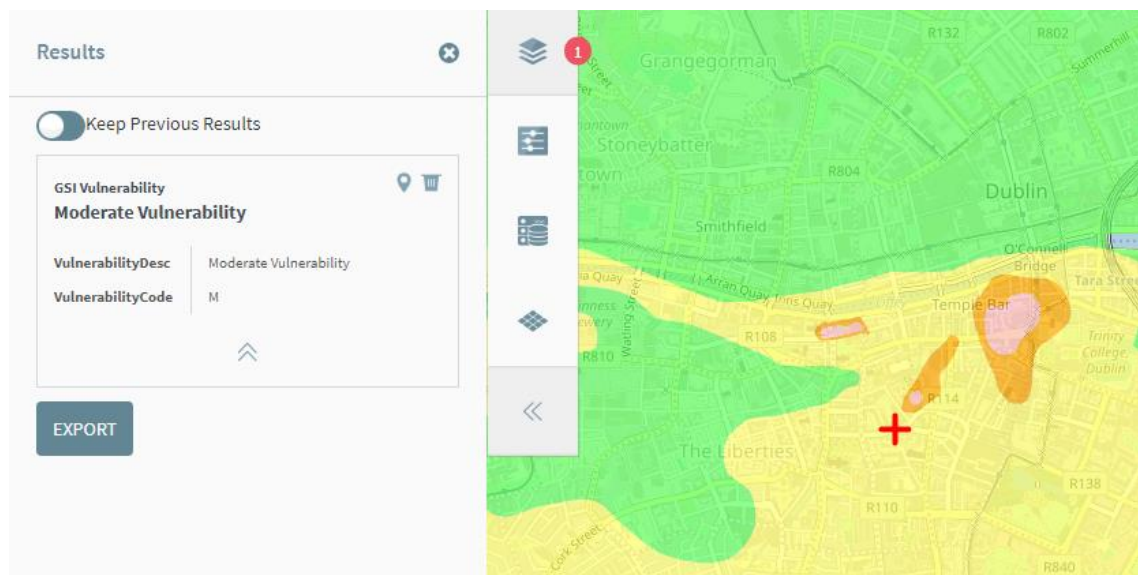
3.3 Hydrogeology

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 Medium 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 status as good.

Figure 3.2 Groundwater Vulnerability



3.3.2 Groundwater abstractions

The GSI public viewer indicates that there is a groundwater abstraction approximately 500 m north of the site. The well use is unknown. Yields are 114.5 m³/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 identified surface watercourse is an un-culverted section of the River Poddle located approximately 450m to the southwest of the site. It should be noted that the Poddle at this location is considered to be upgradient of the site and that there is no water quality information for the River Poddle at this location. The River Liffey flows in a west to east direction approximately 475 m north and downgradient of the site. The River Liffey is classified as a transitional waterbody at this location and water quality is indicated as being at risk at this location and WFD monitoring (2010-2015) ranks the water quality status as moderate.

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 Dublin Urban, its status is described as good, however 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 Stephen Street Upper. Drawings have been requested from Dublin City Council (6th 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 450m to the south of the site on Wexford Street occurring in July 2013. No records of any other flood events have been recorded within 500m of the site.

A review of the site was undertaken by assessing the available flood event maps provided by the OPW. The maps refer to flood event probabilities in terms of a percentage Annual Exceedance Probability, or 'AEP'. This represents the probability of a flood event occurring in any given year. These probabilities may also be expressed as odds (e.g. 100 to 1) of the event occurring in any given year. The latest maps, dated May 2017, indicates that the site has a <0.1% Fluvial AEP event risk i.e. less than a 1 in 1,000 year event. The fluvial flood event map is presented as Figure 3.

Please note that this flood event map has been generated for a large area of Dublin City Centre. To most accurately quantify the risk, a site-specific Flood Risk Assessment (FRA) could be undertaken if deemed necessary.

3.5 EPA Licensed IPPC/ Section 4 Discharge / Waste Facilities

Information from the EPA website <https://gis.epa.ie/EPAMaps/> indicates that there are no IPPC or licensed waste facilities located within 1km of the site. A section 4 discharge is noted for Kevin Street Garda Station development located approximately 200m to the south west 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 are no current designated sites within 2 km of the site.

The Grand Canal pNHA (proposed Natural Heritage Area (site code 00210)) is located approximately 1.2 km to the south of the site. Proposed Natural Heritage Areas (pNHAs) were published on a non-statutory basis in 1995; they have not been statutorily proposed or designated but are of significance for wildlife and habitats.

3.7 Local Authority Information

RSK have requested information from Dublin City Council on 6th 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

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
On-site	
Historic leak of HV cable insulating fluids.	LAB and mineral oil mixture and potential breakdown products
Off-Site	
Historic leak of HV cable insulating fluids at site 34.	LAB and mineral oil mixture and potential breakdown products

4.1.2 Sensitive receptors

Sensitive receptors at the site include:

- Current / future site users (pedestrians).
- 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 hydrocarbons 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
<p><u>On-site</u> Contamination associated with historic leakage of HV cable insulating fluid containing mineral oil and LAB.</p> <p><u>Off-site</u> Contamination associated with historic leakage of HV cable insulating fluid containing mineral oil and LAB from site 34.</p>	Inhalation of hydrocarbon vapours	Current / future site users & occupants of adjacent sites	Unlikely	Medium	<p>Low</p> <p>The insulating fluid has a low volatility. The vapour pressure of LAB is 0.013 hPa @ 25°C and mineral oils <0.1hPa @ 20°C.</p> <p>There are no buildings built over the cable route reducing risks to residential and commercial human health receptors.</p> <p>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.</p> <p>In addition, the spillage occurred over 10 years ago, and the most volatile fractions of the fluid are likely to have partitioned and dissipated.</p>

Potential source	Possible pathway	Potential receptor	Likelihood	Severity	Risk and justification
	Direct dermal contact or ingestion of hydrocarbons	Current / future site users & occupants of adjacent sites	Unlikely	Medium	<p>Low</p> <p>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.</p>
	Current / future site users & occupants of adjacent sites	Permeation of water supply pipes	Unlikely	Medium	<p>Low</p> <p>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.</p> <p>In addition both LAB and Mineral Oil have low solubility</p>
	Vertical and lateral migration	River Liffey/ Underlying locally important aquifer	Unlikely	Medium	<p>Low</p> <p>It is unlikely that perched groundwater at the site is in continuity with the River Liffey. However, if we assume that it is, given the distance to the River Liffey (500m), it is highly unlikely that dissolved contamination at the site of the leak will affect surface water in the River Liffey given the processes of dispersion, 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 and mineral 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

Historic information confirms that the area surrounding the site has been subject to development since the 1830's and has been used only for residential / commercial (office & recreational) end uses, which are not considered to be significantly potentially contaminating.

The site is the location of a leakage of cable fluid from a high voltage (HV) underground cable which occurred in early 2009. It is RSKs understanding that the fluid contained a mixture of Linear Alkyl Benzene (LAB) and Mineral Oil and that the total fluid loss was approximately 725 litres.

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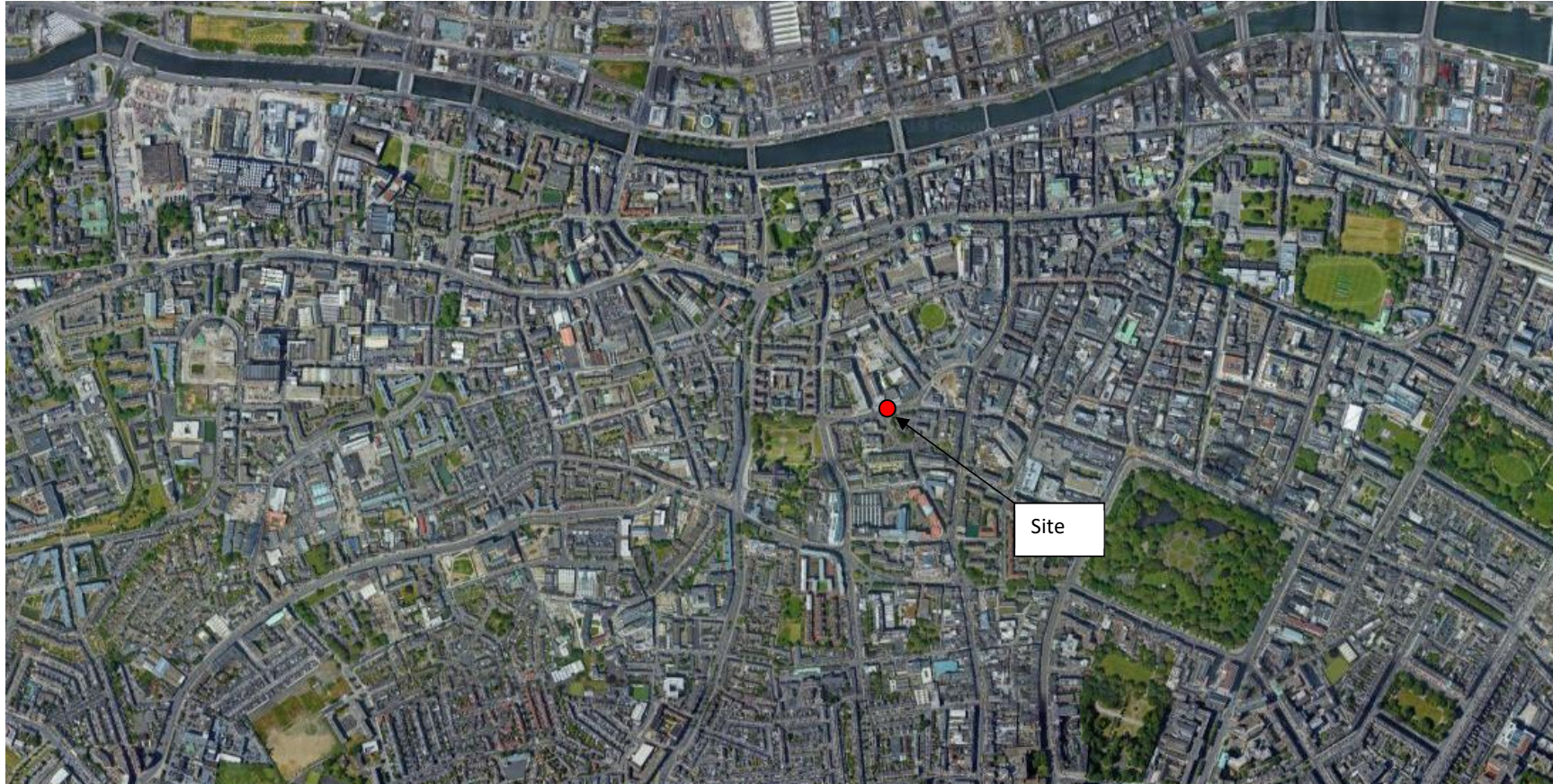
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The initial CSM has identified potential pollutant linkages with a risk class of **LOW** for all identified potential pollution linkages.

6 REFERENCES

1. Petroleum Products in Drinking Water, Background Document for development of WHO guidelines for Drinking-water quality, 2008
2. RSK Ireland Limited, Historical site investigation information held by RSK, dated May 2014.
3. European Chemicals Bureau. European Union Risk Assessment Report for Benzene C₁₀₋₁₃ Alkyl Derivs, June 1997
4. CIRIA, C552, Contaminated Land Risk Assessment. A Guide to Good Practice , 2001.

FIGURES



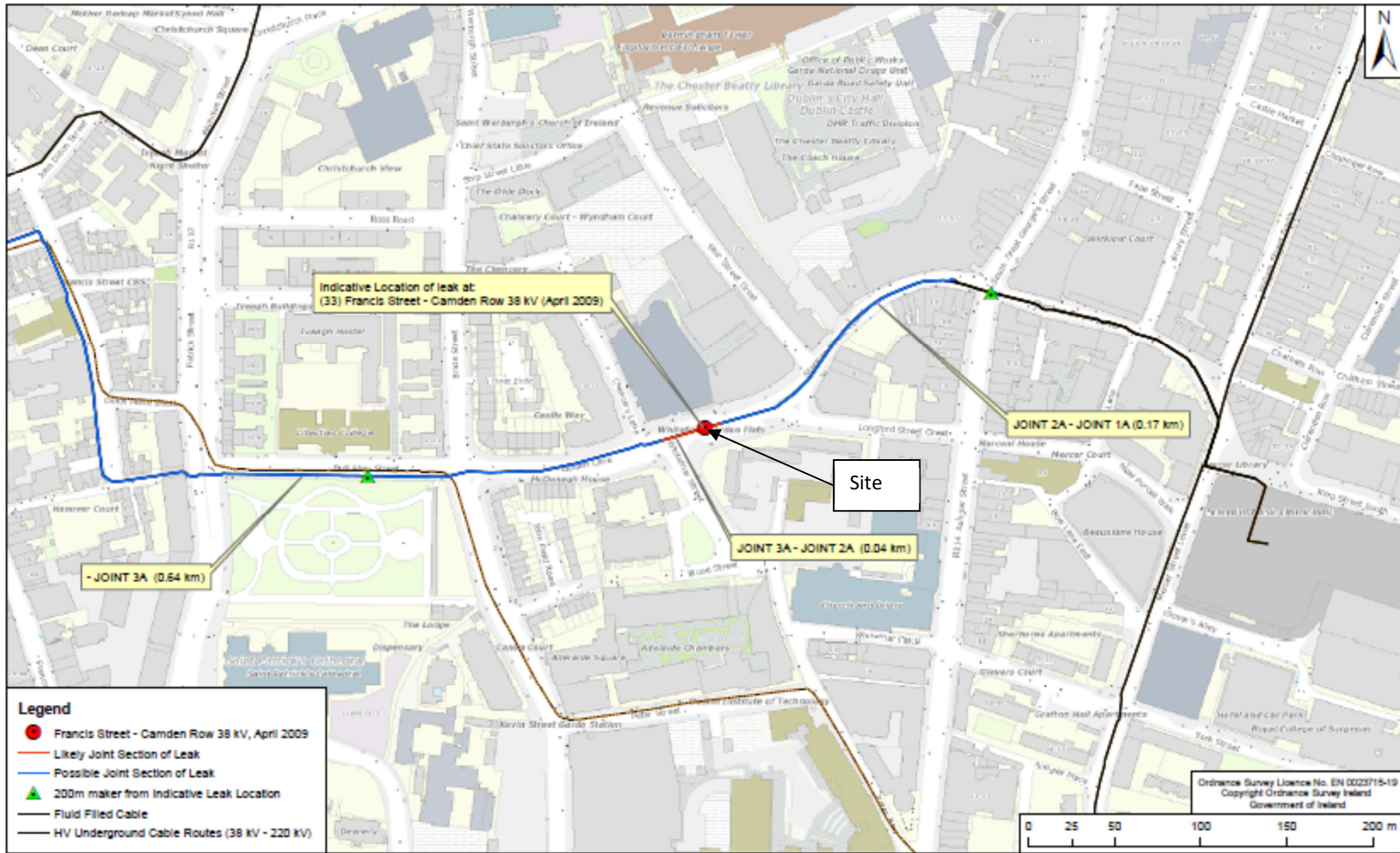
Prepared For: ESB Engineering and Major Projects

Project: Site # 33 – Francis Street to Camden Row

Drawing Title: Figure 1 Site Location Plan

RSK

Source: Google
Date: 08/08/2019



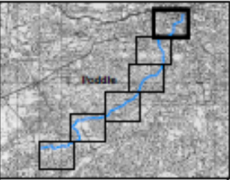
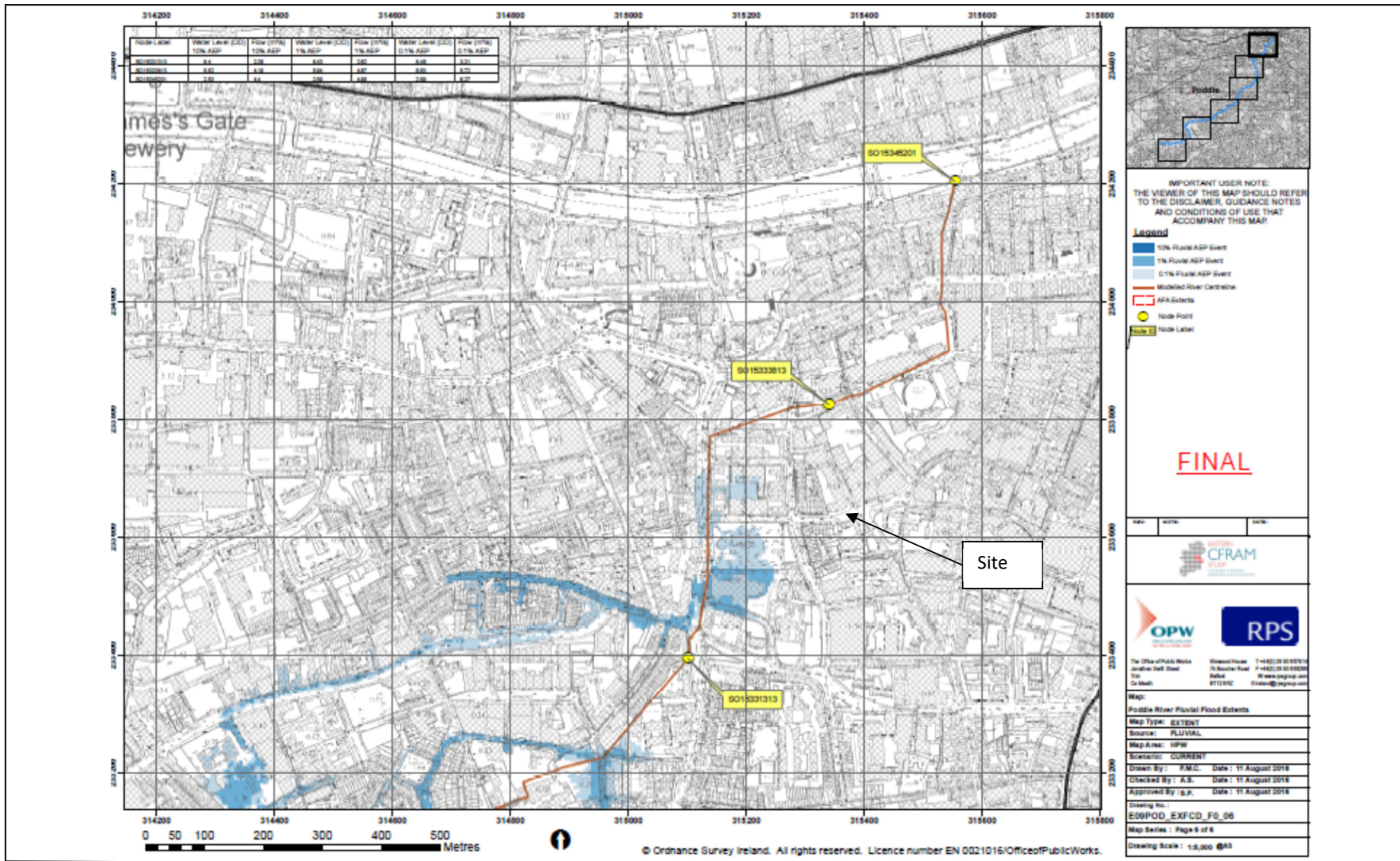
Prepared For: ESB Engineering and Major Projects

Project: Site # 33 Francis Street – Camden Row

Drawing Title: Figure 2 Site Layout Plan



Source: ESB Networks
Date: 08/08/2019



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER
TO THE DISCLAIMER, GUIDANCE NOTES
AND CONDITIONS OF USE THAT
ACCOMPANY THIS MAP!

- Legend**
- 10% Fluvial ASP Event
 - 1% Fluvial ASP Event
 - 0.1% Fluvial ASP Event
 - Modified River Centreline
 - AFA Extents
 - Node Point
 - Node Label

FINAL



The Office of Public Works
Jervis & Ball Street
The Mall
BT1 1HC
 Belfast
Tel: +44(0) 300 00714
 Fax: +44(0) 300 00828
 Email: fluvial@opw.ie

Map:
Poddle River Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By:	F.M.C. Date: 11 August 2018
Checked By:	A.S. Date: 11 August 2018
Approved By:	J.P. Date: 11 August 2018
Drawing No.:	ESW/POD_EX/FCO_F0_06
Map Series:	Page 6 of 6
Drawing Scale:	1:5,000 @A3

Prepared For: ESB Engineering and Major Projects

Project: Site # 33 Francis Street – Camden Row

Drawing Title: Figure 3 Fluvial Flood Event Map

Source: OPW
Date: 08/08/2019



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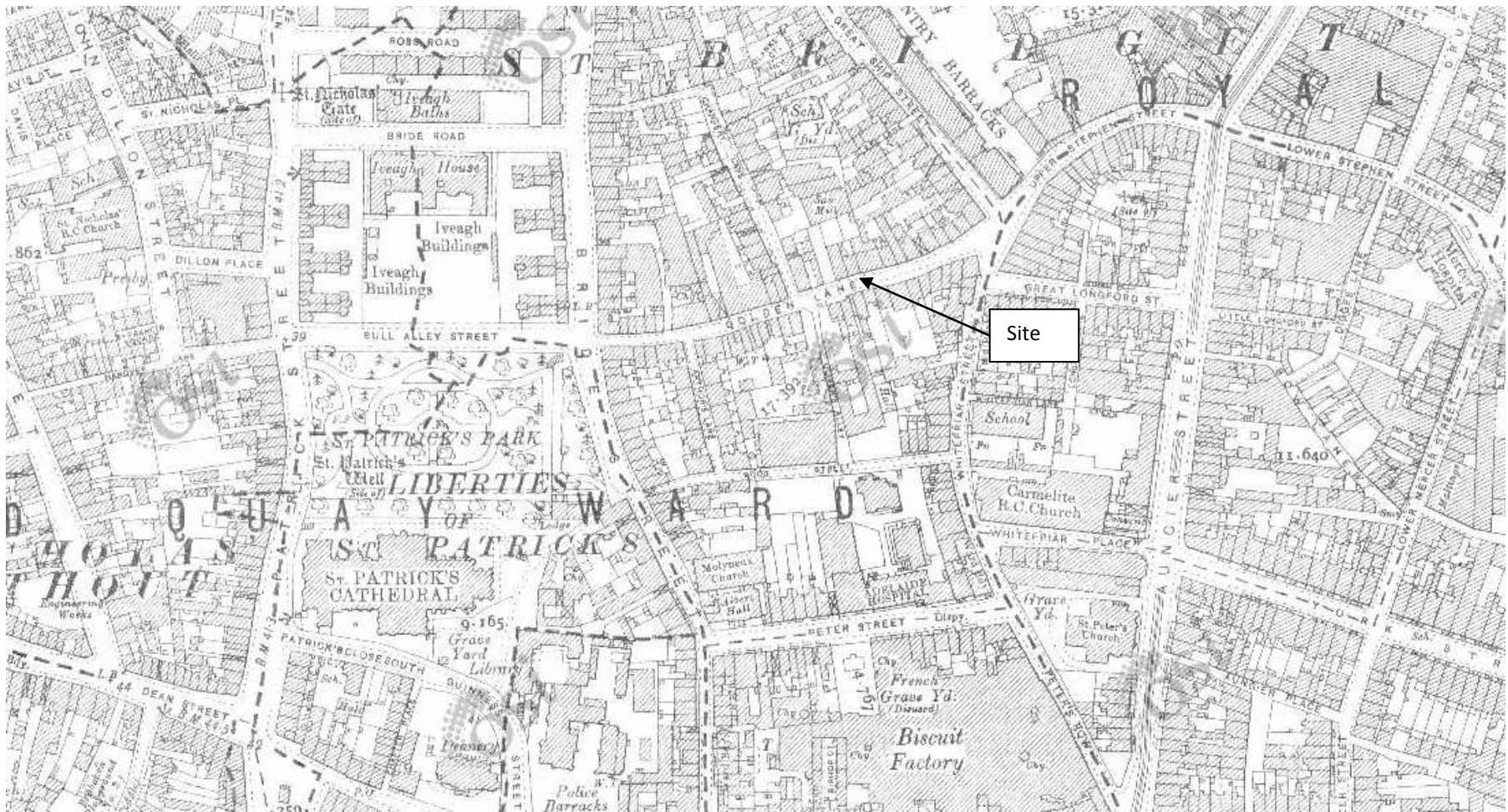
Prepared For: ESB Engineering and Major Projects

Project: Site # 33 Francis Street – Camden Row

Drawing Title: Figure 4 OSI Historical Map 1837-1842

RSK

Source: OSI (Geohive)
Date: 08/08/2019



Prepared For: ESB Engineering and Major Projects

Project: Site # 33 Francis Street – Camden Row

Drawing Title: Figure 5 OSI Historical Map 1888-1913

RSK

Source: OSI (Geohive)
Date: 08/08/2019



Prepared For: ESB Engineering and Major Projects

Project: Site # 33 Francis Street – Camden Row

Drawing Title: Figure 6 TCD Historical Map 1909

RSK

Source: TCD Map Library
Date: 08/08/2019



APPENDIX A

SERVICE CONSTRAINTS

RSK ENVIRONMENT LIMITED SERVICE CONSTRAINTS

1. This report (the "Services") was compiled and carried out by RSK Ireland Limited (RSK) for ESB Engineering and Major Projects (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 environmental consultant 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. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. 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. **Any such party would be** well advised to seek independent advice from a competent environmental consultant and/or lawyer.
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



PHOTOGRAPHIC LOG

Client Name:
ESB Networks

Site Location:
(33) Francis Street – Camden Row

Site walkover

Photo No.
1

Date:
Aug 2019

Direction Photo taken:

East

Description:

View of the 200m west marker from the indicative leak location. Liberties College is located to the immediate north of the 200m marker and St. Patrick's Cathedral and grounds are located to the immediate south.



Photo No.
2

Date:
Aug 2019

Direction Photo taken:

South

Description:

View of St. Patrick's Cathedral and grounds located in the vicinity of the 200m west marker from the indicative leak location. The park was busy with pedestrians.





PHOTOGRAPHIC LOG

Client Name:
ESB Networks

Site Location:
(33) Francis Street – Camden Row

Site walkover

Photo No.
3

Date:
Aug 2019

Direction Photo taken:

Description:

View of the junction at Bride Street (north) and Golden Lane (east), located c.165m west of the indicative leak location. The area is mixed commercial and residential, mainly office spaces with residential apartments above.



Photo No.
4

Date:
Aug 2019

Direction Photo taken:

South

Description:

Garden relating to residential property of McDonagh House on Golden Lane, located c.75m west of indicative leak location.





PHOTOGRAPHIC LOG

Client Name:
ESB Networks

Site Location:
(33) Francis Street – Camden Row

Site walkover

Photo No.
5

Date:
Aug 2019

Direction Photo taken:

South

Description:

Indicative leak location.
View of McDonagh House Residential apartments.
The apartments have a communal landscaped area.



Photo No.
6

Date:
Aug 2019

Direction Photo taken:

East

Description:

Indicative leak location.
View of the junction between Whitefriar Street and Golden Lane. Road is heavily scarred and multiple service manhole covers are present in the vicinity of the leak.
Radisson Blu Hotel is located to the immediate north of the indicative leak location.





PHOTOGRAPHIC LOG

Client Name:
ESB Networks

Site Location:
(33) Francis Street – Camden Row

Site walkover

Photo No.
7

Date:
Aug 2019

Direction Photo taken:

North

Description:

View of the indicative leak location.

Radisson Blu Hotel is located to the immediate north of the indicative leak location. Chancery Lane Apartments are located to the northwest of the leak location which have a communal landscaped area.



Photo No.
8

Date:
Aug 2019

Direction Photo taken:

West

Description:

View of the indicative leak location. Chancery Lane Apartments are located to the northwest of the leak location which have a communal landscaped area.

McDonagh House residential flats are located to the south of the indicative leak location which also have a communal landscaped area.





PHOTOGRAPHIC LOG

Client Name:
ESB Networks

Site Location:
(33) Francis Street – Camden Row

Site walkover

Photo No.
9

Date:
Aug 2019

Direction Photo taken:

East

Description:

View of side entrance to St. Enda's Primary School. Located c.55m southeast of the indicative leak location.



Photo No.
10

Date:
Aug 2019

Direction Photo taken:

Northeast

Description:

View of Stephen Street Upper (c.75m northeast of indicative leak location) which is currently a one-way system with temporary traffic lights due to the ongoing construction. Buildings to the north of Upper Stephen Street and mixed residential / commercial use.



Client Name: ESB Networks	Site Location: (33) Francis Street – Camden Row	Site walkover
-------------------------------------	---	----------------------

Photo No. 11	Date: Aug 2019
Direction Photo taken: South	

Description:

200m marker from indicative leak location. View of the junction between Stephen Street upper and Stephen Street lower. The land use is predominantly commercial; dominated by restaurants / cafes with office space above.



Photo No. 12	Date: Aug 2019
Direction Photo taken: East	

Description:

200m marker from Indicative Leak location. Construction work ongoing in the area to the east of the 200m marker. Land use is predominantly commercial.



APPENDIX C

RISK ASSESSMENT METHODOLOGY

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

Safety Data Sheet

(93/112/EC)



Date of edition: October 1995

1. Identification of Substance/Preparation and Company

Product name:

Masse 106

Supplier:

FELTEN & GUILLEAUME Energietechnik AG

Schanzenstraße 24-30

51063 Köln

Emergency telephone number: 0221/676-3333

2. Composition/Information on Ingredients

Blend of highly refined mineral oils and additives.

On the basis of available information, the components of this preparation are not expected to impart hazardous properties to this product.

3. Hazards Identifikation

Human Health Hazards

If swallowed, aspiration into the lungs may cause chemical pneumonitis.

Prolonged or repeated exposure may give rise to dermatitis.

No specific hazards under normal use conditions.

Safety hazards

The preparation contains mineral oil, for which an exposure limit for oil mist applies.

Environmental hazards

Avoid spillage.

The product is not readily biodegradable.

4. First Aid Measures

Inhalation

Remove to fresh air.

If breathing but unconscious, place in the recovery position.

If breathing has stopped, apply artificial respiration.

Medical attention is to be obtained immediately.

Skin

Remove contaminated clothing and wash affected skin with soap and water.

If high pressure injection injuries occur, obtain medical attention immediately.

Eye

Rinse immediately with plenty of water for at least 10 minutes and seek medical advice.

Ingestion

Do not induce vomiting.

Aspiration into the lungs may occur directly or following ingestion. This can cause chemical pneumonitis which may be fatal.

If breathing but unconscious, place in the recovery position.

If breathing has stopped, apply artificial respiration.

Medical attention is to be obtained immediately.

Advice to physicians

Treat symptomatically

5. Fire Fighting Measures

Extinguishing media

Foam, dry chemical powder, carbon dioxide, sand or earth.

Safety Data Sheet

(93/112/EC)



Date of edition: October 1995

Product name: Masse 106

5. Fire Fighting Measures (continued)

Unsuitable extinguishing media

Do not use water in a jet

Specific hazards

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

6. Accidental Release Measures

Personal precautions

Ventilate contaminated area thoroughly.

Minimise contact with skin.

Environmental precautions

Prevent further leakage or spillage and prevent from entering drains.

Prevent from spreading or entering into drains, ditches or rivers by using sand, earth or other appropriate barriers.

Clean-up methods

Absorb or contain liquid with sand, earth or spill control material.

Shovel into a suitable, clearly marked container for disposal or reclamation in accordance with local regulations.

7. Handling and Storage

Handling

When using do not eat or drink.

When handling product in drums, safety footwear should be worn and proper handling equipment should be used

Prevent spillages.

Storage

Keep container tightly closed and in a well ventilated place. Avoid direct sunlight, heat sources and strong oxidising agents.

Recommended materials: mild steel, high density polyethylene for containers or container linings.

8. Exposure Controls/Personal Protection

Engineering control measures

Use only in well ventilated areas.

Occupational exposure standards

Component name	Limit type	Value/Unit	Other information
Oil mist	8 h TWA	5 mg/m ³	ACGIH
	10 min STEL	10 mg/m ³	ACGIH

Respiratory Protection

Not normally required.

If oil mist cannot be controlled, a respirator fitted with an organic vapour cartridge combined with a particulate prefilter should be used.

Hand Protection

PVC or nitril rubber gloves if splashes are likely to occur and if applicable.

Eye Protection

Safety spectacles

Body Protection

Minimise all forms of skin contact.

Safety Data Sheet

(93/112/EC)



Date of edition: October 1995

Product name: Masse 106

8. Exposure Controls and Personal Protection (continued)

Hygiene measures

- Don't keep oily rags in your pockets.
- Wash hands before eating and drinking.

9. Physical and Chemical Properties

form	liquid	
colour	yellow	
pourpoint	< -60°C	DIN ISO 3016
flashpoint	145°C	DIN 51758
flammability - lower limit (vol%)	0,6	
flammability - upper limit (vol%)	6,5	
vapour pressure (20°C)	< 0,01 hPa	
density (15°C)	888 kg/m ³	DIN 51757
solubility in water (20°C)	negligible	
n-octanol/water partition coeff.	na	
kinematic viscosity (40°C)	8,5 mm ² /s	DIN 51562

10. Stability/Reactivity

Stability

stable under normal use conditions

Materials to avoid

strong oxidising agents

Hazardous decomposition products

Hazardous decomposition products are not expected to form during normal storage.

11. Toxicological Information

Toxicological Data:

Acute toxicity - oral

LD₅₀ is expected to be > 2000 mg/kg.

Irritation of skin, irritation of eye

The product is expected to be slightly irritant.

Sensitisation of skin

The produkt is not expected to be a skin sensitiser.

Prolonged and/or repeated contact

Prolonged/repeated contact may cause defatting of the skin, which can lead to dermatitis and may make the skin more susceptible to irritation and penetration by other materials.

Carcinogenicity

Product is based on mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Other components are not known to be associated with carcinogenic effects.

Other information

Aspiration into the lungs may occur directly or following ingestion. This can cause chemical pneumonitis which may be fatal.

Information given is based on a knowledge of the toxicology of similar products.

Safety Data Sheet

(93/112/EC)



Date of edition: October 1995

Product name: Masse 106

12. Ecological Information

Basis for assessment

Information given is based on data on the components and the ecotoxicology of similar products.

Mobility

- Product floats on water. It is liquid under most environmental conditions.
- If it enters soil, it will be adsorbed to soil particles and will not be mobile.
- Product has the potential to bioaccumulate.

Ecotoxicity

Product is expected to be practically non-toxic to aquatic organisms, LC/EC50 > 100 mg/L.

13. Disposal Considerations

Product

Precautions: Dispose to licensed disposal contractor.

Waste disposal Nr. (D): 54106

Container disposal

Drain container thoroughly.

Dispose to licensed disposal contractor.

Recommended cleaning procedure

Cleaning by disposal contractor

14. Transport Information

Product is not dangerous for conveyance under UN, IMO, ADR/RID and IATA/ICAO codes. (According ADR/RID regulations from 1.1.1995)

15. Regulatory Information

Classification

The Product is not classified as dangerous under EC criteria.

16. Other Information

Additional informations

Concawe Report 5/87 Health Aspects of Lubricants.

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should therefore not be construed as guaranteeing any specific property of the product.



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 4th 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 (CO₂), 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/cm³ at 20 °C typical
Solubility in water: Insoluble
Kinematic Viscosity at 20 °C: 4.0 – 4.5 cSt (4.0 – 4.5 mm²/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⁻¹ 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 (7th 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.