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Preliminary Site Assessment

Site 32 Harold's Cross - Ringsend 110 kV

Electricity Supply Board

Project number: PR-427640_ACM_RP_ENV_048_2

27 January 2020

Quality Information

Prepared by	Checked by	Approved by
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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.

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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 at the junction of Haddington Road and Baggot Street, Dublin 4 (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 and repaired by ESB at this location in September 2009. 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 located 20 m north of the site, although this may be protected by low permeability clay (natural and/or engineered when the canal was constructed);

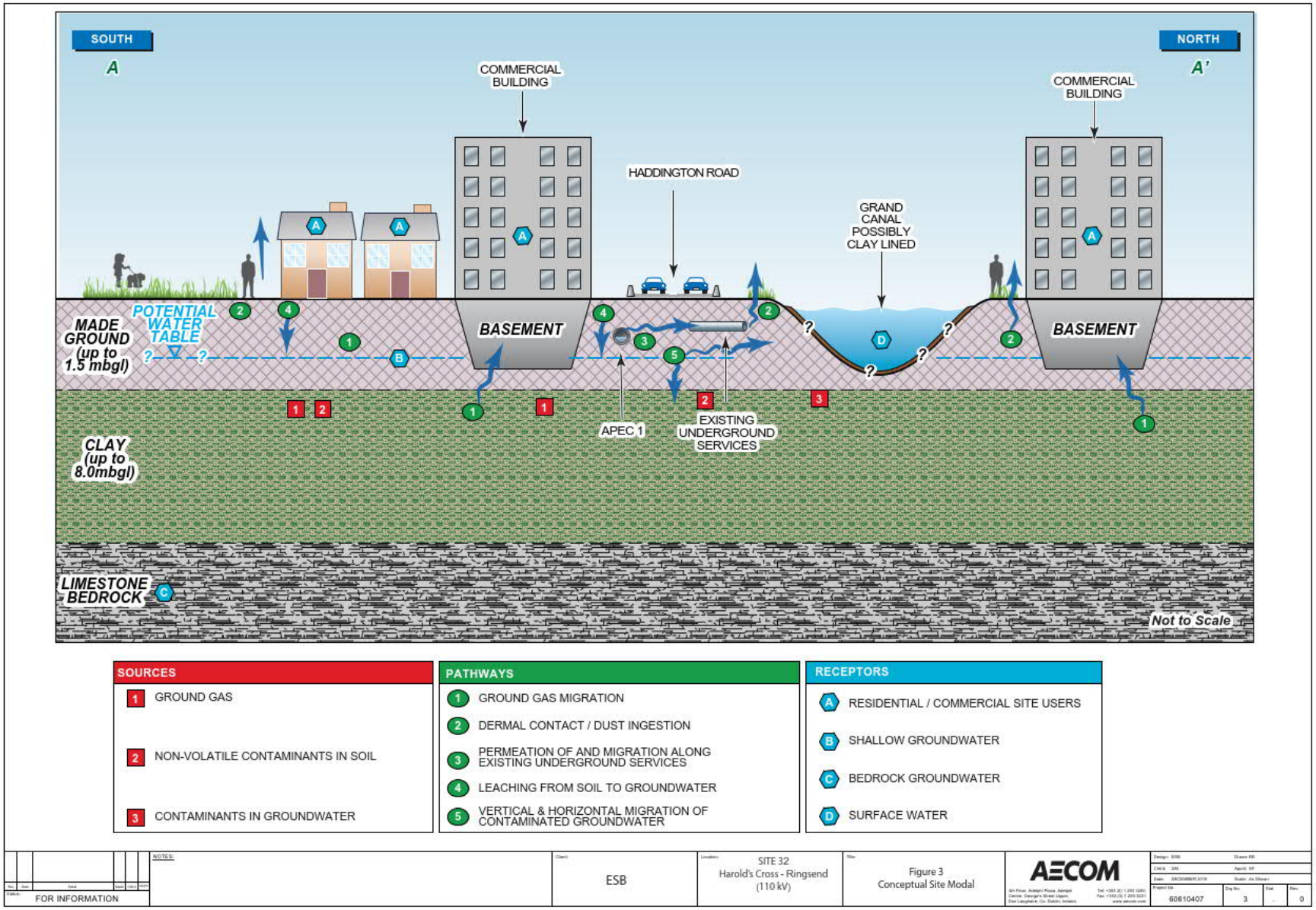
- The culverted Swan River is located approximately 700m south of the site, although this may be protected by low permeability clay deposits which are likely to be encountered beneath the site; and
- The groundwater aquifer beneath the site, although this may also be protected by low permeability clay deposits.

It is estimated that 265 litres of cable fluid (Linear Alkyl Benzene (T 3788)) was released in September 2009. 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 (32) Harold's Cross - Ringsend 110 kV (September 2009)	LABs	Soil Groundwater Ground Gas

The preliminary CSM developed for the site looked at potential SPR linkages identified during the assessment works and found that potential risks were considered to be very low to low. Based on these findings, further assessment is not considered to be required as no viable SPR linkages have been identified.


SOUTH
A
NORTH
A'
COMMERCIAL BUILDING
COMMERCIAL BUILDING
HADDINGTON ROAD
GRAND CANAL POSSIBLY CLAY LINED
BASEMENT
BASEMENT
MADE GROUND (up to 1.5 mbgl)
POTENTIAL WATER TABLE
CLAY (up to 8.0mbgl)
APEC 1
EXISTING UNDERGROUND SERVICES
LIMESTONE BEDROCK
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
RECEPTORS
A RESIDENTIAL / COMMERCIAL SITE USERS
B SHALLOW GROUNDWATER
C BEDROCK GROUNDWATER
D SURFACE WATER
FOR INFORMATION
NOTES:
ESB
SITE 32
Harold's Cross - Ringsend (110 kV)
Figure 3
Conceptual Site Modal
AECOM
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EPA Contaminated Land and Groundwater Risk Assessment Methodology

Table1. 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_048	27 January 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 located at the junction of Haddington Road and Baggot Street, Dublin 4 (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 and repaired by ESB at the site in September 2009. 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 26 July 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 29 July 2019
  - EPA Geoportal Site (https://gis.epa.ie/EPAMaps), accessed 29 July 2019
  - EPA Incidents Database (https://www.epa.ie/newsandevents/incidents/recent/), accessed 29 July 2019
  - Ordnance Survey of Ireland (OSI) (http://geohive.ie), accessed 29 July 2019
  - Glucksman Map Library, Trinity College Dublin, accessed 10 July 2019
  - Office of Public Works (OPW) Flood Maps (http://www.floodinfo.ie), accessed 29 July 2019
  - National Parks and Wildlife Service (NPWS) (http://webgis.npws.ie/npwsviewer/), accessed 29 July 2019
  - National Waste Collection Permit Office (NWCPO) website (http://www.nwcpo.ie/), accessed 29 July 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 at the junction of Haddington Road and Baggot Street, Dublin 4 (ITM 716879.26 732965.55) at an elevation of approximately 19 m above ordnance datum (m OD). The surrounding topography slopes away from the junction to the south along Baggot Street, but in general is relatively flat.

3.2 Geology

The Teagasc Soils Map indicates the site locality comprises urban sediment. Directly underlying and north of the leak location the Quaternary geology is classified as urban. Surrounding the site to the south, east and west, the Quaternary geology of the site is comprised of till derived from the underlying limestone bedrock.

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

A number of geotechnical records are located within the vicinity of the site. East of the site within a commercial development area, fill/made ground was noted to a maximum of 1.5 meters below ground level (m bgl), which was underlain by clay to a maximum of 8 m bgl, where boulders were encountered. Southwest of the site a similar stratigraphic sequence was recorded at Fleming Hall commercial development with fill/made ground to 2 m bgl, clay to 7m bgl and boulders encountered at to 7.2 m bgl at which the investigation terminated.

3.3 Hydrology

3.3.1 Surface Water Features

The closest surface water body to the site is the Grand Canal (a proposed Natural Heritage Area (pNHA), Site Code 002104), located 20 m north of the leak location. The canal flows to the east and discharges to the River Liffey Estuary approximately 1.5 km northeast of the site which flows into South Dublin Bay. 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 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 culverted Swan River is located approximately 700m south of the site and flows in an easterly direction towards the River Dodder.

The site lies within the lower catchment of the River Liffey and Dublin Bay, which covers an area of 1624 km^2. The River Liffey is located approximately 1.5 km north of the site and flows easterly into Dublin Bay.

The River Dodder is located approximately 1 km east of the site and flows to the north into the Liffey Estuary, and then Dublin Bay.

Given its proximity to the site, the Grand Canal is considered to be the most sensitive surface water receptor.

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. 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' quality[1].

The most significant surface water feature in the wider area is the River Liffey Estuary. The Water Framework Directive (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.

The WFD status of the River Dodder is classified as 'Moderate' and characterised as being at risk of not meeting its WFD objectives. There is no surface water quality information available for the Swan River.

3.3.3 Flooding

According to OPW Flood Maps the area and surrounding 1 km radius 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. Further, the area is not in close proximity to the extent of land affected by coastal flood events.

3.4 Hydrogeology

3.4.1 Aquifer Classification

According to the GSI, the bedrock aquifer beneath the site is classified as a Locally Important Aquifer. The bedrock underlying the site 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 60 millimetres/year (mm/yr).

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

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

The closest groundwater wells and springs are located over 1 km east of the site.

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.

3.4.2 Groundwater Vulnerability

The GSI National Groundwater Vulnerability Mapping identified some spatial variation in groundwater vulnerabilities within the site area, varying from low to moderate. The site itself is classified as moderate; however 0.4 km south, the area is classed as low. The variation in vulnerability classification correlates to the variable depth and nature of overburden across the site.

3.4.3 Groundwater Quality

Groundwater beneath the site is part of the Dublin Groundwater Body (IE_EA_G_008) which, according to the EPA 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 20 m north of the site, is a pNHA throughout its course.

South Dublin Bay, which is approximately 2.4 km east of the site, is also an SAC, SPA and pNHA. 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 near the site. The NWCPO website indicated that there are no waste facilities within 1 km of the site.

3.6.2 Storm Water Discharges

Four Irish Water storm water overflow discharge locations have been identified within 1 km of the site, as summarised in Table 2 below.

Table 2 Storm Water Discharges

Emission ID	Name	Register No.
TPEFF0700D0034SW168	Ringsend	D0034-01
TPEFF0700D0034SW160	Ringsend	D0034-01
TPEFF0700D0034SW156	Ringsend	D0034-01
TPEFF0700D0034SW179	Ringsend	D0034-01

3.6.3 EPA Licensing

The EPA database of Industrial Emissions (IE) and Integrated Pollution Control (IPC) and Waste licences was consulted and no active licensed facilities were identified within 1 km of the site.

According to the EPA website, there are no Section 4 discharges[2] to water within 1 km of the site and there have been no reported environmental incidents within 1 km of the site since at least 2010.

[2] Section 4 discharges to water to support the characterisation of waterbodies for the 2nd Cycle of River Basin Management Planning. This dataset takes in account, among other datasets, the Section 4s dataset developed in 2005 as Point Source Pressures for the Article 5 Characterisation and Risk Assessment Report for the Water Framework Directive 2000/60/EC; (European Communities (Water Policy) Regulations 2003 (SI 722 of 2003)).

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 located 20 m north of the site, although this may be protected by low permeability clay (natural and/or engineered when the canal was constructed);
- The culverted Swan River is located approximately 700m 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.

4. Source Audit Findings

4.1 Site Description

The leak location is situated adjacent to the Grand Canal at Baggot Street Bridge in Dublin City Centre. The leak site was located on a section of a 110 kV cable running from Harold's Cross to Ringsend. The cable was originally installed in 1951 with new sections of the cable added in 1986. The cable length is 5.6 km (see Figure 2).

No evidence of impact from the cable fluid release was noted during the site walkover. There was strong vegetation growth observed along the canal banks with no visual signs of dieback.

4.2 Surrounding Land Use

Land use in the immediate vicinity of the site is predominantly commercial with some residential. Land use in the vicinity of the site is summarised in Table 3 below.

Table 3 Adjacent Land Use

Site Boundary	Land Use
North	A bridge linking Baggot Street Lower and Baggot Street Upper across the Grand Canal is located immediately north of the site, with the Grand Canal beyond approximately 20 m from the leak location. An area of public open space is present along both banks of the canal and commercial office buildings (likely with basements) and more public open space (Wilton Park and Fitzwilliam Square) are located along the northern canal bank. Residential houses with gardens are located 70 m to the north on Baggot Street Lower.
East	Land use to the east of the site is predominantly commercial land use with some residential use above commercial properties. There are residential properties with rear gardens located adjacent to the eastern extent of the site on Haddington Road. Baggot Street Hospital is located 70 m south east on Baggot Street Upper. Hertz Car Hire is located immediately east of the leak location on Haddington Road, which could potentially have some fuel storage on site.
South	The Mespil Hotel and various commercial properties are located immediately south of the site, and, based on observations, have basement levels beneath Baggot Street. Fleming's Hall apartments are also located southwest of the site, with predominantly commercial high-rise buildings beyond. Residential properties with gardens are located approximately 200 m south of the site.
West	A Maxol petrol station and Gas Networks Ireland Pressure Reduction Station are located 60m west of the leak location. High-rise commercial buildings are located on Mespil Road to the west of the Mespil Hotel, beyond which are residential properties with gardens to the front and rear.

4.3 Historic Site Review

A review of historical maps and aerial photographs available from OSI, Glucksman Map Library (Trinity College Dublin) and Google Earth was carried out. A summary of the findings is presented in Table 4.

Table 4 Historic Map and Aerial Photograph Review

Year	Description
1829 to 1841 (OSI)	The site and immediate surrounding area appears to be predominantly residential terraced housing. Grand Canal lies north of the site and continuing north, areas of open green space including Fitzwilliam Square, Wilton Place and tennis gardens are located. West of the site a hat manufactory is located and to the east a Hospital is situated in close proximity (0.15 km) on Baggot Street. South of the site, a pump is located.
1897 to 1913 (OSI)	Significant residential developments have been carried out since the previous map. The hat manufactory to the west is no longer present and instead has been replaced by cottages and a laundry house with a tank. Open green space still remains north of the canal and to the east the Hospital has expanded to include a nurses' home and institution. A second tank is noted south of the site on Burlington Lane.
1847 (Five Feet to Statute Mile) Trinity Maps	The earliest map available in the Trinity Map Library was from 1847. In the map the Grand Canal is present. The road running parallel to the Grand Canal is named as Circular Road with Fleming's Place running south east from Circular Road. The area around the site is developed with what appears to be mostly residential buildings. Wilton Square is located to the north of the Grand Canal.
1864 (Five Feet to Statute Mile) Trinity Maps	The next map available from the Trinity Map Library is from 1864. On this map the road running parallel to the Grand Canal is now named as Mespil Road. The bridge that crosses the Grand Canal joining Baggot Street Lower and Baggot Street Upper is named as Macartney Bridge. Burlington Place is located on the corner of Mespil Rd and Burlington Rd. There is a hat manufactory west of the site along Mespil Rd, where a tank and chimney are located.
1889 (Five Feet to Statute Mile) Trinity Maps	The lock located near the site is now named as the 4th Lock. Eustace Bridge is located to the west of the site crossing over the Grand Canal. The hat manufactory is now labelled a jam manufactory. the chimney remains but the tank is no longer present. A tramway runs north to south over Macartney bridge to the east of the site. City of Dublin Hospital is located on Baggot Street Upper to the south of the site.
1907-8 (1:2,500) Trinity Maps	There has been increased development in the area surrounding the site. Two laundries are located to the southwest and southeast of the site. There is a tank present near the laundry located to the southwest. Pembroke Estate office is present across the Grand Canal opposite the site. Stanley's Cottage is also located beside the laundry to the southwest.
1935-6 (1:1,250) Trinity Maps	There has been some development along the southern side of the Grand Canal and Mespil Rd, the purpose of this development is unknown. Irex Industries are located to the south of the site. There are no other significant changes compared to the previous map
1969 (1:1,000) Trinity Maps	There are two electrical substations present between the southern side of the Grand Canal and the northern side of Mespil Road, where other new developments are also located. There are also two other electrical substations located to the south of the site, one located at the bottom of Ansley House and the top of Fleming's place and the other at the junction of Fleming's Place and Waterloo Rd. There are also three factories, laundry and printing works located south of the site along Fleming's Place.
1988 (1:1000) Trinity Maps	The two electrical substations along the Grand Canal are no longer labelled but the building footprint remains. There are small developments on both sides of the Grand Canal, but no significant changes have occurred since the previous map.
1995 (OSI)	Development of the surrounding area is shown on the 1995 aerial photograph. The high-density dwellings and/or commercial properties surround the site. From the aerial photograph it is evident that a structure has been built where the Maxol Petrol station is located today but there is no indication if at this time (1995) this is the primary use.
2000 (OSI)	Some minor changes to the site have occurred since 1995. Construction work is occurring to an area immediately west of the site developing the Mespil Hotel.
2005 (OSI)	Construction work has ceased to the west of the site and little – no changes have occurred in the surrounding vicinity. It remains unclear if the building structure north of the site is operating as a petrol station.
2012 (Google Earth)	No changes have appeared to have occurred since 2005.

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 backfilled with either clause 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 265 litres of cable fluid was released in September 2009. 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 5 summarises the basic physical and chemical properties of LABs.

Table 5 Linear Alkyl Benzene Physical and Chemical Properties

Property	Description
Molecular Weight	239-243 g/mol
Melting Point	<-70^{o}C
Boiling Point	251-320^{o}C @ 1 atm (OECD)
Vapour Pressure @ 25^{o}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^{o}C
Flash Point	140^{o}C
Explosive Properties	None

LAB (C12) has a calculated octanol-water partition coefficient (Koc) of 2.2x10^4 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:

- Petrol station present immediately adjacent to the site;

- Gas Networks Ireland Pressure Reduction Station immediately adjacent to the site;
- Car hire yard to the east of the site with potential fuelling facilities;
- Fill materials (understood to be up to 2 m bgl) present in the surrounding area; and
- Fuel / chemicals (e.g. for back-up generators) present in commercial 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 6.

Table 6 Area of Potential Environmental Concern

Number	APEC	Potential Contaminants of Concern	Potential Media Impacted
1	Leak at (32) Harold's Cross - Ringsend 110 kV (September 2009)	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 Haddington Road.

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 10 below.

By considering potential SPR linkages, an assessment of the human health and controlled water 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 7 below.

Table 7 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 8 below.

Table 8 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 9 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 9 is provided in the following table:

Table 10 Description of the Classified Risks and Likely Action Required

Level of Risk	Description
Very High Risk	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. This risk, if realised, is likely to result in substantial liability. Urgent investigation and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the long term.
Moderate Risk	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.
Low Risk	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.
Very Low Risk	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.

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 LAB, product T 3788;
- The geology beneath the site is assumed to comprise approximately 1.5 m of made ground underlain by clay up to a depth of 8 m bgl. Limestone bedrock is assumed to be present at a depth of approximately 8 m bgl;
- Groundwater is assumed to be present at relatively shallow depths within the made ground;
- It is assumed that the Grand Canal adjacent to the site is lined with an impermeable material such as clay, as was commonly used from the 1700s to early 20th Century to prevent leakage from the canal and thus loss of water level restricting navigation;
- It is assumed that 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 commercial buildings adjacent to the site have basements, while residential houses are assumed to not have basements.

The preliminary CSM is presented graphically in Figure 3.

Table 10 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 with plant uptake 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. Ingestion of soils via consumption of vegetables grown in 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.
		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 an industrial/commercial/low to high density residential scenario.	Medium	Unlikely	Low	If a significant source of LAB NAPL is present on groundwater, there is potential for ground gas to be generated from degradation processes. However, given the time elapsed since the leak occurred (10 years) and the relatively small volume of fluid released at this location (265 litres), it is unlikely that ground gas is being generated in significant quantities and potential risk from this pathway is considered to be low.
NAPL and TPH, VOC, SVOC and PCB concentrations in soils	Permeation of LAB NAPL through plastic water supply pipes.	Site users in an industrial/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, however given the relatively low volume of cable fluid released (265 litres) over 10 years ago, it is not considered likely that a sufficient volume of NAPL could be present to impact water mains. In addition, the WHO drinking water guideline (DWG) for the relevant aromatic fraction[3] 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

[3] 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
						supply above this level. Furthermore, water will be moving rapidly in the pipe 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 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 Swan River and Grand Canal.	Mild	Unlikely	Very Low	It is understood that the leak (265 litres) at this location was repaired in 2009. Given that there is no evidence of impact in the Grand Canal during the site walkover and no reported incidents of oil release, it is likely that NAPL released from the cable has stabilised over the 10-year period since the leak was repaired. In addition, given the relatively low volume of fluid released, the risk to nearby surface waters is considered to be very low.
LAB (NAPL)	Migration of potential contaminants along preferential flow pathways such as underground services and permeable backfill around the electricity cable.	Site users in an industrial/commercial/low to high density residential with plant uptake scenario.	Mild	Unlikely	Very Low	Likely to be a high concentration of services present in the vicinity of the leak given the urban setting. If 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 volume of fluid released was relatively low. Consequently, the potential for migration over significant distances is considered to be very low. In addition, 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 very low.
LAB (NAPL)	Migration in saturated and unsaturated soil.	Groundwater beneath the site.	Mild	Low Likelihood	Low	Extent of NAPL migration will depend on the characteristics of the receiving soil. However, given the volume of cable fluid released (265 litres) and duration since the leak was repaired (10 years) the potential risk of NAPL being present is considered to be low. In addition, as groundwater wells and springs are not indicated to be present within 1 km of 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.

Source	Pathway	Receptor	Severity	Likelihood	Potential Risk	Discussion
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	Considering the relatively low volume of cable fluid released and the 10 - year period since the cable was repaired, it is considered that the risk of shallow groundwater being significantly impacted is low. In addition, 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.
LAB (NAPL)		Groundwater in limestone bedrock aquifer beneath the site.	Mild	Unlikely	Very 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 Swan River and Grand Canal.	Mild	Unlikely	Very Low	The potential risk to surface water bodies is considered very low given the relatively low volumes leaked over 10 years ago. The Grand Canal is likely lined with impermeable material. No evidence of impact from the cable fluid release was noted during the site walkover, with strong vegetation growth observed along the canal banks.

6. Conclusions

AECOM completed a Preliminary Site Assessment of the site located on the south bank of the Grand Canal at the junction of Haddington Road and Baggot Street. The objective of the works was to identify potential risks to human health and controlled waters 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 located 20 m north of the site, although this may be protected by low permeability clay (natural and/or engineered when the canal was constructed);
- The culverted Swan River is located approximately 700m 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.

It is estimated that 265 litres of cable fluid (Linear Alkyl Benzene (T 3788)) was released in September 2009. 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 11 Area of Potential Environmental Concern

Number	APEC	Potential Contaminants of Concern	Potential Media Impacted
1	Leak at (32) Harold's Cross - Ringsend 110 kV (September 2009)	LABs	Soil Groundwater Ground Gas

The preliminary CSM developed for the site looked at potential SPR linkages identified during the assessment works and found that potential risks were considered to be very low to low. Based on these findings, further assessment is not considered to be required as no viable SPR linkages have been identified.

Figures

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Project Title:

ESB CABLE ALLIGNMENT - SITE 32
HAROLD'S CROSS
INCHICORE (110kV)

Client:

ESB

LEGEND

Leak location

0 0.5 1 km

Notes:

AECOM Internal Project No:

60610407

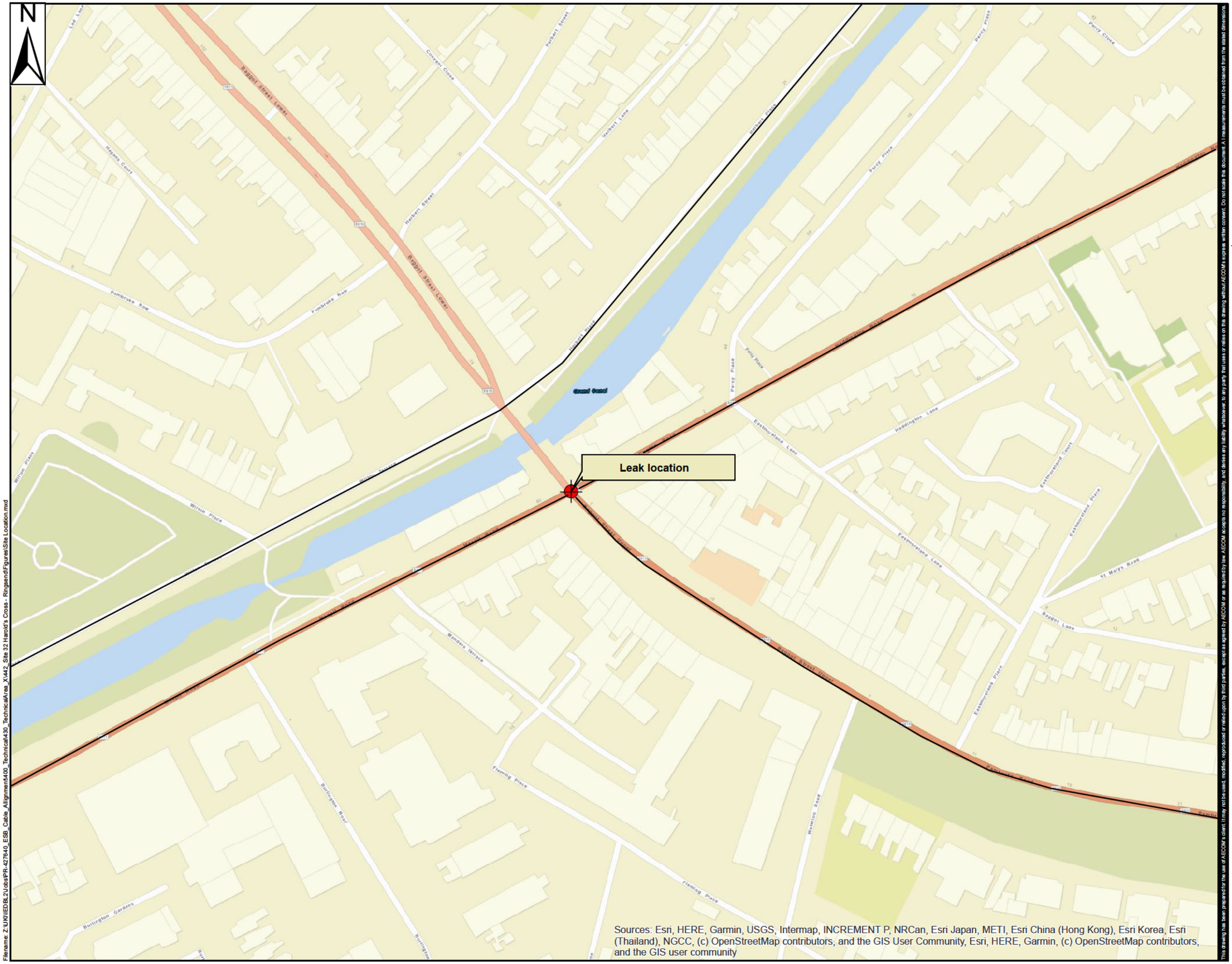
Drawing Title:

FIG.1 - SITE LOCATION MAP

Drawing No:

Drawn:	Chk'd:	App'd:	Date:
RE	DM	SF	29.11.19

Filename: Z:\UK\IED\BL2\Jobs\PR-427640_ESB_Cable_Alligment\400_Technical\430_Technical\Area_X\442_Site 32 Harold's Cross - Ringsend\Figures\Site Location.mxd



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Project Title:

ESB CABLE ALLIGNMENT - SITE 32
HAROLD'S CROSS
INCHICORE (110kV)

Client:

ESB

LEGEND

Leak location

Fluid Filled Cable

0 25 50 m

Notes:

AECOM Internal Project No:

60610407

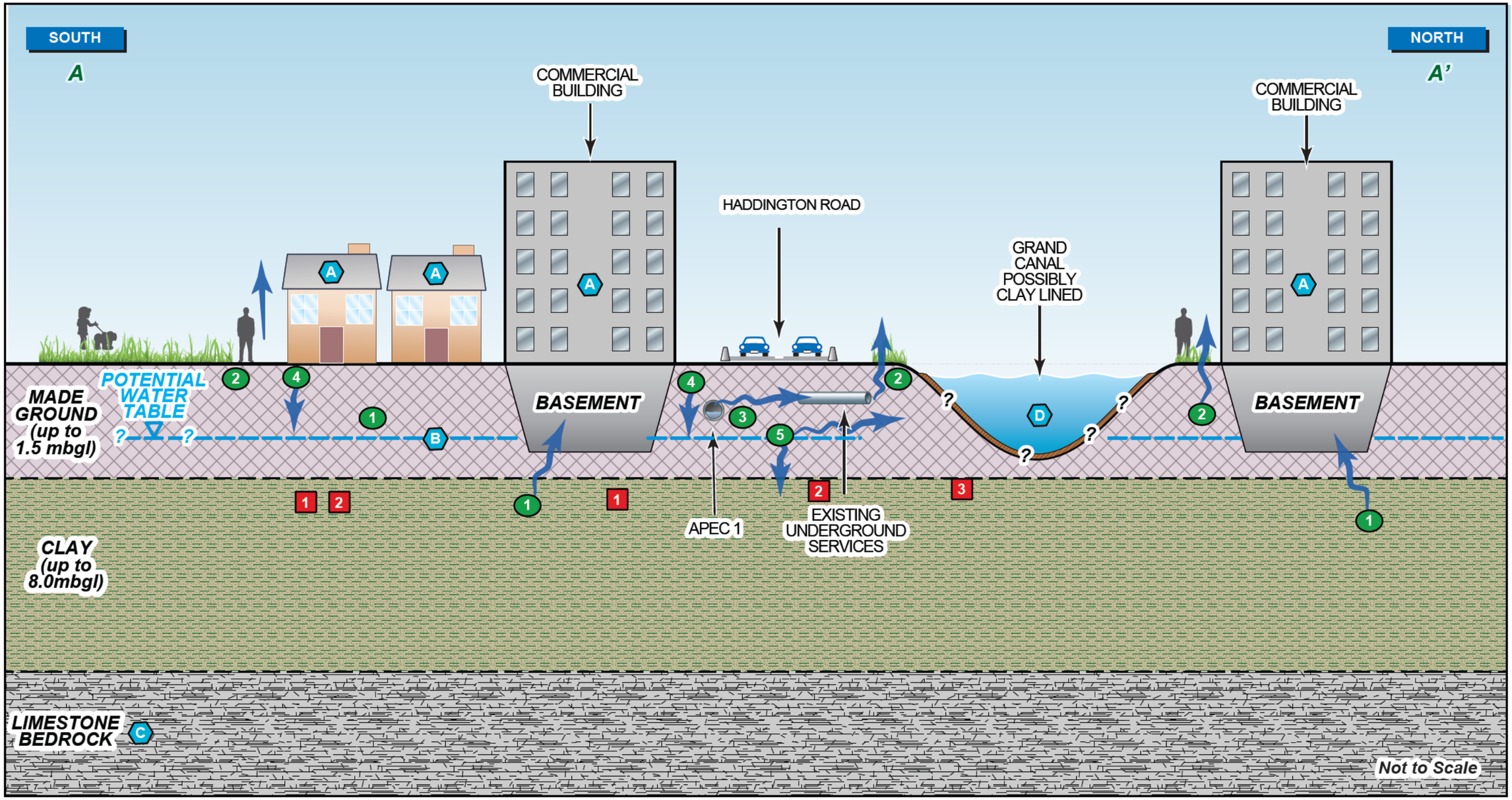
Drawing Title:

FIG.2 - SITE LAYOUT MAP

Drawing No:

Drawn:	Chk'd:	App'd:	Date:
RE	DM	SF	29.11.19

Filename: Z:\UKIEDBL2\Jobs\PR-427840_ESB_Cable_Allignment\400_Technical\430_Technical\Area_X\442_Site 32 Harold's Cross - Ringend\Figures\Site Location.mxd



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

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

Rev	Date	Detail	Made	Chk'd	App'd
Status: FOR INFORMATION					

NOTES:

Client: ESB

Location: SITE 32 Harold's Cross - Ringsend (110 kV)

Title: Figure 3 Conceptual Site Modal

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Design	ESB	Drawn	RE
Chk'd	DM	App'd	SF
Date	DECEMBER 2019	Scale	As Shown

Project No.	Drg No.	Stat.	Rev
60610407	3	.	0

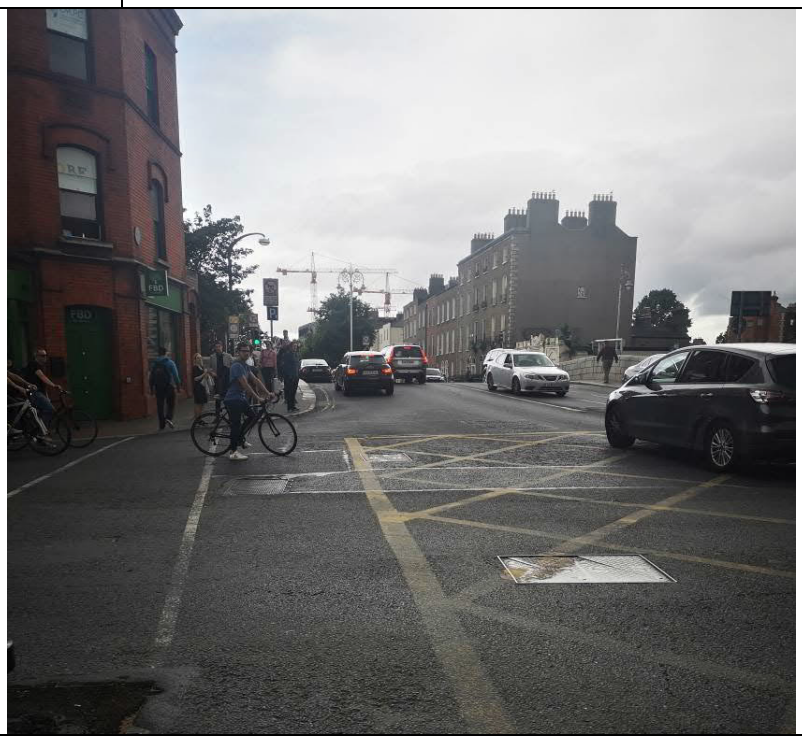
Appendix A Site Photographs

AECOM

PHOTOGRAPHIC LOG

Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

Date:
26 July 2019



Description
Location of the APEC at the junction of Haddington Road and Baggot Street.

Date:
26 July 2019

Description:
Residential properties on the Haddington Road along the eastern cable route of the site.

AECOM

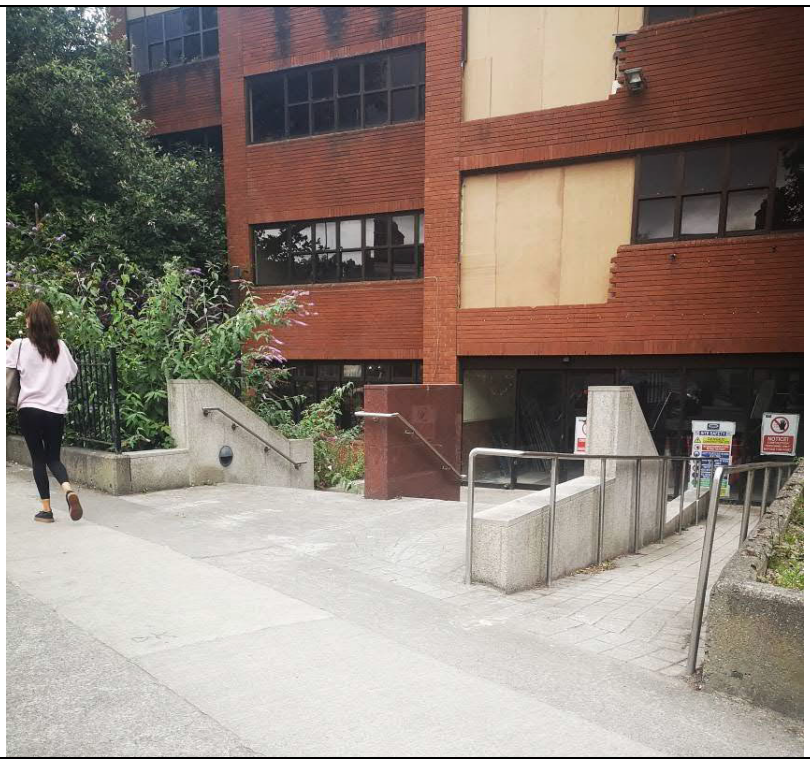
PHOTOGRAPHIC LOG

Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

Date:
26 July 2019

Description
Car park with basement along Haddington Road to the north of the eastern cable route of the site. Evidence of fire damage was noted.

Date:
26 July 2019



Description:
Car park with basement along Haddington Road to the north of the eastern cable route of the site. Evidence of fire damage was noted.

AECOM

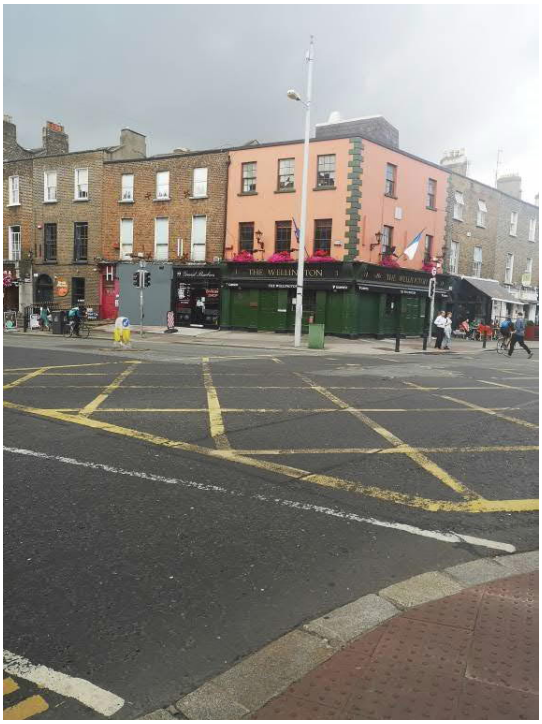
PHOTOGRAPHIC LOG

Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

Date:
26 July 2019

Description
Services at the boundary of the eastern cable route of the site.

Date:
26 July 2019



Description:
The APEC from the eastern cable route. The APEC is the location of a busy traffic intersection.

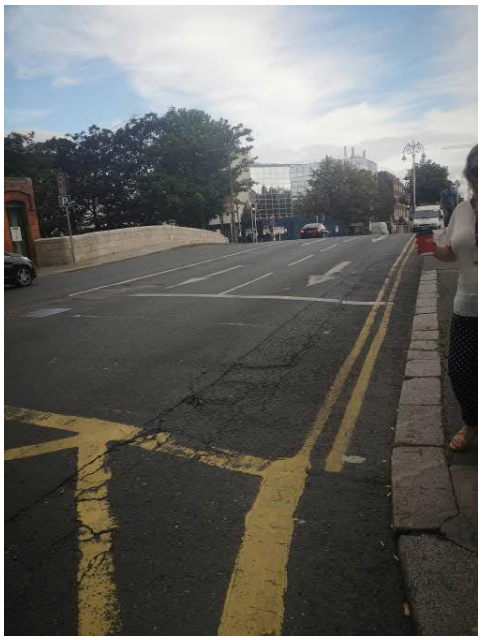
AECOM

PHOTOGRAPHIC LOG

Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

Date:
26 July 2019

Description
Bridge linking Lower and Upper Baggot Street immediately north of the APEC.



Date:
26 July 2019

Description:
View North of Grand Canal, APEC is located to the right of the image.

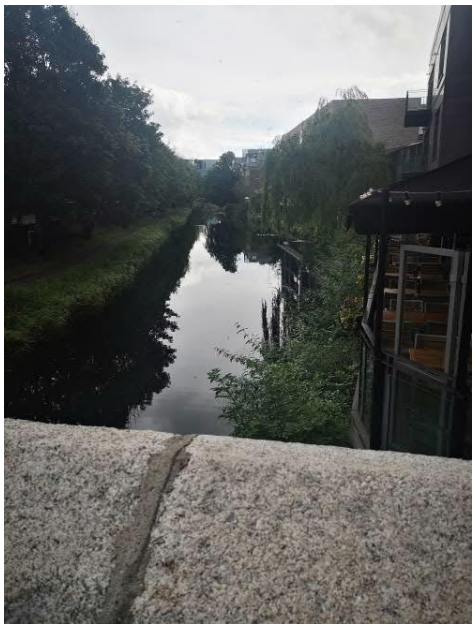
AECOM

PHOTOGRAPHIC LOG

Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

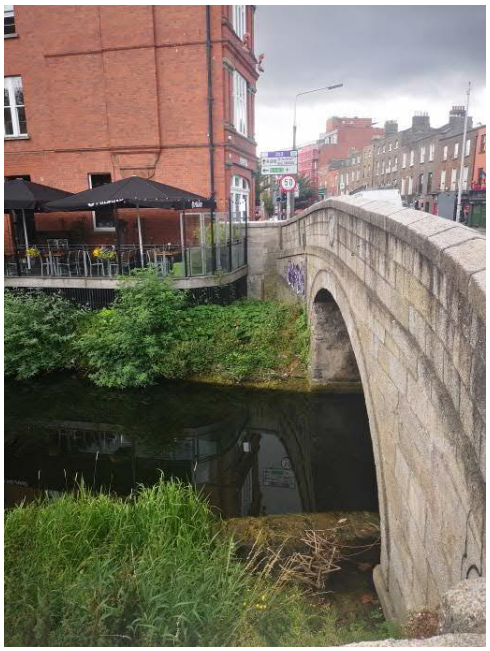
Date: 26 July 2019

Description
The Grand Canal adjacent to the eastern cable line of the site.



Date: 26 July 2019

Description:
Grand Canal the location of the APEC is to the northeast.



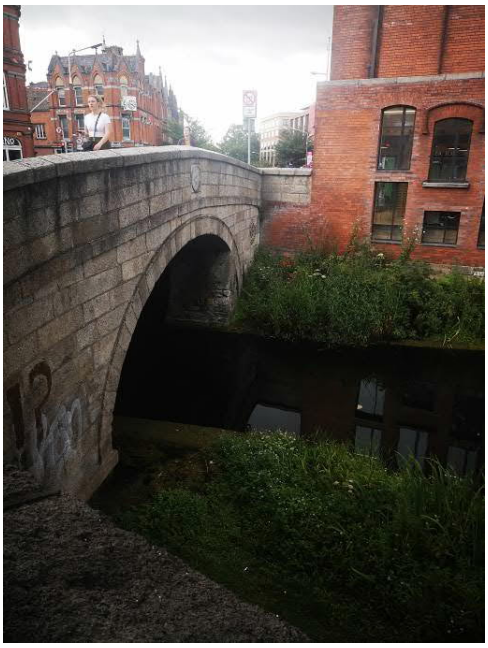
AECOM

PHOTOGRAPHIC LOG

Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

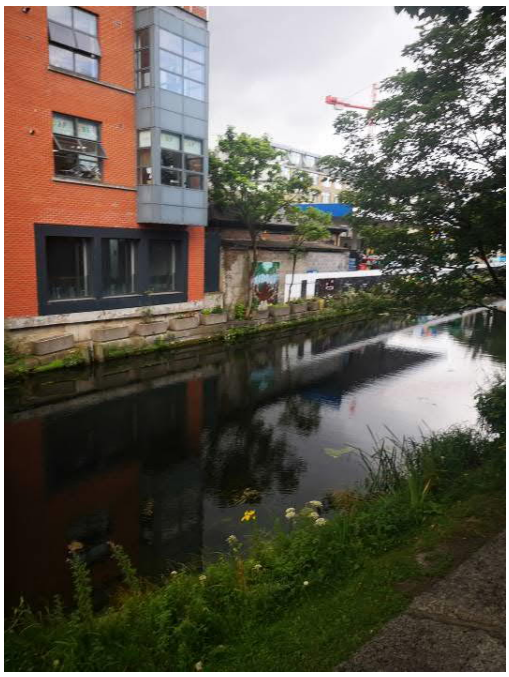
Date: 26 July 2019

Description
Grand Canal, the location of the APEC is to the northwest.



Date: 26 July 2019

Description:
Grand Canal along the western cable route of the site.



AECOM

PHOTOGRAPHIC LOG

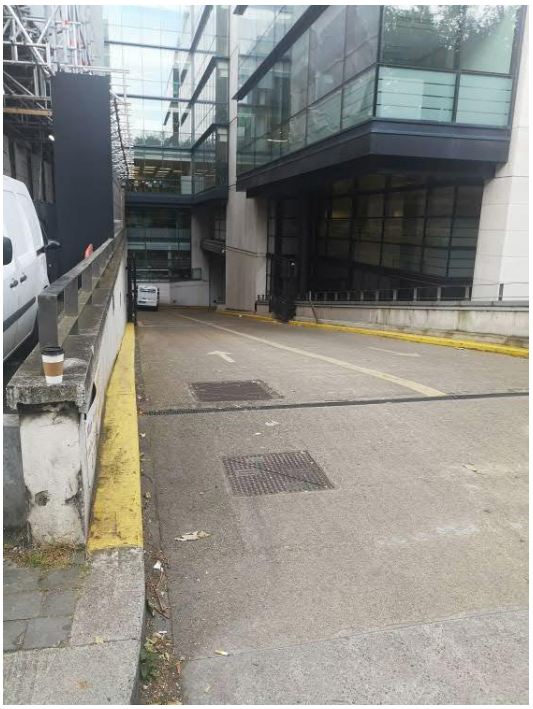
Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

Date:
26 July 2019

Description
Mespil Road along the western cable route of the site.

Date:
26 July 2019

Description:
Basement associated with the Mespil Hotel south of the western cable route.



AECOM

PHOTOGRAPHIC LOG

Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

Date: 26 July 2019

Description
Mespil Road on western cable route facing east to the APEC.

Date: 26 July 2019

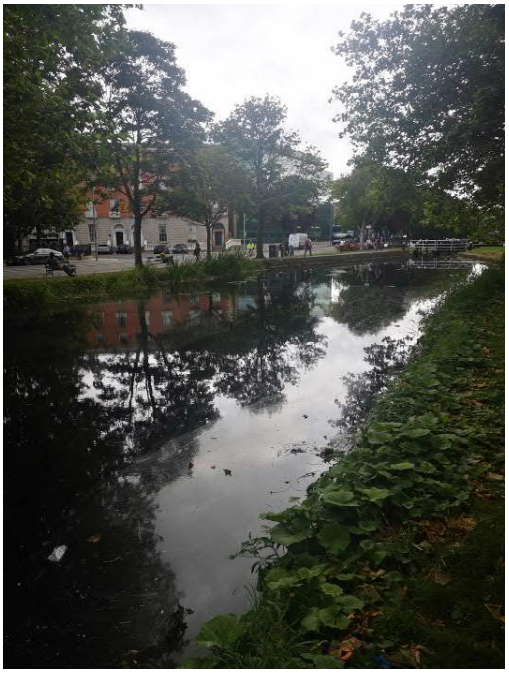
Description:
ESB services at the boundary of the site on the western cable route.

AECOM

PHOTOGRAPHIC LOG

Client Name: ESB	**Site Location:** Site 32: Harold's Cross - Ringsend	**Project No.** PR-427640

Date:
26 July 2019



Description
Grand Canal on the western cable route.

Date:

Description:

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