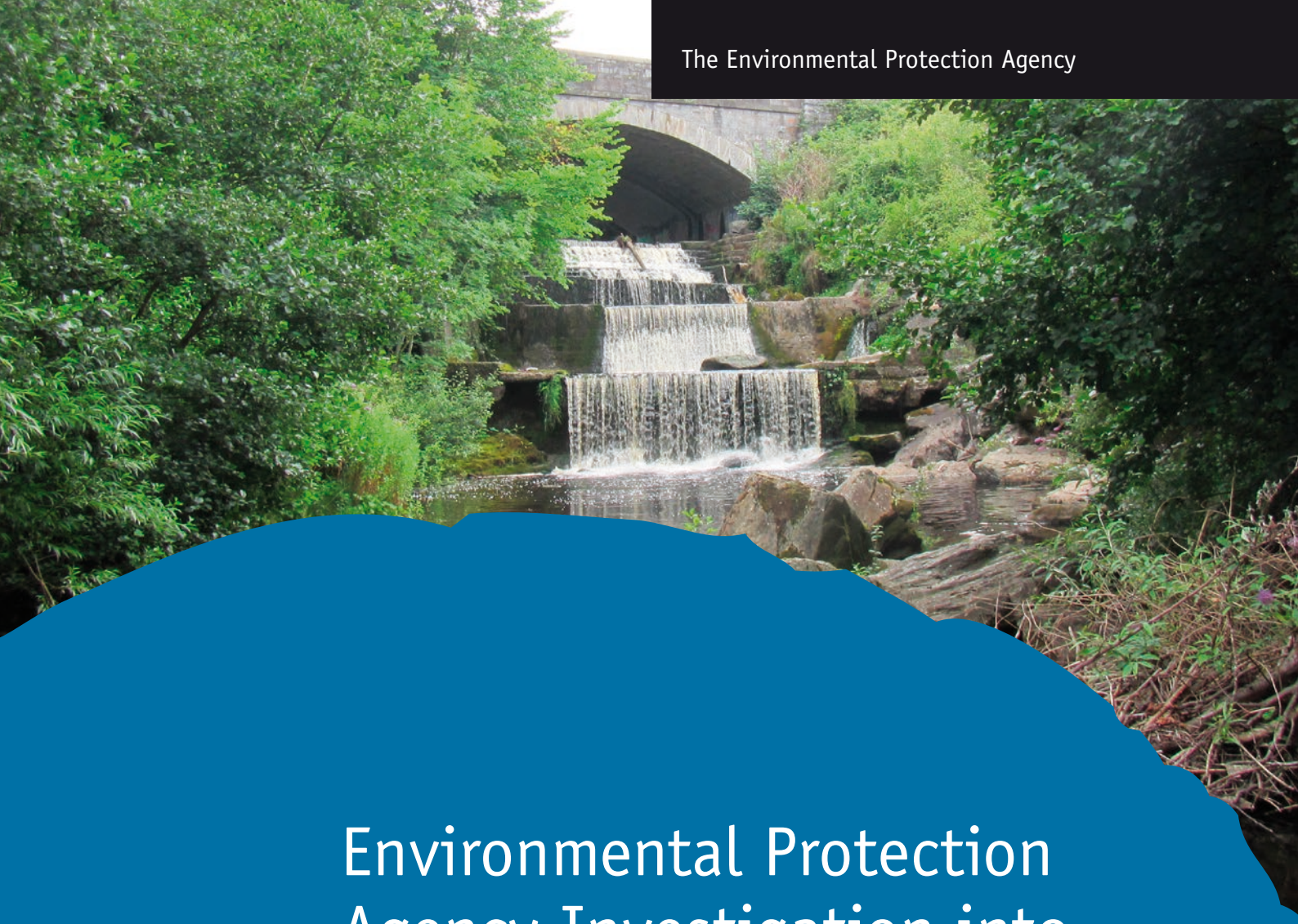

Environmental Protection Agency Investigation into ESB Networks Fluid Filled Underground Electricity Cable Leaks

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Environmental Protection Agency

The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

The work of the EPA can be divided into three main areas:

- **Regulation:** We implement effective regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.
- **Knowledge:** We provide high quality, targeted and timely environmental data, information and assessment to inform decision making at all levels.
- **Advocacy:** We work with others to advocate for a clean, productive and well protected environment and for sustainable environmental behaviour.

Our Responsibilities

LICENSING

We regulate the following activities so that they do not endanger human health or harm the environment:

- waste facilities (e.g. landfills, incinerators, waste transfer stations);
- large scale industrial activities (e.g. pharmaceutical, cement manufacturing, power plants);
- intensive agriculture (e.g. pigs, poultry);
- the contained use and controlled release of Genetically Modified Organisms (GMOs);
- sources of ionising radiation (e.g. x-ray and radiotherapy equipment, industrial sources);
- large petrol storage facilities;
- waste water discharges;
- dumping at sea activities.

NATIONAL ENVIRONMENTAL ENFORCEMENT

- Conducting an annual programme of audits and inspections of EPA licensed facilities.
- Overseeing local authorities' environmental protection responsibilities.
- Supervising the supply of drinking water by public water suppliers.
- Working with local authorities and other agencies to tackle environmental crime by coordinating a national enforcement network, targeting offenders and overseeing remediation.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE), Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Prosecuting those who flout environmental law and damage the environment.

WATER MANAGEMENT

- Monitoring and reporting on the quality of rivers, lakes, transitional and coastal waters of Ireland and groundwaters; measuring water levels and river flows.
- National coordination and oversight of the Water Framework Directive.
- Monitoring and reporting on Bathing Water Quality.

MONITORING, ANALYSING AND REPORTING ON THE ENVIRONMENT

- Monitoring air quality and implementing the EU Clean Air for Europe (CAFÉ) Directive.
- Independent reporting to inform decision making by national and local government (e.g. periodic reporting on the State of Ireland's Environment and Indicator Reports).

REGULATING IRELAND'S GREENHOUSE GAS EMISSIONS

- Preparing Ireland's greenhouse gas inventories and projections.
- Implementing the Emissions Trading Directive, for over 100 of the largest producers of carbon dioxide in Ireland.

ENVIRONMENTAL RESEARCH AND DEVELOPMENT

- Funding environmental research to identify pressures, inform policy and provide solutions in the areas of climate, water and sustainability.

STRATEGIC ENVIRONMENTAL ASSESSMENT

- Assessing the impact of proposed plans and programmes on the Irish environment (e.g. major development plans).

RADIOLOGICAL PROTECTION

- Monitoring radiation levels, assessing exposure of people in Ireland to ionising radiation.
- Assisting in developing national plans for emergencies arising from nuclear accidents.
- Monitoring developments abroad relating to nuclear installations and radiological safety.
- Providing, or overseeing the provision of, specialist radiation protection services.

GUIDANCE, ACCESSIBLE INFORMATION AND EDUCATION

- Providing advice and guidance to industry and the public on environmental and radiological protection topics.
- Providing timely and easily accessible environmental information to encourage public participation in environmental decision-making (e.g. My Local Environment, Radon Maps).
- Advising Government on matters relating to radiological safety and emergency response.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

AWARENESS RAISING AND BEHAVIOURAL CHANGE

- Generating greater environmental awareness and influencing positive behavioural change by supporting businesses, communities and householders to become more resource efficient.
- Promoting radon testing in homes and workplaces and encouraging remediation where necessary.

MANAGEMENT AND STRUCTURE OF THE EPA

The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

- Office of Environmental Sustainability
- Office of Environmental Enforcement
- Office of Evidence and Assessment
- Office of Radiation Protection and Environmental Monitoring
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet regularly to discuss issues of concern and provide advice to the Board.

Environmental Protection Agency Investigation into ESB Networks Fluid Filled Underground Electricity Cable Leaks

ENVIRONMENTAL PROTECTION AGENCY

An Ghniomhaireacht um Chaomhnú Comhshaoil
PO Box 3000, Johnstown Castle, Co. Wexford, Ireland

Telephone: +353 53 916 0600 Fax: +353 53 916 0699
Email: info@epa.ie Website: www.epa.ie

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Executive Summary

Executive Summary

The EPA became aware of losses of fluid from underground ESB Networks electricity cables in May 2019 following receipt of enquiries from RTE. The EPA received a letter from ESB Networks, 27th May 2019, which briefly outlined the extent of the underground fluid filled cables, insulating fluid, leaks associated with the cables, questions regarding reporting obligations to the EPA and a request for a meeting.

The EPA announced that it would investigate the fluid filled cables leaks. EPA engaged with Waterways Ireland, Dublin City Council and Commission for Regulation of Utilities in June 2019.

On the 11th June 2019 EPA met with ESB Networks where they agreed to prepare a report addressing the extent and nature of fluid filled cables; the type of fluids used and their classification; the maintenance and monitoring of cables for leaks; action and procedures for when a leak is detected (identification of leak, reporting, impact assessment, repair, mitigation (time frame)) as well as the extent of the leaks and the reporting to regulatory bodies that ESB Networks had undertaken with regard to the leaks.

Scope and Objectives of the Investigation

With these reports from ESB Networks, the EPA was then able to define the scope and objectives of the investigation in August 2019, as follows:

- establish the nature and scale of fluid filled cables in the control of ESB Networks and the nature of the fluid used in the cables, its classification (hazardous/non-hazardous) and risk to ground, waterbodies and other receptors;
- review the reporting by ESB Networks prior to June 2019 and their future reporting protocol proposal;
- evaluate the Environmental Liability Regulations Screening Report, to be completed by ESB Networks and establish if any historical leaks should have been reported to the EPA under the Environmental Liability Regulations 2008;
- evaluate the approach being taken by ESB Networks to assess historical leaks from fluid filled cables (Historic Fluid Incident Response Protocol) and comment on the progress by ESB Networks towards completing the environmental assessment.

The EPA investigation focused on gathering information from ESB Networks. The information provided by ESB Networks was validated and confirmed by engaging with relevant bodies: The Commission for Regulation of Utilities, relevant Local Authorities, Waterways Ireland, Mr O'Loughlin, Energy Networks Association, Environment Agency, and relevant Government Departments.

Nature and Extent of Leakage from Fluid Filled Cables

Based on the investigations the EPA understand that underground fluid filled electrical cables were installed between 1950 and 1989 by ESB Networks. ESB Networks installed approximately 221km of fluid filled cables during this period, of which approximately 44km have since been replaced with polyethylene (XLPE) cables which do not require fluid. Since 1980 there has been a gradual transition, for installation of new cables, from fluid filled cables to polyethylene (XLPE) cables.

Fluid filled cables remain functional for the transmission of electricity, however, due to deterioration, vegetative intrusion and/or third-party excavation works these cables may leak fluid to the environment. ESB Networks have confirmed that 68 'historic' leaks have occurred from fluid filled cables located within five Local Authority areas between 1993 and June 2019. In addition, there are seven 'current and new' leaks since June 2019. ESB Networks have stated they were 'not able to locate any information on identified leaks or rate of leakage prior to 1993'.

Nature of the Cable Fluids

The fluid used as an insulating liquid in the fluid filled cables was originally mineral oil (cables installed between 1950 and 1974) and thereafter linear alkylbenzene (LAB) (cables installed between 1964 and 1989). When fluid filled cables lose fluid to the environment as the result of a leak the fluid must be replaced to ensure continuity of electricity transmission. Addition of fluid continues until the leak is located and repaired. Cable fluid added to fluid filled cables prior to approximately 1986 was mineral oil, thereafter linear alkylbenzene was used as replacement fluid. Mineral oil is classified as hazardous, linear alkyl benzene has been classified as non-hazardous since January 2019. ESB Networks have identified that the fluid lost from the fluid filled cable leaks is often a mix of mineral oil and linear alkyl benzene, therefore the fluid lost must be considered hazardous.

The timeframe from initially identifying a loss of fluid to the repair of the cable has typically taken from 1 month to several years.

Notification of Leaks and Protocols for Dealing with Leaks

The EPA received two notifications from Electricity Supply Board regarding Marina Generating Station (Industrial Emissions Licence Reg. No. P0578-03) in November 2012 and Poolbeg Generating Station (Industrial Emissions Licence Reg. No. P0577-03) in 2006 concerning losses of fluid from cables. The Electricity Supply Board, Marina Generating Station, incident was investigated by the EPA who concluded that there was no evidence of environmental damage, and it was appropriately closed out. The Electricity Supply Board, Generating Station, Poolbeg incident was outside the installation licence boundary and the licensee would have been advised to notify the Local Authority.

The Environmental Liability Regulations 2008, as amended, came into operation on 1st April 2009 and require an operator to take measures to prevent environmental damage where there is an imminent threat of same, or to prevent further damage if the damage has already occurred.

On 6th September 2019, ESB Networks completed a screening, in accordance with the Environmental Liabilities Regulations, of all leaks that occurred since April 2009. This screening identified 4 leaks with the potential to cause environmental damage as defined in the Regulations. The EPA has assessed the site assessment reports prepared by ESB Networks and, is now satisfied that there is no further action required under these Regulations in all the 4 cases.

ESB Networks have established two protocols since commencement of the investigation, the first protocol relates to the leaks which occurred prior to June 2019 and the second relates to leaks occurring in June 2019 or which may occur in the future. The protocols identify the actions to be taken by ESB Networks, including notification, identification of location of leaks, repair of the leak, assessment of impact, and, if necessary, remediation of any impact associated with the leak. The protocols shall be amended and updated by ESB Networks based upon feedback from statutory and non-statutory bodies and experience.

ESB Networks commenced an assessment of the environmental risk associated with fluid leaks which occurred prior to June 2019 on 5th June 2019. The assessment is being completed in accordance with EPA Guidance document *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'*. Preliminary site assessments of each historic leak have been completed by ESB Networks. ESB Networks will commence intrusive investigations and environmental monitoring in January 2020, where necessary.

ESB Networks have identified, in correspondence submitted to the EPA, that they will propose revision of the timeframe for decommissioning of fluid filled cables as part of their submission to the Commission for Regulation of Utilities under price review period 2020-2025.

Conclusions on the Fluid Filled Cables Investigation

The main conclusions arising from the EPA investigation:

- There were 68 'historic' leaks between 1993 and June 2019 and a further 7 'current and new' leaks since June 2019. The locations and scale of each leak has been identified by ESB Networks and they are undertaking site specific investigations of each;
- The fluid used as an insulating liquid in cables was originally mineral oil and more recently linear alkyl benzene. Mineral oil is classified as hazardous while LAB is classified as non-hazardous. ESB have identified that the fluid lost from the cable leaks is often a mixture of mineral oil and LAB and therefore must be classified as hazardous;
- While ESB Networks report that they consulted a relevant authority regarding 20 of the 68 leaks identified prior to June 2019, ESB Networks failed in the case of 48 leaks to notify Local Authorities, in accordance with Section 14(1) of the Local Government (Water Pollution Act) 1977, as amended;
- ESB Networks failed to screen the impact of fluid leaks, which occurred since 1st April 2009, for the applicability under Regulations 7 and 9 of the European Communities (Environmental Liability) Regulations 2008, as amended, until after June 2019;

- ESB Networks have established two protocols since June 2019 to deal with historic and future leaks and the EPA is satisfied with the approach and protocols now being implemented by ESB Networks to assess each leak and to engage with the relevant Local authorities;
- The EPA acknowledges that decommissioning of fluid filled cables can be a challenging process but considers fluid filled cables that have a high occurrence of leakage and are in proximity to sensitive receptors should be prioritised for decommissioning.

Next steps

ESB Networks shall follow their protocols for all historic and future leaks. In relation to historic leaks ESB Networks shall submit the preliminary site assessments to the relevant Local Authority for assessment in accordance with the Local Government (Water Pollution Act) 1977, as amended. In addition, ESB Networks shall complete ecological assessments, commence site investigations and environmental monitoring in January 2020 as necessary based on the preliminary site assessments and any feedback from the relevant Local Authorities. Detailed site assessment reports and generic qualitative risk assessments shall be competed for each leak and shall identify any corrective actions and remediations.

Report Record of Findings

Report Record of Findings

This report records the findings under the following five sections:

Section 1: Introduction, Scope and Methodology

The Environmental Protection Agency (EPA) took on the task to 1) investigate the circumstances of ESB Networks fluid filled cable leak incidents; 2) evaluate the approach being taken by ESB Networks to assess historical leaks from fluid filled cables and comment on the progress by ESB Networks towards completing environmental risk assessments; and 3) evaluate the approach being taken by ESB Networks for future leaks from fluid filled cables.

Section 2: Relevant Legislation and Guidance

The principal legislative instruments that are applicable to this issue are: Local Government (Water Pollution) Act 1977, as amended; Environmental Protection Agency Act 1992, as amended; European Communities (Environmental Liability) Regulations 2008, as amended and the European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended.

ESB Networks are using the framework of the *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites*' for their environmental assessment of each leak. The EPA have published guidance to inform operators of their obligations under the European Communities (Environmental Liability) Regulations 2008, as amended, *'Environmental Liability Regulations, Guidance Document'*.

Section 3: Roles and Responsibilities

The relevant roles and responsibilities of the Environmental Protection Agency (EPA), Local Authority, Commission for Regulation of Utilities and ESB Networks are identified.

Section 4: Engagement with Relevant Organisations

The engagement with ESB Networks and the various statutory and non-statutory bodies, identified as being central to completion of the investigation, is identified. The engagement sought to evaluate compliance with environmental legislation and validate information received.

Section 5: EPA Evaluation and Findings

The EPA evaluation and findings arising from its review of the information obtained during the investigation.

Section 6: Conclusion and Recommendations

Outlines the EPA conclusions and recommendations arising from the evaluation of the information and evidence gathered as part of the investigation and identifies the further site-specific investigations to be completed by ESB Networks.

Section 1: Introduction, Scope and Methodology

Section 1: Introduction, Scope and Methodology

Introduction

The Environmental Protection Agency (EPA) became aware of losses of fluid from underground ESB Networks electricity cables in May 2019 following receipt of enquiries from RTE. The EPA, in a statement issued to RTE, confirmed that the EPA would investigate the ESB Networks fluid filled cable leaks. Following receipt of the RTE Investigates queries the EPA received a letter from ESB Networks (dated the 20th May 2019 and received on the 27th May 2019, Appendix 1) which briefly outlined the extent of the underground fluid filled cables, insulating fluid in the cables, leaks associated with these cables, queried reporting obligations to the EPA and requested a meeting with the EPA.

The EPA engaged with Waterways Ireland, Dublin City Council and Commission for Regulation of Utilities in June 2019.

On the 11th June 2019 EPA met with ESB Networks where they agreed to prepare a report addressing the extent and nature of fluid filled cables; the type of fluids used and their classification; the maintenance and monitoring of cables for leaks; action and procedures for when a leak is detected (identification of leak, reporting, impact assessment, repair, mitigation (time frame)) as well as the extent of the leaks and the reporting to regulatory bodies that ESB Networks had undertaken with regard to the leaks.

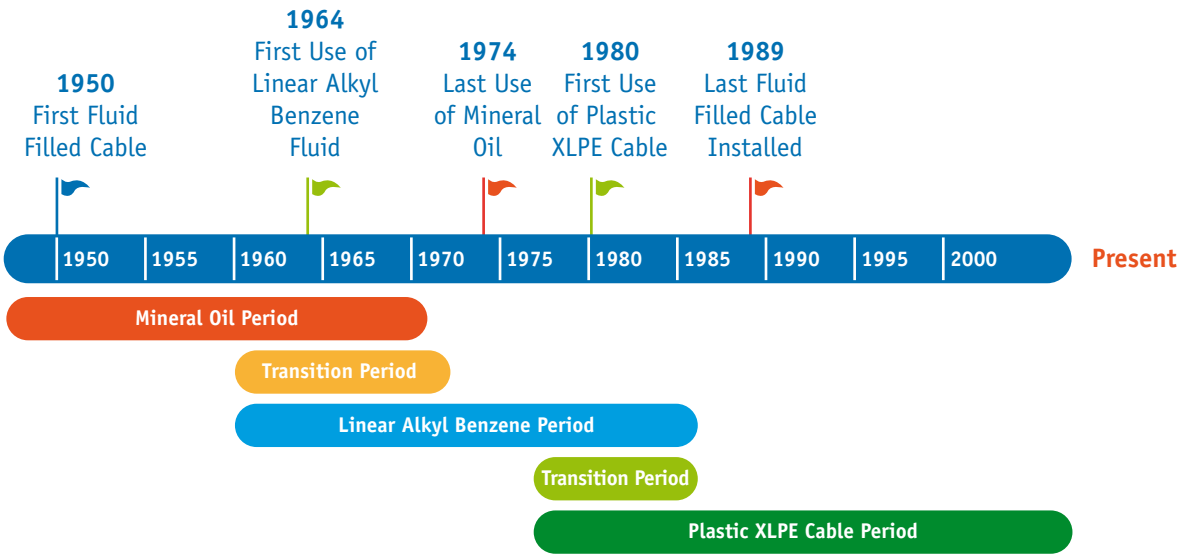
With these reports from ESB Networks, the EPA was then able to define the scope and objectives of the investigation in August 2019, as follows:

- establish the nature and scale of fluid filled cables in the control of ESB Networks and the nature of the fluid used in the cables, its classification (hazardous/non-hazardous) and risk to ground, waterbodies and other receptors;
- review the reporting by ESB Networks prior to June 2019 and their future reporting protocol;
- evaluate the Environmental Liability Regulations Screening Report, to be completed by ESB Networks and establish if any historical leaks should have been reported to the EPA under the Environmental Liability Regulations 2008;
- evaluate the approach being taken by ESB Networks to assess historical leaks from fluid filled cables (Historic Fluid Incident Response Protocol) and comment on the progress by ESB Networks towards completing the environmental assessment.

Fluid Filled Cables

Fluid filled cables are a legacy technology for transmitting electricity underground. The fluid acts as an insulating medium to ensure efficient cable operation. Underground cable technology has developed over time with improvements in materials, science and engineering. Fluid filled cable technology has been replaced with solid insulated cables, however, approximately 177km of fluid filled cables remain in service in 2019. ESB Networks have outlined in ESB Networks report entitled 'Preliminary Environmental Sensitivity Assessment Report of Fluid Filled Cable Leakages Updated (Dated September 2019)' three distinct cable technology periods as outlined in Figure 1.0: Cable Type Usage History.

Figure 1.0: Cable type usage history



During 1950-1974 fluid filled cables used mineral oil to impregnate the paper within the cables and provide insulation. During 1964 – 1989 an alternative fluid was used called linear alkyl benzene. Plastic cables were installed from 1980, these cables used a plastic compound called cross-linked polyethylene (XLPE) and didn't require insulating fluid. There was a gradual transition between each technology and therefore an overlap of technologies occurred as indicated in Figure 1.0: Cable type usage history.

Many fluid filled cables remain in operation, in Ireland and worldwide. They continue to transmit electricity, however leakage of cable fluid may occur as a result of wear and tear, vegetative intrusion or third-party excavation works. Replacement of fluid filled cables in urban areas is challenging for many reasons including the need for road closures, interaction with other underground services, third party land access and electricity outages. Fluid which leaks from cables must be replaced to maintain electricity transmission prior to repair of the leak. ESB Networks therefore continue to add fluid to maintain the insulating function and ensure the cables continue to transmit electricity until the fluid filled cable is repaired or replaced. The lost fluid has the potential to impact on the receiving environment including land, surface water, and groundwater.

Fluid filled cables are mainly located in population centres but can pass through or adjacent to sensitive areas such as Special Areas of Conservation, Special Protected Areas, Natural Heritage Areas, proposed Natural Heritage Areas, designated bathing waters, wells, groundwater bodies, surface waters and canals.

ESB Networks have confirmed that there are fluid filled cables located in the following Local Authority areas: Dublin City Council, Dun Laoghaire-Rathdown County Council, South Dublin County Council, Fingal County Council, Cork City Council, Cork County Council, Limerick County Council, Clare County Council, Wicklow County Council, Wexford County Council and Kerry County Council as detailed in Figure 1.1: Overview map of ESB Networks Fluid Filled Cable Locations (ESB Networks December 2019).

Figure 1.1: Details the national extent of ESB Networks fluid filled cable locations.

ESB Networks have confirmed that 68 'historic' leaks have occurred from fluid filled cables located within five Local Authority areas (Dublin City Council, Dun Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Cork City Council) between 1993 and June 2019 (Appendix 2, Maps). In addition, there are seven current or new leaks since June 2019. ESB Networks have stated that they were '*not able to locate any information on identified leaks or leakage prior to 1993*'.

ESB Networks fluid filled cable status and replacement programme

ESB Networks installed approximatley 221 km of fluid-filled cables across low pressure and high-pressure circuits between 1950 and 1989. ESB Networks identified that they commenced a replacement programme for fluid filled cables in 2005, to date 20% (approximately 44km) of the fluid filled cables have been replaced with a polyethylene (XLPE) cable, leaving 83 fluid-cables circuits with a total length of 177km in service. ESB Networks state that this programme has removed 40% of the cable fluid leaks from the system, however records provided by ESB Networks record leakage rates of between 7,050 and 40,980 litres per annum (2007-2019). High pressure cables have not been identified by ESB Networks for immediate replacement due to their relatively young age, construction, location and low risk from common causes of damage (i.e. third-party excavation works).

The Commission for Regulation of Utilities has the overall responsibility for approving ESB Networks' capital expenditure programme which includes replacement of fluid filled cables. The capital expenditure programmes are set over 5-year periods and are referred to as price review (PR) periods. PR1 covered 2001 to 2005, PR2 2006 to 2010, PR3 2011 to 2015, PR4 2016 to 2020 and PR5 will cover 2020 to 2025. Submissions on price review period (PR5 2020-2025) are due to be submitted by ESB Networks in late 2019, Commission for Regulation of Utilities will then assess the submission and issue a decision for the price review period 2020-2025.

ESB Networks fluid filled replacement programme (40-year replacement programme 2010 to 2050) was proposed and agreed by Commission for Regulation of Utilities for inclusion in the regulatory price review period PR2 (2006 to 2010). The replacement programme will continue to form part of the capital expenditure plan for price review period, PR5 2020 to 2025. ESB Networks have indicated to the EPA, during a meeting on 27th August 2019 and information provided on the 6th September 2019, that they will be proposing a new replacement strategy in their submission to Commission for Regulation of Utilities. The new replacement strategy will have fluid filled cables replaced within the next 15 years, by 2035 (Table 1.1 refers). The fluid filled cable replacement programme is based upon several criteria, including environmental risk and continued security of supply.

Table 1.1: Cable replacement programme as outlined in ESB Networks report entitled 'Preliminary Environmental Sensitivity Assessment Report of Fluid Filled Cable Leakages Updated (Dated September 2019)' received by the EPA from ESB Networks on the 6th September 2019.

Period	220 kV Cables	110 kV Cables	38 kV Cables	Total
2020-2025	50km	11km	20km	81km
2025-2030	15km	5km	32km	52km
2030-2035		14km	30km	44km
			Grand Total	177km

Methodology

The EPA has applied an investigative approach based largely on gathering data and verifying sources of information through engagement and assistance with relevant statutory, non-statutory bodies and Mr O'Loughlin. Statutory powers have been utilised, as appropriate.

The EPA reviewed its records to confirm if it had previously received correspondence or related queries in relation to fluid filled cable leaks. This exercise identified two incident notifications from Electricity Supply Board regarding Marina Generating Station (Industrial Emissions Licence Reg. No. P0578-03) in November 2012 and Poolbeg Generating Station (Industrial Emissions Licence Reg. No. P0577-03) in 2006.

In early June 2019 the EPA engaged with Waterways Ireland, Dublin City Council, Commission for Regulation of Utilities, Department of Housing, Planning and Local Government, Department of Communications, Climate Change and Environment and RTE. These engagements assisted in establishing the initial level of knowledge in relation to fluid filled cable leaks.

Based on the initial information gathered the EPA identified the relevant legislation and guidance. The legislation and guidance identified ESB Networks obligations to notify statutory bodies of fluid filled cable leaks to the environment and put measures in place to prevent/limit environmental pollution.

The EPA defined the scope and objectives of the initial meeting with ESB Networks on the 11th June 2019. The Agenda proposed by the EPA included the following:

- Extent and nature of fluid filled cables;
- Type of oils used and their classification;
- Maintenance and monitoring of cables for leaks by ESB Networks;
- Action/procedures when a leak us detected;
  - Identification of leak
  - Reporting
  - Impact assessment
  - Repair, mitigation (time frame)
- Extent of leaks and reporting to regulatory bodies.

On conclusion of the meeting ESB Networks agreed to complete the following actions:

- a report addressing the agenda items and provide a schedule of initial actions and time frames for completion of each action;
- prepare a scoping document for a detailed review of fluid filled cables leaks and the environmental risk assessment of losses from fluid filled cables;
- complete an environmental risk assessment in accordance with relevant guidance documents including '*EPA Guidance on the Management of Contaminated Land and Groundwater at EPA licensed Sites*';

- current/future reporting process shall be prepared by ESB Networks. The future reporting shall address all statutory/formal notification requirements and identify appropriate informal (non-statutory) notifications;
- complete an Environmental Liability Regulations Assessment Report addressing all fluid filled cables losses and submit the report to the EPA.

Since the meeting, ESB Networks have provided the information associated with the agreed actions and have continued to provide further information as requested by the EPA. The following scope and objectives of the investigation were defined in August 2019, as follows:

- establish the nature and scale of fluid filled cables in the control of ESB Networks and the nature of the fluid used in the cables, its classification (hazardous/non-hazardous) and risk to ground, waterbodies and other receptors;
- review the reporting by ESB Networks prior to June 2019 and their future reporting protocol;
- evaluate the Environmental Liability Regulations Screening Report, to be completed by ESB Networks and establish if any historical leaks should have been reported to the EPA in accordance with the Environmental Liability Regulations 2008, as amended;
- evaluate the approach being taken by ESB Networks to assess historical leaks from fluid filled cables (Historic Fluid Incident Response Protocol) and comment on the progress by ESB Networks towards completing the environmental assessment.

EPA held a further meeting with ESB Networks on the 27th August 2019 which focused primarily on their obligations under the Environmental Liability Regulations 2008, as amended.

Commission for Regulation of Utilities, the economic regulator of ESB Networks, provided the EPA with annual environmental performance reports submitted to Commission for Regulation of Utilities by ESB Networks for the years 2006 to 2017. Relevant local authorities were requested under Section 63 of the Environmental Protection Agency Act 1992, as amended, to verify information received by the EPA from ESB Networks.

The EPA has acquired international information in relation to fluid filled cables. The EPA ascertained the Environment Agency's view on the extent of the fluid filled cable leaks in the United Kingdom and their role in enforcement and advocacy. The EPA acquired the Energy Networks Association (represents the electricity transmission and distribution network licensed operators) *'Guidance for the Operation and Management of Fluid Filled Cables, Engineering Recommendation C135 (Issue 1 2016)' and the 'Environment Agency and Electricity Companies (in England and Wales), Operating Code on the Management of Fluid-Filled Cable Systems (Issue 3)'*.

Documentary analysis was carried out to evaluate compliance with environmental legislation and guidance, and what the findings may mean for the EPA, Local Authority, and ESB Networks with regard breaches of environmental legislation, investigations and environmental assessment.

Section 2: Relevant Legislation and Guidance

Section 2: Relevant Legislation and Guidance

The EPA has identified four legislative instruments which are applicable to the fluid filled cable leaks to the environment. These pieces of legislation assisted the EPA in establishing the applicable statutory responsibilities of the respective parties. The EPA has published guidance on the European Communities (Environmental Liability) Regulations 2008 entitled *'Environmental Liability Regulations, Guidance Document'* and the *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'*.

The principal legislative instruments that are applicable to this issue include the following:

- Local Government (Water Pollution) Act 1977, as amended;
- Environmental Protection Agency Act 1992, as amended;
- European Communities (Environmental Liability) Regulations 2008, as amended; and
- European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended.

Local Government (Water Pollution) Act 1977, as amended

The Local Government (Water Pollution) Act 1977, as amended, (Water Pollution Act) came into force on 15th March 1977. The Water Pollution Act provides for the control of water pollution and for other matters connected with water pollution. The local authorities have generally been designated as the competent authority for all aspects of the Water Pollution Act. The Water Pollution Act prohibits the introduction of polluting matter to waters.

In the instance whereby, a person may cause or permit an accidental discharge(s) of polluting matter to waters (river, stream, canal, reservoir, aquifer, pond, watercourse or other inland waters), the Water Pollution Act provides that the person responsible shall notify the local authority (in whose functional area the discharge occurred) after the occurrence under Section 14 (1). If the person responsible fails to notify the local authority it will be guilty of an offence and liable to prosecution under the Water Pollution Act.

Environmental Protection Agency Act 1992, as amended

The Environmental Protection Agency Act 1992, as amended, (EPA Act) came into force on 23rd April 1992. The purpose of the EPA Act was to make provision for the protection of the environment and the control of pollution. The EPA Act provides for the EPA to oversee local authorities' environmental protection performance under Section 63.

European Communities (Environmental Liability) Regulations 2008, as amended

The European Communities (Environmental Liability) Regulations 2008, as amended (Environmental Liability Regulations) came into force on the 1st of April 2009. The regulations transpose European Union Directive 2004/35/CE (21st April 2004) on environmental liability with regard to the prevention and remedying of environmental damage. The purpose of the Environmental Liability Regulations 2008 is to establish a framework of environmental liability to prevent and remedy environmental damage. The EPA is the designated competent authority for all aspects of the Environmental Liability Regulations. The Environmental Liability Regulations define environmental damage under three categories:

- damage to natural habitats and protected species;
- water damage; or
- land damage.

The Environmental Liability Regulations apply strict liability for any cases of environmental damage/ imminent threat of environmental damage caused by the activities listed in Schedule 3 of the Environmental Liability Regulations. Activities listed in Schedule 3 include EPA and local authority licensed or permitted facilities where the activities are concerned with discharges. The regulations also apply fault-based liability to any other operators for cases of damage to protected species and natural habitats.

Regulation 7 and 9 place obligations on the operator to in the first instance take measures to prevent environmental damage where there is an imminent threat of same, or to prevent further damage if the damage has already occurred, and to notify the EPA of any imminent threat which cannot be dispelled or if environmental damage has occurred. If the person responsible fails to comply with Regulation 7 and 9 it will by guilty of an offence and liable to prosecution under the Environmental Liability Regulations.

The EPA is statutorily required (Regulation 8 or 10, as appropriate) to issue directions to operators where it is aware of cases of imminent threat or environmental damage, seek information and instruct the operator to take preventative/remedial measures. Failure of the operator to comply with any of these directions is an offence and liable to prosecution under the Environmental Liability Regulations.

European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended

The European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended (Groundwater Regulations) transpose European Union Directive 2004/118/EC (12th December 2006) on the protection of groundwater against pollution and deterioration.

Regulation 9(a-b) states that hazardous substances must be prevented from entering groundwater, and the input of non-hazardous substances must be limited to ensure that such inputs do not cause a deterioration in groundwater status or cause significant and sustained upward trends in the concentration of pollutants in groundwater. Appropriate controls should be placed, by operators, on activities that discharge substances to groundwater.

Controls are required to prevent leaks of non-hazardous substance because chronic losses over decades may cause an environmental impact, whereas leaks of hazardous substances should be prevented from entering the environment because of the immediate and/or longer-term impact they can cause.

It is an offence not to comply with a requirement of the Groundwater Regulations (Regulation 21). If the person responsible fails to comply it will be guilty of an offence and liable to prosecution.

The Regulations identify the EPA, relevant Local Authorities and the Electricity Supply Board as relevant public authorities. Regulation 4 states that the relevant public authorities shall promote compliance with the requirements of the Groundwater Regulations.

See Appendix 3 Legislation for further detail and relevant extracts from the legislation.

The relevant EPA published guidance documents that are applicable to this issue include the following:

- Environmental Liability Regulations, Guidance Document; and
- EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites.

Environmental Liability Regulations, Guidance Document

The EPA *'Environmental Liability Regulations, Guidance Document'* was published in 2011. The guidance document describes the main provisions of the Environmental Liability Regulations. The principle aim is to inform operators, persons whose activities have the potential to cause either an imminent threat of environmental damage or actual environmental damage, about when the Environmental Liability Regulations apply and the requirements for those concerned. The EPA *'Environmental Liability Regulations, Guidance Document'* addresses the following:

- the Environmental Liability Regulations;
- roles and responsibilities;
- risk management;
- determination of environmental damage; and
- remediation measures.

EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites

The *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'* was published in 2013. The principal aim in dealing with contaminated land and groundwater related issues is to secure the protection of human health, water bodies (including groundwater) and the wider environment. The guidance ensures that the standard of works undertaken is adequate, that issues are understood and dealt with appropriately and that both operators and the statutory bodies achieve the aim of closing issues out in an efficient manner.

The *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'* adheres to the following 3 stage approach:

- Stage 1 Site characterisation and assessment;
- Stage 2 Corrective action feasibility and design;
- Stage 3 Corrective action implementation and aftercare.

Timeframes for completion of the risk-based assessments is based on site specific circumstances, the EPA guidance document indicates that Stage 1 of the risk-based assessment approach may take 3-18 months. Stage 2, if deemed necessary, takes 6-12 months and stage 3, if needed, typically takes a number of years.

Section 3: Roles and Responsibilities

Section 3: Roles and Responsibilities

The EPA has established that the following organisations are involved, in their respective roles:

- EPA, the investigating authority, the competent authority for Environmental Liability Regulations 2008, and its supervisory role over the performance of statutory functions by local authorities;
- Local Authorities, fluid filled cables are present in the functional area of eleven local authorities, the leaks to date from the fluid filled cables occurred within the functional area of five local authorities. Local Authorities are the competent authority for the Water Pollution Act;
- Commission for Regulation of Utilities, the economic regulator of ESB Networks, licence ESB Networks and must approve and review the 5-year price review periods; and
- ESB Networks, the owner/operator of the fluid filled cables and therefore responsible for leaks arising therefrom.

The role of the EPA

The EPA is an independent statutory body established under the Environmental Protection Agency Act, 1992. EPA's mission is *'To protect and improve the environment as a valuable asset for the people of Ireland. To protect our people and the environment from the harmful effects of radiation and pollution'*.

The EPA has a wide range of responsibilities, including:

- Regulation, licensing and permitting, industrial and waste enforcement, water infrastructure, and local authority performance;
- Knowledge, monitoring and assessment (air quality and water quality), research, and accessible information; and
- Advocacy, awareness raising and promoting sustainable behaviour.

The EPA discharges its wide range of functions through enforcement actions, consultation, engagement, cooperation and mutual assistance with other regulatory bodies and agencies to achieve environmental protection.

In relation to fluid filled cables the EPA has taken the role of investigating the nature and extent of the cable leaks, the EPA is the competent authority for the Environmental Liability Regulations and has a supervisory role for Local Authorities environmental functions under Section 63 of the EPA Act. In addition, the EPA licence (Industrial Emissions Licence) Electricity Supply Board Generating Stations.

The EPA has established memorandum of understandings with other regulatory bodies and agencies. A revised memorandum of understanding between the EPA and the Commission for Regulation of Utilities was signed in April 2019.

The role of the Local Authority in Environmental Enforcement

The local authority is a statutory public body established under the Local Government Acts 1925, as amended. They are multi-purpose bodies with responsibility for promoting the community interest. They do this through delivering a broad range of services in relation to roads, traffic, planning, housing, economic and community development, environment, recreation and amenity services, fire services and maintaining the register of electors.

There are 31 local authorities that implement and enforce over 500 environmental protection obligations arising from more than 100 pieces of legislation. The local authorities derive their main environmental protection functions from the Water Pollution Act, the Waste Management Act 1996, as amended, and the Air Pollution Act 1987.

The role of the Commission for Regulation of Utilities

The CRU is a statutory public body established in 1999 under the Electricity Regulation Act 1999. CRU is responsible for protecting the public interest in water, energy and energy safety. CRU is the economic regulator for the energy and public water sectors in Ireland and safety regulator in the energy sector.

The CRU has issued operating authorisations to ESB Networks. The licences control ESB Networks operation, maintenance and development of the electricity distribution system.

The mechanism by which the CRU sets revenue allowances for ESB Networks is through a five-year revenue allowance process, referred to as a price review (PR).

Given the statutory role of the CRU, they do not become involved in the day-to-day decision-making or management of ESB Networks. Their role is to challenge ESB Networks to ensure efficient delivery of capital expenditure and ensure positive outcomes for consumers in continuity and quality of supply. The CRU measures and incentivises ESB Networks performance on metrics (such as customer minutes lost and customer interruptions). They do not specifically measure or incentivise ESB Networks performance in environmental outcomes.

ESB Networks provide an annual environmental performance report to CRU, as required by Condition 30 of the Distribution System Operator Licence[1].

1 https://www.cru.ie/wp-content/uploads/2009/07/cer09183.pdf, Condition 30 Environment

The role of ESB Networks

ESB Networks finances, builds and maintains the over ground and under-ground electrical transmission system and distribution system. The transmission system carries electricity flows from power generation stations to bulk supply points near Ireland's cities and towns where it interconnects with the distribution system. The distribution system allows for the flow of electricity from the transmission system to 2.3 million customer premises in Ireland. It comprises networks operating at 110kV in the Dublin area, and nationwide the networks operating at 38kV, 20kV and 10kV and low voltage

ESB Networks is the licensed distribution system operator and owner and, as such, takes independent decisions to prioritise infrastructure investment based on its statutory function to operate, maintain and develop the network. ESB Networks performs its transmission systems functions under the direction of Eirgrid.

Eirgrid is an independent state-owned company which manages the power flows on the transmission system including controlling the electricity generated by all the major generation facilities. Eirgrid also plans the development of the transmission system to ensure that it is adequate to meet the growing demand for electricity into the future and to accommodate the increased proportion of electricity that will be provided by renewable sources.[2]

2 https://www.esbnetworks.ie/who-we-are/our-networks

Section 4: Engagement with Relevant Organisations

Section 4: Engagement with Relevant Organisations

The EPA has engaged with ESB Networks and the following Local Authorities, State Bodies, Government Departments and interested parties during its investigation:

- Commission for Regulation of Utilities (CRU);
- Waterways Ireland;
- Local Authorities (Dublin City Council, South Dublin County Council, Dun Laoghaire-Rathdown County Council, Wicklow County Council and Cork City Council);
- Department of Communications, Climate Action and Environment;
- Department of Housing, Planning and Local Government;
- Mr O'Loughlin;
- Energy Networks Association;
- Environment Agency.

The purpose of the broad engagement was to:

- Evaluate ESB Networks' compliance with their environmental obligations;
- Evaluate local authority statutory environmental performance in the context of the cable leaks;
- Validate information provided by ESB Networks in relation to the nature, source and cause of the fluid filled cable leaks;
- Validate information provided by ESB Networks on price review and fluid filled cable replacement programme; and
- Ascertain the international experience, enforcement and advocacy approach to fluid filled underground electricity cables and associated leaks.

ESB Networks

ESB Networks are central to completion of the investigation as they are the body which holds the necessary information about the fluid filled cables, insulating fluid, location and scale of historical leaks. The EPA have been engaging with ESB Networks since 27th May 2019 through the exchange of letters, emails, telephone conference calls and meetings. ESB Networks have provided significant documentation in response to requests for information, the following are the principle documents received:

- Historic Cable Fluid Incident Response Protocol, dated September 2019, in relation to cables leaks which occurred and were repaired prior to June 2019;
- Cable Fluid Incident Response Protocol, dated September 2019, in relation to cables leaks which were leaking in June 2019 or leaks which occur post June 2019;
- Preliminary Environmental Sensitivity Assessment Report of Fluid Filled Cable Leakages, dated September 2019, outlining the nature/extent of fluid filled cables, identifies 'historic' and 'current' leaks and environmental risk assessment approach; and
- Cable Fluid Assessment dated September 2019, which outlines the hazardous/non-hazardous assessment of cable fluids, key properties, fate and transport in the environment.

ESB Networks have developed a webpage on their company website which provides information on cable leak locations https://www.esbnetworks.ie/acting-responsibly/environmental-information.

Commission for Regulation of Utilities

ESB Networks operate under licences issued by CRU. The licences control ESB Networks operation, maintenance and development of the electricity distribution system. ESB Networks are required to submit Annual Environmental Performance Reports to CRU in accordance with conditions of their Licences.

They also have submitted capital expenditure plans for maintenance and development of the network in support of their 'price reviews' referred to as PR1 covered 2001 to 2005, PR2 2006 to 2010, PR3 2011 to 2015, PR4 2016 to 2020 and PR5 which will cover 2020 to 2025.

The CRU provided the following documentation to the EPA in support of the investigation:

- ESB Networks Annual Environmental Performance Reports 2006 to 2017;
- Relevant sections of documentation, related to fluid filled cables, received from ESB Networks in support of their electricity 'price reviews';
- Volumes of fluid leakage per annum, as reported by ESB Networks; and
- Value of capital allowances for fluid filled cable replacement permitted under each 'price review' and actual spend reported by ESB Networks.

Local Authorities

Fluid filled cables are mainly located in the larger population centres, the majority of which are in Dublin. ESB Networks have confirmed that there are fluid filled cables located in the following Local Authorities: Dublin City Council, Dun Laoghaire-Rathdown County Council, South Dublin County Council, Fingal County Council, Cork City Council, Cork County Council, Limerick County Council, Clare County Council, Wicklow County Council, Wexford County Council and Kerry County Council (Figure 1.1: Overview map of ESB Networks Fluid Filled Cable Locations).

ESB Networks have identified that cable fluid leaks have occurred in the following local authority areas (Appendix 2, Maps):

- Dublin City Council;
- South Dublin County Council;
- Dun Laoghaire-Rathdown County Council;
- Wicklow County Council; and
- Cork City Council.

Based on this information the EPA communicated by telephone and letter with these Local Authorities. The EPA invoked its supervisory powers under the Section 63 (1) of the EPA Act and requested, on the 24th September 2019 and 19th November 2019, that the five local authorities provide the EPA with a report on their performance (in relation to environmental protection) in relation to losses of insulating fluid from underground ESB Networks fluid filled cables. The Local Authorities were specifically requested to address the following points:

i) Notification of losses received from ESB Networks, including scale of the losses, timeframe over which loss occurred and when the notification was received;

ii) Assessments of environmental impact received from ESB Networks and/or completed by the Local Authority;

iii) Engagement with ESB Networks since May 2019; and

iv) Current communication arrangements between ESB Networks and the local authority regarding current and future fluid losses from underground cables.

The EPA received a response, that addressed the above points, from each of the Local Authorities.

The EPA has not engaged with the other Local Authorities within whose functional areas' fluid filled cables are present as leaks from those cables have not been identified by ESB Networks. Therefore, the Local Authorities will hold no information on the fluid filled cables as there is no reporting or authorisation requirement prior to a leak occurring.

Waterways Ireland

Since 6th June 2019 the EPA have engaged with Waterways Ireland through telephone/conference calls and letter.

Waterways Ireland confirmed that during the period 2012 to 2014 they had recorded and responded to water pollution incidents in canals associated with oil slicks. In 2014, ESB Networks acknowledged that a fluid filled cable leak incident resulted in fluid entering the Back Drain of the Grand Canal at Black Horse Bridge. ESB Networks completed mitigation measures in the canal over approximately 6 months. Waterways Ireland also recorded water pollution incidents concerning surfactants (frothing) in canals, however, the nature and source of the incidents were not confirmed or specifically linked to fluid filled cable leaks.

The EPA received a letter on 16th July 2019 from Waterways Ireland notifying under the Environmental Liability Regulations 2008 of possible cable fluid leak incidents on lands owned and/or under the control of Waterways Ireland. EPA has acknowledged receipt of the letter.

Mr O'Loughlin

The EPA spoke with and met Mr O'Loughlin to seek clarification and provide him an opportunity to elaborate on his statement to the Joint Committee on Communications, Climate Action and Environment and issues raised in the RTE Investigates Programme.

Energy Networks Association

The EPA engaged by email with the Energy Networks Association Limited (Energy Networks Association). The Energy Networks Association represents the electricity transmission and distribution network licensed operators for electricity in the United Kingdom, ESB Networks is an Energy Networks Association Group Member. The EPA was provided with a copy of their protocol entitled *'Guidance for the Operation and Management of Fluid Filled Cables, Engineering Recommendation C135 (Issue 1 2016)' and the 'Environment Agency and Electricity Companies (in England and Wales), Operating Code on the Management of Fluid-Filled Cable Systems (Issue 3)'*. The operating code resulted from co-operative initiatives between the Energy Networks Association and the Environment Agency.

Environment Agency, United Kingdom

The Environment Agency outlined the extent and nature of fluid filled cables; the type of fluids used and their classification; the maintenance and monitoring of cables for leaks by electricity transmission and distribution network licensed operators; action and procedures for when a leak is detected, the engagement and protocols in place for investigations. The Environment Agency discussed their role and responsibility in relation to leaks from fluid filled cables.

The Environment Agency engages with the Energy Networks Associations in relation to fluid filled cables. In March 2010, the Environment Agency and the Energy Networks Association signed a partnership agreement entitled 'Environment Agency and Electricity Companies (in England and Wales), Operating Code on the Management of Fluid-Filled Cable Systems (Issue 3)'. The purpose of which was to promote and support best practice among the electricity transmission and distribution networks licensed operators.

The main obligations for electricity transmission and distribution network operators under the operating code include the following:

- determine which parts of each cable route pass through sensitive areas;
- report monthly leaks exceeding 40 litres/month in sensitive areas and leaks exceeding 100 litres/month elsewhere;
- carry out leak location, repair and remediation 1) in sensitive areas by consulting with the Environment Agency and 2) in other areas without delay for leaks above 100 litres/month or within two months for leaks below 100 litres/month; and
- use Best Available Techniques within the industry to reduce leak rates.

While the operating code provides for a consistent and proportionate response, it does not preclude the taking of enforcement action by the Environment Agency.

The Environment Agency and the Energy Network Association established a working group to address the long-term replacement of fluid filled cables.

The working group objectives are to establish and promote best practice in the operational management of the cable network together with a risk-based approach to strategic replacement. Their main objectives include the following:

- reduction in total fluid lost;
- reduced leakage in environmentally sensitive areas; and
- replacement rates in sensitive areas.

Section 5: Environmental Protection Agency Evaluation and Findings

Section 5: Environmental Protection Agency Evaluation and Findings

The investigation examines:

- fluid filled cable leaks which occurred prior to June 2019, these have been repaired and are no longer leaking fluid to the environment, historic leaks. The historic leaks are subdivided into those which occurred prior to 1st April 2009, which are not subject to Environmental Liability Regulations, and those occurring since 1st April 2009 which are subject to Environmental Liability Regulations; and
- fluid filled cable leaks that were occurring in June 2019 or commence since June 2019, current leaks.

The protocols developed by ESB Networks since June 2019 also similarly differentiate between historic and current leaks. ESB Networks have provided details of the historic and current leaks, including description (location), leak start date, leak repair date, total leak (litres), rate (litres/month), year cable installed, cable fluid, and consultation with relevant authority (pre-June 2019 and post June 2019). Details of each leak as provided by ESB Networks are presented in Appendix 4, Table 1 and 2.

ESB Networks Management of Cable Fluid Leaks Prior to June 2019

Documents submitted by ESB Networks to the EPA demonstrate that they have been recording cable fluid usage since at least 1993 (Appendix 4: Table 1 and 2). ESB Networks have not provided any information on leaks or fluid losses prior to 1993. ESB Networks have stated they were '*not able to locate any information on identified leaks or leakage prior to 1993*'. Commission for Regulation of Utilities provided copies of ESB Networks Annual Environmental Performance Reports for the years 2006 to 2017. The annual reports acknowledge that fluid filled cable leaks were taking place, quantify the scale of leaks in each reporting year and identify the failure to achieve compliance with ESB Networks annual target leakage rate (Table 1.2 below refers). While there is a difference between the volumes of fluid leakage reported by ESB Networks annually to the Commission for Regulation of Utilities and the figures provided to the EPA in September 2019 and November 2019 each set of data indicates a loss of fluid more than ESB Networks own annual target.

Table 1.2: Details ESB Networks cable fluid leak losses as reported in their Annual Environmental Performance Report (AEPR) submitted to Commission for Regulation of Utilities and as submitted to the EPA 6th September 2019.

Year	Annual Environmental Performance Report ESB Networks cable fluid leak loss (litres/ year)	ESB Networks cable fluid leak loss litres/ year. Provided by ESB Networks to the EPA on 6th September 2019[1].	ESB Networks Cable fluid leak loss target (litres/year)[2]
2019	–	7,144	–
2018	–	40,980	–
2017	15,201	12,721	15,000
2016	14,721	12,825	15,000
2015	21,741	14,037	15,000
2014	54,600	30,392	15,000
2013	32,270	26,399	15,000
2012	32,307	24,137	15,000
2011	38,669	28,506	20,000
2010	31,415	7,050	20,000
2009	26,061	19,450	20,000
2008	28,126	–	20,000
2007	29,348	–	20,000
2006	–	–	–

1 As outlined in ESB Networks report entitled 'Preliminary Environmental Sensitivity Assessment Report of Fluid Filled Cable Leakages Updated (Dated September 2019)'.

2 ESB Network's 'Management of Fluid Filled Cables Policy' set a maximum cable leakage volume objective per year.

The Annual Environmental Performance Reports, submitted by ESB Networks to Commission for Regulation of Utilities, record that ESB Networks:

- In 2006 and 2007 developed a policy for 'Management of Fluid Filled Cables in ESB Networks'. This document covers the management procedure for fluid filled cables and addresses detection of leaks, avoidance of third-party damage, location of leaks, procurement of cable fluid, disposal of contaminated soil, recording of leaks, targets for average leak repair time, leak volume targets, short term work programme to reduce leakage, and medium-term work programmes to further reduce cable leaks;
- In 2008 and 2009 carried out an environmental risk ranking of fluid filled cable circuits to guide future replacement and maintenance policy. In 2009 ESB Networks started to trial Perfluorocarbon gas tracing leak detection methodology; and
- In the years 2012 to 2015 the perfluorocarbon gas tracing technology was tendered for, purchased and commissioned.

The following points in relation to fluid filled cables are extracted from the price reviews and/or Annual Environmental Performance Reports for the years 2006 to 2017:

- The first price review programme PR1 (period 2001 to 2005) did not explicitly mention fluid filled cables;
- The price review programme PR2 (2006 to 2010) proposed a programme of monitoring and identification of cable fluid replacement due to the level of cable fluid leaks recorded;
- ESB Networks fluid filled cable replacement programme (40-year programme 2010 to 2050) was first proposed and agreed by Commission for Regulation of Utilities for inclusion in the price review programme PR3 (2011 to 2015). This programme of replacement was to address cable deterioration and associated fluid filled cable leaks;
- The replacement works due to be completed during PR 3 (2011-2015) were largely deferred until PR4 (2016 to 2020);
- The price review programme PR4 (2016 to 2020) identified the need to replace 110 KV and 38KV fluid filled cables and included a capital expenditure programme. Approximately €5.4m was included for fluid filled cables environmental remediation costs (Appendix 4, Table 4: Details ESB Networks capex allowance, the level of leaks and ESB Networks trigger levels).

Commission for Regulation of Utilities is currently reviewing PR4 (2016-2020) and will be establishing the price review programme (PR5) for the period 2020 to 2025 based on submissions due in late 2019 from ESB Networks. ESB Networks have stated, in correspondence provided to the EPA, that the proposed new replacement strategy is to fast track the fluid filled cable replacement programme for completion by 2035.

Cable Fluid Incident Response Protocols

Two protocols have been prepared by ESB Networks since June 2019. They are entitled as follows:

- 'Historic Cable Fluid Incident Response' in relation to cables leaks which occurred and were repaired prior to June 2019; and
- 'Cable Fluid Incident Response' in relation to cables leaks which were leaking in June 2019 or leaks which may occur in the future (post June 2019).

The purpose of the protocols is to set out a process whereby ESB Networks will identify and evaluate 'historic' leaks, detect 'current and new' fluid filled cable leak incidents, satisfy statutory notification and reporting to relevant bodies, repair cables and follow relevant guidance to evaluate the environmental risk and identify remediation, as necessary.

The two protocols were drafted following an initial meeting with the EPA on 11th June 2019. It has been acknowledged by ESB Networks that the protocols would be subject to amendment and change based on experience and feedback from the EPA, local authorities and other bodies. To date the EPA has requested amendment of the protocols through correspondence. ESB Networks provided an updated version of the two protocols in September 2019 which addressed the points raised by the EPA (Appendix 5).

Historic Cable Fluid Incident Response Protocol (Rev 01), dated September 2019

The protocol is concerned with cable fluid incidents that have occurred prior to June 2019. It identifies ESB Networks as the responsible body. This protocol sets out ESB Networks proposed approach to assess the impact associated with historic cable fluid loss incidents in accordance with the Water Pollution Act and the Environmental Liability Regulations. The protocol includes the following steps:

- Engagement – ESB Networks will engage with the relevant local authorities, EPA and relevant non-statutory bodies. It provides for the reporting to and notification of relevant local authority and non-statutory bodies under the Water Pollution Act and the Environmental Liability Regulations. The protocol proposes the establishment of joint working groups/liaison groups to enhance engagement during investigations;
- Environmental Sensitivity Assessment – The environmental sensitivity assessment will consider both the fluid filled cable network (age, leakage volumes, cable fluid capacity) and proximity to environmental receptors (Special Area of conservation, Special Protected Areas, etc.);
- Environmental Assessment – The environmental assessment will include an evaluation of the risk to human health and the environment which will be completed in accordance with the *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'*;
- Environmental Liability Regulations – the protocol outlines the process by which ESB Networks will screen and categorise incidents and notify the EPA when necessary. The protocol identifies the information which will be provided by ESB Networks in the notifications.

The EPA received two notifications from Electricity Supply Board regarding Marina Generating Station (Industrial Emissions (IE) Licence Reg. No. P0578-03) in November 2012 and Poolbeg Generating Station (IE Licence Reg. No. P0577-03) in 2006 concerning losses of fluid from cables. The loss was cleaned up satisfactorily in the case of Marina Generating Station. The loss notified under the Poolbeg Generating Station IE Licence was not investigated further by the EPA, as the leak did not take place within the Industrial Emissions Licensed boundary, the licensee would have been informed to notify the Local Authority.

Based on the Section 63(1) responses received by the EPA from the relevant five local authorities (Dublin City Council, South Dublin County Council, Dun Laoghaire-Rathdown County Council, Wicklow County Council and Cork City Council) ESB Networks have consulted with the local authorities within whose functional area fluid filled cable leak incidents have occurred/or are ongoing (Appendix 4, Table 1: A table summarising historic fluid filled cable leaks from April 2009 to June 2019 and Table 2: A table summarising historic fluid filled cable leaks prior to April 2009 (August 1993 to April 2009)).

The environmental sensitivity assessment has been undertaken by ESB Networks (report submitted September 2019). The assessment ranked the risk the fluid filled cable network may pose to environmental receptors (Special Areas of Conservation, Special Protected Areas, Natural Heritage Areas, proposed Natural Heritage Areas, designated bathing waters, groundwater bodies, wells, surface waters, and canals). The environmental sensitivity assessment will inform ESB Networks approach to the environmental assessment of leaks, Stage 1 (site characterisation and assessment), and contribute to the decommissioning programme for the fluid filled cable network.

The proposed environmental assessment, corrective action, remediation and aftercare identified in the protocol has being appropriately based on the *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'*. ESB Networks are taking a precautionary approach and are carrying out an environmental assessment on all 75 cable leak incidents (68 that occurred prior to June and 7 that have occurred since), details of each leak is outlined in Table 1, 2 and 3 Appendix 4).

Table 1.3: The indicative timeframe for environmental assessment outlined in ESB Networks report entitled 'Preliminary Environmental Sensitivity Assessment Report of Fluid Filled Cable Leakages Updated (Dated September 2019)' that was submitted to the EPA on 6th September 2019.

Indicative Timelines Environmental Assessment			
ID Number	**Task Name**	**Start**	**Finish**
	Indicative Timelines Environmental Assessment	05/06/2019	01/09/2020
	Initiation		
1	Procure Environmental Consultants	05/06/2019	30/06/2019
2	Engage Environmental Consultants	30/06/2019	30/06/2019
	Stage 1 – Phase 1		
3	Commence Preliminary Site Assessments (Numbers 1 to 25)	01/07/2019	30/08/2019
4	Commence Preliminary Site Assessments (Numbers 26 to 50)	01/08/2019	30/09/2019
5	Finalise Preliminary Site Assessments	30/08/2019	30/10/2019
6	Submit Preliminary Site Assessments	31/10/2019	30/11/2019
	Stage 1 – Phase 2		
7	Commence Sequence of Ecological Assessments as required	02/09/2019	Timeline dependent on other site investigations
8	Develop Site Prioritisation Plan	01/11/2019	31/12/2019
9	Develop Site Investigation Plan	01/11/2019	31/12/2019
10	Site Investigations and Environmental monitoring programme	05/01/2020	05/01/2023
11	Detailed Site Assessment Reports and GORA	05/01/2020	05/01/2023
	Stage 2		
12	Corrective Action Feasability and Design	*	*
	Stage 3		
13	Corrective Action Implementation and Aftercare	**	**

* Subject to the assessment outcome and following consultation with the relevant authorities as part of Stage 1.

** Subject to the time frames developed and following consultation with the relevant authorities as part of Stage 2

The proposed environmental assessment indicates that preliminary environmental site assessments and site prioritisation plan shall be completed by 31st December 2019. The site investigation and environmental monitoring programme are scheduled to commence on the 5th January 2020. Stage 2 and 3 will be subject to the environmental site assessment and monitoring findings.

The EPA accepts that completion of the environmental assessments will be a lengthy process as each fluid filled cable leak is a separate incident which may require site specific investigation and environmental monitoring. Stage 1 of the environmental assessment process is scheduled for completion in January 2023. The EPA considers that the environmental assessments should be completed within a significantly shorter period.

Local Authorities are the competent body for evaluation of the environmental assessment reports of cable leaks which have occurred in their functional areas.

The proposed use/establishment of joint working groups, as identified in the protocol, may assist in facilitating engagement and sharing of information between relevant statutory and non-statutory parties.

The protocol has addressed the process in which ESB Networks will screen, notify, prevent, investigate and remediate environmental damage in accordance with the Environmental Liability Regulations.

Cable Fluid Incident Response Protocol (Rev 01), dated September 2019

The protocol is concerned with current incidents and those that occur post June 2019. It identifies ESB Networks as the responsible body and outlines a cable fluid loss management process. The protocol includes the following steps:

- Fluid usage monitoring – ESB Networks monitoring programme involves cable fluid usage trend monitoring to provide early indication of a potential leak. ESB Networks have identified that fluid usage in a circuit of over 50 litres per month for two consecutive months as a notifiable (potential) leak;
- Notification of potential leak – ESB Networks will notify the relevant local authority and as required the relevant non-statutory bodies. Regarding the Environmental Liability Regulations, the protocol outlines the process in which it will screen and categorise incidents and where necessary notify (or potential obligation to notify under the precautionary principal) the EPA. The protocol identifies the information which will be provided by ESB Networks in the notifications;
- Establish leak location – ESB Networks are responsible for establishing the location, nature and extent of the potential leaks. Leak detection techniques will consist of Perfluorocarbon tracing (PFT) or similar techniques. The timeframe necessary to establish the leak location will be influenced by volumes of loss and other factors such as location, access and the need for road closure;
- Notification of actual leak – ESB Networks shall notify the local authority and as required non-statutory bodies of the actual leak once the location is confirmed. The EPA will be notified where there is an obligation to do so in accordance with the Environmental Liability Regulations;

- Cable repair – ESB Networks will repair the leak as soon as possible subject to constraints such as road opening permissions, third party land access, and electrical supply outages;
- Environmental assessment – the protocol provides for evaluation of the risk to human health and the environment. The environmental assessment will be completed in accordance with the *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'*.

The protocol provides for a fluid usage monitoring programme and leak detection techniques such as perfluorocarbon tracing gas or similar techniques. To date fluid filled cable leaks have continued for prolonged periods (months to several years) resulting in significantly large volumes of losses to the environment. This protocol provides for a more timely detection of potential and actual fluid filled cable leaks, repair, notification and engagement with the relevant Local Authority's, EPA and non-statutory bodies, as appropriate.

Notwithstanding this, the protocol identifies that a potential leak investigation and notification will be triggered for circuits with fluid usage of over 50 litres per month for two consecutive months. ESB Networks adopted this approach based on the National Operating Code for Management of Fluid-Filled Cable Systems (established between the Environment Agency and Energy Networks Association Member Companies (England and Wales)[3]. The EPA questioned use of the code, in correspondence on the 28th June 2019, and stated that it considers that any proposed trigger for investigations and notification should be justified based on science, technical evaluation and location of specific receptors. The EPA considers that the trigger level is a matter for the local authorities to agree with ESB Networks and may be based on the above referenced code.

The protocol has adequately established ESB Networks statutory notification obligations under the Water Pollution Act. Based on the responses received by the EPA from local authorities (Section 63 Responses) the protocol is being implemented by ESB Networks. The EPA expects that all future fluid filled cable leak incidents will be subject to the protocol.

Regarding the Environmental Liability Regulations, the protocol has addressed the process in which it will screen, notify, prevent, investigate and remediate environmental damage in accordance with the Environmental Liability Regulations.

3 http://www.energynetworks.org/assets/files/electricity/she/environment/fluid_filled_cables/ENA%20EA%20National%20Operating%20Code%202015.pdf

Extent of fluid filled cables, classification of the insulating fluids and the risk posed to human health and the environment

Type and Scale of Fluid Filled Cables, the Number of Leak Locations

ESB Networks have identified 68 cable leaks which occurred prior to June 2019, details of which are presented in Table 1 and Table 2 of Appendix 4. In addition, there are 7 leaks which were occurring or commenced since June 2019. ESB Networks reported that approximately 500,000 litres of cable fluid leaked during the period 1993 to June 2019.

Type and Classification of Cable Fluid Losses

The cable fluid used consists of either mineral oil, linear alkyl benzene or a mixture of both. The fluid used is based upon the date when the cable was installed and/or the date when additional cable fluid was added.

The ESB Networks policy document entitled 'Management of Fluid Filled Cables in ESB Networks' states that '*cable fluid purchased since approximately 1986 is a linear alkyl benzene material. Prior to that date, mineral oil was used to insulate the cable cores'* (Appendix 5).

ESB Networks have confirmed that linear alkyl benzene, Chemical Abstracts Services (CAS) Registry Number 67774-74-7, is the substance/form of insulating liquid currently used by ESB Networks in fluid filled cables.

ESB Networks completed a preliminary review which determined, for mineral oil and linear alkyl benzene, that they would not readily mix in water (low aqueous solubility) and will predominantly remain in the liquid phase in soil pore spaces and/or adhere (sorb) to soil particles and therefore restrict their potential for transport. Linear alkyl benzene will biodegrade in aerobic conditions. Mineral oil is not readily biodegradable as compounds may persist.

ESB Networks completed an assessment to determine whether linear alkyl benzene and mineral oil cable-based fluids are hazardous or non-hazardous. The assessment followed the methodology outlined in the EPA publication entitled "Classification of Hazardous and Non-Hazardous Substances in Groundwater" December 2010. The following conclusions were reported by ESB Networks:

- Linear Alkyl Benzene based cable fluid is classified as a non-hazardous substance in groundwater. While it is potentially toxic to freshwater and marine organisms and may be fatal to humans if swallowed in large amounts, it is not persistent or bio accumulative. A substance must exhibit all 3 intrinsic properties (persistent, bio accumulative and toxic) to be classified as hazardous;
- Mineral oil-based cable fluid (it is predominantly a light naphthenic distillate) is classified as a hazardous substance in groundwater. ESB Networks identified that according to EPA definitions, light naphthenic distillate is very bioaccumulative, very persistent and very toxic.

Mineral Oil

The EPA document "Classification of Hazardous and Non-Hazardous Substance in Groundwater 2010" classifies mineral oils, consisting of light naphthenic distillate, as hazardous.

EPA Evaluation of Linear Alkyl Benzene

The EPA completed an assessment of the nature and properties of linear alkyl benzene, which included review of the European Communities (Water Policy) Regulations, 2003 and the European Environmental Objectives (Groundwater) Regulations 2010, as amended, the EPA document entitled 'Classification of Hazardous and Non-Hazardous Substances in Groundwater 2010', technical reviews carried out by the Joint Agencies Groundwater Directive Advisory Group (JAGDAG) (which includes the Irish EPA as an invited member) and the European Chemicals Agency (ECHA).

The EPA document "Classification of Hazardous and Non-Hazardous Substance in Groundwater 2010" considers the following forms of linear Alkyl Benzene to be hazardous: CAS Numbers: 134211-53-3, 115963-94-5, 115733-08-09 and 96792-49-2. However, it does not include CAS Number 67774-74-7 which is used by ESB Networks. The document notes in relation to linear alkyl benzene that it '*required further review*' due to the family or group of substances being considered to fall under the List 1 (hazardous) category. This was an established method of classification in the original Groundwater Directive (80/68/EEC). The Groundwater Directive categorised broad families of substances as List 1 (hazardous) or List 2 (non-hazardous), without necessarily assessing and differentiating the intrinsic persistence, bioaccumulation and toxicity (PBT) properties criteria for each specific substance.

A publication in January 2019 by the Joint Agencies Groundwater Directive Advisory Group (JAGDAG), has resulted in updated assessments. Linear alkyl benzene is not listed as hazardous in this publication. The EPA will update its 2010 document, taking account of the January 2019 publication, available at the following link:

https://www.wfduk.org/sites/default/files/Confirmed_Haz-NonHaz_January2019.pdf

Information contained on the ECHA website[4] indicates that linear alkyl benzene CAS 67774-74-7, was reviewed by ECHA in 1997 and they concluded that it was a non-hazardous substance, noting that there was no risk or need for further testing. This ECHA information contributed to the substance not being listed in the January 2019 JAGDAG document or included as a dangerous substance under the amended Dangerous Substance Directive 2001/59/EC.

The EPA's review of the physical, chemical properties and environmental toxicity of linear alkyl benzene based cable fluid are that linear alkyl benzene is photosensitive and readily biodegradable under both aerobic and anaerobic conditions. It is not readily soluble in the water column and will tend to partition into suspended matter or sediment.

4 https://echa.europa.eu/documents/10162/133736c1-cfd1-4679-8d46-4488256bb443

While linear alkyl benzene tends to bioconcentrate, it is readily metabolised in fish and therefore has a low tendency to bioaccumulate. It consequently poses a low risk to biota. Therefore, the most likely fate of emissions of linear alkyl benzene is in sediment or groundwater depending on the receiving medium.

EPA's assessment confirms the current (JAGDAG publication 2019) non-hazardous substance determination for linear alkyl benzene CAS 67774-74-7.

Ambient Environmental Monitoring by EPA

The EPA conducts an ongoing monitoring programme (Water Framework Monitoring Programme) by which lake and river water quality trends are assessed with respect to ecological criteria and physical-chemical water quality standards. All the major lakes, rivers and their more important tributaries are included in the programme. The biological programme covers a channel length of approximately 13,200km and involves sampling at some 2,300 stations. A complete survey cycle is completed every three years.

As part of the Water Framework Monitoring Programme approximately one third of our major rivers and their more important tributaries are surveyed and assessed each year by EPA ecologists. The results of the most recent biological surveys are available on the EPA interactive maps and also on www.catchments.ie. These maps are updated automatically once the surveys are completed and the data is validated.

A number of online reports are also available: Water Quality Indicator reports which include the results of the biological monitoring programme providing an overview of all the main issues related to the quality of the aquatic environment in Ireland. The most recent water quality indicator report is 'Water Quality in Ireland 2013 – 2018'. The report covers such topics as national and regional quality trends, fish kills, and other current water quality issues. Canals, lakes, coastal waters and groundwater are also covered.

The EPA monitoring programme would not specifically have been looking for the presence of insulating fluids which could have entered a water body, however, the monitoring programme hasn't identified anything that may have been associated with or caused by a loss of insulating fluid to a water body (river, canal, estuary, coastal water or groundwater).

Environmental Liability Regulations

The Environmental Liability Regulations came into operation on 1st April 2009 and require an operator to take measures to prevent environmental damage where there is an imminent threat of environmental damage, or to prevent further damage if the damage has already occurred.

Operators are obliged to screen the impact, if any, of incidents resulting from their activities for their applicability under Regulations 7 and 9 (and take measures to prevent environmental damage or to prevent further environmental damage) of the Environmental Liability Regulations. Operators are then obliged in accordance with the Environmental Liability Regulations to notify the EPA where the screening identified an imminent threat or case of environmental damage. Failure to comply is an offence liable to prosecution.

ESB Networks identified that 39 leaks have occurred since 1st April 2009. 33 of these are "historic" leaks which have been repaired by June 2019, while 7 are "current and new" leaks which were leaking in June 2019 or commenced thereafter. ESB Networks failed to screen the impact of fluid leaks, which occurred since 1st April 2009, for the applicability under Regulations 7 and 9 of the Environmental Liability Regulations 2008 until after June 2019.

The screening assessment completed by ESB Networks concluded that one "historic" leak and 3 "current and new" leaks may have the potential to cause environmental damage and require notification to the EPA under the Environmental Liability Regulations. This conclusion is largely due to the likelihood of protected species in the vicinity of the leaks (e.g. salmon and otter), or proximity of the leaks to surface waters.

On the 8th October 2019, the EPA issued 4 separate Directions under Regulation 8(1) of the Environmental Liability Regulations to ESB Networks requiring the submission of a site assessment report for these 4 identified leaks by the 31st October 2019 and instructing ESB Networks to take preventive measures in accordance with the Environmental Liability Regulations should an imminent threat of environmental damage exist. A response to the directions was received by the EPA from ESB Networks on the 31st October 2019. The EPA has assessed the 4 responses received and, having sought further information in relation to one case, is now satisfied that there is no further action required under these Regulations in all the 4 cases.

If ESB Networks find that a leak is causing imminent threat of environmental damage or environmental damage has occurred, ESB Networks have been directed to notify the EPA through the online system for reporting under the Environmental Liability Regulations.

Section 6: Conclusion and Recommendations

Section 6: Conclusion and Recommendations

Based on the scope and objectives of the investigations the EPA concludes and recommends as follows:

The main conclusions arising from the EPA investigation:

- There were 68 'historic' leaks between 1993 and June 2019 and a further 7 'current and new' leaks since June 2019. The locations and scale of each leak has been identified by ESB Networks and they are undertaking site specific investigations of each;
- The fluid used as an insulating liquid in cables was originally mineral oil and more recently linear alkyl benzene. Mineral oil is classified as hazardous while linear alkyl benzene is classified as non-hazardous. ESB have identified that the fluid lost from the cable leaks is often a mixture of mineral oil and linear alkyl benzene and therefore must be considered hazardous;
- While ESB Networks report that they consulted a relevant authority regarding 20 of the 68 leaks identified prior to June 2019, ESB Networks failed in the case of 48 leaks to notify Local Authorities, in accordance with Section 14(1) of the Local Government (Water Pollution) Act 1977, as amended;
- ESB Networks failed to screen the impact of fluid leaks, which occurred since 1st April 2009, for the applicability under Regulations 7 and 9 of the European Communities (Environmental Liability) Regulations 2008, as amended, until after June 2019;
- Screening undertaken for the applicability of the European Communities (Environmental Liability) Regulations 2008, as amended, identified 4 leaks with the potential to cause environmental damage as defined in the Regulations. The EPA has assessed the site assessment reports prepared by ESB Networks and, is now satisfied that there is no further action required under these Regulations in all the 4 cases;
- ESB Networks have established two protocols since June 2019 to deal with historic and future leaks and the EPA is satisfied with the approach and protocols now being implemented by ESB Networks to assess each leak and to engage with the relevant Local authorities;
- The EPA acknowledges that decommissioning of fluid filled cables will be challenging but considers fluid filled cables that have a high occurrence of leakage and are in proximity to sensitive receptors should be prioritised for decommissioning;

Subsequent conclusions arising from the EPA investigation include the following:

- ESB Networks are appropriately using the *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'* as the basis of their environmental assessments;
- The EPA accepts that the environmental assessment of all leaks will be a lengthy process as each fluid filled cable leak is a separate incident which may require site specific investigation and environmental monitoring. The EPA considers that the environmental assessments should be completed within a significantly shorter period than outlined by ESB Networks;

- The scale of the leaks from fluid filled cables has consistently exceeded the annual targets set by ESB Networks. ESB Networks should consider using the percentage of the total volume of cable fluid lost per annum as a measure of losses, such a measure would be comparable with other network operators;
- ESB Networks protocol identifies that a potential leak investigation and notification will be triggered for circuits with fluid usage of over 50 litres per month for two consecutive months. ESB Networks adopted this approach based on the National Operating Code for Management of Fluid-Filled Cable Systems (established between the Environment Agency and Energy Networks Association Member Companies (England and Wales). The EPA considers that ESB Networks provide the local authorities with justification for any proposed trigger levels under the above referenced code;
- ESB Networks and Local Authorities should review the agreements and codes developed between the Environment Agency and Energy Networks Association and adopt relevant aspects.

Recommendations on the Fluid Filled Cables Investigation

The following are the recommendations for each relevant organisation arising from the EPA investigation:

ESB Networks

ESB Networks shall complete the following:

- An environmental assessment of each historical, current and future leak. These site-specific assessments should be in accordance with the EPA guidance document entitled *'EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites'*. The environmental assessments of each historical leak shall be completed by ESB Networks and submitted to the relevant Local Authorities. Local Authorities are the competent body for evaluation of the environmental assessment reports of cable leaks which have occurred in their functional areas;
- Implementation of the protocol (Cable Fluid Response Protocol) to ensure that the fluid filled low pressure cables are maintained and repaired pending replacement to limit fluid leaks;
- Decommissioning of fluid filled low pressure cables shall be completed within as short a time as possible to minimise the environmental impact associated with fluid filled cables;
- Identification and implementation of appropriate controls to ensure fluid filled cable losses are prevented/limited from discharging to groundwater in accordance with the European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended;
- Amendments and updates of each of the protocols based on experience and feedback from the EPA, local authorities and other bodies.

Local Authorities

The relevant Local Authorities shall:

- Consider the powers provided to them in accordance with Section 14 of the Local Government (Water Pollution) Act 1977, as amended, and
  - Establish if a prosecution under Section 14 of the Local Government (Water Pollution) Act 1977, as amended, would be successful, appropriate or necessary, and
  - Subject to the findings initiate summary legal proceedings in the District Court against ESB Networks for failing to notify the local authority as soon as practicable after the occurrence of the incidents;
- Consider the establishment of a liaison group (as proposed in the ESB Networks protocols) to encourage and promote best practice for the protection of the environment.

Appendices

Appendix 1 – Initial Correspondence from ESB Networks

NETWORKS

esbnetworks.ie

Gréasán BSL CGA
Teach Chlann Liam, Cúirt Chann Liam,
Baile Átha Cliath 2, D02 CV61, ÉIRE
Fón 1850 372 757

ESN Networks DAC
Clanwilliam House, Clanwilliam Court,
Dublin 2, D02 CV61, Ireland
Phone 1850 372 757

Mr Brian Duggan
Inspector
Environmental Protection Agency
Regional Inspectorate
McCumiskey House
Richview
Clonskeagh Road
Dublin 14

Environmental Protection Agency
27 MAY 2019
Office of Environmental Enforcement

20 May 2019

Dear Mr Duggan,

I am writing to you in relation to the existance of legacy fluid filled underground electricity cables predominantly in the Dublin area. As set out below these cables contain a non-hazardous biodegradable insulating fluid.

As you are aware ESB Networks reports to the EPA on SF6 and PCBs (both hazardous substances) on an annual basis. ESB Networks currently does not submit reports to EPA on leakage associated with these fluid filled cables. We would like to clarify our reporting obligations in relation to these cables.

There are approximately 177 km of fluid filled cables on the electricity network. The majority of these are in Dublin city. In line with other international utilities these cables were installed in the period 1950 to 1989 and at the time were considered to be leading edge cable technology. The original fluid contained in the cables was a mineral oil insulating fluid which was not readily biodegradable. This fluid was replaced in the mid 1980s with linear alkyl benzene, which biodegrades naturally in the environment and is classified as a non-hazardous environmental substance as verified by tests carried out by an independent laboratory. Laboratory tests confirm the fluid does not contain PCBs. At this stage residual volumes of the original mineral oil may remain in older short lengths of cable which are not prone to leakage.

Leaks from the cables can occur as a result of aging, vegetation damage and third party damage. The leaks are detected by a reduction in the fluid pressure in the cable which raises an alarm on the network control system. As a result of advances in technology this type of cable has not been installed since the 1980s. ESB has a comprehensive policy on the management of fluid filled cables and a system in place to measure leakage rates. In addition there is a replacement programme to target older cables.

The ESB Networks Annual Environmental Performance Report submitted to the Commission for Regulation of Utilities contains details of leakage rates and provides information on any significant incidents which have occurred during the year. For example in 2015 a third party damaged the Inchicore- Poolbeg 220KV cable resulting in leakage and this incident, which caused damage to Copperface Jacks nightclub was reported to Dublin City Council. It is not clear to us whether ESB

Directors Jerry O'Sullivan (Chairman), Paddy Hayes, Paul Mulvaney, Des Geraghty, Gina Quin.
Registered Office: Clanwilliam House, Clanwilliam Court, Dublin 2, D02 CV61, Ireland Registered in Ireland No. 4856172

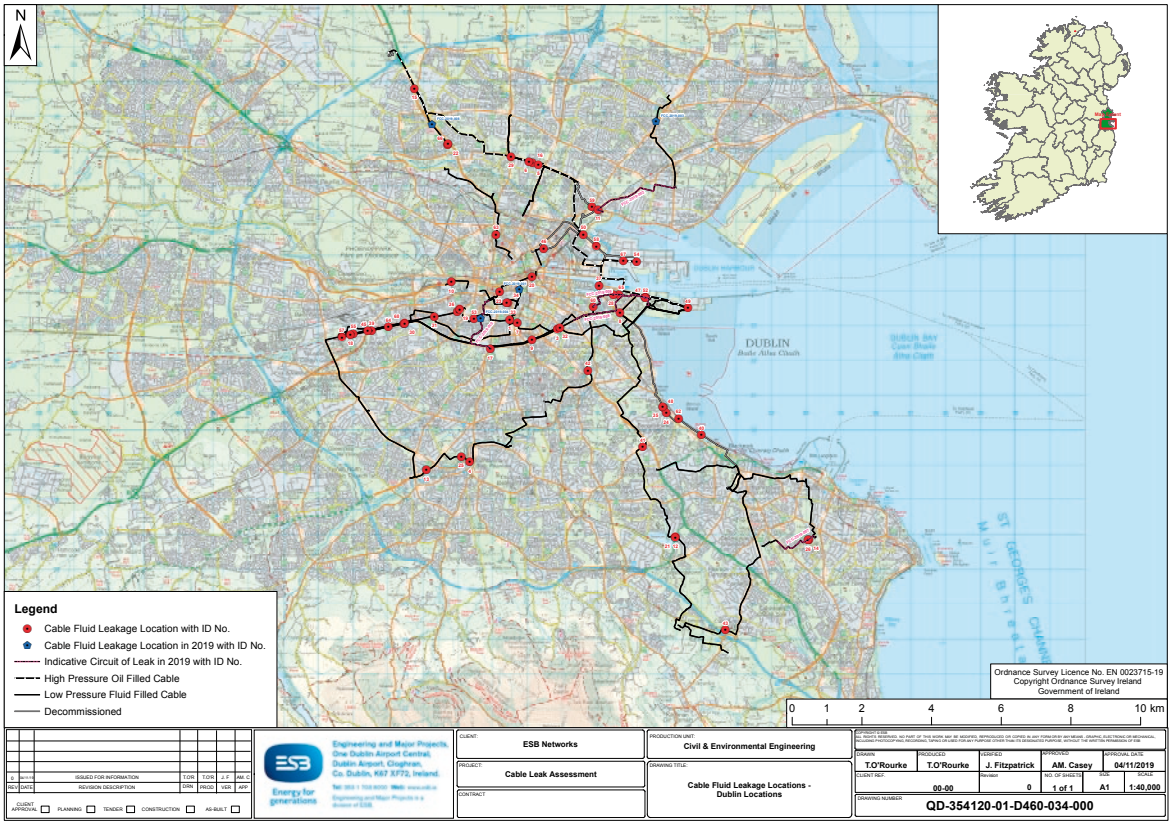
Networks has any reporting obligations to the EPA regarding leakage from these cables which is conditional or not upon certain thresholds being exceeded. However, we are cognisant of the guidance set out in the Environmental Liability Regulations Guidance Document published by EPA. We note that in the UK a Code has been put in place between the Energy Networks Association (ENA) and the Environment Agency which sets out agreed reporting thresholds. In order to bring clarity to ESB Networks reporting obligations we would like to explore with you the possibility of adopting a similar agreed process whereby ESB Networks reports to EPA on (i) leakages over an agreed threshold in areas outside of special areas of conservation and (ii) all leakages which occur in special areas of conservation. We propose in the first instance, subject to appropriate system access, to upload details of cable leaks (in line with this proposal) for the last twelve months on to EDEN.

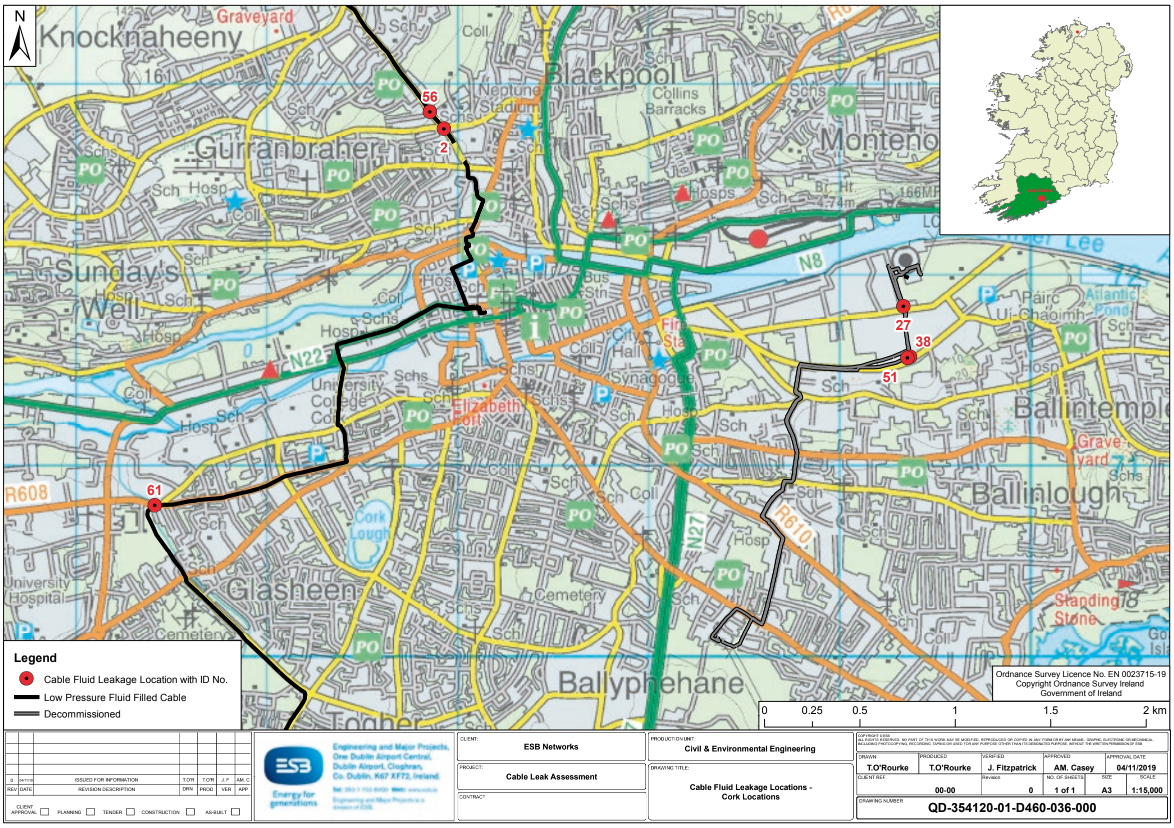
We would welcome a meeting with EPA to discuss an agreed approach in relation to this matter.

Yours sincerely,

Niall Ring
Safety, Health & Environment Manager
ESB Networks DAC

Appendix 2 – Maps

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61
Legend
Cable Fluid Leakage Location with ID No.
Low Pressure Fluid Filled Cable
Decommissioned
Ordnance Survey Licence No. EN 0023715-19
Copyright Ordnance Survey Ireland
Government of Ireland
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PROJECT: Cable Leak Assessment
PRODUCTION UNIT: Civil & Environmental Engineering
DRAWING TITLE: Cable Fluid Leakage Locations - Cork Locations
DRAWN T.O'Rourke
PRODUCED T.O'Rourke
VERIFIED J. Fitzpatrick
APPROVED AM. Casey
APPROVAL DATE 04/11/2019
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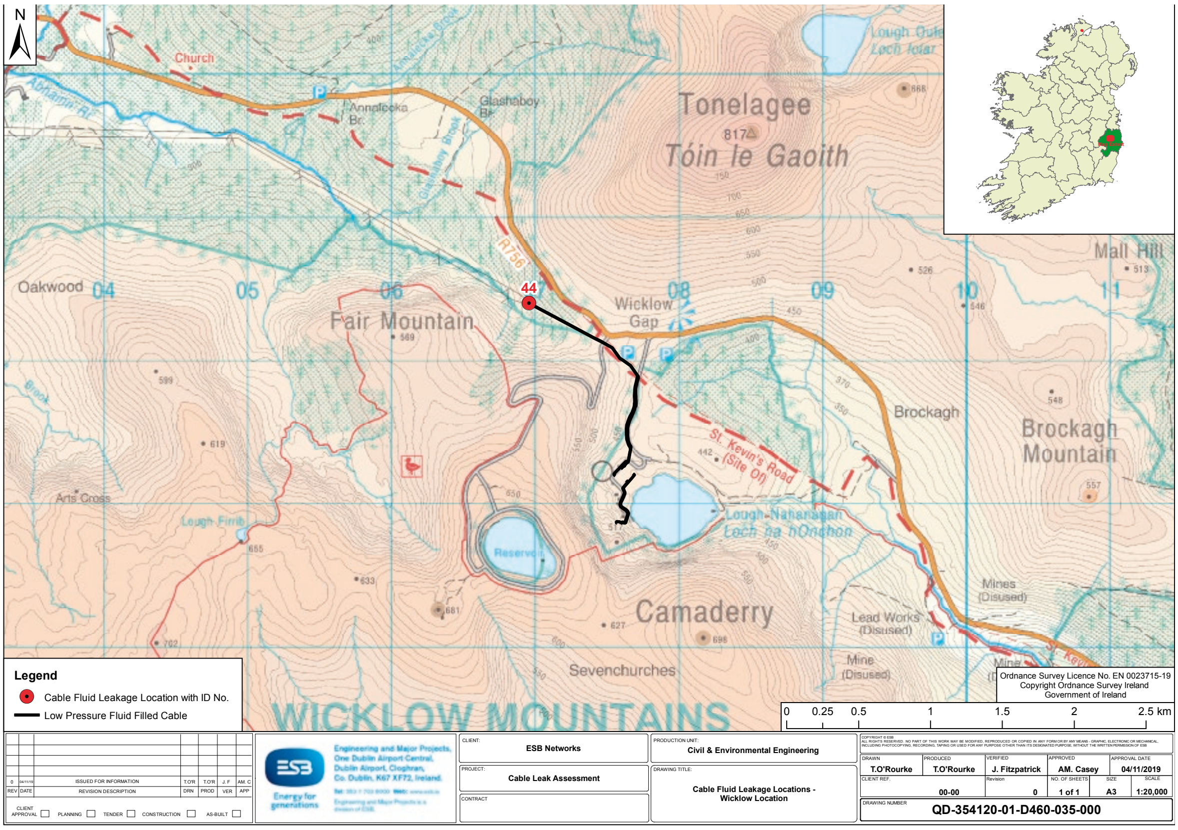
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Legend
Cable Fluid Leakage Location with ID No.
Low Pressure Fluid Filled Cable
Ordnance Survey Licence No. EN 0023715-19
Copyright Ordnance Survey Ireland
Government of Ireland
0 0.25 0.5 1 1.5 2 2.5 km
CLIENT: ESB Networks
PROJECT: Cable Leak Assessment
PRODUCTION UNIT: Civil & Environmental Engineering
DRAWING TITLE: Cable Fluid Leakage Locations - Wicklow Location
DRAWN T.O'Rourke
PRODUCED T.O'Rourke
VERIFIED J. Fitzpatrick
APPROVED AM. Casey
APPROVAL DATE 04/11/2019
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Appendix 3 – Legislative Review

Legislative Review

The principal legislative instruments that are potentially applicable to this issue include the following:

- Local Government (Water Pollution) Act, 1977 as amended;
- Environmental Protection Agency Act 1992, as amended;
- European Communities (Environmental Liability) Regulations 2008, as amended;
- European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended.

Local Government (Water Pollution) Act, 1977 as amended

The Water Pollution Act prohibits the introduction of polluting matter to waters. Polluting matter is broadly defined and includes the following:

> *"… includes any poisonous or noxious matter, and any substances (including any explosive, liquid or gas) the entry or discharge of which into any waters is liable to render those or any other waters poisonous or injurious to fish, spawning grounds or the food of any fish, or to injure fish in their value as human food, or to impair the usefulness of the bed and soil of any waters as spawning grounds or their capacity to produce the food of fish or to render such waters harmful or detrimental to public health or to domestic, commercial, industrial, agriculture or recreational uses"*

In the instance whereby a person may cause or permit an accidental discharge(s) of polluting matter to waters, the Water Pollution Act provides that the person responsible shall notify the local authority (in whose functional area the discharge occurred) after the occurrence under Section 14 (1), which states:

> *"(1) As soon as practicable after the occurrence of an accidental discharge, spillage or deposit of any polluting matter which enters or is likely to enter any waters or a sewer, the person responsible shall notify the local authority in whose functional area the discharge, spillage or deposit occurs or, in the case of a sewer, the sanitary authority in which the sewer is vested or by which it is controlled."*

If the person responsible fails to notify the local authority it will be guilty of an offence and liable to prosecution under the Water Pollution Act, Section 14(2) states:

> *"A person who fails to comply with subsection (1) commits an offence and is liable on summary conviction to a fine not exceeding €5,000, or imprisonment for a term not exceeding 3 months, or both., …"*

The powers to prosecute under the Water Pollution Act are extended to and exercisable by the local authority and sanitary authority to which the activity relates under Section 14 (3) of the Water Pollution Act, which states:

> *"A prosecution for an offence under this section may be taken by a local authority or a sanitary authority."*

The following further powers under the Water Pollution Act are available however they may not be suitable to the loss of insulating fluid from cables operated by ESN networks. The Water Pollution Act provides for an application to seek injunctive relief from the High Court or implement measures to prevent or control pollution.

If 'polluting matter' is likely to enter waters the local authority or any other person may apply to the High Court to restrain the 'polluting matter' under Section 11 of the Water Pollution Act which states:

"(1) Where a contravention of section 3 (1) or 4 (1) has occurred or is occurring, the High Court may, on the application of a local authority or any other person, whether or not the person has an interest in the waters, by order prohibit the continuance of the contravention. …"

Section 12 (1) of the Water Pollution Act provides the local authority with powers to issue a notice directing the responsible persons to take steps to prevent or control pollution.

"(1) Where it appears to a local authority that it is necessary to do so in order to prevent or control pollution of waters, it may serve a notice in writing under this section on any person having the custody or control of any polluting matter on premises in its functional area. …"

Where a notice is not complied with, the person to whom it is served, will be guilty of an offence and will be liable to prosecution by the local authority under Section 12(6) which states:

"(6) … A prosecution for an offence under this section may be taken by a local authority."

In all cases the Water Pollution Act provides for the local authority to take urgent measures to prevent water pollution and to mitigate or remedy the effects of any pollution caused by polluting matter in certain circumstances under both Section 12(5) and 13(1), which states:

"… 12(5) Where a person does not comply with a notice under this section within the period specified in the notice, the local authority which served the notice may take any steps it considers necessary to prevent polluting matter in relation to which the notice is served from entering waters, …"

"… 13(1) Where it appears to a local authority that urgent measures are necessary to prevent pollution of any waters in its functional area, to remove polluting matter from waters in that area, or, while such matter is in waters outside that area, to prevent it affecting any part of that area, the local authority may take such steps, carry out such operations or give such assistance as it considers necessary to prevent such matter from entering the waters, to remove the matter from the waters, to dispose of it as it thinks fit and to mitigate or remedy the effects of any pollution caused by the matter."

Environmental Protection Agency Act 1992, as amended

The EPA Act provides for the EPA to oversee local authorities' environmental protection performance under Section 63(1) which states:

"The Agency may request a local authority to furnish, within a specified period, to it information in relation to the performance by the authority, either generally or in a specific case, of a statutory function of that authority in relation to environmental protection and the authority shall comply with such a request."

The legislation provides for the EPA to assist local authorities to improve their environmental performance on a case by case basis under Section 63(2) and (3):

"(2) The Agency may, having notified the local authority of its intention to do so, carry out an assessment of the performance by a local authority, either generally or in a specific case, of a statutory function of that authority in relation to environmental protection; for that purpose the authority shall comply with any request for the furnishing to the Agency of information, records or reports or the results of any monitoring by the authority, or, in connection with the foregoing, the affording to the Agency of access to any premises occupied by the authority, made by the Agency during the course of such assessment.

(3) Having exercised its powers under subsection (1) or (2), and having considered any information furnished to, or otherwise coming into the possession of, it in consequence of that exercise, the Agency may, with a view to ensuring the satisfactory performance by the local authority concerned of the function in question, do all or any of the following:

a) issue such advice and recommendations to the authority as it considers necessary,

b) provide, on such terms and conditions as may be agreed, such assistance, support or guidance as the Agency considers, in consultation with the authority, would be helpful,

c) without prejudice to any of its powers under this Act or any other enactment, issue to the authority the terms of a direction ('the proposed direction') it proposes to issue, under subsection (5), to the authority requiring it to carry out, cause to be carried out, or arrange for, within a specified period, such action related to the function in question as the Agency considers necessary for the purposes of environmental protection.

(4) The proposed direction shall specify a period within which the local authority may make observations to the Agency in relation to the proposal to make the direction (and the authority may make such observations within that period accordingly).

(5) After the expiration of the period referred to in subsection (4) and consideration of any observations made by the local authority under that subsection, the Agency may confirm, with or without modification, or decide not to confirm its proposal to make the direction concerned, and, in a case where the proposal is confirmed, the Agency shall issue to the authority the direction concerned accordingly and the authority shall comply with the direction within the period specified therein.

(6) Notwithstanding anything in this section, where the Agency is of the opinion that the failure of a local authority to perform in a satisfactory manner a statutory function of the authority in

relation to environmental protection is resulting in significant environmental pollution, or in a real and imminent risk of such pollution, the Agency may direct the authority to carry out, cause to be carried out, or arrange for, within a specified period, such action related to the function in question as the Agency considers necessary for the purposes of preventing, limiting, eliminating, abating or reducing such pollution, and the authority shall comply with such a direction.

(7) Where a local authority fails to comply with a direction issued under subsection (5) or (6), the Agency may carry out, cause to be carried out, or arrange for, such action related to the function in question as it considers necessary to ensure compliance with the direction and the costs of such action may be recovered by the Agency from the authority as a simple contract debt in any court of competent jurisdiction.

(8) A local authority shall be guilty of an offence if it:

a) fails to comply with a request under subsection (1) or (2), or

b) fails to comply with a direction under subsection (5) or (6).

(9) The Minister may, with the consent of such other (if any) Minister of the Government as the Minister considers appropriate having regard to the functions of that other Minister, make regulations enabling the Agency to exercise, in relation to a public authority (other than a local authority within the meaning of this section) that, in the opinion of the Minister, performs a statutory function in relation to environmental protection, the powers conferred on the Agency by this section in relation to a local authority.

(10) Nothing in this section shall be construed as enabling the Agency to exercise any power or control under this section in relation to the making of a decision on an application for a permission under section 34 of the Act of 2000.

(11) In this section, 'local authority' has the meaning assigned to it by the Local Government Act 2001."

European Communities (Environmental Liability) Regulations 2008

The purpose of the Environmental Liability Regulations is to establish a framework of environmental liability based on the 'polluter-pays' principle to prevent and remedy environmental damage. The EPA is the designated competent authority for all aspects of the Environmental Liability Regulations. The Environmental Liability Regulations define environmental damage under three categories:

- damage to natural habitats and protected species;
- water damage; or
- land damage.

The Environmental Liability Regulations apply strict liability for any cases of environmental damage/ imminent threat of environmental damage caused by the activities listed in Schedule 3 of the Environmental Liability Regulations. Activities listed in Schedule 3 includes EPA and local authority licensed or permitted facilities where the activities are concerned with discharges. The regulations also apply fault-based liability to any other operators for cases of damage to protected species and natural habitats. Regulation 3 states:

(1) These Regulations apply to:

(a) environmental damage, or imminent threat of environmental damage caused by an occupational activity referred to in Schedule 3,

(b) damage to protected species and natural habitats, or imminent threat of that damage, where an operator of an occupational activity (other than an occupational activity referred to in Schedule 3) acts or fails to act and he or she knows or ought to have known that his or her act or failure to act causes or would cause damage or imminent threat of damage to protected species and natural habitats.

Regulation 7 and 9 place obligations on the operator to in the first instance take measures to prevent environmental damage where there is an imminent threat of same, or to prevent further damage if the damage has already occurred, and to notify the EPA of any imminent threat which cannot be dispelled or if environmental damage has occurred. It is an offence not to comply with these requirements. Regulation 7 and 9 state:

7. (1) Where environmental damage has not occurred, but an operator of an occupational activity:

a) is aware, or

b) ought reasonably be expected in the circumstances to form the opinion,

that there is an imminent threat that it will occur he or she shall without delay take necessary preventive measures.

(2) Where the operator referred to in paragraph (1) forms, or ought reasonably be expected in the circumstances to form, the opinion that preventive measures taken pursuant to paragraph (1) do not dispel the imminent threat of environmental damage, he or she shall as soon as possible inform the Agency of the imminent threat, the preventive measures taken and of the forming by him or her of the opinion that the measures do not dispel the threat.

(3) A person who contravenes paragraph (1) or (2) is guilty of an offence.

9. (1) Where environmental damage has occurred, the operator who:

a) is aware, or

b) ought reasonably be expected in the circumstances to form the opinion,

that his or her occupational activity caused the damage shall inform the Agency without delay.

(2) The operator referred to in paragraph (1) shall also take all practicable steps to immediately control, contain, remove or manage contaminants or causes of damage where he or she is aware, or ought reasonably be expected in the circumstances to form the opinion, that to do so would prevent:

a) further environmental damage,

b) damage to human health, or

c) further impairment of services.

(3) A person who contravenes paragraph (1) or (2) is guilty of an offence.

The EPA has established an online submissions form[5] for operators to inform the EPA of cases of imminent threat or environmental damage.

The EPA is statutorily required (Regulation 8 or 10, as appropriate) to issue directions to operators where it is aware of cases of imminent threat or environmental damage, seek information and instruct the operator to take preventative/remedial measures. Furthermore, in instances of environmental damage, the EPA must decide what remedial measures are required to remedy environmental damage (Regulation 11(1)) and issue a direction to the operator notifying them that environmental damage has occurred, what remedial measures are required and what monitoring and inspection measures are required to ensure that remedial measures are completed (Regulation 12(1)). Failure of the operator to comply with any of these directions is an offence. The operator may appeal any direction under Regulation 8, 10 or 12 to the District Court in which the direction has been served within 7 days of being served the direction.

Under Regulation 8(3) and 10(3), the EPA may itself take the necessary preventative or remedial actions in certain circumstances and Regulation 17 allows the EPA to recover the costs of these actions from the operator. Regulation 22 allows the EPA to seek injunctive relief to direct a person to comply with a direction or requirement or make such provision in relation to the payment of costs as the Court considers appropriate.

The fines on conviction of an offence are specified in Regulation 24, as follows:

(1) A person guilty of an offence under Regulation 7, 8, 9, 10, or 12, shall be liable:

a) on summary conviction to a fine not exceeding €5,000 or imprisonment for a term not exceeding 6 months or both, or

b) on conviction on indictment, to a fine not exceeding €500,000 or to imprisonment for a term not exceeding 3 years or both.

5 https://www.epa.ie/enforcement/liab/submission/

European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended

The European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended (Groundwater Regulations) transpose European Union Directive 2004/118/EC (12th December 2006) on the protection of groundwater against pollution and deterioration.

Regulation 9(a-b) states that hazardous substances must be prevented from entering groundwater, and the input of non-hazardous substances must be limited to ensure that such inputs do not cause a deterioration in groundwater status, or cause significant and sustained upward trends in the concentration of pollutants in groundwater. Appropriate controls should be placed on activities that discharge substances to groundwater. Regulation 9 states:

a) The input of hazardous substances into groundwater is prohibited;

b) The input of non-hazardous substances shall be limited so as to ensure that such inputs do not cause deterioration in groundwater status or cause significant and sustained upward trends in the concentration of pollutants in groundwater;"

It is an offence not to comply with a requirement of the Groundwater Regulations under Regulation 21. If the person responsible fails to comply it will be guilty of an offence and liable to prosecution under the Groundwater Regulations 2010, Regulation 22 states:

"A person, public authority, body corporate or unincorporated body guilty of an offence is liable;

a) on summary conviction to a fine not exceeding €5,000 or to imprisonment for a term not exceeding 3 months or to both; or

b) on conviction on indictment to a fine not exceeding €500,000 or to imprisonment for a term not exceeding 3 years or to both."

A prosecution for an offence under the Groundwater Regulations can be taken by statutory body, local authority and Government Minister in accordance with Regulation 23, which states:

"A prosecution for an offence under these Regulations may be taken by the co-ordinating local authority for the river basin district, the Agency, a Minister of the Government, and, where appropriate, a relevant public authority. A prosecution for an offence may be taken by a local authority within the river basin district whether or not the offence is committed in the functional area of the authority."

The Regulations in Schedule 1 identify relevant public authorities, these include the EPA, relevant Local Authorities and the Electricity Supply Board. Regulation 4 state that the relevant public authorities shall promote compliance with the requirements of the Groundwater Regulations and take all reasonable steps, including where necessary, the implementation of programmes of measures. Regulation 4 states:

"A public authority shall, insofar as its functions allow and subject to any provisions and limitations listed elsewhere in this Part, promote compliance with the requirements of these Regulations and take all reasonable steps including, where necessary, the implementation of programmes of measures, to:

a) prevent or limit, as appropriate, the input of pollutants into groundwater and prevent the deterioration of the status of all bodies of groundwater;

b) protect, enhance and restore all bodies of groundwater and ensure a balance between abstraction and recharge of groundwater with the aim of achieving good groundwater quantitative status and good groundwater chemical status by not later than 22 December 2015;

c) reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order to progressively reduce pollution of groundwater;

d) achieve compliance with any standards and objectives established for a groundwater dependant protected area included in the register of protected areas established under Regulation 8 of the 2003 Regulations by not later than 22 December 2015, unless otherwise specified in the Community legislation under which the individual protected areas have been established.

Regulation 5 states that the public authority shall not knowingly cause or allow deterioration in water quality in the performance of its functions, Regulation 5 states:

"A public authority shall not, in the performance of its functions, undertake those functions in a manner that knowingly causes or allows deterioration in the quantitative status or chemical status of a body of groundwater."

Appendix 4: Tables and Figures

Table 1: A table summarising historic fluid filled cable leaks from April 2009.

ID	Description	Leak Start Date	Leak Repair Date	Total Leak (litres)	Rate (litres/ month)	Year Installed	Cable Fluid	Consulted relevant authority	
								Pre June 2019	Post June 2019
1	Camden Row – Newmarket 38 kV – May 2019	May 2010	May 2019	244	2.3	1950	Linear Alkyl Benzene/ Mineral Oil mix	Dublin CC	Dublin CC
2	Fairhill – Kilbarry 38 kV Cable – February 2019	September 2018	February 2019	1.595	266	1964	Linear Alkyl Benzene/ Mineral Oil mix	Cork CC	Cork CC
3	Harold's Cross – Ringsend 110 kV – November 2018	January 2016	November 2018	29,422	840	1964	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC/ Waterways Ireland
4	Dodder Rd- Templeogue 38 kV- November 2018	August 2015	November 2018	7,252	186	1964	Linear Alkyl Benzene		Dublin CC/ SDCC
5	Ballymun Fairview 38 kV – August 2018. Site 1	December 2017	August 2018	5,170	575	1950	Linear Alkyl Benzene		Dublin CC
6	Ballymun- Fairview 38kV – August 2018. Site 2	December 2017	August 2018	5,170	575	1950	Linear Alkyl Benzene		Dublin CC
7	Inchicore – Poolbeg One 220 kV – February 2018	March 2015	February 2018	7,732	n/a	1971	Linear Alkyl Benzene	Dublin CC	Dublin CC
8	Carrickmines – Poolbeg 220 kV – September 2016	September 2015	September 2016	8,975	748	1971	Linear Alkyl Benzene		Dublin CC
9	Inchicore – Poolbeg Two 220 kV	November 2014	July 2016	3,989	160	1984	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC/ Waterways Ireland
10	Kingsbridge – Watling Street 38 kV – August 2015	June 2015	August 2015	1,400	700	1967	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC

ID	Description	Leak Start Date	Leak Repair Date	Total Leak (litres)	Rate (litres/ month)	Year Installed	Cable Fluid	Consulted relevant authority	
								Pre June 2019	Post June 2019
11	Clontarf – East Wall Road 38 kV – August 2015	July 2013	August 2015	1,056	42	1964	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
12	Carrickmines – Poolbeg 220 kV – June 2015	April 2013	June 2015	11,965	460	1971	Linear Alkyl Benzene		Dublin CC/Dun Laoghaire Rathdown CC
13	Dodder Rd – Templeogue 38 kV – April 2015	January 2013	April 2015	6,435	240	1964	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC/ SDCC
14	Deansgrange – Sallynoggin 38 kV – March 2015	March 2011	March 2015	3,812	80	1950	Linear Alkyl Benzene/ Mineral Oil mix		Dun Laoghaire Rathdown CC
15	Finglas – Merville 38 kV – February 2015	August 2014	February 2015	6,215	1,036	1967	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
16	Unidare – Whitehall 38 kV – January 2015	October 2010	January 2015	13,155	257	1951	Linear Alkyl Benzene	Dublin CC	Dublin CC
17	Francis Street – Harold's Cross 110 kV – November 2014	July 2011	November 2014	14,617	375	1964	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC/ Waterways Ireland
18	Francis Street – Inchicore 110 kV – November 2014	May 2011	November 2014	9,370	230	1964	Linear Alkyl Benzene/ Mineral Oil mix	Waterways Ireland	Dublin CC/ Waterways Ireland
19	Inchicore – Marrowbone Lane 38 kV – June 2014	September 2011	June 2014	14,562	477	1950	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
20	Bedford Row – Sheriff Street 38 kV – April 2013	July 05	April 2013	4,171	144	1950	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
21	Carrickmines – Poolbeg 220 kV – October 2012	2010	October 2012	17,434	830	1971	Linear Alkyl Benzene		Dublin CC/Dun Laoghaire Rathdown CC
22	Finglas – Merville 38 kV – March 2012	February 2012	March 2012	5,845	5,845	1967	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC

ID	Description	Leak Start Date	Leak Repair Date	Total Leak (litres)	Rate (litres/ month)	Year Installed	Cable Fluid	Consulted relevant authority	
								Pre June 2019	Post June 2019
23	Bedford Row – Francis St 38 kV Sept 2011	March 2009	September 2011	5,396	180	1967	Linear Alkyl Benzene		Dublin CC
24	Blackrock – Ringsend 110 kV 2010	2008	2010	640	107	1972	Linear Alkyl Benzene		Dublin CC/Dun Laoghaire Rathdown CC
25	Dodder Rd – Templeogue 38 kV – November 2009	August 2009	November 2009	2,290	573	1964	Linear Alkyl Benzene/ Mineral Oil mix	Dublin CC	Dublin CC/ SDCC
26	Deansgrange – Sallynoggin 38 kV – February 2019	March 2017	February 2019	3,468	144	1950	Linear Alkyl Benzene		Dun Laoghaire Rathdown CC
27	Marina – Trabeg Two 110 kV – November 2012	November 2012	November 2012	773	773		Linear Alkyl Benzene/ Mineral Oil mix	EPA	Awaiting meeting
28	Pembroke – Ringsend 38 kV – November 2011	October 2010	November 2011	10,702	765	1950	Linear Alkyl Benzene		Dublin CC
29	Unidare – Whitehall 38 kV – February 2010	January 2010	February 2010	450	225	1951	Linear Alkyl Benzene		Dublin CC
30	Francis Street – Inchicore 110 kV – July 2010	July 2010	July 2010	355	355	1964	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
31	Inchicore – Marrowbone Lane – 38 kV – November 2009	February 2009	November 2009	1,105	110	1950	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
32	Harold's Cross – Ringsend 110kV – Sept 2009	September 2009	September 2009	265	265	1964	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
33	Francis Street – Camden Row 38 kV – April 2009	February 2009	April 2009	725	242	1950	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC

Table 2: A table summarising historic fluid filled cable leaks prior to April 2009.

ID	Description	Leak Start Date	Leak Repair Date	Total Leak (litres)	Rate (litres/ month)	Year Installed	Cable Fluid	Consulted relevant authority	
								Pre June 2019	Post June 2019
34	Francis Street – South King Street – 38 kV March 2009	January 2009	March 2009	755	252	1965	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
35	Blackrock – Ringsend 110 kV – March 2009	October 2008	March 2009	12,140	2,023	1972	Linear Alkyl Benzene		Dublin CC/Dun Laoghaire Rathdown CC
36	Inchicore – Marrowbone Lane 38 kV -November 2008	November 2008	November 2008	285	n/a	1950	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
37	Parkview – Ringsend 38 kV – November 2008	November 2008	November 2008	100	n/a	1951	Linear Alkyl Benzene		Dublin CC
38	Marina – Trabeg Two 110 kV – October 2008	October 2008	October 2008	3,555	3,555	1972	Linear Alkyl Benzene		Awaiting meeting
39	Francis street – Inchicore 110 kV – October 2008	October 2008	October 2008	3,765	3,765	1964	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
40	Blackrock – Ringsend 110 kV – September 2008	April 2007	September 2008	12,760	709	1972	Linear Alkyl Benzene		Dublin CC/Dun Laoghaire Rathdown CC
41	Carrickmines – Poolbeg 220 kV – February 2008	February 2008	February 2008	590	590	1971	Linear Alkyl Benzene	Dun Laoghaire Rathdown CC	Dublin CC/Dun Laoghaire Rathdown CC
42	Donnybrook – Pembroke 38 kV – February 2008	February 2008	February 2008	460	n/a	1972	Linear Alkyl Benzene		Dublin CC
43	Carrickmines – Pottery Road 110 kV – 2008	2008	2008	3,000	n/a	1972	Linear Alkyl Benzene		Dun Laoghaire Rathdown CC
44	Maynooth – Turlough Hill 220 kV – September 2007	September 2007	September 2007	294	294	1973	Linear Alkyl Benzene		Awaiting meeting
45	Francis Street – Inchicore 110 kV August 2007	March 2005	August 2007	8,435	281	1964	Linear Alkyl Benzene/ Mineral Oil mix	Dublin CC	Dublin CC

ID	Description	Leak Start Date	Leak Repair Date	Total Leak (litres)	Rate (litres/ month)	Year Installed	Cable Fluid	Consulted relevant authority	
								Pre June 2019	Post June 2019
46	East Wall Road – McDermott 38 kV – April 2007	April 2007	April 2007	620	620	1951	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
47	East Wall Road – Ringsend 38 kV – March 2007	January 2007	March 2007	390	130	1951	Linear Alkyl Benzene/ Mineral Oil mix	Dublin CC	Dublin CC
48	Blackrock – Ringsend 110 kV – December 2006	July 2004	December 2006	27,177	906	1972	Linear Alkyl Benzene		Dublin CC/Dun Laoghaire Rathdown CC
49	Poolbeg – Ringsend TF4 110 kV – August 2006	August 2010	August 2006	210	210	1983	Linear Alkyl Benzene	EPA	Dublin CC
50	East Wall Road – McDermott 38 kV – September 2006	April 2005	November 2005	7,526	940	1951	Linear Alkyl Benzene/ Mineral Oil mix	Dublin CC	Dublin CC
51	Marina – Trabeg Two 110kV – November 2005	November 2005	November 2005	400	400	1972	Linear Alkyl Benzene	Cork CC	Awaiting meeting
52	Parkview – Ringsend 38 kV – May 2005	June 2003	May 2005	10,610	442	1951	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
53	Marrowbone Lane – Newmarket 38 kV – March 2005	December 2004	March 2005	6,554	1,638	1950	Linear Alkyl Benzene/ Mineral Oil mix	Dublin CC	Dublin CC
54	East Wall Road – North Wall 38 kV – December 2004	March 2004	December 2004	15,637	1,563	1951	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
55	Francis Street – Inchicore 110kV – 2004	2004	November 2004	4,338	n/a	1964	Linear Alkyl Benzene/ Mineral Oil mix	Dublin CC, Waterways Ireland	Dublin CC/ Waterways Ireland
56	Fairhill – Kilbarry 38 kV November 2004	January 2004	November 2004	1,028	93	1964	Linear Alkyl Benzene/ Mineral Oil mix		Awaiting meeting
57	Inchicore – Poolbeg Two 220 kV – July 2004	May 2004	July 2004	1,137	379	1984	Linear Alkyl Benzene	Dublin CC	Dublin CC
58	East Wall Road – Fairview – April 2004	March 2002	April 2004	29,164	1,121	1951	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC

ID	Description	Leak Start Date	Leak Repair Date	Total Leak (litres)	Rate (litres/ month)	Year Installed	Cable Fluid	Consulted relevant authority	
								Pre June 2019	Post June 2019
59	Ballymun – Fairview – March 2004	April 2003	March 2004	3,927	328	1950	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
60	Pembroke – Ringsend 38 kV – 2004	2004	2004	28,614	2,631	1950	Linear Alkyl Benzene		Dublin CC
61	Dennehy's Cross – Liberty Street 38 kV – 2001	2001	2004	11,772	295	1968	Linear Alkyl Benzene/ Mineral Oil mix	Cork CC	Awaiting meeting
62	Blackrock – Ringsend 110 kV – November 2003	October 2003	November 2003	4,206	2,103	1972	Linear Alkyl Benzene	Dun Laoghaire	Dublin CC/Dun Laoghaire Rathdown CC
63	Phibsborough – Granby Row – July 2003	August 2002	July 2003	285	24	1950	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
64	Inchicore – Poolbeg Two 220 kV – May 2003	May 2003	May 2003	300	300	1984	Linear Alkyl Benzene		Dublin CC
65	Pembroke – Ringsend 38 kV – 2003	2000	2003	126,309	2,631	1950	Linear Alkyl Benzene		Dublin CC
66	Finglas – Merville 38 kV – November 2002	November 2002	November 2002	648	648	1967	Linear Alkyl Benzene/ Mineral Oil mix		Dublin CC
67	Finglas – Northwall 220 kV – December 1998	November 1998	December 1998	2,363	2,363	1979	High Pressure Cable Oil	Dublin CC	Dublin CC
68	Francis Street – Inchicore 110kV – 1993	August 93	November 1993	1,000	250	1964	Linear Alkyl Benzene/ Mineral Oil mix	Dublin CC	Dublin CC/ Waterways Ireland

Table 3: A table summarising 'current and new' fluid filled cable leaks from June 2019.

ID	Description	Leak Start Date	Leak Repair Date	Total Leak (litres)	Rate (litres/ month)	Year Installed	Cable Fluid	Leak Detection	Reported
FFC – 2019- 001	Bedford Row – South King Street	June 2017	August 2019	5,407	200	1950	Linear Alkyl Benzene/ Mineral Oil	Trinity Street	Dublin CC
FFC – 2019-004	Francis Street – Inchicore	August 2018	September 2019	1,508	116	1964	Linear Alkyl Benzene	Oscar Square	DCC/Waterways Ireland
FFC – 2019-006	Harold's Cross – Ringsend	June 2019	N/A	115	38	1964	Linear Alkyl Benzene	To Be Confirmed	Dublin CC
FFC – 2019-003	Coolock – Raheny	May 2018	N/A	2,330	155	1972	Linear Alkyl Benzene	To Be Confirmed	Dublin CC
FFC – 2019-002	Clontarf – East Wall Road	May 2018	N/A	1,555	103	1964	Linear Alkyl Benzene/ Mineral Oil mix	To Be Confirmed	Dublin CC
FFC – 2019-007	Deansgrange – Sallynoggin	August 2019	N/A	183	183	1950	Linear Alkyl Benzene	To Be Confirmed	Dun Laoghaire Rathdown CC
FFC – 2019-008	Finglas – Merville	October 2019	October 2019	1090	1090	1965	Linear Alkyl Benzene CAS 67774-74-7	Junction of Wellmount Road and Finglas Road	Dublin CC, Fisheries Ireland and EPA

Table 4: Details ESB Networks capex allowance, actual spend and cable fluid loss for price review PR4, PR3 and PR2 over the period 2006 to 2010. PR1 did not consider fluid filled cables hence it is not included in the table.

	PR4				PR3					PR2					
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	TOTAL
Total Distribution Allowance	€25.8 million				€20.5 million					€50 million					
Total Transmission Allowance										N/A					
Actual Spend (Distribution Only)	762,883	651,526	416,294	556,128	311,014	53,140	27,068	959,623	1,073,102	10,900,680	440,081	138,277	148,242	1,764,023	18,202,081
Actual Spend Total (Transmission + Distribution)	900,518	2,451,780	1,729,872	714,846	713,959	646,302	6,523,593	3,635,333	1,099,200	10,900,680	440,081	138,277	148,242	1,764,023	31,806,706
Leakage (litres)	–	–	15,201	14,721	21,741	54,600	32,270	32,307	38,669	31,415	26,061	28,126	29,348	–	324,459

Appendix 5 – ESB Networks Fluid Filled Cable Protocols

Cable Fluid Incident Response Protocol – Rev 01

Historic Cable Fluid Incident Response Protocol – Rev 001

Policy Management of Fluid Filled Cables in ESB Networks

Cable Fluid Incident Response Protocol

Rev 01

Date: September 2019

Document Title:	Cable Fluid Incident Response Protocol	
Revision No.:	01	
Prepared by:	Jim Fitzpatrick	Date:01/07/2019
Title:	Senior Specialist	
Reviewed by:	Anne Marie Casey	Date: 02/07/2019
Title:	Senior Contaminated Land Specialist	
Approved by:	Greg Hanna	Date: 03/07/2019
Title:	Underground Networks Asset Manager	

Change History of Report

Date	New Revision	Author	Summary of Change
06/09/19	Rev_01	AMC/ PK	ELD Considerations

Contents

1 Introduction

ESB Networks operates and maintains a network of High Voltage (HV) underground cables of over 1,600 km across Ireland, of which approximately 205 km (175 km operational) are insulated by cable fluid. 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. The fluid also protects the cables from corrosion and is an integral part of the cable system.

It should be noted that the location of some cables, such as those feeding critical infrastructure, may be confidential and exempt from public disclosure due to security reasons.

This Cable Fluid Incident Response Protocol, sets out the proposed approach of ESB Networks to assess the impact associated with cable fluid loss, in line with the EPA document - Guidance *on the Management of Contaminated Land and Groundwater at EPA Licenced Sites.*

This protocol will implemented with relevant Local Authorities and statutory.

2 Cable Fluid Loss Management Process

Fluid filled cables are largely located in urban/suburban areas and so are particularly vulnerable to considerable 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. The following steps are followed when ESB Network cable fluid usage increases on a particular circuit.

A leak, notified to ESB Networks due to 3rd party damage will be addressed by progressing directly to Steps 4 and 5.

Step 1: Fluid Usage Monitoring

ESB Network monitor cable fluid usage trends on an ongoing basis. Such monitoring will indicate the status of fluid usage in each circuit and provide early indication of a potential leak. Circuits with fluid usage of over 50[1] litres per month for 2 consecutive months will trigger a notification to the relevant local authority and statutory bodies.

[1] Aligned with UK Operating Code on the Management of Fluid Filled Cables between Environmental Agency and Electricity Companies.

Step 2: Notification of Potential Leak

ESB Networks will notify the relevant Local Authority (LA) and as required the relevant statutory and non-statutory bodies with respect to the potential leak. ESB Networks will also notify the EPA under the Environmental Liability Directive (ELD) (Regulations 2008) where there is an obligation (or potential obligation to notify under the precautionary principal) to notify.

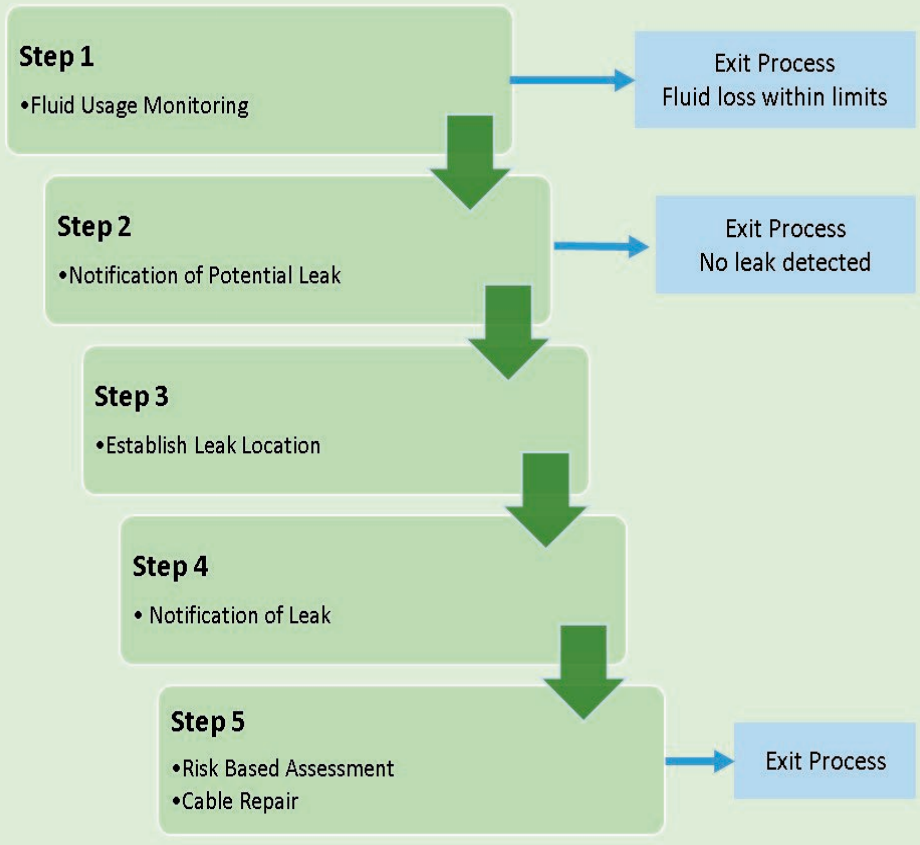
The initial notification to the LA and/or the EPA will include:

- Identity of circuit
- Expected general location of leak (along circuit between two known points)
- Expected magnitude of a leak and the nature of fluid

Where there is a potential obligation to notify under the ELD, ESB will identify whether or not strict or fault based liability is applicable. This is an initial notification based on the precautionary principal.

Information provided by the LA and/or EPA at this or any subsequent stage will be included where appropriate in the relevant assessments.

Figure 1; Cable Fluid Loss Management Process



Step 3: Establish Leak Location

ESB Networks will establish the location, nature and extent of the potential loss.

Leak detection techniques will be employed to establish the leak location. As appropriate to the situation, these will include Perfluorocarbon tracing (PFT) or similar technique and circuit freezing. Duration of leak detection process will be governed by issues such as volume of leak, the circuit impact environmental ranking, outage constraints, road opening constraints and nature of circuit route.

Step 4: Notification of Actual Leak

ESB Networks will submit a detailed notification to the relevant Local Authority and as required the relevant statutory and non-statutory bodies once the specific leak location is confirmed.

Separate notification will be issued to the EPA to inform them where there is an ELD obligation to notify.

Step 5A: ELD Assessment and Corrective Action

Complete an environmental site assessment to further assess the potential risk to *water damage, land damage and damage to natural habitats and protected species*. The following stages of assessment will be undertaken as required;

1. Risk Assessment:
    a. Desk-based Assessment
    b. Detailed Site Assessment
2. Corrective Action Plan
    a. Develop and implement a remedial action plan where required.

Step 5B: Contaminated Land and Groundwater Site Assessment

ESB Networks will be responsible for the appropriate environmental assessment and corrective action for each location. ESB Network will initiate the Risk Based Approach to Leak Assessment and Corrective Action – as detailed in Section 3.

ESB Networks will engage with representatives of the relevant Local Authority, statutory and non-statutory bodies during the course of the risk based process outlined in Section 3.

ESB Networks will be responsible for providing regular technical and non-technical updates to representatives of the relevant Local Authority, statutory and non-statutory bodies in order to attain agreement on next-step requirements throughout the course of the works.

ESB Networks will keep the Local Authority, relevant statutory and non-statutory bodies updated on progress and outcomes.

Step 5C: Cable Repair

In parallel with the Environmental Assessment and Corrective Action, ESB Networks will organise necessary permissions/licences, the required resources, equipment and materials to repair the cable and comply with its statutory obligations.

Given the nature and location of the cables it is envisaged that constraints, outside the direct control of ESB Networks, may be encountered during the course of the cable repair works. Constraints such as road opening permissions, safety requirements, third party land access approvals and electrical outages may impact on these timeframes.

ESB Networks will keep the Local Authority, relevant statutory and non-statutory bodies updated on cable repair progress and outcomes.

3 Risk Based Approach to Fluid Loss Assessment & Corrective Action

A risk-based approach will be adopted to assess the potential risks to human health and the environment. The risk-based approach applied is consistent with guidance which in turn separately addresses the differing requirements of relevant environmental legislative guidance, namely;

- EPA, Environmental Liabilities Regulations Guidance Document, 2011
- EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed site

3.1 Environmental Liabilities Directive (Regulations) Assessment

The Environmental Liability Directive (ELD) (Regulations 2008) define environmental damage under three categories:

- **Damage to natural habitats and protected species** - any damage that has significant adverse effects on reaching or maintaining the favorable conservation status of European designated habitats or species (i.e. those covered by the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC).
- **Water damage** - damage which significantly adversely affects the ecological, chemical and/or quantitative status and/or ecological potential of waters covered in the Water Framework Directive (2000/60/EC).
- **Land damage** - any contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction in or under the land of substances, preparations, organisms or micro-organisms.

In order to assess obligations under the ELD, the following steps will be implemented;

2. Initial screening to determine whether there is an ELD obligation (or potential obligation to notify under the precautionary principal) to notify under either of the following categories;
    a. **Strict liability** applies to a wide range of operations that are listed in Schedule 3 of the Regulations. The operators of these activities are held strictly liable for *water damage, land damage and damage to natural habitats and protected species* as defined in the Regulations. ESB would potentially have Strict Liability in relation to any incidents occurring at its respective IE-licensed sites

b. **Fault-based liability** applies to all occupational activities that are not listed in Schedule 3 of the Regulations. Operators of occupational activities other than those listed in Schedule 3 are liable for damage to *natural habitats and protected species,* if the operator was at fault or negligent. Fault-Based Liability in relation to incidents occurring outside any licensed sites.

3. Inform the EPA where it has been determined there is an ELD obligation (or potential obligation to notify under the precautionary principal) to notify.

4. Complete an environmental site assessment to further assess the potential risk to *water damage, land damage and damage to natural habitats and protected species*. The following stages of assessment will be undertaken as required;

    a. Desk-based Assessment
    b. Detailed Site Assessment

5. Develop and implement a remedial action plan where required.

3.2 Contaminated Land and Groundwater Site Assessment

The following risk methodology will be adopted and follows a staged approach, addressing key issues in succession and as required.

The following are the three main stages and their substages to be led by a contaminated land specialist:

1. Stage 1: Site Characterisation & Assessment
    - Preliminary Site Assessment
    - Detailed Site Assessment
    - Quantitative Risk Assessment
2. Stage 2: Corrective Action Feasibility & Design
    - Outline Corrective Action Strategy
    - Feasibility Study & Outline Design
    - Detailed Design
    - Final Strategy & Implementation Plan
3. Stage 3: Corrective Action Implementation & Aftercare.
    - Enabling Works
    - Corrective Action Implementation & Verification
    - Aftercare

3.3 Stage 1: Site Characterisation & Assessment

The characterisation and assessment of the leak location involves the collection, collation and assessment of information associated with the site as directed by an

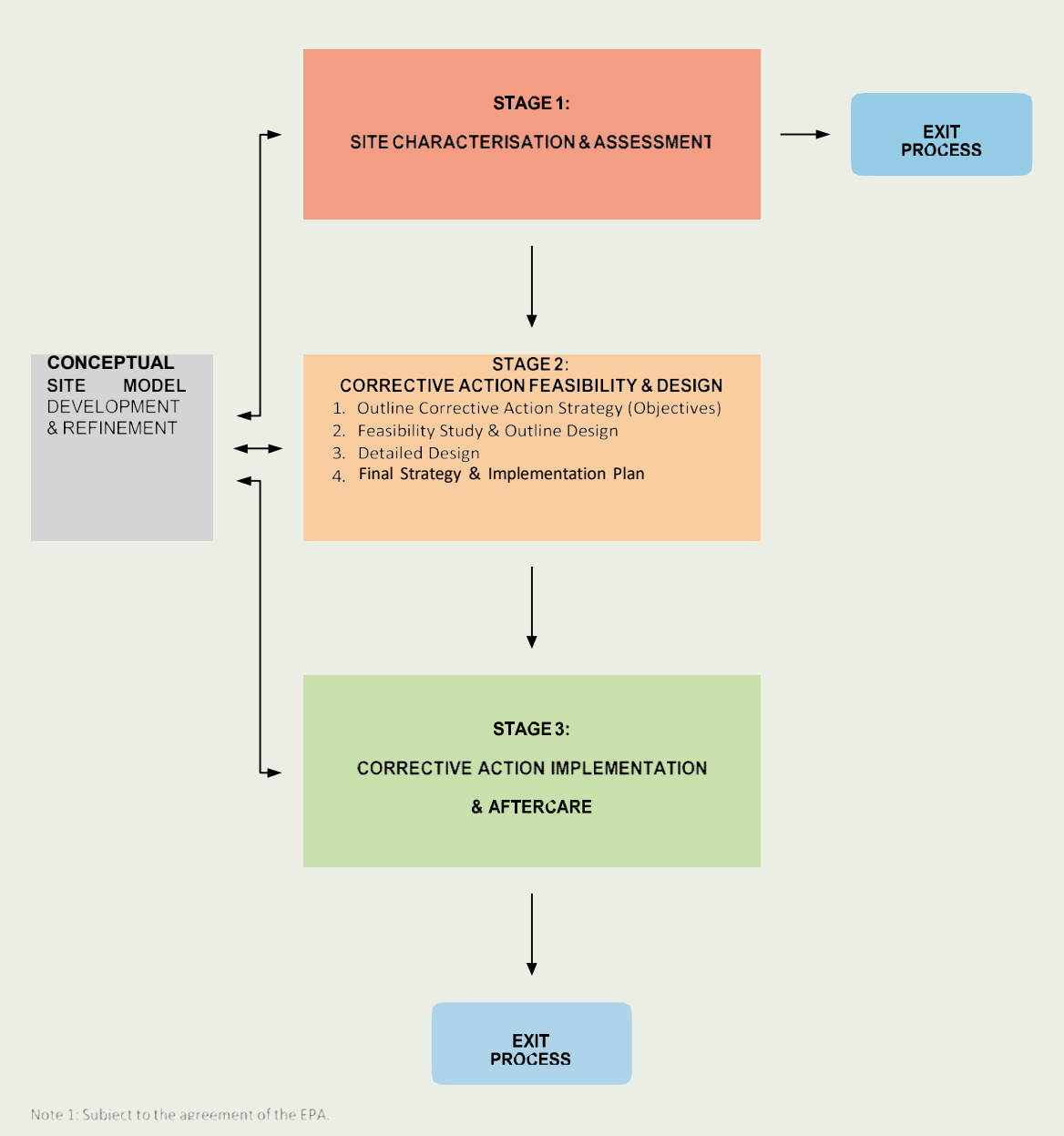
experienced contaminated land specialist.

This stage will typically be undertaken in three phases as set out below:

a) Preliminary Site Assessment,
b) Detailed Site Assessment and
c) Quantitative Risk Assessment (QRA). This will comprise as required:
    - Generic QRA (GQRA)
    - Detailed QRA (DQRA)

On identification of the leak location, a Preliminary Site Assessment (PSA) will be undertaken by ESB Networks. As part of the PSA and following collation of available desk-based information (including any information provided by relevant Local Authorities e.g. water abstractions) and establishing the constituents of the fluid in the cable section; the contaminated land specialist develops a Conceptual Site Model (CSM) which identifies the relevant source, pathways and receptors on a site specific basis. This information is used to determine if a pollutant linkage is present.

Figure 1: EPA Contaminated Land & Groundwater Risk Assessment Methodology



Based on the findings of the PSA i.e. if a pollutant linkage is identified by the CSM, an intrusive site investigation may be required as part of the Detailed Site Assessment phase. This phase may require soil, groundwater and surface water sampling and monitoring to collect sufficient data to support the completion of a Generic Quantitative Risk Assessment (GQRA) or Detailed Quantitative Risk Assessment (DQRA).

The findings of the GQRA and/or DQRA determines if a significant potential risk to human health or the environment is present which requires corrective action or if, following the assessment, it can be determined that risks associated with the leak are not considered significant, thereby concluding the assessment process and

confirming no further action is required with the relevant Local Authority, statutory and non-statutory bodies.

3.4 Stage 2: Corrective Action Feasibility & Design

If Stage 1 identifies a significant potential risk to either human health or the environment then ESB Networks will submit notifications to other relevant authorities, in accordance with relevant Regulations, such as the Environmental Liabilities Regulations.

The environmental assessment will progress to Stage 2 of this Methodology. This stage considers the feasibility of appropriate Corrective Action options and a design/plan for Corrective Action will be determined in consultation with the relevant authority.

Corrective Actions can comprise an action programme ranging from Monitored Natural Attenuation (MNA) to the need for extensive site remediation works and installation and management of treatment systems (active remediation).

The justification for the selected corrective action approaches to be undertaken on the basis of impact on the environment and also consider factors such as practicability, likelihood of success in achieving the remedial objectives, cost, timescale and sustainability and in agreement with the relevant Local Authority, statutory and non-statutory bodies.

3.5 Stage 3: Corrective Action Implementation & Aftercare

The implementation of the Corrective Action scheme designed at Stage 2 is undertaken in Stage 3 with a critical element being verification that the corrective action strategy is achieving its aims. For those sites that require Stage 3 action, the risk assessment methodology allows for sign-off and closeout by the relevant authorities, or the management of an issue in the long term, as well as the opportunity to review the actions taken, their appropriateness and their efficiency in achieving the desired environmental outcome.

The time taken to progress through the three main stages very much be based on site-specific circumstances. However, the following are some timeframes referenced in the EPA document - *Guidance on the Management of Contaminated Land and Groundwater at EPA Licenced site*:

- Stage 1: Normally 3–18 months
- Stage 2: 6–12 months (if needed)
- Stage 3: Typically a number of years (if needed).

Given the nature and location of the cables it is envisaged that constraints, outside the direct control of ESB Networks, may be encountered during the course of the risk based assessment. Constraints such as road opening permissions, safety requirements, third party land access approvals and electrical outages may impact on these timeframes. Timeframes and other limitations associated with these constraints will be identified during the course of implementing the risk based process and the LA will be consulted on their impact to the overall assessment.

Historic Cable Fluid Incident Response Protocol
Rev 001

Date: September 2019

Document Title:	Historic Cable Fluid Incident Response Protocol	
Revision No.:	00	
Prepared by:	Jim Fitzpatrick	Date:01/07/2019
Title:	Senior Specialist	
Reviewed by:	Anne Marie Casey	Date: 02/07/2019
Title:	Senior Contaminated Land Specialist	
Approved by:	Greg Hanna	Date: 03/07/2019
Title:	Underground Networks Asset Manager	

Change History of Report

Date	New Revision	Author	Summary of Change
	Rev_01	AMC/JR/PK	ELD Considerations

Contents

1 Introduction

ESB Networks operates and maintains a network of High Voltage (HV) underground cables of over 1,600 km across Ireland, of which approximately 205 km (175 km operational) are insulated by cable fluid. 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. The fluid also protects the cables from corrosion and is an integral part of the cable system.

It should be noted that the location of some cables, such as those feeding critical infrastructure, may be confidential and exempt from public disclosure due to security reasons.

Fluid filled cables are largely located in urban/suburban areas and so are particularly vulnerable to considerable 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.

This Historic Cable Fluid Incident Response Protocol, sets out the proposed approach of ESB Networks to assess the impact associated with historic cable fluid loss, in line with the EPA document - *Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites.*

This document will be implemented with relevant Local Authorities and statutory bodies.

2 Historic Cable Fluid Incident Engagement

ESB Networks has identified 39 locations where known historic leaks has occurred since 2009. The information associated with known locations of historic leaks available to the relevant Local Authority, statutory and non-statutory bodies.

ESB Networks is responsible for carrying out the appropriate environmental assessment and corrective action (if required) for each location.

ESB Networks will engage with representatives of the relevant Local Authority, statutory and non-statutory bodies during the course of the risk based process outlined in Section 3. It is suggested that this engagement will be achieved by establishing a Joint Working Group or through local liaisons with the relevant Local Authority and/or statutory - details to be agreed - as appropriate and as required.

ESB Networks is responsible for providing regular technical and non-technical updates to the Joint Working Group or representatives of the relevant Local Authority, statutory and non-statutory bodies in order to attain agreement on next-step requirements throughout the course of the works.

3 Risk Based Approach to Fluid Loss Assessment & Corrective Action

A risk-based approach will be adopted to assess the potential risks to human health and the environment. The risk-based approach applied is consistent with guidance which in turn separately addresses the differing requirements of relevant environmental legislative guidance, namely;

- EPA, Environmental Liabilities Regulations Guidance Document, 2011
- EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed site

3.1 Environmental Liabilities Directive (Regulations) Assessment

The Environmental Liability Directive (ELD) (Regulations 2008) define environmental damage under three categories:

- **Damage to natural habitats and protected species** - any damage that has significant adverse effects on reaching or maintaining the favorable conservation status of European designated habitats or species (i.e. those covered by the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC).
- **Water damage** - damage which significantly adversely affects the ecological, chemical and/or quantitative status and/or ecological potential of waters covered in the Water Framework Directive (2000/60/EC).
- **Land damage** - any contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction in or under the land of substances, preparations, organisms or micro-organisms.

In order to assess obligations under the ELD, the following steps will be implemented;

1. Initial screening to determine whether there is an ELD obligation (or potential obligation to notify under the precautionary principal) to notify under either of the following categories;
    a. **Strict liability** applies to a wide range of operations that are listed in Schedule 3 of the Regulations. The operators of these activities are held strictly liable for *water damage, land damage and damage to natural habitats and protected species* as defined in the Regulations. ESB would potentially have Strict Liability in relation to any incidents occurring at its respective IE-licensed sites

b. **Fault-based liability** applies to all occupational activities that are not listed in Schedule 3 of the Regulations. Operators of occupational activities other than those listed in Schedule 3 are liable for damage to *natural habitats and protected species,* if the operator was at fault or negligent. Fault-Based Liability in relation to incidents occurring outside any licensed sites.

2. Inform the EPA where it has been determined there is an ELD obligation (or potential obligation to notify under the precautionary principal) to notify.

3. Complete an environmental site assessment to further assess the potential risk to *water damage, land damage and damage to natural habitats and protected species*. The following stages of assessment will be undertaken as required;

    a. Desk-based Assessment
    b. Detailed Site Assessment

4. Develop and implement a remedial action plan where required.

3.2 Contaminated Land and Groundwater Site Assessment

The following risk methodology will be adopted and follows a staged approach, addressing key issues in succession and as required.

The following are the three main stages and their substages to be led by a contaminated land specialist:

1. Stage 1: Site Characterisation & Assessment
    - Preliminary Site Assessment
    - Detailed Site Assessment
    - Quantitative Risk Assessment
2. Stage 2: Corrective Action Feasibility & Design
    - Outline Corrective Action Strategy
    - Feasibility Study & Outline Design
    - Detailed Design
    - Final Strategy & Implementation Plan
3. Stage 3: Corrective Action Implementation & Aftercare.
    - Enabling Works
    - Corrective Action Implementation & Verification
    - Aftercare

3.3 Stage 1: Site Characterisation & Assessment

The characterisation and assessment of the leak location involves the collection, collation and assessment of information associated with the site as directed by an

experienced contaminated land specialist.

This stage will typically be undertaken in three phases as set out below:

a) Preliminary Site Assessment,
b) Detailed Site Assessment and
c) Quantitative Risk Assessment (QRA). This will comprise as required:
    - Generic QRA (GQRA)
    - Detailed QRA (DQRA)

On identification of the leak location, a Preliminary Site Assessment (PSA) will be undertaken by ESB Networks. As part of the PSA and following collation of available desk-based information (including any information provided by relevant Local Authorities e.g. water abstractions) and establishing the constituents of the fluid in the cable section; the contaminated land specialist develops a Conceptual Site Model (CSM) which identifies the relevant source, pathways and receptors on a site specific basis. This information is used to determine if a pollutant linkage is present.

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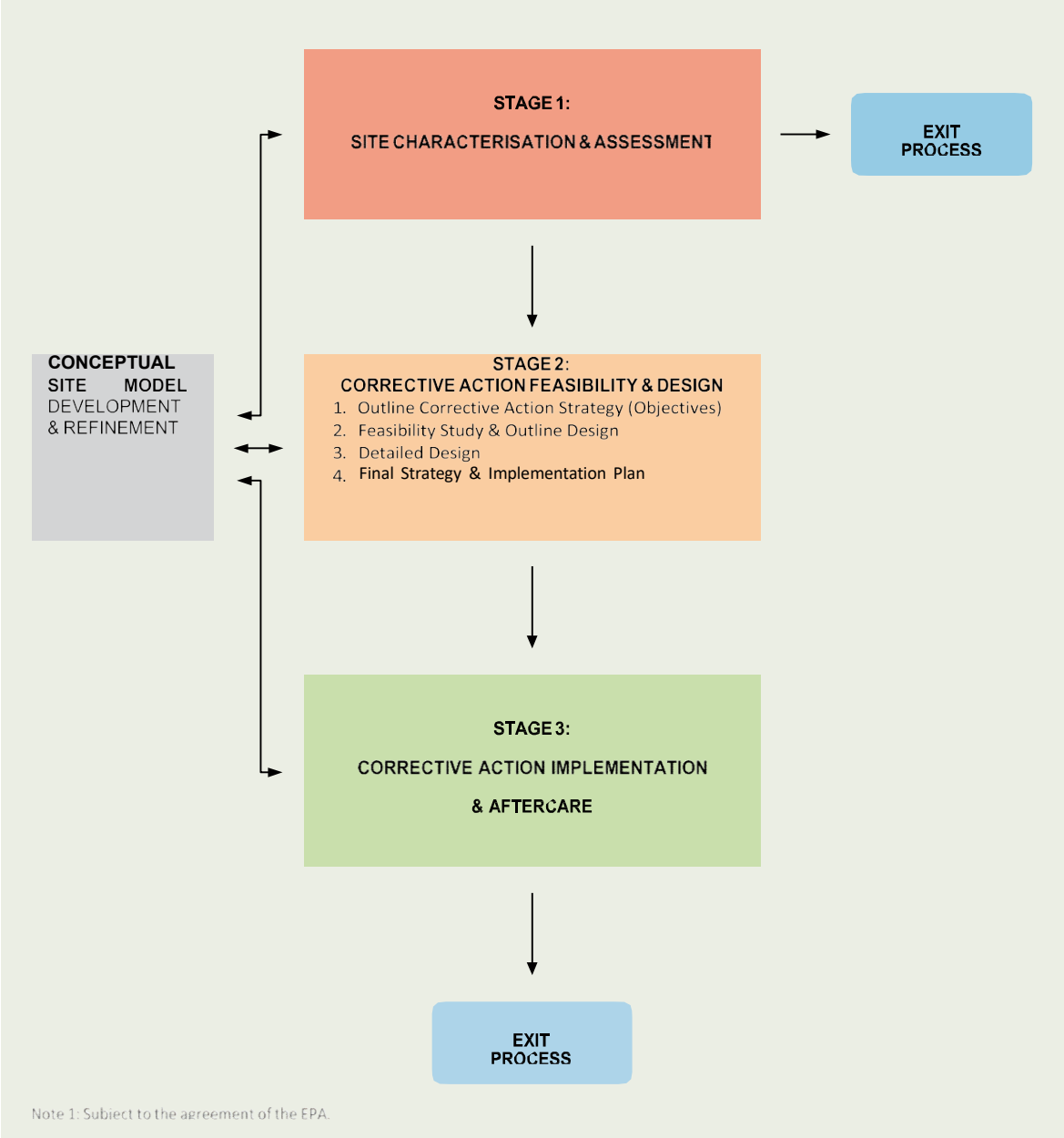

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Policy
Management of Fluid Filled Cables in ESB Networks

To provide feedback or view the errata log for this document, click here: Provide Feedback View Feedback Log

Issuing Authority:	Head of Asset Management		
Content Owner:	Looby. Tom (ESB Networks)		
Document Number:	DOC-301007-ANR	Version:	0
Document Status:	Approved	Status Date:	01/09/07

The Requirements of this document shall be complied with by all users.
Feedback on this document is welcome and should be given to the Content Owner.
Requests for derogation(s) shall be referred to the Content Owner.

Management of Fluid Filled Cables in ESB Networks

Issue Date: September 2007

Document No: DOC-301007-ANR

Issued by: *Underground Networks*

Asset Management

Approved: *Brendan Keane,*

Manager, Network Assets and Procurement,

Asset Management

Contents

1. About this Document

This document covers the management procedure for fluid filled cables in ESB Networks.

2. Background

Nationally there are 890 kms of underground high voltage cables. Less than 15% of these, primarily located in the greater Dublin area, incorporate a fluid as an insulating medium. This cable design was installed between the 1950's and the mid 1970's. In the 1970's dry type plastic insulation was developed and all cables installed since then have been of that type.
There are few significant leaks on the majority of these for long periods of time; the majority of the leaks apply to less than 20% of the cable fluid filled cable population.

Leaks can occur due to a variety of causes. Corrosion of the metallic cable sheath, manufacturing defects, soil movement and traffic vibration; leaks at plumbed cable joints and third party interference and damage to the cable structure, are the main causes of most fluid filled cable leakages.

This document outlines how leaks from such cables are proactively managed and outlines the nature of cable replacement fluid, methods employed to avoid leaks, their detection, location, recording and reporting, target leak repair times, target annual leakage rates and specific work programmes to reduce leaks.

3. Detection of Leaks

All fluid filled cables are fitted with pressure gauges and alarms which sense the loss of pressure associated with leaks. These alarms are monitored by a computerised supervisory system (SCADA) in a continuously staffed Control Centre and are dispatched for immediate attention. The alarm systems and pressure gauges are tested at least once per year every year in accordance with Cable Maintenance policy , and defective items, if any, are replaced as soon as practicable.

4. Avoidance of Third Party Damage

A considerable number of leaks, estimated to be up to 30% of the total, can be caused by third party activity such as excavation works, installation of signage and other utility plant close to cables and unauthorised moving or disturbance of cables. Where ESB is notified of impending works close to fluid filled cables, detailed cable route drawings are furnished to the Contractor and ESB monitoring staff are assigned to oversee the works in the vicinity of such cables

5. Location of Leaks

Leaks are located by a combination of the following techniques coupled with local knowledge and cable route patrolling:

- Successively freezing the cable using liquid nitrogen and monitoring fluid pressures
- Sheath testing of cables with plastic sheaths and using voltage gradient methods to pinpoint the source of the leak
- Engagement of a specialist Contractor with particular expertise in cable leak location methods

6. Procurement of Cable Fluid

Cable fluid purchased since approximately 1986 is a linear Alkylbenzene material. Prior to that date, mineral oil was used to insulate the cable cores.

All new cable replacement fluid complies with the OECD 301 Test for ready biodegradability. The water hazard rating for this material is WGK-1 which is classed as a low hazard to water.

7. Disposal of Contaminated Soil

Contaminated soil is disposed of in an Environmentally compliant manner using appropriately permitted and licensed Service Providers in accordance with ESB Procedures for hazardous material.

8. Recording of Leaks

When it is necessary to replenish cable fluid levels all relevant details (circuit name, date, fluid volume pumped) are accurately recorded after every pumping operation. This information forms the basis of a monthly report which is used to assess performance, identify trends and the need for remedial action.

9. Targets for "Average Leak Repair Times"[1]

High volume leaks, which cannot be replenished by pumping fluid back into the cable , or a fluid leak in an environmentally sensitive area, will be attended to immediately subject to outage and road opening licence availability.

An Environmentally sensitive area is defined as an area that is within 50m from a watercourse or situated within an area where ground water is known to be vulnerable or in close proximity to a borehole, well or water intakes used to extract water for human consumption, or an area designated as a Special Area of Conservation (SAC) or Candidate SAC.

For other cable leaks, the following repair times will be targeted from 2008 subject to outage and road opening licence availability:

Leakage Rate (Litres per Annum)	Location Time (Months)	Repair Time (Months)
< 600	9	3
600 – 1200	6	3
> 1200	3	3
UK Utility Fluid Filled Cable Leak Response Agreement Requirements for reference[2]		
< 1200	Commence leak location/repairs within two months subject to the limits of leak location	
> 1200	38/110kV - Commence procedures for location/repairs without delay	
	220kV - Monitor and commence action to locate and repair before cumulative leakage exceeds 480 litres (approx 6 months)	

[1] These are average figures ;in specific cases it may not be possible to achieve these due to local circumstances eg leak located within main railway bridge etc ; in other cases eg with a favourable road opening licence turnaround, it may be possible to complete the location and repair works sooner than given in the Table above

[2] Note these give start times but do not commit to a finish date

10. Leak Volume Targets

Leak volume rates for 2008 onwards will be less than 20,000 litres per annum. Post 2010 the target will be less than 15,000 litres per annum, based on replacement of the leakiest 38kV circuits before the end of 2010.

11. Short Term Work Programme to Reduce Leakage

1. There is an ongoing programme of cable leak location and repair using specialist in house staff and using external contractors who can provide cable leak location expertise and equipment. This work is prioritised on the basis of proximity of the circuit to sensitive locations, leakage rate and circuit outage and road opening licence availabilities.

2. Circuits with elevation heads in the 20-25m range, which have a history of leakage will be targeted for pressure reduction and reduction of individual hydraulic section length. This will be achieved via installation of stop joints at suitable locations. The reduced pressure will reduce the leakage rate and the shorter section length will reduce the time expended in locating leaks.

3. A remote monitoring trial scheme will be introduced in 2008. Its potential for better and faster detection of fluid leakage relative to traditional alarm systems will be then be evaluated. Assuming that the trial is successful, it would be intended to expand its introduction to all main circuits in 2010.

4. Repair of sheath faults on those Aluminium sheathed circuits which are sheath testable is being undertaken subject to circuit outage and road opening licence availability

12. Medium Term Work Programmes to Further Reduce Cable Leaks

In addition to the ongoing implementation of the short term programmes above approximately 19.5km of the worst leakage performance oil filled cable will be replaced before the end of 2010. The abandoned fluid filled cables will be depressurized and vacuumed to remove as much free fluid as possible and then sealed at both cable ends.

An Ghníomhaireacht um Chaomhnú Comhshaoil

Tá an Ghníomhaireacht um Chaomhnú Comhshaoil (GCC) freagrach as an gcomhshaol a chaomhnú agus a fheabhsú mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaol a chosaint ar thionchar díobhálach na radaíochta agus an truaillithe.

Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

- **Rialú:** Déanaimid córais éifeachtacha rialaithe agus comhlíonta comhshaoil a chur i bhfeidhm chun torthaí maithe comhshaoil a sholáthar agus chun díriú orthu siúd nach gcloíonn leis na córais sin.
- **Eolas:** Soláthraímid sonraí, faisnéis agus measúnú comhshaoil atá ar ardchaighdeán, spriocdhírithe agus tráthúil chun bonn eolais a chur faoin gcinnteoireacht ar gach leibhéal.
- **Tacaíocht:** Bímid ag saothrú i gcomhar le grúpaí eile chun tacú le comhshaol atá glan, táirgiúil agus cosanta go maith, agus le hiompar a chuirfidh le comhshaol inbhuanaithe.

Ár bhFreagrachtaí

CEADÚNÚ

Déanaimid na gníomhaíochtaí seo a leanas a rialú ionas nach ndéanann siad dochar do shláinte an phobail ná don chomhshaol:

- saoráidí dramhaíola (m.sh. láithreáin líonta talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh. déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- an diantalmhaíocht (m.sh. muca, éanlaith);
- úsáid ghlanscartha agus scaoileadh rialaithe Orgánach Géinmhodhnaithe (OGanna);
- foinsí radaíochta ianúcháin (m.sh. trealamh x-gha agus radaiteiripe, foinsí tionsclaíocha);
- áiseanna móra stórála peitril;
- sceitheadh fuíolluisce;
- gníomhaíochtaí dumpála ar farraige.

FORFHEIDHMIÚ NÁISIÚNTA I LEITH CÚRSAÍ COMHSHAOIL

- Clár náisiúnta iniúchtaí agus cigireachtaí a dhéanamh gach bliain ar shaoráidí a bhfuil ceadúnas ón nGníomhaireacht acu.
- Maoirseacht a dhéanamh ar fhreagrachtaí cosanta comhshaoil na n-údarás áitiúil.
- Caighdeán an uisce óil, arna sholáthar ag soláthraithe uisce phoiblí, a mhaoirsiú.
- Obair le húdaráis áitiúla agus gníomhaireachtaí eile chun dul i ngleic le coireacht chomhshaoil trí chomhordú a dhéanamh ar líonra forfheidhmiúcháin náisiúnta, díriú ar chiontóirí, agus maoirsiú a dhéanamh ar fheabhsúchán.
- Cur i bhfeidhm rialachán ar nós na Rialachán um Dhramhthrealamh Leictreach agus Leictreonach (WEEE), um Shrian ar Shubstaintí Guaiseacha agus na Rialachán um rialú ar shubstaintí a ídíonn an ciseal ózóin.
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaol.

BAINISTÍOCHT UISCE

- Monatóireacht agus tuairisciú a dhéanamh ar cháilíocht aibhneacha, lochanna, uiscí idirchreasa agus cósta na hÉireann, agus screamhuiscí; leibhéil uisce agus sruthanna aibhneacha a thomhas.
- Comhordú náisiúnta agus maoirsiú a dhéanamh ar an gCreat-Treoir Uisce.
- Monatóireacht agus tuairisciú a dhéanamh ar Cháilíocht an Uisce Snámha.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOL

- Monatóireacht a dhéanamh ar cháilíocht an aeir agus Treoir an AE maidir le hAer Glan don Eoraip (CAFÉ) a chur chun feidhme.
- Tuairisciú neamhspleách le cabhrú le cinnteoireacht an rialtais náisiúnta agus áitiúil (m.sh. tuairisciú tréimhsiúil ar Staid Chomhshaol na hÉireann agus Tuarascálacha ar Tháscairí).
- Rialú Astaíochtaí na nGás Ceaptha Teasa in Éirinn
- Fardail agus réamh-mheastacháin na hÉireann maidir le gás ceaptha teasa a ullmhú.
- An Treoir maidir le Trádáil Astaíochtaí a chur chun feidhme i gcomhair breis agus 100 de na táirgeoirí dé-ocsaíde carbóin is mó in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde comhshaoil a chistiú chun brúnna a shainaithint, bonn eolais a chur faoi bheartais, agus réitigh a sholáthar i réimsí na haeráide, an uisce agus na hinbhuanaitheachta.

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Measúnacht a dhéanamh ar thionchar pleananna agus clár beartaithe ar an gcomhshaol in Éirinn (m.sh. mórphleananna forbartha).

COSAINT RAIDEOLAÍOCH

- Monatóireacht a dhéanamh ar leibhéil radaíochta, agus measúnacht a dhéanamh ar a oiread is atá muintir na hÉireann gan chosaint ar an radaíocht ianúcháin.
- Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha.
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta.
- Sainseirbhísí cosanta ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

TREOIR, FAISNÉIS INROCHTANA AGUS OIDEACHAS

- Comhairle agus treoir a chur ar fáil d'earnáil na tionsclaíochta agus don phobal maidir le hábhair a bhaineann le caomhnú an chomhshaoil agus leis an gcosaint raideolaíoch.
- Faisnéis thráthúil ar an gcomhshaol ar a bhfuil fáil éasca a chur ar fáil chun rannpháirtíocht an phobail a spreagadh sa chinnteoireacht i ndáil leis an gcomhshaol (m.sh. Timpeall an Tí, Mapaí Radóin).
- Comhairle a chur ar fáil don Rialtas maidir le hábhair a bhaineann leis an tsábháilteacht raideolaíoch agus le cúrsaí práinnfhreagartha.
- Plean Náisiúnta Bainistíochta Dramhaíola Guaisí a fhorbairt chun dramhaíl ghuaiseach a chosc agus a bhainistiú.

MÚSCAILT FEASACHTA AGUS ATHRÚ IOMPRAÍOCHTA

- Feasacht chomhshaoil níos fearr a ghiniúint agus dul i bhfeidhm ar athrú iompraíochta dearfach trí thacú le gnóthais, le pobail agus le teaghlaigh a bheith níos éifeachtúla ar acmhainní.
- Tástáil le haghaidh radóin a chur chun cinn i dtithe agus in ionaid oibre, agus gníomhartha leasúcháin a spreagadh nuair is gá.

BAINISTÍOCHT AGUS STRUCHTÚR AN GCC

Tá an ghníomhaíocht á bainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóirí. Déantar an obair ar fud cúig cinn d'Oifigí:

- An Oifig um Inbhuanaitheacht Comhshaoil
- An Oifig Forfheidhmithe i leith cúrsaí Comhshaoil
- An Oifig um Fhianaise agus Measúnú
- An Oifig um Chosaint Radaíochta agus Monatóireacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag comhaltaí air agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair imní agus le comhairle a chur ar an mBord.

EPA Headquarters
Johnstown Castle Estate
County Wexford
Tel: (053) 916 0600
Fax: (053) 916 0699
Web: www.epa.ie
Email: info@epa.ie