

Preliminary Site Assessment

Site 57 Inchicore – Poolbeg 220 kV

Electricity Supply Board

Project number: PR-427640_ACM_RP_ENV_059_0

08 April 2020

Quality Information

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The site reconnaissance consisted of a general external inspection of the site aimed at identifying potential sources of ground contamination affecting the site. An environmental compliance audit and/or detailed structural inspection of existing buildings were outside the project brief. Similarly, the site visit excluded detailed consideration of the ecological or archaeological aspects of the site, and if such are believed to be of potential significance then it is recommended that specialist advice is sought.

Any risks identified in this Report are perceived risks, based on the information reviewed during the desk study and therefore partially based on conjecture from available information. The study is limited by the non-intrusive nature of the work and actual risks can only be assessed following a physical investigation of the site.

It should be noted that the effects of ground and water borne contamination on the environment are constantly under review, and authoritative guidance values are potentially subject to change. The conclusions presented herein are based on the guidance values available at the time this Report was prepared, however, no liability by AECOM can be accepted for the retrospective effects of any changes or amendments to these values.

The opinions expressed in this report and the comments and recommendations given are based on a desk assessment of readily available information and an initial site reconnaissance by an AECOM employee. At this stage intrusive investigations have yet to be undertaken at site to establish actual ground and groundwater conditions and to provide data for an assessment of the geo-environmental status of the site.

Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

Where assessments of works or costs identified in this Report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Reference to historical Ordnance Survey (OS) maps and/or data provides invaluable information regarding the land use history of a site. However, it should be noted that historical evidence will be incomplete for the period pre-dating the first edition and between the release of successive maps and/or data.

Certain statements made in the Report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the Report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. AECOM specifically does not guarantee or warrant any estimate or projections contained in this Report.

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Appendix A Photographic Log

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ABBREVIATIONS

AECOM	AECOM Ireland Limited
APEC	Area of Potential Environmental Concern
bgl	Below Ground Level
BH	Borehole
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CSM	Conceptual Site Model
ESB	Electricity Supply Board
EPA	Environmental Protection Agency
GSI	Geological Survey Ireland
IEL	Industrial Emissions Licence
IPC	Integrated Pollution Control
ITM	Irish Transverse Mercator
km	Kilometre
kV	Kilovolt
LAB	Linear Alkyl Benzene
m OD	Metres above Ordnance Datum
NHA	Natural Heritage Areas
NAPL	Non-Aqueous Phase Liquid
NPWS	National Park and Wildlife Service
NWCPO	National Waste Collection Permit Office
OECD	Organisation for Economic Co-operation and Development
OPW	Office of Public Works
OSI	Ordnance Survey Ireland
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCOC	Potential Constituents of Concern
pNHA	Proposed Natural Heritage Area
PSA	Preliminary Site Assessment
RFP	Request for Proposal
SAC	Special Area of Conservation
SDS	Safety Data Sheet
SIDS	Screening Information Datasets
SPA	Special Protection Area
TPH	Total Petroleum Hydrocarbons
WAC	Waste Acceptance Criteria
WFD	Water Framework Directive

EXECUTIVE SUMMARY

Introduction

AECOM Ireland Limited (AECOM) completed a Preliminary Site Assessment (PSA) of a cable fluid leak location on the southern tow path of the Grand Canal at Inchicore, Dublin 8 (the site).

ESB Networks operates and maintains a network of High Voltage (HV) underground cables of over 1,600 kilometres (km) across Ireland, of which approximately 175 km are insulated by a cable fluid. The majority of the fluid filled cables are located in urban settings across Dublin City and Cork City. The remainder are located outside these areas with limited numbers of fluid filled cables in other counties.

The length of each cable route varies and cable routes frequently extend across county boundaries. The cable fluid acts as an electrical insulator and aids the conduction of heat away from the conductor allowing the cable to be run more efficiently. Fluid filled cables are largely located in urban/suburban areas and so are particularly vulnerable to third party interference or damage. Over time cables can develop leaks due to corrosion / fracture/ defects in the cable sheath and in joints and terminations. When such leaks occur there is potential for pollution to occur to surface water, groundwater, soils and ecology.

A leak was identified by Electricity Supply Board (ESB) at this site in May 2004 and repaired in July 2004. AECOM understand that the fluid type lost from the cable was a low viscosity blend of linear alkyl benzene (LAB).

Objective

The assessment reported herein comprises the first step of Stage 1: Site Characterisation & Assessment – Preliminary Site Assessment (PSA) and was carried out in accordance with *EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (July 2013)*, and specifically the Guideline Template for Preliminary Site Assessment Report. This guidance draws on the *EPA Code of Practice (CoP)*, *Code of Reference for Unregulated Waste Disposal Sites (2007)* and *UK Environment Agency, Model Procedures for the Management of Land Contamination, Contaminated Land Report (CLR) 11 (September 2004)*.

In terms of the data requirement for PSA reports, both the EPA CoP and CLR 11 outline that the findings of this initial risk assessment stage are largely based on desk-study information and a site walkover to identify potential pollutant linkages, which are then evaluated using appropriate criteria.

As such, the objective of the PSA reported herein is to:

- Identify potential contamination sources (i.e. the cable fluid), pathways (i.e. breathing in vapours, movement through made ground / soil) and receptors (i.e. who/what will be affected) and the likely interactions between each element;
- Assess the potential severity of the hazard and the sensitivity of the receptor (ranging from minor to severe);
- Assess the likelihood that a risk will occur (ranging from unlikely to high likelihood); and
- Develop a preliminary conceptual site model (CSM) based on an overall assessment of each of these elements above.

The preliminary CSM will then be used to identify potential risks to human health (site users and/or nearby residents) and controlled waters (i.e. groundwater and surface water) which may be associated with a fluid leak from the identified location. It should be noted that this stage of the risk assessment process is based mostly on qualitative information sources and identification of a potential risk at this stage does not necessarily indicate the presence of a risk, but rather the need for further assessment.

A table cross referencing the template headings from the EPA Guidance Template and where the corresponding information is reported herein is presented in Appendix B.

Assessment Findings

Based on the findings of the desktop study, the overall environmental sensitivity of the site is considered to be moderate. Identified sensitive receptors within 1 km of the site include:

- The Grand Canal bounds the site to the north. Although this may be protected by low permeability clay (natural and/or engineered when the canal was constructed);
- The River Camac located approximately 270 m to the south of the site, although this may be protected by low permeability clay deposits which are likely to be encountered beneath the site; and
- The groundwater aquifer beneath the site, although this may also be protected by low permeability clay deposits, likely to be encountered beneath the site.

It is estimated that 1,137 litres of cable fluid (Linear Alkyl Benzene (T 3788)) was released between May 2004 and July 2004. Due to its high biodegradability, it is considered that LABs are of less concern for adverse environmental impact than other hydrocarbon fluids. A summary of the source audit findings is as follows:

Area of Potential Environmental Concern

Number	APEC	Potential Contaminants of Concern	Potential Media Impacted
1	Leak at (57) Inchicore - Poolbeg 220 kV (May – July 2004)	LABs	Soil Groundwater Ground Gas

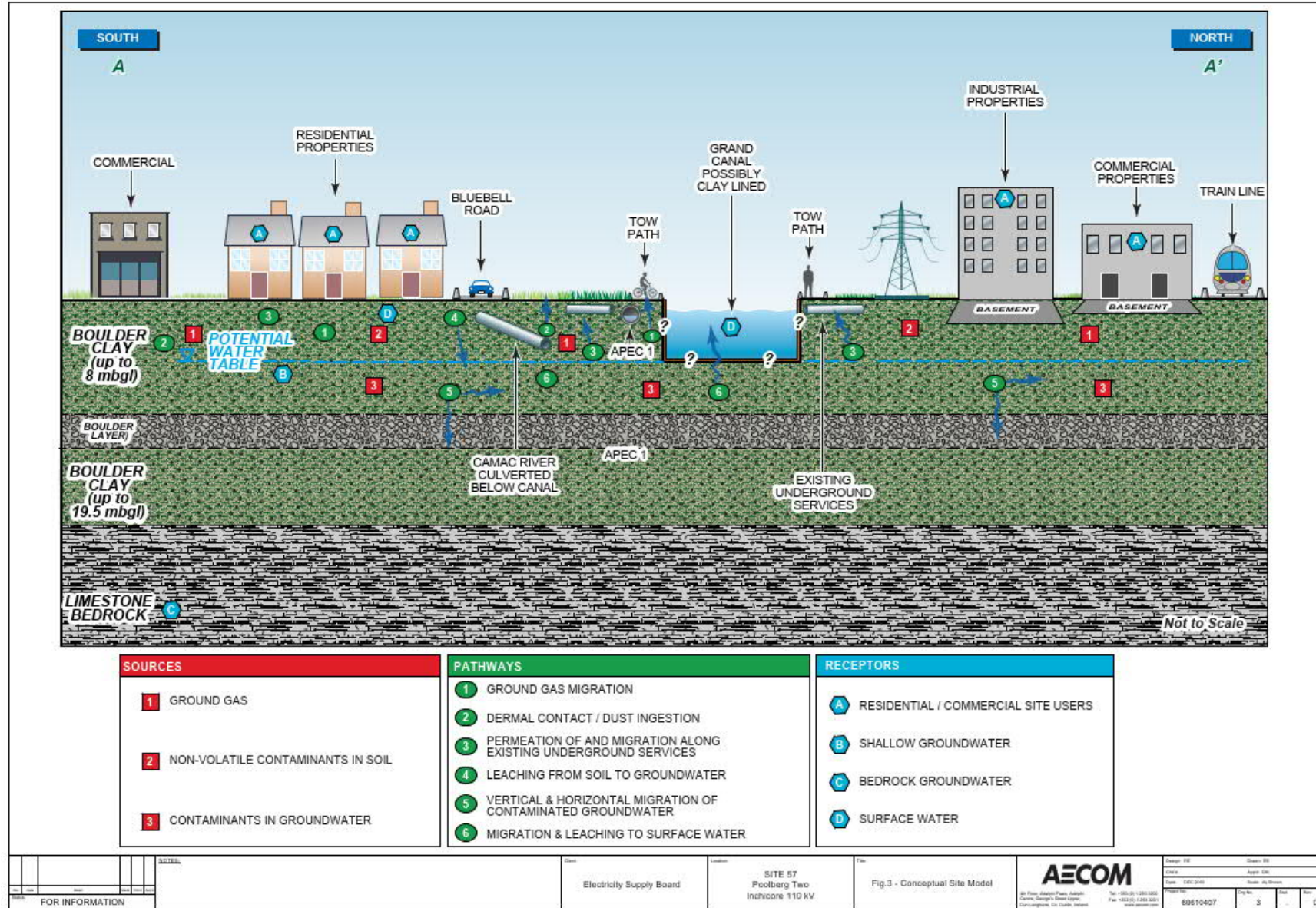
The preliminary CSM developed for the site looked at potential source-pathway-receptor linkages identified during the assessment works and identified a moderate risk to site users due to the potential for ground gas generation resulting from degradation of LAB NAPL (if present).

A low/moderate risk was identified to groundwater due to potential impact to groundwater chemistry from the presence of NAPL.

Potential risk to the Grand Canal was considered to be low given that canals are generally lined with impermeable materials which would prevent the migration of NAPL into the canal from groundwater or via preferential flow pathways.

Risks associated with other potential source-pathway-receptor linkages were considered to be low.

The risk assessment completed herein is preliminary in nature as it can only be based on an evaluation of qualitative data sources (i.e. not on intrusive site investigation works). Consequently, identification of potential risk does not necessarily indicate a risk to a receptor, rather that further assessment may be required to investigate assumptions made in the CSM and quantify whether a potential risk actually exists. Generally, where a low or very low risk has been identified further assessment may not be deemed necessary to assess a particular SPR linkage, although further assessment may be deemed to be required to investigate CSM assumptions where the potential risk is considered to be low or very low due to the sensitivity of the receptor.



EPA Contaminated Land and Groundwater Risk Assessment Methodology

Table 1 EPA Methodology

Stage	Methodology	Report Reference	Report Date	Status
Stage 1: Site Characterisation and Assessment				
1.1	Preliminary Site Assessment	PR-427640_ACM_RP_ENV_059	08 April 2020	Final
1.2	Detailed Site Assessment			
1.3	Quantitative Risk Assessment			
Stage 2: Corrective Action and Feasibility Design				
2.1	Outline Corrective Action Strategy			
2.2	Feasibility Study and Outline Design			
2.3	Detailed Design			
2.4	Final Strategy and Implementation Plan			
Stage 3: Corrective Action Implementation and Aftercare				
3.1	Enabling Works			
3.2	Corrective Action Implementation and Verification			
3.3	Aftercare			

Source: EPA Guidance on the Management of Contaminated Land at EPA Sites

1. Introduction

AECOM Ireland Limited (AECOM) is pleased to present this preliminary site assessment (PSA) completed on behalf of Electricity Supply Board (ESB) for a site in Inchicore, Dublin 8 (the site).

This report was commissioned by ESB under a request for proposal (RFP) issued on 26 June 2019 (Ref. Qd-354120-01R460_002-001-001) and carried out in accordance with AECOM proposal reference: PR-427640_ACM_PL_ENV_001_3, dated 03 July 2019. AECOM understand that ESB has undertaken these works on behalf of ESB Networks.

1.1 Project Background

ESB Networks operates and maintains a network of High Voltage (HV) underground cables of over 1,600 kilometres (km) across Ireland, of which approximately 175 km are insulated by a cable fluid. The majority of the fluid filled cables are located in urban settings across Dublin City and Cork City. The remainder are located outside these areas with limited numbers of fluid filled cables in other counties.

The length of each cable route varies and cable routes frequently extend across county boundaries. The cable fluid acts as an electrical insulator and aids the conduction of heat away from the conductor allowing the cable to be run more efficiently. Fluid filled cables are largely located in urban/suburban areas and so are particularly vulnerable to third party interference or damage. Over time cables can develop leaks due to corrosion/fracture/defects in the cable sheath and in joints and terminations. When such leaks occur, there is potential for pollution to occur to surface water, groundwater, soils and ecology.

A leak was identified by Electricity Supply Board (ESB) at this site in May 2004 and repaired in July 2004. AECOM understand that the fluid type lost from the cable was a low viscosity blend of linear alkyl benzene (LAB).

The site location is presented in Figure 1 and the site layout showing the site is presented in Figure 2.

1.2 Project Objective

The assessment reported herein comprises the first step of Stage 1: Site Characterisation & Assessment – Preliminary Site Assessment (PSA) and was carried out in accordance with *EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (July 2013)*, and specifically the Guideline Template for Preliminary Site Assessment Report. This guidance draws on the *EPA Code of Practice (CoP)*, *Code of Reference for Unregulated Waste Disposal Sites (2007)* and *UK Environment Agency, Model Procedures for the Management of Land Contamination, Contaminated Land Report (CLR) 11 (September 2004)*.

In terms of the data requirement for PSA reports, both the EPA CoP and CLR 11 outline that the findings of this initial risk assessment stage are largely based on desk-study information and a site walkover to identify potential pollutant linkages, which are then evaluated using appropriate criteria.

As such, the objective of the PSA reported herein is to:

- Identify potential contamination sources (i.e. the cable fluid), pathways (i.e. breathing in vapours, movement through made ground / soil) and receptors (i.e. who/what will be affected) and the likely interactions between each element;
- Assess the potential severity of the hazard and the sensitivity of the receptor (ranging from minor to severe);
- Assess the likelihood that a risk will occur (ranging from unlikely to high likelihood); and
- Develop a preliminary conceptual site model (CSM) based on an overall assessment of each of these elements above.

The preliminary CSM will then be used to identify potential risks to human health (site users and/or nearby residents) and controlled waters (i.e. groundwater and surface water) which may be associated with a fluid leak from the identified location. It should be noted that this stage of the risk assessment process is based mostly on qualitative information sources and identification of a potential risk at this stage does not necessarily indicate the presence of a risk, but rather the need for further assessment.

A table cross referencing the template headings from the EPA Guidance Template and where the corresponding information is reported herein is presented in Appendix B.

2. Scope of Work

To achieve the above objective, the following scope of work was undertaken:

- A site walkover by AECOM staff (completed on 01 November 2019);
- A desktop review of site history to identify areas of potential environmental concern (APEC);
- A desktop review of publicly available information regarding the site's environmental setting and sensitivity, including:
 - Geological Survey of Ireland (GSI) Groundwater Public Viewer Maps (<https://dcenr.maps.arcgis.com/apps/MapSeries>), accessed 04 – 18 October 2019;
 - EPA Geoportal Site (<https://gis.epa.ie/EPAMaps>), accessed 04 – 18 October 2019;
 - EPA Incidents Database (<https://www.epa.ie/newsandevents/incidents/recent/>), 04 – 18 October 2019;
 - Ordnance Survey of Ireland (OSI) (<http://geohive.ie>), accessed 04 – 18 October 2019;
 - Glucksman Map Library, Trinity College, Dublin, 22 October 2019;
 - Office of Public Works (OPW) Flood Maps (<http://www.floodinfo.ie>), accessed 04 – 18 October 2019;
 - National Parks and Wildlife Service (NPWS) (<http://webgis.npws.ie/npwsviewer/>), accessed 04 – 18 October 2019;
 - National Waste Collection Permit Office (NWCPO) website (<http://www.nwcpo.ie/>), accessed 04 – 18 October 2019;
- A review of information provided by ESB in the RFP; and
- Data assessment and reporting.

3. Environmental Setting

3.1 Topography

The site is located in Inchicore, Dublin 8, which has an elevation of approximately 34 m above Ordnance Datum (m OD) and is topographically relatively flat. The wider area is generally low-lying and typically flat.

Grand Canal is located immediately north of the site, flowing to the east and discharging at the Grand Canal Dock. The Grand Canal falls rapidly from west to east across three locks along the southern site boundary.

3.2 Geology

Teagasc Soils Map indicates the site locally is overlain by made ground. To the north and south of the site, the Quaternary geology is comprised of glacial till derived from the underlying limestone bedrock.

The GSI Bedrock Geology Map (scale 1:100,000) indicates the site is underlain by the Dinantian marine basal facies, dark-grey fine-grained limestones and shales of the Lucan formation. No geological features are noted within the surrounding area.

A number of geotechnical boreholes are located within the vicinity of the site. North of the site, a deep borehole (R526/B59366) was drilled within the ESB Networks Transformer Compound on Jamestown Road. This borehole was drilled to a recorded depth of 30.5 m below ground level (bgl) and recorded boulder clay up to 17 m bgl with a gravel layer within the boulder clay at 8 m bgl. Bedrock was encountered during drilling at a recorded depth of 19.5 m below ground level.

Three shallow boreholes drilled to the east of the site (R498) recorded made ground up to 1 m bgl underlain by clay up to 2 m bgl. A further four boreholes drilled as part of site investigation works for

the Luas (tram rail system) to the east of the site (R7491) reported made ground up to 1.7 m bgl, underlain by stiff clay up to 7.5 m bgl. Bedrock was encountered at a minimum depth of 6.5 m bgl.

Two boreholes and a trial pit were excavated as part of the Blackhorse Bridge renovation works to the east of the site (R2212). Made ground was encountered up to 5.5 m bgl, underlain by boulder clay up to 7.6 m bgl. Bedrock was encountered at depths of 7 m bgl.

3.3 Hydrology

3.3.1 Surface Water Features

The site lies within the lower catchment of the River Liffey and Dublin Bay, which covers an area of 1624 km².

The closest surface water body to the site is the Grand Canal (a proposed Natural Heritage Area (pNHA), Site Code 002104) located immediately north of the leak location. The canal flows to the east and discharges to the River Liffey Estuary approximately 7.5 km northeast of the site, which flows into South Dublin Bay (an SAC). This comprises the following protected sites:

- South Dublin Bay Special Area of Conservation (SAC) (Site Code 000210);
- South Dublin Bay and River Tolka Special Protection Area (SPA) (Site Code 004024); and
- South Dublin Bay proposed Natural Heritage Area (pNHA) (Site Code 000210).

As impervious materials are generally used to line canals during construction, it is not considered likely that the Grand Canal is in hydrological continuity with groundwater in the area.

The closest natural surface water body to the site is the Camac River, located approximately 270 m south of the site. The Camac River crosses (by culvert) the Grand Canal immediately east of the Blackhorse Bridge which is located 740m to the east of the identified leak location.

Given its proximity to the site, the Grand Canal and Camac River are considered to be the most sensitive surface water receptors.

3.3.2 Surface Water Quality

The Grand Canal, which bounds the site to the north, is referred to as an Artificial Water Body (AWB) by the EPA under the Water Framework Directive (WFD). Waterways Ireland assess the biological quality of the Grand Canal, which along the section adjacent to the site during the period 2015 – 2017 was classified as ‘Good’ quality¹.

The most significant natural surface water feature in the wider area is the Camac River. The most recent reported EPA water quality status of the Camac River (monitoring station below Blackhorse Bridge) is a Q Value of 3 and a rating ‘Poor’. The WFD ecological status of the Camac River is characterised as being at risk of not meeting its WFD objectives.

The most significant surface water feature in the wider area is the River Liffey Estuary (located 1.5 km north of the site). The WFD status of both the upper and lower sections of the estuary (classified as a Transitional Water Body) is classified as ‘Moderate’ and characterised as being at risk of not meeting its WFD objectives.

3.3.3 Flooding

According to OPW Flood Maps, the site does not lie within the “River – Low Probability”, “River – Medium Probability” or “River – High Probability” modelled extent of land that might be flooded by rivers in a moderate to very extreme event.

Parts of the surrounding area located within a 1 km radius to the northwest and southeast of the site lie within the “River – Low Probability”, “River – Medium Probability” and “River – High Probability” indicating that flooding by rivers may occur during moderate to very extreme event in these areas.

¹ EPA, *Water Quality in 2017, An Indicators Report*, 2018

The site is not in close proximity to the extent of land affected by coastal flood events.

3.4 Hydrogeology

According to the GSI, the bedrock aquifer beneath the site is classified as a Locally Important Aquifer that is moderately productive in local zones. The soil permeability in the surrounding area is low; consequently the groundwater recharge in this aquifer is estimated by the GSI to be approximately 70 millimetres/year (mm/yr) and is likely to be confined to the made ground due to the presence of a 2 m thick stiff to very stiff brown gravelly sandy clay unit below made ground and above the boulder clay identified from borehole logs at the site.

Regional groundwater flow direction is likely to be to the north towards the River Liffey. A more detailed site assessment would be required to assess the local groundwater flow regime.

According to the GSI wells and springs database, there are no springs but two groundwater wells located within 1 km of the site. The first is located approximately 1 km to the west of the site and is recorded with a 'excellent' yield of 1,200 m³/day with an industrial use. The other well is located approximately 900 m to the south of the site and is recorded as industrial use with a 'good' yield of 381 m³/day.

The site is not mapped as being located within a Source Protection Area for either a public water supply or a group water supply scheme.

3.4.1 Groundwater Vulnerability

The GSI National Groundwater Vulnerability Mapping identified that the groundwater under the site was of 'Moderate' vulnerability. However, some spatial variation in groundwater vulnerability is seen in the greater surrounding area of the site where approximately 750 m east of the site the groundwater is of high to extreme vulnerability.

3.4.2 Groundwater Quality

Groundwater beneath the site is part of the Dublin Groundwater Body (IE_EA_G_008) which, according to the WFD Ireland website, is classified as having 'Good' status and is characterised as being not at risk.

3.5 Natural Habitats and Protected Species

The Grand Canal, which lies just north of the site, is a pNHA (site code 002104) throughout its course.

South Dublin Bay, which is approximately 8 km east of the site, is also a pNHA and a SAC (site code 000210). South Dublin Bay, together with the River Tolka Estuary, forms a Special Protection Area (SPA) for birds (site code 004024).

Site Codes for each of these protected areas are provided in Section 3.3.1.

3.6 Regulatory Database Search

3.6.1 National Waste Collection Permit Office

The National Waste Collection Permit Office (NWCPO) website was reviewed to identify authorised waste facilities within the jurisdiction of Dublin City County Council that are also near the site. The NWCPO website indicated that there is one waste facility within a 1 km of the site as summarised in Table 2 below.

Table 2 Dublin City Council Permitted Waste Facilities within 1 km of the site

Authorisation Number	Facility Name	Location	Waste Activity
WFP-DC-09-0008-02	Martin Services (Industrial) Limited	Unit 11 Bluebell Business Park Bluebell Dublin 12	Wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers)

Authorisation Number	Facility Name	Location	Waste Activity
WFP-DC-11-0025-02	Rehab Enterprises Limited	The Rehab Building Kylemore Road Ballyfermot Dublin 10	Photographic film, mixed packaging and waste electronic equipment

3.6.2 Storm Water Discharges

Four Irish Water storm water overflow discharge locations have been identified within 1 km of the site (on the southern side of the River Liffey), as summarised in Table 3 below.

Table 3 Storm Water Discharges

Emission ID	Name	Register No.
TPEFF0700D0034SW094	Ringsend	D0034-01
TPEFF0700D0034SW102	Ringsend	D0034-01
TPEFF0700D0034SW103	Ringsend	D0034-01
TPEFF0700D0034SW238	Ringsend	D0034-01

3.6.3 EPA IE, IPC and Waste Licensing

The EPA database of IE, IPC and Waste licences was consulted and two active licensed facilities were identified within 1 km of the site.

Table 4 EPA Waste Facilities within 1 km of the Site

Licence Number	Facility Name	Location	Licence Status
W0112	National Recycling and Environmental Protection Ltd	John F Kennedy Drive, JFK Industrial Estate, Naas Rd, Dublin 12, Dublin	Licensed
W0221	Labre Park Amenity Site	Civic Ballyfermot, Dublin 10, Dublin	Licensed

The EPA database of Industrial Emissions (IE) and Integrated Pollution Control (IPC) licences was consulted which identified a number of IE and IPC licences within 1 km of the site. Table 5 provides further details.

Table 5 EPA IE and IPC facilities within 1km of the Site

IE Register Number	Facility Name	Location	Distance to Site	Activity
W0054-02, IE, Licensed	SRCL Limited (Kylemore Road) trading as Eco-Safe Systems Ltd, Allied Industrial Estate, Kylemore Road, Dublin 10	Unit 1 A, Allied Industrial Estate, Kylemore Road, Ballyfermot, Dublin 10, Dublin	320 m	Industry
P0392-01, IE, Licensed	Jamestown Metal Resources Limited	Jamestown Road, Inchicore, Dublin 8., Dublin	360 m	Industry
P0796-01, IPC, Surrendered	Jamestown Shot Blasting & Metal Coating Limited	Jamestown Road, Inchicore, Dublin 8, Dublin	400 m	Industry
P0092-01, IPC, Licensed	Ultra-Packaging Limited	Unit 1, Allied Industrial Estate,	420 m	Industry

IE Register Number	Facility Name	Location	Distance to Site	Activity
		Kylemore Road, Dublin 10, Dublin		
P0094-01, IPC, Licenced	CVP Limited	Kylemore Road, Ballyfermot, Dublin 10, Dublin, 10	520 m	Industry
P0078, IE, Licenced	Henkel Ireland Operations and Research Limited (Ballyfermot)	Kylemore Park North, Ballyfermot, Dublin 10, Dublin	790 m	Industry
P0228, IE, Licenced	BASF Printing Systems Ireland Limited	Bluebell Avenue, Bluebell Industrial Estate, Dublin 12, Dublin	940 m	Industry
P0051, IE, Licenced	BOC Gases Ireland Limited	P.O. Box 201, Bluebell, Dublin 12, Dublin	980 m	Industry
W0044. IE, Licenced	Thorntons Recycling Centre (Ballyfermot)	Killeen Road, Ballyfermot, Dublin 10, Dublin	990 m	Industry
P0080, IPC, Licenced	Colas Bitumen Emulsions (East) Limited	Bluebell Avenue, Bluebell Industrial Estate, Dublin 12	940 m	Industry

There have been no reported environmental incidents within 1 km of the site since at least 2010 according to the EPA website.

3.7 Environmental Sensitivity

The overall environmental sensitivity of the site is considered to be moderate. Identified sensitive receptors within 1 km of the site include:

- The Grand Canal bounds the site to the north. Although this may be protected by low permeability clay (natural and/or engineered when the canal was constructed);
- The River Camac located approximately 270 m to the south of the site, although this may be protected by low permeability clay deposits which are likely to be encountered beneath the site; and
- The groundwater aquifer beneath the site, although this may also be protected by low permeability clay deposits, likely to be encountered beneath the site.

4. Source Audit Findings

4.1 Site Description

The site is situated along a tow path that runs along the southern bank of the Grand Canal. It is estimated that fluid loss from the cable was 1,137 litres up to that date when it was repaired in July 2004.

No evidence of impact from the cable fluid release was noted during the site walkover. The wider area is urbanised and generally paved with vegetation, and as such, there were no visible signs of contamination. There were no visual signs of any surface staining or vegetation dieback along the canal adjacent to the leak location.

4.2 Surrounding Land Use

Land use in the immediate vicinity of the site is predominantly commercial with some residential, as summarised in Table 6 below.

Table 6 Adjacent Land Use

Site Boundary	Land Use
North	The surrounding land to the north (within 500 m) is predominantly industrial, with more residential and commercial mixed land use beyond this (within 1 km). Located immediately north of the site is the Grand Canal, beyond which is an ESB Networks transformer compound (Inchicore 10 kV Substation, Inchicore 220 kV Substation, 22 kV GIS Substation) and Jamestown Business Park hosting several light industrial business units including Proline Architectural Hardware, Lanz Stationary and Name Plate printing. Located 460 m north of the site lie two large diesel storage tanks associated with the Inchicore Railway Works.
East	Irish Water filter beds lie immediately east of the site, beyond which is Bluebell Community Centre and a playing pitch. Approximately 750 m to the northeast is a cluster of residential developments. The surrounding land to the east (within 1 km), is predominately residential and commercial. Commercial buildings include hotels, shops, restaurants and bars. An Applegreen service station is located approximately 900 m to the east of the site. Approximately 750 m east of the site the River Camac intersects with the Grand Canal below Blackhorse Bridge.
South	The surrounding land use to the south (within a 1 km) is a residential area and Bluebell Avenue which is residential and Bluebell Business Park, which is commercial land use, extends approximately 475 m south before reaching the Naas Road. Land use is a mix of commercial, residential (with gardens) and recreational along the Naas Road which runs west to east approximately 900 m south of the site.
West	West of the site on the southern side of the canal is predominantly residential land use with gardens. The northern side of the canal is occupied by Laydex Limited in the Allied Industrial Estate. The Laydex facility appears to be a warehouse from which it supplies building products, adhesives, fire protection seals and coatings, to the construction industry. SRCL Ltd is also located within the Allied Industrial Estate. They hold a Waste Licence for the sterilisation of healthcare and mechanical equipment. Kylemore Road (R112) is approximately 500 m west of the site and runs north to south. To the west of the Kylemore Road is Kylemore Industrial Estate that extends for approximately 550 m west stopping at the L1014, past which the land is mainly industrial.

4.3 Historic Site Review

4.3.1 Historic Maps and Aerial Photograph Review

A review of historical maps and aerial photographs available from OSI, Glucksman Map Library (Trinity College Dublin) and Google Earth was completed. A summary of the findings is presented in Table 7.

Table 7 Historic Map and Aerial Photograph Review

Year	Description
1837 to 1842 (OSI)	The site and the surrounding area appear to be predominantly undeveloped and in agricultural use. Few residential and industrial buildings exist within a 1 km radius north and south of the site. Approximately 120 m north of the site is Jamestown house which is surrounded by agricultural fields. Further north, approximately 1 km from the site is an historical quarry named "Old Quarry". Approximately 900 m to the northeast of the site is a paper mill. The Blackhorse Bridge is located 750 m east of the site connecting Inchicore South to Drimnagh across the Grand Canal. Approximately 220 m south of the site is a woollen mill which is surrounded by agricultural land. Drimnagh Castle is located 800 m to the south of the site.
1838 (Six inches to one statute mile) Trinity Map	The site is undeveloped and the land surrounding the site is mostly undeveloped green fields. The Inchicore Railway Works (IRW) is located to the north of the site, within the grounds a coke oven is indicated. The Grand Canal is to the immediate north of the site running west to east. To the east is Whitehorse bridge that crosses over the Grand Canal. A road runs from the southwest to the northeast, over the Grand Canal by Whitehorse bridge. Jamestown House is

Year	Description
	located to the northwest of the Site. There is a road that runs from the IRW down to the Grand Canal just to the east of the Site. The Bluebell river is to the southwest of the site.
1888 to 1913 (OSI)	Significant developments can be seen on the 1897 – 1913 maps in the Ballyfermot and Jamestown areas, most notably the industrial appearance of the Inchicore Railway Works Station and the Great Southern and Western Railway line that runs southwest to northeast 600 m north of the site. Approximately 520 m northeast of the site, along Tyrconnell Road, sees the appearance of residential housing. To the south of the site, minor residential development has occurred with five residential houses built on the south bank of the Grand Canal approximately 100 m from the site.
1907 (1:2,500) Trinity Maps	The site is undeveloped as is much of the land to the south. There are filter beds (Dublin Corporation Waterworks) along the southern site of the Grand Canal. There are 10 residential buildings to the southwest of the site. The Bluebell River is now named as the Cammock River. The land to the south of the Grand Canal is named as Bluebell. The bridge to the east is now named as Blackhorse Bridge. The land to the north has been more developed mostly with residential housing. Within the IRW there is a gas works marked. The road that runs over the Grand Canal from the southwest to the northeast is named as Tyrconnell Road.
1936 (1:2,500) Trinity Maps	There have been further developments to the south, most of which is residential building. There is a Nugget Polish Factory approximately 700 m southwest. There is an electricity station to the northwest of the site. South of Ireland Asphalt Works towing paths run either side of the Grand Canal. To the north there is more residential development. The Inchicore Railway Works is now the Great Southern Railway Works (GSRW). There is one crane and tank located on the southeast border of the GSRW site. Within the site several more tanks are shown. There is also Drumm Battery Works located on the GSRW grounds. There is a 'Container Factory' located to the north of the site.
1943-44 (1:2,500) Trinity Maps	Area to the north of the site has been more developed, while the south is still undeveloped in the immediate area. Land to the southeast of the site is a large residential estate. There are tanks indicated to the northwest and northeast of the electricity substation. The land to the north and northeast is heavily developed (residential estate) while the land to the northwest has not been as developed. There is a 'Sheep Dip Factory' shown to the north of the site. There are two electricity substations; one to the northwest of the site beside Shannon House and a second to the north beside the south of the 'Ireland Asphalt Works'.
1970 (1:1,000) Trinity Maps	There are two weirs and a tank located to the west of the site along the northern bank of the Grand Canal. There are two electricity substations to the north-northwest, each has a tank nearby them. To the north there are four factories, one machinery plant and three tanks shown. There is also an 'Iron Foundry' shown to the northeast.
1995 (OSI)	Substantial development of the Drimnagh, Inchicore and Jamestown area is shown on the 1995 aerial photograph. Significant urbanisation is seen north and south of the site. The surrounding land has been developed for industrial, residential and commercial use. To the north of the site, significant industrial development at the Inchicore Rail Works station is seen, with a significant reduction of agricultural land. Approximately 460 m north of the site sees the appearance of two diesel storage tanks for the Inchicore Rail Works. To the south of the site significant urban residential and commercial development is seen, with a significant decrease in agricultural land.
2000 (OSI)	Minor industrial expansion is seen in the Jamestown area 200 m northwest of the site. The remaining surrounding land to the north and south of the site remains largely unchanged and heavily urbanised.
2005 (OSI)	More industrial development can be seen in the Jamestown, Inchicore area with the appearance of connecting roads and industrial buildings. Within a 1 km radius residential and commercial development remains unchanged.
2012 (Google Earth)	Little to no changes can be seen when comparing the 2005 and 2012 aerial photos in the Jamestown, Inchicore and Drimnagh areas.

4.4 Potential Sources

4.4.1 Cable Fluid Source

Information on the potential fluid released was provided in the ESB RFP document. Typically, fluid filled cables are installed in trenches approximately 1.2 m deep, 1.1 m wide and the depth to the top of the

cable is typically 0.9 m – 1 m. The cables are typically surrounded by 0.35 m of sand and then the trench is backfilled with either class 804 fill or trench arisings.

Based on information from the GSI, it is likely that the cable on this site is installed within sand and backfilled with made ground, therefore leaked fluid is likely to have migrated through either the sand surround or made ground (if sufficient permeability).

It is estimated that 1,137 litres of cable fluid was released between May 2004 and July 2004.

It is assumed, based on records provided to AECOM by ESB, that the fluid lost was 'T 3788' manufactured by H&R ESP Ltd of Milton Keynes in the UK. T 3788 is a low viscosity blend of linear alkyl benzenes (LABs), CAS # 67774-74-7.

4.4.1.1 Physical and Chemical Properties

LABs have side alkyl chains of 10-13 carbon atoms in length attached to a benzene ring. The alkyl chain may be attached to the benzene ring at any position except the terminal (end) position. As LABs are a mixture, their precise physico-chemical properties are dependent upon the components of the mixture, but they are generally colourless, oily liquids, less dense than water, with very low aqueous solubility and low volatility. Their potential spreading in the ground will therefore be similar to other light non-aqueous phase liquids (LNAPL) but with very little mass loss due to volatilisation or dissolution.

Information relating to the nature and toxicity of linear alkyl benzenes has been primarily sourced from the following documents:

1. Safety Data Sheet (SDS) for T 3788;
2. European Union Risk Assessment Report, Benzene, C10-13 alkyl derivatives, 20 June 1997; and
3. Organisation for Economic Co-operation and Development (OECD) Screening Information Datasets (SIDS) Initial Assessment Reports for High Production Volume Chemicals, United Nations Environment Programme, Chemicals Branch, May 2002.

Table 8 summarises the basic physical and chemical properties of LABs.

Table 8 Linear Alkyl Benzene Physical and Chemical Properties

Property	Description
Molecular Weight	239-243 g/mol
Melting Point	<-70°C
Boiling Point	251-320°C @ 1 atm (OECD)
Vapour Pressure @ 25°C	6.5 x 10 ⁻⁵ kPa (OECD)
Aqueous Solubility	0.041 mg/L (OECD)
Henry's Law Constant	9.34 x 10 ⁻⁴ atm·m ³ /mol (OECD)
Density	0.86 @ 20°C
Flash Point	140°C
Explosive Properties	None

LAB (C12) has a calculated octanol-water partition coefficient (K_{oc}) of 2.2x10⁴ and is classified by the EU risk assessment as a high adsorptive substance.

4.4.1.2 Degradation

The OECD SIDS (2002) review concluded that LABs undergo "rapid primary biodegradation in natural waters and complete mineralisation by micro-organisms under aerobic conditions". A measured half-life in water of four to nine days was reported. Microorganisms in sewage sludge and soil were reported to rapidly and completely biodegrade LABs. Anaerobic biodegradation was inferred to occur, but at a slow rate.

Degradation in soil is expected to occur but to be slower than in surface water due to the much slower mixing and the limited availability of oxygen. Where oxygen is available, aerobic degradation would occur at the fringes of a body of LNAPL in the soil/groundwater, producing elevated carbon dioxide levels in the soil and potentially elevated alkalinity in the groundwater.

In the absence of oxygen, anaerobic degradation may occur by methanogenesis or by reduction of sulphate, nitrate, ferric iron (Fe^{3+}) and manganese (Mn^{3+}). These processes could lead to reducing conditions in the groundwater, with depleted concentrations of sulphate (SO_4^-) and nitrate (NO_3^-) and increased concentrations of dissolved methane (CH_4), ferrous iron (Fe^{2+}) and dissolved manganese (Mn^{2+}). Such conditions would be expected to occur close to the LNAPL body and locally downgradient. With increased distance from the LNAPL, mixing with the surrounding groundwater and aeration from seasonal fluctuations and groundwater recharge would gradually allow ambient (most likely oxidised) conditions to be re-established.

4.4.1.3 Toxicity

According to the OECD review, LABs were assessed to be not acutely toxic to human health. Data from repeat exposure, reproductive and genotoxicity studies also indicated a low potential for toxic effects. The OECD concluded that "Linear alkyl benzenes do not present any significant acute or sub-chronic health effects by various exposure routes. LAB is not teratogenic (i.e. causing birth defects) and does not produce selective reproductive toxicity."

Laboratory studies have shown that repeated exposure to LABs may be irritating to the skin, and the SDS recommends the use of gloves when handling LABs. The low vapour pressure of LABs limits the potential for exposure via inhalation, and this is not expected to be a significant exposure route at normal temperatures.

Eco-toxicity studies reviewed by the OECD found no acute toxic effects on aquatic species tested at concentrations up to and exceeding solubility limits. The only exception to this was for the water flea *Daphnia magna*. No data was available regarding terrestrial eco-toxicity studies.

Due to its high biodegradability and rapid metabolism, the OECD concluded that LABs were of little concern for adverse environmental impact. The OECD and EU review of LABs both concluded that LABs were a low priority for further investigation.

4.4.1.4 Conclusion

Based on the above, underground leakage of LABs is not likely to lead to significant issues from dissolved hydrocarbons or vapours. The main concern from LABs is expected to be the potential for them to migrate and spread as a LNAPL, downwards through unsaturated soil that is present and then laterally in the vicinity of the groundwater table. The extent of LNAPL migration will depend on the properties of the surrounding soil and on the saturation and pressure distribution within the LNAPL. These in turn would depend on the quantity of cable fluid lost and the timescale over which the leakage occurred. Vapour impacts are considered to be unlikely, but degradation of the cable fluid may lead to the generation of ground gas (including carbon dioxide and methane) and affect groundwater chemistry in the vicinity and locally downgradient of the LNAPL.

4.4.2 Potential Off-Site Sources of Contamination

Based on a review of historic maps and the current site setting, land use surrounding the site has been principally residential and commercial. The following potential off-site sources of contamination have been identified as part of the assessment works completed:

- Current and historic industrial practices in the vicinity of the site;
- Fill materials (likely to be up to 2 m bgl) present in the surrounding area; and
- Fuel / chemicals (e.g. for back-up generators) present in industrial buildings around the site.

4.5 Source Audit Summary

Based on the assessment works completed, the primary Area of Potential Environmental Concern (APEC) for this site comprises the leak location identified by ESB. This is presented in Figure 2 and a description is provided in Table 999.

Table 9 Area of Potential Environmental Concern

Number	APEC	Potential Contaminants of Concern	Potential Media Impacted
1	Leak at (57) Inchicore – Poolbeg 220 kV (May 2004 – July 2004)	LABs	Soil Groundwater Ground Gas

Other potential off-site sources have also been identified based on the type of activity. However, no information is available for these sites therefore the only APEC assessed herein is the leak site beneath the southern tow path of the Grand Canal in Inchicore, Dublin 8.

5. Conceptual Site Model

A preliminary Conceptual Site Model (CSM) has been developed identifying potential contaminant sources, contaminant migration pathways and potential receptors.

In the context of land contamination, there are three essential elements to any risk:

- A **source** – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters;
- A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body; and
- A **pathway** – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of contaminant–pathway–receptor is described as a pollutant linkage. The preliminary CSM was developed to describe viable source-pathway-receptor (SPR) linkages for the site, which are presented in Table 14 below.

By considering potential SPR linkages, an assessment of the human health and environmental risks is made with reference to the significance and degree of the risk. The risk assessment has been undertaken with reference to BS10175-2011 + A2 2017 and CIRIA Document C552: 'Contaminated Land Risk assessment - A Guide to Good Practice' (2001).

The preliminary risk assessment completed for this site is based on consideration of whether a potential source of contamination can reach a receptor, and hence whether it is of major or minor significance. Considering that assessment works are still at preliminary stage and no intrusive investigation work has been completed, development of the preliminary CSM and assessment of potential risk is based on information provided by ESB on the nature of the leak, and on the AECOM site reconnaissance and desk based study. As such, only a qualitative assessment can be made around potential risks to receptors. This means that identification of potential risk does not necessarily indicate a risk to a receptor, rather that further assessment may be required to investigate assumptions made in the CSM and quantify whether a potential risk actually exists.

5.1 Qualitative Risk Assessment Methodology

A qualitative risk assessment has been carried out by assessing the severity of the potential consequence, taking into account both the potential severity of the hazard and the sensitivity of the target, based on the categories given in Table 10 below.

Table 10 Potential Hazard Severity Definition

Category	Definition
Severe	Acute risks to human health, catastrophic damage to buildings/property, major pollution of controlled waters.
Medium	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species, significant damage to buildings or structures.
Mild	Pollution of non-sensitive waters, minor damage to buildings or structures.
Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non-sensitive ecosystems or species.

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given in Table 11 below.

Table 11 Probability of Risk Definition

Category	Definition
High likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
Low likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable.

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard as shown in the table below.

Table 12 Level of Risk for Potential Hazard Definition

Probability of Risk	Potential Severity			
	Severe	Medium	Mild	Minor
High	Very high	High	Moderate	Low/Moderate
Likely	High	Moderate	Low/Moderate	Low
Low	Moderate	Low/Moderate	Low	Very low
Unlikely	Low/Moderate	Low	Very low	Very low

A description of the levels of risk outlined in Table 12 is provided in the following table:

Table 13 Description of the Classified Risks and Likely Action Required

Level of Risk	Description
Very High Risk	<p>There is a high probability that severe harm could arise to a designated receptor from an identified hazard, or there is evidence that severe harm to a designated receptor is currently happening.</p> <p>This risk, if realised, is likely to result in substantial liability.</p> <p>Urgent investigation and remediation are likely to be required.</p>
High Risk	<p>Harm is likely to arise to a designated receptor from an identified hazard.</p> <p>Realisation of the risk is likely to present a substantial liability.</p> <p>Urgent investigation is required and remedial works may be necessary in the short term and are likely over the long term.</p>
Moderate Risk	<p>It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild, if realised.</p>
Low Risk	<p>It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.</p>
Very Low Risk	<p>There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.</p>

5.2 Preliminary CSM Assumptions

Based on the findings of the desktop study and information provide in the RFP by ESB, the following assumptions were made in development of the CSM:

- The fluid assumed (based on records provided) to have leaked from the cable is a Linear Alkyl Benzene (LAB), product T 3788;
- The geology beneath the site is assumed to comprise approximately 2 m of made ground underlain by clay up to a depth of 19 m bgl. Limestone bedrock is assumed to be present at a depth of approximately 19 m bgl;
- Groundwater is assumed to be present at relatively shallow depths within the made ground;
- It is assumed that there is no direct connection between the site and surface water bodies;
- Other below ground utilities including mains water are assumed to be present in the vicinity of the site; and
- It is assumed that industrial/commercial buildings adjacent to the site do not have basements.

The preliminary CSM is presented graphically in Figure 3.

Table 14 Conceptual Site Model

Source	Pathway	Receptor	Severity	Likelihood	Potential Risk	Discussion
LABs	Inhalation of vapours which have migrated from the ground to above ground buildings.	Site users in a commercial/low to high density residential scenario.	Mild	Low Likelihood	Low	LAB is assumed as the cable fluid used. The low vapour pressure of LABs limits the potential for exposure via inhalation, and this is not expected to be a significant exposure route at normal temperatures.
LABs	Soil and dust ingestion from near surface soils. Dermal contact with near surface soils. Inhalation of fugitive dust from near surface soils.	Site users in a commercial/low to high density residential with plant uptake scenario.	Minor	Unlikely	Very Low	Given the likely depth to the cable, surface soils are unlikely to be affected and exposure via these pathways is not considered likely.
	Ingestion of soils via consumption of vegetables grown in near surface soils.	Intrusive site workers.	Minor	Likely	Low	Given the relatively low toxicity of LABs (assessed to be not acutely toxic), and likely short duration and infrequency of such events, this pathway is not considered to represent a significant health risk.
LAB (NAPL)	Migration of ground gas generated from the degradation of the cable fluid to above ground buildings.	Site users in a commercial/low to high density residential scenario.	Severe	Low Likelihood	Moderate	If a significant source of LAB NAPL is present on groundwater, there is potential for ground gas to be generated from degradation processes. The likelihood of ground gas being generated in significant quantities is considered to be low, however given the potential severity of the impact, further assessment would be required to fully evaluate this potential risk.
LAB (NAPL)	Permeation of LAB NAPL through plastic water supply pipes.	Site users in a commercial/low to high density residential with plant uptake scenario.	Medium	Unlikely	Low	Public water mains likely to be present in the vicinity of the leak, servicing commercial and residential properties have the potential to be impacted. However, the WHO drinking water guideline (DWG) for the relevant aromatic fraction ² is 0.09 mg/l and as the solubility limit of LAB is 0.041 mg/L (OECD) i.e. less than the DWG, LAB cannot dissolve into the water supply above this level. Furthermore, water will be moving rapidly in the pipe under pressurised conditions making it unlikely to reach the solubility limit. ESB has consulted with Irish Water (statutory body responsible for water supply) regarding the potential risk for cable fluid present in the vicinity of water supply pipes. Following review of their records, AECOM understands that Irish Water do not have concerns regarding impact of

² Petroleum Products in Drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality, 2008

Source	Pathway	Receptor	Severity	Likelihood	Potential Risk	Discussion
						water supplies from cable fluid leaks. It is therefore considered that the potential risk of a pollutant linkage being present is low.
LAB (NAPL)	Migration of potential contaminants along preferential flow pathways such as underground services and permeable backfill around the electricity cable.	Nearby surface water bodies including the Grand Canal and Camac River	Mild	Low Likelihood	Low	It is understood that the leak at this location was repaired in July 2004. Given the 16 year period since this leak was repaired it is likely that NAPL released from the cable has stabilised over the intervening period and the risk to surface water bodies is considered to be low. Further assessment would be required to fully evaluate this potential risk.
LAB (NAPL)	Migration of potential contaminants along preferential flow pathways such as underground services and permeable backfill around the electricity cable, and consequently vapour inhalation and / or ingestion, dermal contact.	Site users in a commercial/high density residential with plant uptake scenario.	Minor	Likely	Low	Likely to be services present in the vicinity of the leak given the urban setting. As the soil / made ground around the leak is generally clay, the leaking fluid will likely have migrated mainly along any permeable backfill around the cable. The solubility of LAB is low and it is likely to absorb strongly to made ground and clay surrounding the leak location. Consequently, the potential for migration over significant distances is considered to be low.
LAB (NAPL)	Migration in saturated and unsaturated soil.	Groundwater beneath the site.	Mild	Likely	Low / Moderate	Considering the volume of cable fluid released over the 3-month leak period (1,137 litres), it is considered highly likely that shallow groundwater has been impacted. However, as groundwater wells are indicated to be present at distances of greater than 900 m from the site, the severity of impact would be considered mild. Due to its high biodegradability and rapid metabolism, the OECD concluded that LABs were of little concern for adverse environmental impact. However, impacts could occur due to the presence of NAPL and associated biodegradation products. Further assessment would be required to fully evaluate potential risk.
Dissolved phase leaching from LAB NAPL or from soils containing LAB NAPL	Leaching from soil to groundwater. Vertical and horizontal migration of contaminants through groundwater. Horizontal migration of contaminants through groundwater to nearby surface water receptors.	Groundwater in superficial deposits beneath the site.	Mild	Low Likelihood	Low	The solubility of LAB is low, therefore it is considered that the potential for dissolved phase impact from the presence of NAPL is considered to be low.

Source	Pathway	Receptor	Severity	Likelihood	Potential Risk	Discussion
LAB (NAPL)		Groundwater in limestone bedrock aquifer beneath the site.	Mild	Low Likelihood	Low	Information on the local geology indicates the presence of underlying stiff clay, which would reduce vertical migration of groundwater to the bedrock aquifer.
		Nearby surface water bodies including the River Camac.	Mild	Low Likelihood	Low	Given the distance to the Camac River, the potential risk of an SPR linkage being present is considered low.
		Grand Canal	Mild	Unlikely	Very Low	The volume of cable fluid released could cause pollution of the canal, however given the canal is likely lined with impermeable material, the likelihood of horizontal migration through to the canal waters is considered low. No evidence of impact from the cable fluid release was noted during the site walkover, with strong vegetation growth observed along the canal banks. Further assessment would be required to fully evaluate this potential risk.

6. Conclusions

AECOM completed a Preliminary Site Assessment of a cable fluid leak location on the southern tow path of the Grand Canal, Inchicore, Dublin 8. The objective of the works was to identify potential risks to human health and the environment that may be associated with a fluid leak from the identified location.

Based on the findings of the desktop study, the overall environmental sensitivity of the site is considered to be moderate. Identified sensitive receptors within 1 km of the site include:

- The Grand Canal bounds the site to the north. Although this may be protected by low permeability clay (natural and/or engineered when the canal was constructed);
- The River Camac located approximately 270 m to the south of the site, although this may be protected by low permeability clay deposits which are likely to be encountered beneath the site; and
- The groundwater aquifer beneath the site, although this may also be protected by low permeability clay deposits likely to be encountered beneath the site.

It is estimated that 1,137 litres of cable fluid (Linear Alkyl Benzene (T 3788)) was released between May 2004 and July 2004. Due to its high biodegradability, it is considered that LABs are of less concern for adverse environmental impact than other hydrocarbon fluids. A summary of the source audit findings is as follows:

Table 15 Area of Potential Environmental Concern

Number	APEC	Potential Contaminants of Concern	Potential Media Impacted
1	Leak at (57) Inchicore – LABs Poolbeg 220 kV (May 2004 – July 2004)		Soil Groundwater Ground Gas

The preliminary CSM developed for the site looked at potential source-pathway-receptor linkages identified during the assessment works and identified a moderate risk to site users due to the potential for ground gas generation resulting from degradation of LAB NAPL (if present).

A low/moderate risk was identified to groundwater due to potential impact to groundwater chemistry from the presence of NAPL.

Potential risk to the Grand Canal was considered to be low given that canals are generally lined with impermeable materials which would prevent the migration of NAPL into the canal from groundwater or via preferential flow pathways.

Risks associated with other potential source-pathway-receptor linkages were considered to be low.

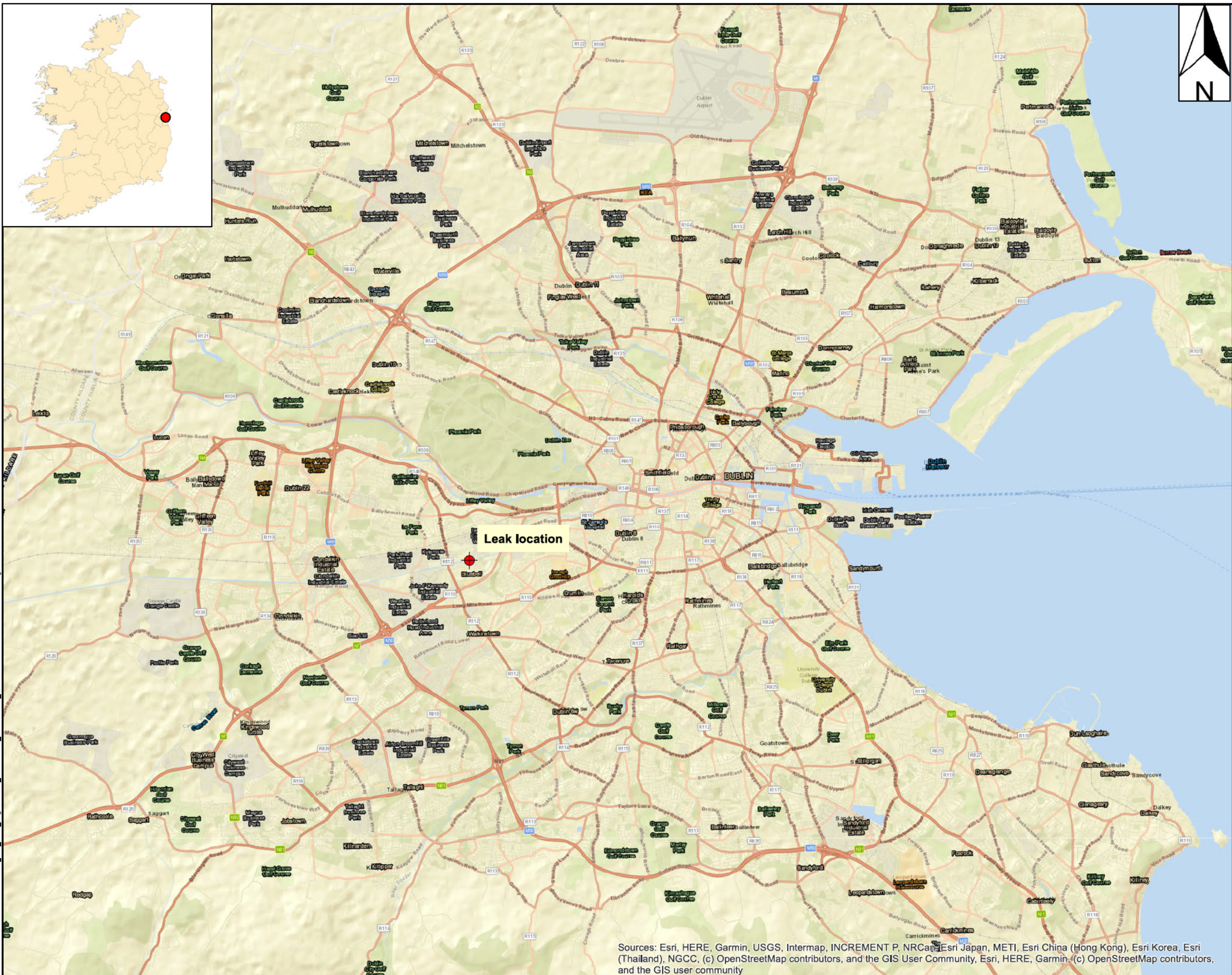
The risk assessment completed herein is preliminary in nature as it can only be based on an evaluation of qualitative data sources (i.e. not on intrusive site investigation works). Consequently, identification of potential risk does not necessarily indicate a risk to a receptor, rather that further assessment may be required to investigate assumptions made in the CSM and quantify whether a potential risk actually exists. Generally, where a low or very low risk has been identified further assessment may not be deemed necessary to assess a particular SPR linkage, although further assessment may be deemed to be required to investigate CSM assumptions where the potential risk is considered to be low or very low due to the sensitivity of the receptor.

Figures

Figure 1. Site Location Plan

Figure 2. Areas of Potential Environmental Concern

Figure 3. Conceptual Site Model



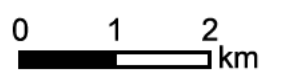
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Project Title:
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SITE 57
POOLBERG TWO
INCHICORE

Client:
ESB

LEGEND
Leak Location



Notes:

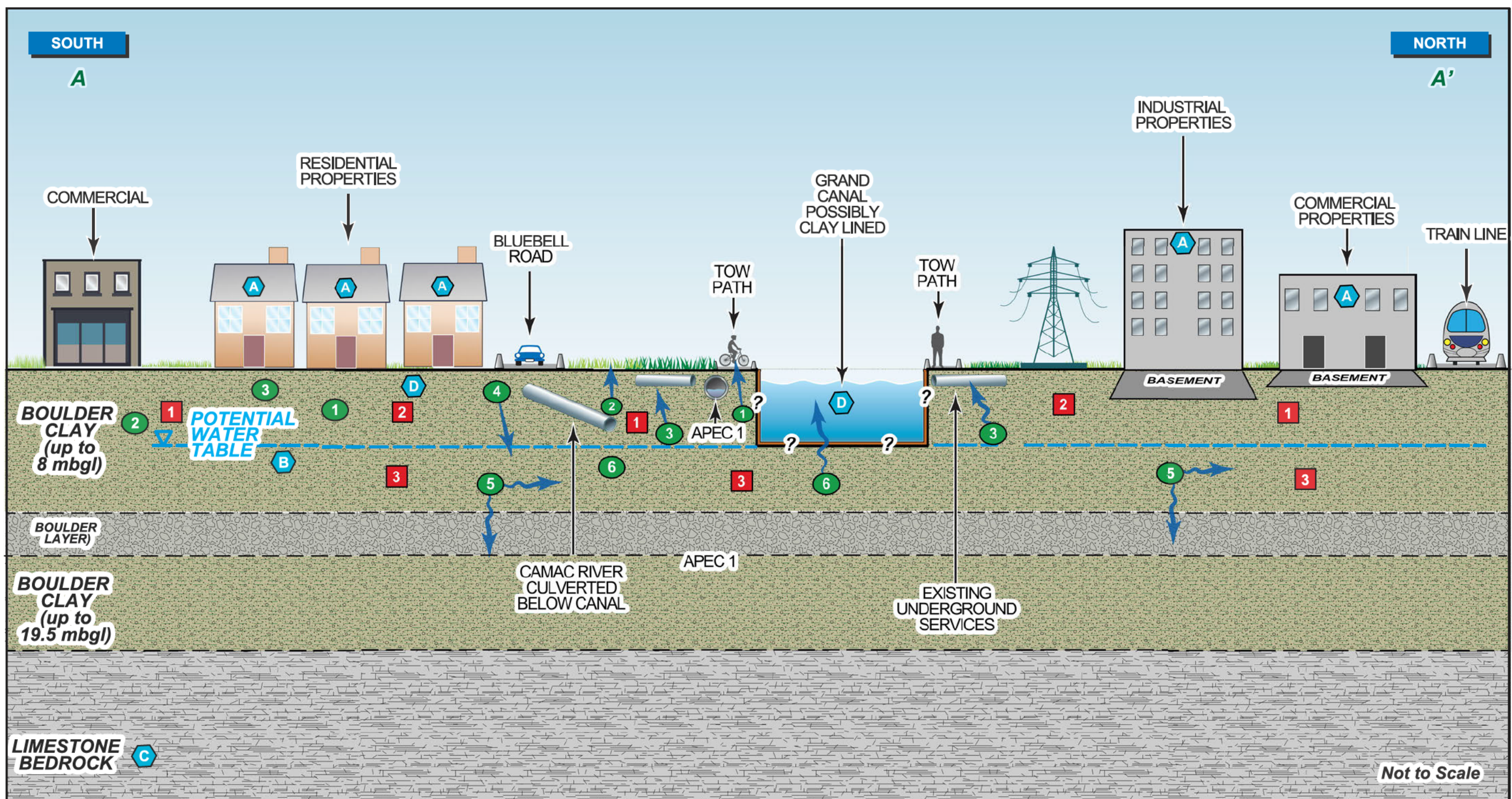
AECOM Internal Project No:
60610407
Drawing Title:
FIG.1 - SITE LOCATION

Drawing No:
FIG. 1
Drawn: Chk'd: App'd: Date:
RE DM SF 18/10/19

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCA, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Filename: Z:\UK\EBL2\Jobs\PR-427640_ESB_Cable_Alignment\400_Technical\Area_X\Additional Site Info Oct 2019\Locations\Fig.1 Site 35.mxd

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Not to Scale

SOURCES	
1	GROUND GAS
2	NON-VOLATILE CONTAMINANTS IN SOIL
3	CONTAMINANTS IN GROUNDWATER

PATHWAYS	
1	GROUND GAS MIGRATION
2	DERMAL CONTACT / DUST INGESTION
3	PERMEATION OF AND MIGRATION ALONG EXISTING UNDERGROUND SERVICES
4	LEACHING FROM SOIL TO GROUNDWATER
5	VERTICAL & HORIZONTAL MIGRATION OF CONTAMINATED GROUNDWATER
6	MIGRATION & LEACHING TO SURFACE WATER

RECEPTORS	
A	RESIDENTIAL / COMMERCIAL SITE USERS
B	SHALLOW GROUNDWATER
C	BEDROCK GROUNDWATER
D	SURFACE WATER

NOTES:

Rev	Date	Drawn	Checked	App'd

FOR INFORMATION

Client: Electricity Supply Board

Location: SITE 57 Poolberg Two Inchicore 110 kV

Title: Fig.3 - Conceptual Site Model

AECOM
 4th Floor, Adelphi Plaza, Adelphi Centre, George's Street Upper, Dun Laoghaire, Co. Dublin, Ireland.
 Tel: +353 (0) 1 293 3200 Fax: +353 (0) 1 293 3201 www.aecom.com

Design: RE	Drawn: RE
Chk'd: DM	App'd: DM
Date: DEC 2019	Scale: As Shown
Project No. 60610407	Dwg No. 3
Stat. -	Rev: 0

Appendix A Photographic Log

Facility Name:
ESB Cable Assessment

Site Location:
Site 57 - Inchicore

Project No.
427640

Photo No. 1	Date: 01/11/19	
Direction Photo Taken: West		
Description: West-facing view showing potential leak location		

Photo No. 2	Date: 01/11/19	
Direction Photo Taken: West		
Description: Filled opening in the asphalt along the pedestrian walkway, close to potential leak location.		

Facility Name:
ESB Cable Assessment**Site Location:**
Site 57 - Inchicore**Project No.**
427640

Photo No. 3	Date: 01/11/19	 A photograph showing a large area of ground covered in black, charred debris and ash. In the background, a concrete-lined canal or drainage ditch runs horizontally. The surrounding area is grassy and appears to be an outdoor site.
Direction Photo Taken:		
Description: Burned waste materials lying approximately 50 away from leak location.		

Photo No. 4	Date: 01/11/19	 A photograph showing a street view from a south-facing perspective. In the foreground, there is a metal fence. Behind the fence, a row of residential houses with brick walls and gabled roofs is visible. A street with parked cars and utility poles runs alongside the houses. The sky is overcast and grey.
Direction Photo Taken: Southwest		
Description: South facing view showing entrance gate to Canal Terrace (it was observed to be closed during the site visit) and residential houses located adjacent to potential leak location.		

Facility Name:
ESB Cable Assessment**Site Location:**
Site 57 - Inchicore**Project No.**
427640**Photo No.**
5**Date:**
01/11/19**Direction Photo
Taken:**

North

Description:

High voltage power lines
located approximately 50
m north of potential leak
location.



Facility Name:
ESB Cable Assessment**Site Location:**
Site 57 - Inchicore**Project No.**
427640**Photo No.**
6**Date:**
01/11/19**Direction Photo Taken:**

South

Description:

Green area located beyond the north bank of Grand Canal, in front of the leak location.



Facility Name: ESB Cable Assessment	Site Location: Site 57 - Inchicore	Project No.: 427640
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Photo No.: 7	Date: 01/11/19	
Direction Photo Taken: South		
Description: Substation located approximately 50 m east of leak location, adjacent to LUAS stop.		

Photo No.: 8	Date: 01/11/2019	
Direction Photo Taken:		
Description: Play area located 250 east of potential leak location		

Appendix B PSA Template Report Table of Contents Cross Reference

EPA Template Table of Contents**Production Area Preliminary Site Assessment Report**

Executive Summary	Executive Summary
1. Introduction	Section 1
1.1 Project Contractual Basis & Personnel Involved	Section 1
1.2 Background Information	Section 1.1
1.3 Project Objectives	Section 1.2
1.4 Scope of Works	Section 2
2. Source Audit Findings	Section 4
2.1 Current Site Operations	Section 4.1 to Section 4.2
2.2 Previous Site Operations	Section 4.3
2.3 Chemicals of Potential Concern	Section 4.4
3. Site Environmental Setting	Section 3
3.1 General Introduction	Section 3
3.2 Regional Geology and Hydrogeology	Section 3.2 and Section 3.4
3.3 Site Geology and Hydrogeology	Section 3.2 and Section 3.4
3.4 Summary of Previous Site Sampling and Monitoring Data	Not Applicable
4. Summary and Conclusions	Section 6
4.1 Summary and Conclusions	Section 6
4.2 Recommended Way Forward	Separate Cover Letter
5. References	Throughout Text

