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# ESB Networks Historic Cable Fluid Losses: Preliminary Site Assessment

## Location 13: Dodder Rd - Templeogue 38 kV - April 2015

*Prepared for*

ESB Networks  
Engineering Major Projects  
One Dublin Airport Central  
Dublin Airport  
Cloghran  
Co. Dublin

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Project Number: GCU0257001

February 2020

FINAL (Issue 10)

Project Title: ESB Networks Historic Cable Fluid Losses: Preliminary Site Assessment. Location 13: Dodder Rd - Templeogue 38 kV - April 2015

Report Ref: GCU0257001/002

Status: Final

Client: ESB Networks  
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Document Production / Approval Record (final documents only)

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## EXECUTIVE SUMMARY

This report presents a preliminary site assessment (PSA) of the potential environmental impacts associated with the historic loss of cable fluid from a section of underground cable located in Templeogue, Dublin 6. ESB records indicate that 6,435 litres of cable fluid (a mixture of linear alkyl benzenes, refined mineral oils and additives) leaked into the ground from the subject section of cable over a period of 27 months between January 2013 and April 2015.

The PSA was performed with reference to the EPA's 2013 publication "*Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites*". The EPA's guidance document outlines a staged and risk-based approach to contaminated land and groundwater assessment, with the PSA being the first stage in the process. By its nature the PSA stage is precautionary and conservative, aiming to identify those potential "pollutant linkages" where more detailed assessment is required.

Generally, more detailed assessment is only necessary where the assessed risk to a potential receptor is moderate, high or very high. However, in cases where the potential receptor is particularly sensitive, more detailed assessment may be recommended even if the assessed risk is low.

The findings of the PSA for the subject loss of cable fluid can be summarised as follows:

- The leak location is in a mixed commercial/residential area adjacent to the entrance to Templeogue Tennis Club on Templeogue Road, Dublin 6;
- The topography in the vicinity of the leak location is relatively flat; ground elevations within the area of interest are relatively level along Templeogue Road. Ground elevations dip down to the south or south-east across the grounds of the tennis club and beyond to the River Dodder;
- The River Dodder is located approximately 100m south of the leak location at the closest point and flows generally towards the north-east. The River Dodder discharges to the tidal reaches of the River Liffey adjacent to the East Link bridge, approximately 8 km downstream of the leak location. The status of the River Dodder under the WFD classification system is currently "moderate" and it is categorised as being "at risk" of not meeting WFD objectives;
- Based on available geological maps, the area of the leak location is underlain by silty clays with subordinate sands and gravels, below which is limestone bedrock. Additionally, gravelly alluvium is mapped along the River Dodder valley;
- The groundwater body underlying the area of interest is classified as a "locally important" aquifer from a productivity perspective. Its current WFD status is "good", and it is categorised as "not at risk" of achieving WFD objectives. Vulnerability of the bedrock aquifer from a contamination standpoint is "low" in the area of interest, with some areas of higher vulnerability close by;

- The River Dodder, ecosystems dependent on this water body and the bedrock aquifer in the limestone bedrock appear to be the key environmental receptors potentially at risk of impact from the leak of cable fluid from this location. The potential for cable fluid (or some of its constituent compounds) to permeate buried water mains and impact water quality in the water mains also needs to be considered; however, the low solubility of these compounds and the low rate of permeation are such that they are unlikely to impact water quality in the pipes. Whilst occupants of buildings in the vicinity of the leak could be considered to be potential receptors via vapour intrusion pathways, because of the expected low volatility of the cable fluid, the risk of such receptors being impacted is probably low.

A preliminary risk assessment was completed that considered the potential risk posed by the subject leak on the identified potential receptors. The findings of this preliminary risk assessment are summarised in the following table:

Receptor	Risk Category	Comment
River Dodder & dependent ecosystems	Low	Low risk of pollution of River Dodder, which lies approximately 100m south of the leak location. No preferential pathways have been identified potentially linking the leak location to the river.  There are understood to have been no reports of pollution of the river linked to the subject loss of cable fluid.
Water mains, water supply	Low	Whilst the potential for organic compounds to permeate water mains is known (in particular plastic water pipes and the joints of other types of water pipes), the potential for constituents of the cable fluid to permeate water mains was not established during the PSA.  The risk category assumes that cable fluid may be present as residual LNAPL in the water main trench and that there is potential for constituents of the cable fluid to permeate water pipes, but not to the extent that they will impact water quality in the pipes.
Bedrock aquifer	Low	The bedrock is classified as a “locally important” aquifer. Vulnerability rating is “low” in the area of interest with some areas of higher vulnerability also in the vicinity.  No preferential pathways potentially linking the leak location to the aquifer have been identified.
Occupants of buildings where there are potential confined spaces	Very low	There are no occupied buildings in the immediate vicinity of the leak location or the cable route close to the leak location. No health effects are anticipated.

Further investigation of the risk to the above-mentioned receptors (i.e. the River Dodder, ecosystems dependent on this water body, water mains, the bedrock aquifer and occupants of nearby buildings) is not considered necessary.

\* \* \* \* \*

## 1 INTRODUCTION

### 1.1 Project Background

Geosyntec Consultants Ltd (Geosyntec) is pleased to present the Electricity Supply Board (ESB) this Preliminary Site Assessment (PSA), which relates to the potential environmental impacts associated with the historic loss of cable fluid from a section of underground cable located in Templeogue, Co. Dublin. The alignment of the subject section of cable and the approximate location of the historic loss of cable fluid is illustrated in ESB Drawing Number QD-354120-01-D460-001-017-001 (Figure 1).

The PSA was completed in accordance with Geosyntec proposal reference 190607 dated June 2019, which was authorised by the ESB on 1<sup>st</sup> July 2019. The PSA was led by Mr Graham Webb, who is an environmental engineer with over 25 years' relevant experience, and Mr Jim Wragg, who is a contaminant hydrogeologist with over 30 years' relevant experience.

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 a cable fluid. The majority of these fluid-filled cables are located in urban settings across Dublin city and Cork city. The cable fluid acts as an electrical insulator and aids the conduction of heat away from the conductor allowing the cable to be operated more efficiently. The cables are vulnerable to third party interference or damage, and over time, cables can develop leaks due to defects developing in the cable sheath and in joints and terminations. When such leaks occur, there is potential for pollution to arise.

In the case of the section of fluid-filled cable that is the subject of this PSA, ESB records indicate that 6,435 litres of cable fluid leaked into the ground from the cable over a period of 27 months between January 2013 and April 2015.

### 1.2 Objective and Scope of Work

The primary objective of the PSA was to complete a preliminary assessment of the potential types, locations, extent and significance of environmental impacts associated with the subject historic cable fluid loss. The PSA was performed with reference to the EPA's 2013 publication "*Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites*". This PSA report is based on the EPA's guideline template report for PSAs, which is linked to the 2013 guidance.

The EPA's 2013 guidance document outlines a staged approach to contaminated land and groundwater assessment, with the PSA being the first stage in the process. During the PSA stage, the guidance requires the assessor to identify environmental "receptors" - including groundwater and surface water bodies and flora and fauna dependent on them as well as people - who are potentially at risk from the source of contamination, and to qualitatively assess the risk to each environmental receptor by considering the viability of each source-pathway-receptor "pollutant linkage". Those pollutant linkages where there is considered to be a moderate or high risk of impact from the source of contamination, or where the receptor

is particularly sensitive, are identified through this process. These pollutant linkages are then carried forward to the next stage of the process during which more detailed assessment can be completed. Given the above, the PSA stage of the process is precautionary and conservative in nature.

Generally, more detailed assessment is only necessary where the assessed risk to a potential receptor is moderate, high or very high. However, in cases where the potential receptor is particularly sensitive, more detailed assessment may be recommended even if the assessed risk is low.

The PSA for the subject loss of cable fluid was based on a desk study of publicly available information and information provided by the ESB, a walkover survey of the immediate vicinity of the cable within approximately 200 metres of the location of the historic loss of cable fluid, and a reconnaissance of the surrounding area.

Information for the desk study element of the PSA was obtained from the following sources:

- Ordnance Survey Ireland (OSI) website ([www.osi.ie](http://www.osi.ie)): historic maps, historic aerial images, recent “street-view” map;
- Environmental Protection Agency (EPA) websites ([www.epa.ie](http://www.epa.ie) and [www.catchments.ie](http://www.catchments.ie)): locations of EPA-licensed facilities, locations of Natura 2000 sites and National Heritage Areas (NHAs), information on groundwater and surface water quality, including Water Framework Directive (WFD) classifications;
- Geological Survey of Ireland (GSI) website ([www.gsi.ie](http://www.gsi.ie)): overburden and bedrock geology, information on groundwater resources and groundwater vulnerability;
- Office of Public Works (OPW) website ([www.opw.ie](http://www.opw.ie)): flood risk;
- National Waste Collection Permit Office (NWCPO) website ([www.nwcpo.ie](http://www.nwcpo.ie)): register of companies holding waste facility permits or certificates of registration issued by local authorities;
- ESB records outlining the location of the cable fluid loss, the volume of fluid lost and the period over which the fluid loss occurred;
- Safety Data Sheets (SDSs) provided by the ESB for the cable fluids understood to have been used in the subject cable at the time of the cable fluid loss.

The walkover survey and reconnaissance of the area surrounding the subject section of cable was completed by Mr Graham Webb of Geosyntec on 4<sup>th</sup> July 2019. A series of photographs taken at the time of the walkover survey and reconnaissance is included in Appendix A.

During the walkover survey and reconnaissance, information on the following aspects were recorded:

- The environmental setting, with regard to local topography, surface water drainage and the proximity of local surface water courses;

- Land use, in particular the proximity of residential properties and other potentially sensitive land uses close to the subject section of cable;
- The proximity of the subject section of cable to other below-ground infrastructure, such as water mains, gas mains and sewers;
- Distressed vegetation, which may be indicative of subsurface contamination.

Central to the PSA was the development of a preliminary Conceptual Site Model, which presents potential source-pathway-receptor (SPR) linkages identified during the PSA, and a preliminary assessment of the risk posed to identified human or environmental receptors from residual cable fluid potentially remaining in the vicinity of the subject section of cable.

## 2 DETAILS OF LOSS EVENT

### 2.1 Introduction

In the case of the section of fluid-filled cable that is the subject of this PSA, ESB records indicate that 6,435 litres of cable fluid leaked into the ground from the cable over a period of 27 months between January 2013 and April 2015. The type of fluid understood to have been present in the cable is identified in ESB records as a mix of linear alkyl benzenes, refined mineral oils and additives.

### 2.2 Properties of Cable Fluid

The properties of the fluids understood to have been used in the subject section of cable over the period of the leak, based on information contained within the Safety Data Sheets provided by ESB, are as follows:

Property	Linear Alkyl Benzenes	Refined Mineral Oils
Boiling Point	280°C	Not stated
Flash Point	>135°C	145°C
Flammability	Non flammable	Non flammable
Explosive properties	Not explosive	Not stated
Vapour pressure	<0.02 kPA at 20°C	<0.01 hPA at 20°C
Density	0.86 g/cm <sup>3</sup> at 20°C	0.89 g/cm <sup>3</sup> at 20°C
Solubility in water	Negligible	Negligible
Kinematic Viscosity	4.2 mm <sup>2</sup> /s typical	8.5 mm <sup>2</sup> /s at 40°C

In their 2010 publication “*Classification of Hazardous and Non-Hazardous Substances in Groundwater*”, the EPA classifies all petroleum hydrocarbon compounds listed in the document, including linear alkyl benzenes and mineral oil, as hazardous in groundwater. However, this is on the basis that they are former List I substances and it is stated in the document that these classifications are “under review”. Based on the methodology outlined in the above-mentioned publication (which is based on the persistence, toxicity and potential to bioaccumulate of the substance in the environment) and publicly-available information on its properties, Geosyntec has concluded that linear alkyl benzenes should be classified as non-hazardous in groundwater. The classification of mineral-oil based cable fluid is not clear based on the information currently available.

### 2.3 Fate & Transport of Cable Fluid

The fate and transport of cable fluid entering the subsurface during and following the subject leak can be expected to be controlled by the following factors:

- The blend of linear alkyl benzene compounds, refined mineral oils and additives that make up the cable fluid is less dense than water;
- The cable fluid mixture has a low water solubility (< 1 mg/l);
- The compounds in the cable fluid mixture are believed to be semi to non-volatile;
- The compounds present in the cable fluid can be expected to biodegrade but at rates that are controlled by the surface area of the fluid in the subsurface (i.e. in the form of a light non-aqueous phase liquid or LNAPL), its solubility where in contact with groundwater, the availability of electron acceptors and the presence of appropriate microbial populations.

Following creation of a breach in the cable structure, the conceptual model of the dispersion of the cable fluid into the subsurface at the subject location can be described as follows:

- As the cable fluid is less dense than water it will tend to migrate into the pore spaces in the sand bedding around the cable and downward under the force of gravity until it reaches either a water table or low permeability horizon, such as natural clay at the base of the cable trench;
- The cable fluid will tend to spread laterally whilst:
  - There is a driving head provided by leakage of further cable fluid;
  - There is a path of relatively low resistance, e.g. the sand bedding around the cable, potentially permeable fill material in other service trenches that the cable trench intersects, or permeable horizons in the overburden.

The migration potential of the cable fluid released to the subsurface as a result of the subject leak is discussed in more detail in Section 4.

### 3 SITE ENVIRONMENTAL SETTING

#### 3.1 Proximity of Site to Designated Ecologically Sensitive Areas

The National Parks and Wildlife Service on-line mapping tool was consulted to check if the leak location lies close to ecologically sensitive areas. Based on the information reviewed there are no Special Areas of Conservation (SACs - as per the Habitats Directive 92/43/EEC), National Heritage Areas (NHAs or proposed NHAs - as per the Wildlife Amendment Act, 2000) or a Special Protection Areas (SPAs - as per the Birds Directive 2009/147/EC) within a 2 km radius of the leak location.

#### 3.2 Surrounding Land Use & Field Observations

The subject leak location is adjacent to Templeogue Tennis Club on the south side of Templeogue Road, Dublin 6. The fluid-filled cable is located under the footpath on the south side of Templeogue Road. The leak location is bounded to the north by Templeogue Road, beyond which is residential housing and commercial (retail) buildings, and to the east (along Templeogue Road) by further commercial buildings. The tennis club lies to the south of the leak location, beyond which is a residential area. To the west along Templeogue Road there are further residential properties, which are set back approximately 10m from the footpath.

The River Dodder lies approximately 100m south of the leak location (at its closest point) and flows generally eastwards, discharging to the tidal reaches of the River Liffey adjacent to the East Link bridge in central Dublin.

The earliest historic map available from the OSI's website is dated 1837 - 1842 (Appendix B) and shows that the leak location was greenfield land at that time. Templeogue Road is shown on this map, running approximately southwest-northeast past the leak location. The historic map dated 1888 - 1913 shows that the land in the vicinity of the leak location at that time was mostly greenfield apart from a developed region to the north-west, which is named Albany Lodge. The historic map dated 1888 - 1913 shows some development of residences and commercial buildings along Templeogue Road, as well as the establishment of a tramline. At this time a tramline runs through the leak location and a Tramway Depot is shown just south of the leak location.

The earliest aerial image available from OSI's website (other than 19<sup>th</sup> century historical maps) is dated 1995. This image indicates that in 1995, the road layout and the layout of the commercial and residential buildings in the vicinity of the leak location was similar to that observed today.

Based on information from the EPA's and NWCPO's websites there are no facilities in the vicinity of the leak location that operate under an Industrial Emissions licence, an Integrated Pollution Control licence, a Waste licence or a Waste Facility Permit.



### 3.3 Topography & Surface Water

The leak location lies at an elevation of approximately 50 metres above Ordnance Datum. The topography in the vicinity of the leak location appears to be relatively flat, with ground elevations dipping down slightly from north to south towards the River Dodder.

The nearest surface water body to the leak location is the River Dodder which is located approximately 100 metres south of the leak location and generally flows in an east-north-easterly direction. It discharges into the River Liffey adjacent to the East Link bridge in central Dublin, approximately 8 km from the leak location. The status of the River Dodder under the WFD classification system is currently “at risk” of not meeting current WFD objectives and is listed as being under significant pressure due to urban run-off. For the period 2010 - 2015, the EPA classified water quality in the River Dodder as “moderate.”

No fluvial flood risk is identified by the OPW in the vicinity of the leak location.

### 3.4 Geology & Hydrogeology

The bedrock geology underlying the leak location is mapped by the GSI as dark limestone and shale known as the Lucan formation. A section of bedrock outcrop is mapped approximately 300 metres east of the leak location. The overburden deposits overlying the bedrock are indicated by the GSI to comprise mainly glacial till comprising silty clay with subordinate sand and gravel. Additionally, gravelly alluvium is mapped along the River Dodder valley, extending to within approximately 50 metres south of the leak location.

The groundwater body (GWB) underlying the vicinity of the leak location is known as the Dublin GWB. This GWB covers an area of approximately 837 km<sup>2</sup> extending west from the Dublin coastline to the village of Kilmeage in Co. Kildare and extending from Malahide in north Co. Dublin to the southern limits of Dublin city. The GSI classifies the Dublin GWB as a “locally important” aquifer from a productivity perspective. Such aquifers are generally moderately productive only in local zones.

The vulnerability of the bedrock aquifer (from a water quality perspective) is classified by the GSI as “low” directly underlying the leak location, with sections of “moderate” to “high” vulnerability in its vicinity, indicating variable thickness of overburden.

According to the GSI’s online database, there are no recorded wells on their database within 1 km of the leak location.

The EPA is responsible for classifying GWBs in Ireland in terms of water quality and their ability to meet objectives set out in the WFD. Based on the most recent round of EPA monitoring (2010 - 2015), the status of the Dublin GWB was categorised as “good” and it was categorised as “not at risk” with regard to achieving WFD objectives.

## 4 CONCEPTUAL SITE MODEL

### 4.1 Introduction

For the purposes of this PSA, it has been assumed that the top of the fluid filled cable is buried at a depth of 0.9 – 1.1m below ground level within a backfilled trench that is around 1.2m deep. The trench backfill is assumed to comprise a 0.35 m deep sand layer (0.85m below ground level) above which the trench is filled with granular material.

For the purposes of the PSA, strata adjacent to and below the cable trench have been assumed to comprise:

- Low permeability silty clay dominated glacial till, and/or;
- Granular fill materials associated with trench backfill for other underground services that intersect the route of the fluid filled cable, and/or;
- Granular fill materials associated with historical development in the surrounding area.

It has also been assumed that perched groundwater may periodically be present within the in-filled cable trench.

### 4.2 Source & Potential Migration Pathways

Based on the expected low permeability of overburden material in the vicinity of the leak location, cable fluid lost to ground in this case can be expected to have spread laterally within the permeable sand bedding and possibly within the granular backfill within the cable trench. If the cable trench intersects more permeable material (e.g. deeper fill materials associated with historical development, lenses of natural sands or gravels, or another in-filled services trench) this could result in cable fluid migrating from the line of the cable trench and along a different route or routes.

We have developed a series of indicative estimates for the subject leak location under different ground condition scenarios, with regard to the extent of cable fluid migration. These estimates have assumed that the cable is installed within a 0.35m thick sand bedding and surround layer in a trench 1.1m wide cut into low permeability clay soils (which can be expected at the subject location):

- In the case where (i) the sand bedding is dry, (ii) the cable fluid saturation reaches 40% residual saturation of the pore space in the sand bedding and (iii) the overlying granular back-fill material in the trench acts as a capillary break, the theoretical length of trench impacted by LNAPL migration is 209m. Given that the topography locally along the cable route is relatively level, there appears to be potential for cable fluid to migrate both north-east and south-west along the line of the cable trench from the leak location;

- In the event that the base of the trench contains perched water then this would lower the LNAPL saturation in the sand layer surrounding the cable. This could result in LNAPL migration through the granular back-fill material above the sand bedding layer. The thickness of LNAPL-saturated soils will likely be less under this scenario than that outlined above, but the cable fluid would tend to spread further. If a 40% residual cable fluid saturation is assumed in granular backfill material over a 0.2m thickness, this would lead to a theoretical length of trench impacted by cable fluid of 366m;
- The third scenario considered herein is where the cable trench near the leak point passes through an area of granular fill materials of similar properties to those used to backfill the trench. Here a more radial spreading of the cable fluid could occur. If a 0.2m deep soil zone is impacted with a LNAPL saturation of 40% then the theoretical radius of cable fluid LNAPL impact away from the release would be 11 metres. Based on the local topography, there is potential for the migration of cable fluid under this scenario to be preferentially towards the south, towards the tennis club;
- The cable fluid may have some semi-volatile components and as such will generate a modest vapour pressure. However, this may be attenuated by biodegradation processes in the shallow soils. In aerobic shallow soils and groundwater, degradation of alkyl benzenes and other hydrocarbons is expected to be relatively quick (half-life in soil of 15 days<sup>1</sup>). Conversely, degradation is expected to be negligible in anaerobic conditions. Degradation products of alkyl benzenes include toluene and ethylbenzene, which have relatively high vapour pressures. However, these products would be expected to be only generated in small quantities and themselves also degrade quickly;
- Cable fluid has the potential to migrate from the source to underneath confined spaced receptors (such as building cellars), either in LNAPL form or via migration in the dissolved phase in groundwater flow following dissolution from the LNAPL. Vapours generated from the LNAPL or groundwater have the potential to migrate through the unsaturated zone and building defects into confined spaces, where they may be breathed in by building occupants, potentially causing toxic and/or nuisance effects.

In addition to the above scenarios, the following potential migration pathways were considered as part of the PSA but they were not carried forward to the preliminary risk assessment because the source-pathway-receptor (SPR) linkage was not considered viable:

- Soil and dust ingestion from near surface soils;
- Dermal contact with near surface soils;
- Inhalation of fugitive dust from near surface soils; and
- Ingestion of soils via consumption of vegetables grown in near surface soils.

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<sup>1</sup> Energy cable saturant SDS – refer to Appendix C

### 4.3 Potential Receptors

With the above migration pathways in mind, the River Dodder, ecosystems dependent on this water body, and the bedrock aquifer in the Carboniferous Limestone appear to be the key environmental receptors potentially at risk of impact from the leak of cable fluid from this location. The potential for cable fluid (or some of its constituent compounds) to permeate buried water mains and impact water quality in the water mains also needs to be considered; however, the low solubility of these compounds and the low rate of permeation are such that they are unlikely to impact water quality in the pipes.

Whilst occupants of buildings in the vicinity of the leak could be considered to be potential receptors via vapour intrusion pathways, because of the expected low volatility of the cable fluid, the risk of such receptors being impacted is probably low.

Groundworks contractors performing future tasks in the vicinity of the leak location could also be considered potential receptors (via direct contact, inhalation and ingestion pathways). However, it has been assumed that the potential risks posed to future groundworks contractors would be adequately mitigated through effective health and safety planning and work control procedures at the time the works are being carried out. As a result, groundworks contractors have not been considered potential receptors in the preliminary risk assessment presented in the following section.

## 5 PRELIMINARY RISK ASSESSMENT

The key potential source-pathway-receptor (SPR) linkages associated with the subject loss of cable fluid are presented in this section, together with a preliminary assessment of the risk posed to the identified receptors. The preliminary risk assessment is based on the methodology outlined in CIRIA C552 (2001) “*Contaminated Land Risk Assessment – A Guide to Good Practice*”. This methodology requires the classification of the magnitude of the **consequence** (severity) of a risk occurring, and the **probability** of a risk occurring. The risk assessment methodology is summarised in Tables 1 – 4 below.

The potential consequences of contamination risks occurring are classified in accordance with Table 1.

**Table 1: Classification of Consequence**

Classification	Definition of Consequence
Severe	<ul style="list-style-type: none"> <li>• Short-term (acute) risk to human health likely to result in significant harm.</li> <li>• Short-term risk of pollution of sensitive water resource.</li> <li>• Catastrophic damage to buildings/property.</li> <li>• A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• Chronic damage to human health.</li> <li>• Pollution of sensitive water resources.</li> <li>• A significant change in a particular ecosystem, or organism forming part of such ecosystem.</li> </ul>
Mild	<ul style="list-style-type: none"> <li>• Pollution of non-sensitive water resources.</li> <li>• Significant damage to crops, buildings, structures and services.</li> <li>• Damage to sensitive buildings/structures/services or the environment.</li> </ul>
Minor	<ul style="list-style-type: none"> <li>• Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.</li> <li>• Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.)</li> <li>• Easily repairable effects of damage to buildings, structures and services.</li> </ul>

The probability of contamination risks occurring are classified in accordance with Table 2.

**Table 2: Classification of Probability**

Classification	Definition of Probability
High Likelihood	Circumstances are such that an event appears very likely in the short-term or almost inevitable in the long-term; or there is already evidence that such an event has occurred.
Likely	Circumstances are such that such an event is not inevitable, but is possible in the short-term and is likely over the long-term.
Low Likelihood	Circumstances are such that it is by no means certain that an event would occur even over a longer period, and it is less likely in the short-term.
Unlikely	Circumstances are such that it is improbable that an event would occur even in the very long-term.

For each viable SPR linkage, the potential risks are evaluated, as presented in Table 3.

Definitions of the risk categories, together with the investigatory and remedial actions that may be necessary in each case are presented in Table 4.

**Table 3: Risk Matrix**

		Severe	Medium	Mild	Minor
Probability	High likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate risk	Low risk
	Low likelihood	Moderate risk	Moderate risk	Low risk	Very low risk
	Unlikely	Low risk	Low risk	Very low risk	Very low risk

**Table 4: Definition of Risk Categories and Likely Actions Required**

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

The key potential SPR linkages associated with the subject loss of cable fluid are presented in Table 5 below, together with a preliminary assessment of the risk posed to the identified receptors in each case, in line with the above methodology.

Table 5: Preliminary Risk Assessment for Location 13

Source	Potential Pathway	Receptor	Consequence	Probability	Risk Category	Comment
Loss of cable fluid (linear alkyl benzenes, mineral oils and additives) over the period January 2013 to April 2015 (estimated 6,435 litres).	Predominantly lateral migration of cable fluid from the leak location along the cable trench, and/or through granular lenses within the overburden, followed by migration along other preferential pathways (e.g. other in-filled services trenches that intersect the cable trench)	River Dodder; Ecosystems dependent on this water body	Mild	Low Likelihood	Low	Low risk of pollution of River Dodder, which lies approximately 100m south of the leak location. No preferential pathways have been identified potentially linking the leak location to the river.  There are understood to have been no reports of pollution of the river linked to the subject loss of cable fluid.
	Predominantly lateral migration of cable fluid from the leak location along the cable trench, and/or through granular lenses within the overburden, and subsequent migration into backfilled trenches containing water mains. Permeation of constituents of the cable fluid through the walls or joints of the water mains.	Water mains/ Water supply	Medium	Unlikely	Low	Whilst the potential for organic compounds to permeate water mains is known (in particular plastic water pipes and the joints of other types of water pipes), the potential for linear alkyl benzenes and/or mineral oil-based cable fluid to permeate water mains was not established during the PSA.  The risk category assumes that cable fluid may be present as residual LNAPL in the water main trench and that there is potential for it to permeate water pipes. However, the low solubility of the cable fluid and the expected low rate of permeation are such that they are unlikely to impact water quality in the pipes.

Table 5: Preliminary Risk Assessment for Location 13

Source	Potential Pathway	Receptor	Consequence	Probability	Risk Category	Comment
(as above)	Vertical migration of cable fluid via permeable lenses in the overburden and/or via granular material in in-filled services trenches to groundwater in the bedrock aquifer, followed by dissolution of cable fluid and generation of a dissolved-phase plume of hydrocarbons in the bedrock aquifer.	Bedrock aquifer	Mild	Low Likelihood	Low	The bedrock is classified as a “locally important” aquifer. Vulnerability rating is “low” in the area of interest with some areas of higher vulnerability also in the vicinity.  No preferential pathways potentially linking the leak location to the aquifer have been identified.
	Predominantly lateral migration of cable fluid from the leak location along the cable trench, and/or through granular lenses within the overburden, followed by migration along other preferential pathways (e.g. other in-filled services trenches that intersect the cable trench). Release of vapour-phase hydrocarbons and/or daughter products from the LNAPL (noting that there is limited potential for this to occur) and migration in the vapour phase into buildings.	Occupants of buildings where there are potential confined spaces	Minor	Low likelihood	Very low	There are no occupied buildings in the immediate vicinity of the leak location or the cable route close to the leak location.  No health effects are anticipated.



## 6 CONCLUSIONS

The following conclusions have been drawn based on the information reviewed and observations made during this PSA:

- The leak location is in a mixed commercial and residential area in Templeogue, Dublin 6;
- The topography in the vicinity of the leak location is relatively flat; ground elevations within the area of interest are relatively level along Templeogue Road. Ground elevations dip down to the south or south-east across the grounds of the tennis club and beyond to the River Dodder;
- The River Dodder is located approximately 100m south of the leak location at the closest point and flows generally towards the north-east. The River Dodder discharges to the tidal reaches of the River Liffey adjacent to the East Link bridge, approximately 8 km downstream of the leak location;
- The key receptors potentially at risk of impact from the subject leak are considered to be the River Dodder, ecosystems dependent on this water body, the bedrock aquifer underlying the area, water mains in the vicinity of the leak location and occupants of nearby buildings with potential confined spaces;
- Following the preliminary risk assessment methodology outlined in CIRIA publication C552 (2001), the appropriate risk category for these potential receptors and the associated SPR linkages are considered to be:
  - River Dodder - Low
  - Water mains - Low
  - Bedrock aquifer - Low
  - Occupants of nearby buildings - Very low

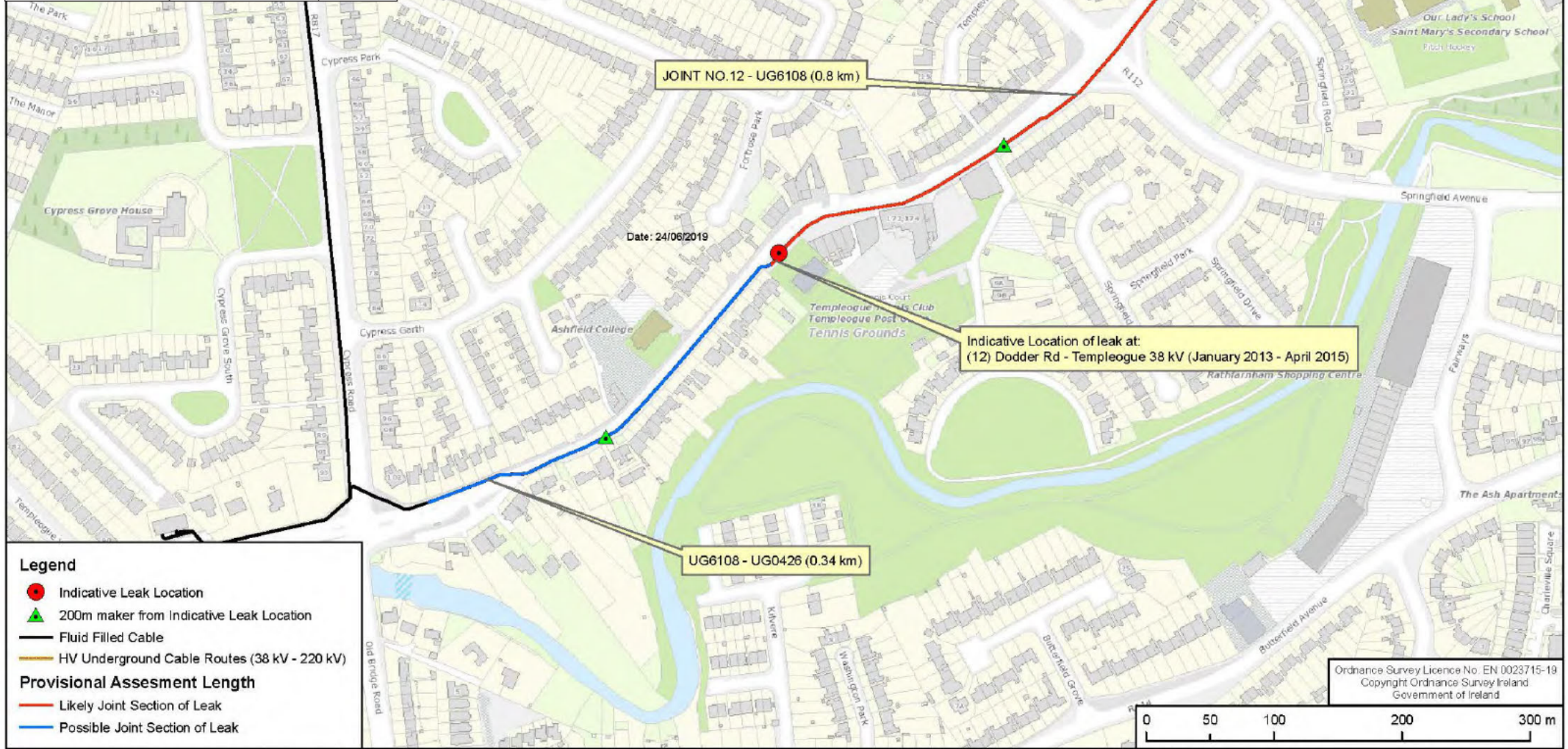
Further investigation of the risk to the above-mentioned receptors (i.e. the River Dodder, ecosystems dependent on this water body, water mains, the bedrock aquifer and occupants of nearby buildings) is not considered necessary.

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**Figure 1 - Site Location No. 13**

Templeogue, Co. Dublin	GCU0257001	
<b>Geosyntec</b> consultants	ESB	Figure <b>1</b>
Dublin, Ireland	July 2019	



**Legend**

- Indicative Leak Location
  - ▲ 200m maker from Indicative Leak Location
  - Fluid Filled Cable
  - HV Underground Cable Routes (38 kV - 220 kV)
- Provisional Assesment Length**
- Likely Joint Section of Leak
  - Possible Joint Section of Leak

1	ADDITIONAL SPATIAL INFORMATION ADDED	TDR	TDR	JF	AMC
2	REQUEST FOR PROPOSAL	TDR	TDR	JF	AMC
REV DATE	REVISION DESCRIPTION	DRW	PROD	VER	APP
CLIENT APPROVAL <input type="checkbox"/> PLANNING <input type="checkbox"/> TENDER <input type="checkbox"/> CONSTRUCTION <input type="checkbox"/> AS-BUILT <input type="checkbox"/>					



Engineering and Major Projects,  
One Dublin Airport Central,  
Dublin Airport, Cloughan,  
Co. Dublin, K67 XF72, Ireland.  
Tel: 053 1 708 8000 Web: www.esb.ie  
Engineering and Major Projects is a  
division of ESB.

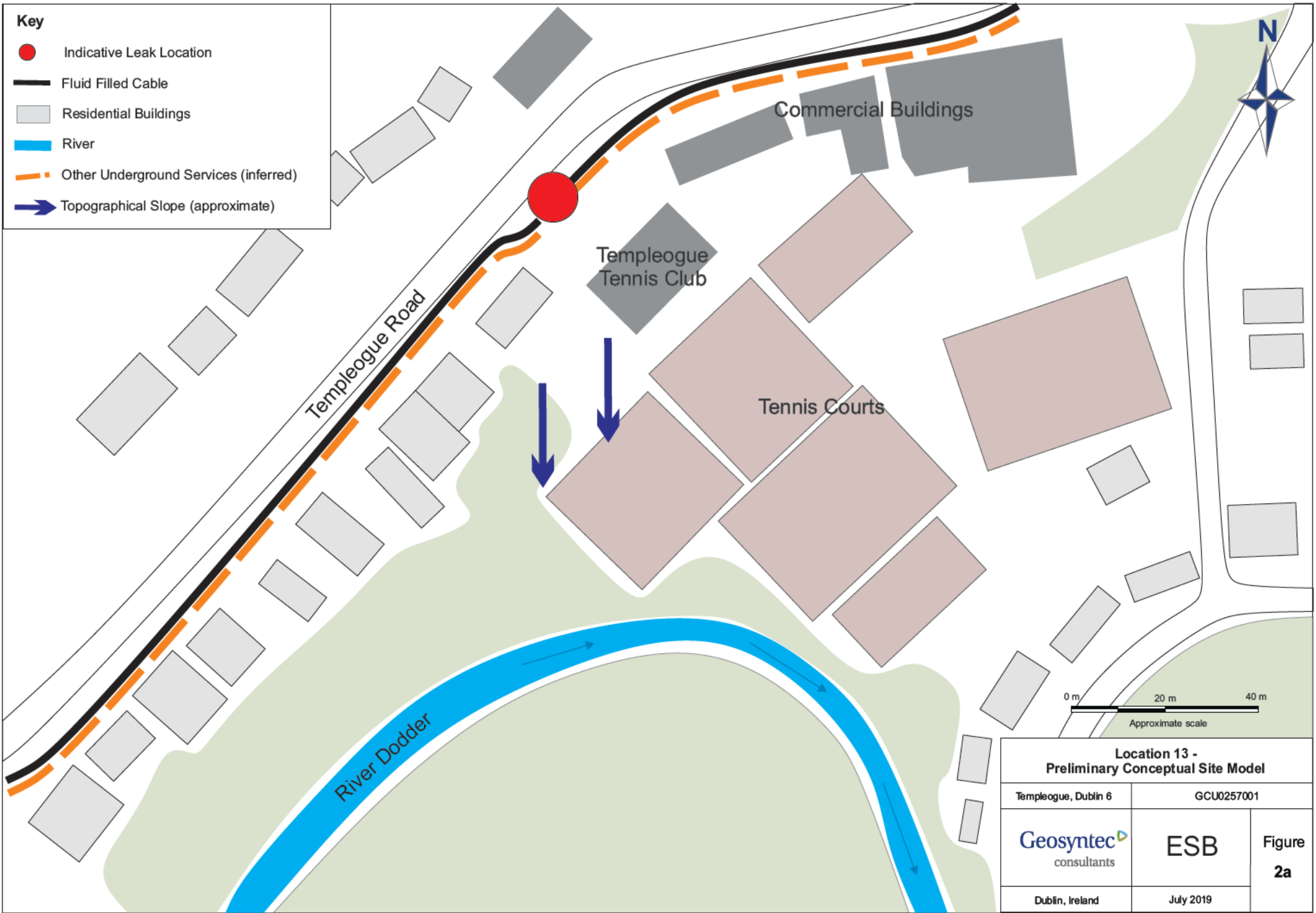
CLIENT:	ESB Networks
PROJECT:	P.R.A.
CONTRACT:	

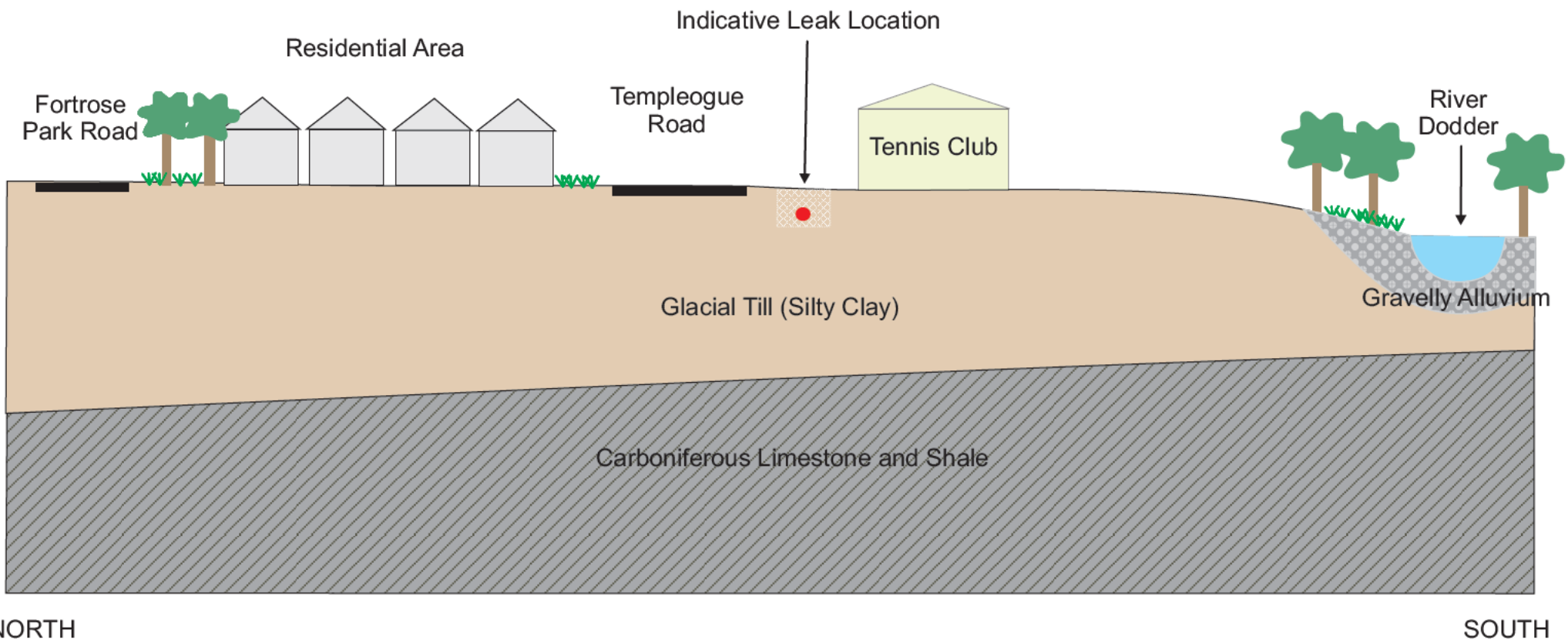
PRODUCTION UNIT:	Civil & Environmental Engineering
DRAWING TITLE:	Indicative Cable Fluid Leakage Locations & Cable Sections (12) Dodder Rd - Templeogue 38 kV (January 2013 - April 2015)

<small>THIS DRAWING IS THE PROPERTY OF THE CLIENT. ALL RIGHTS RESERVED. NO PART OF THIS DRAWING MAY BE REPRODUCED, STORED IN A RETRIEVABLE SYSTEM, TRANSMITTED, OR ANY MANNER BEING MANIPULATED, USED IN ANY MANNER, OR FOR ANY PURPOSE, WITHOUT THE WRITTEN PERMISSION OF THE CLIENT. THE CLIENT ACCEPTS FULL RESPONSIBILITY FOR THE ACCURACY OF THE INFORMATION PROVIDED TO THE CLIENT AND THE CLIENT'S OBLIGATION TO VERIFY THE INFORMATION PROVIDED TO THE CLIENT.</small>					
DRAWN:	T.O'Rourke	PRODUCED:	T.O'Rourke	VERIFIED:	J. Fitzpatrick
CLIENT REF:	00-00	NO OF SHEETS:	1	NO OF SHEETS:	1 of 1
DRAWING NUMBER:	QD-354120-01-D460-001-017-001				

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Location 13 - Preliminary Conceptual Site Model		
Templeogue, Dublin 6	GCU0257001	
Geosyntec consultants	ESB Networks	Figure 2b
Dublin, Ireland	July 2019	

Appendix A - Photolog

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**Photograph 1 – View north-east along Templeogue Road close to leak location**



**Photograph 2 – View south-west along Templeogue Road close to leak location**





**Photograph 3 – Retail area north-east of leak location**



**Photograph 4 – Tennis club entrance**





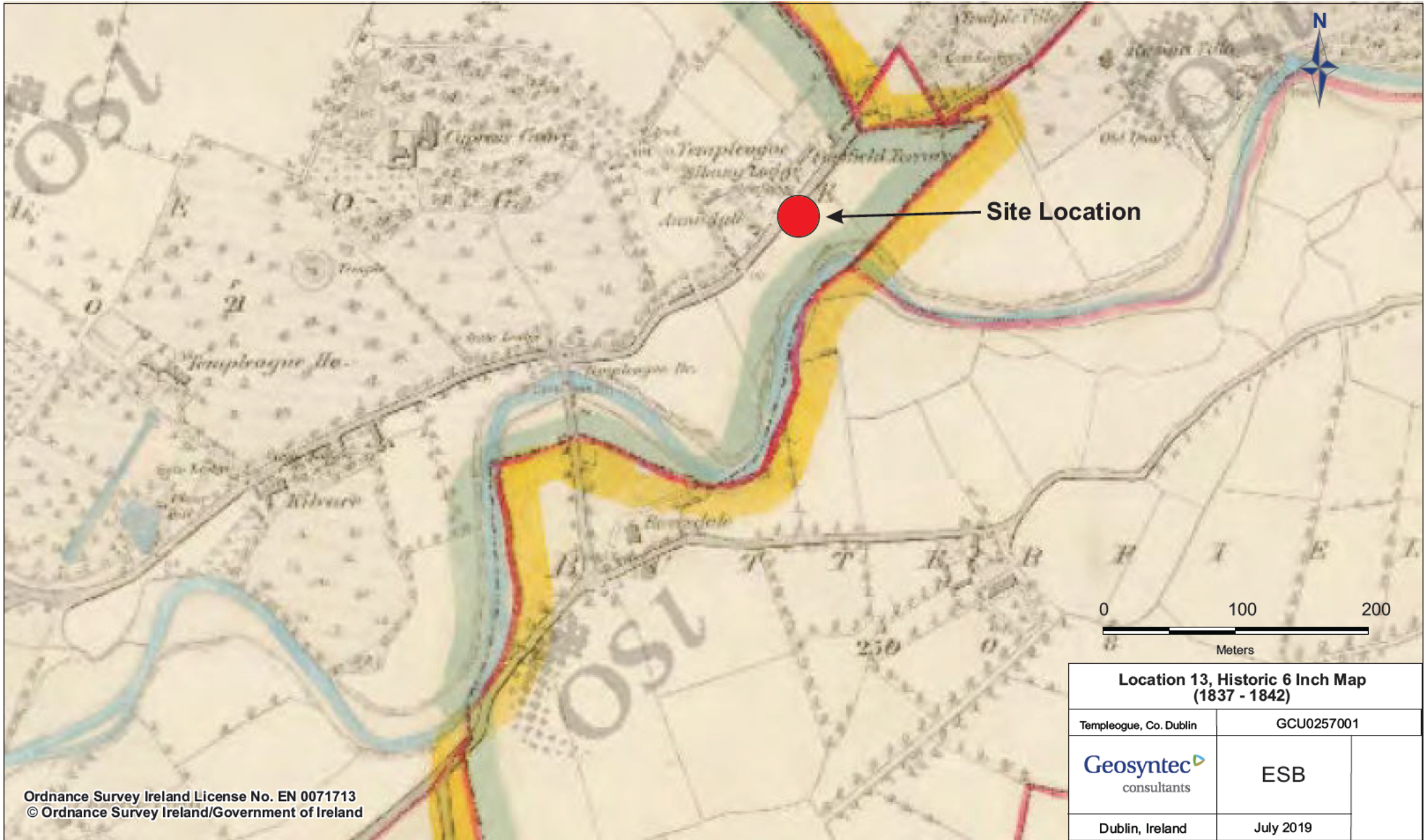
**5. Front garden of residence close to leak location  
(note: mature tree in garden appeared healthy)**



**Photograph 6 – River Dodder down-gradient of leak location  
(close to Riverside Cottages)**

Appendix B – Historical Maps and Aerial Images

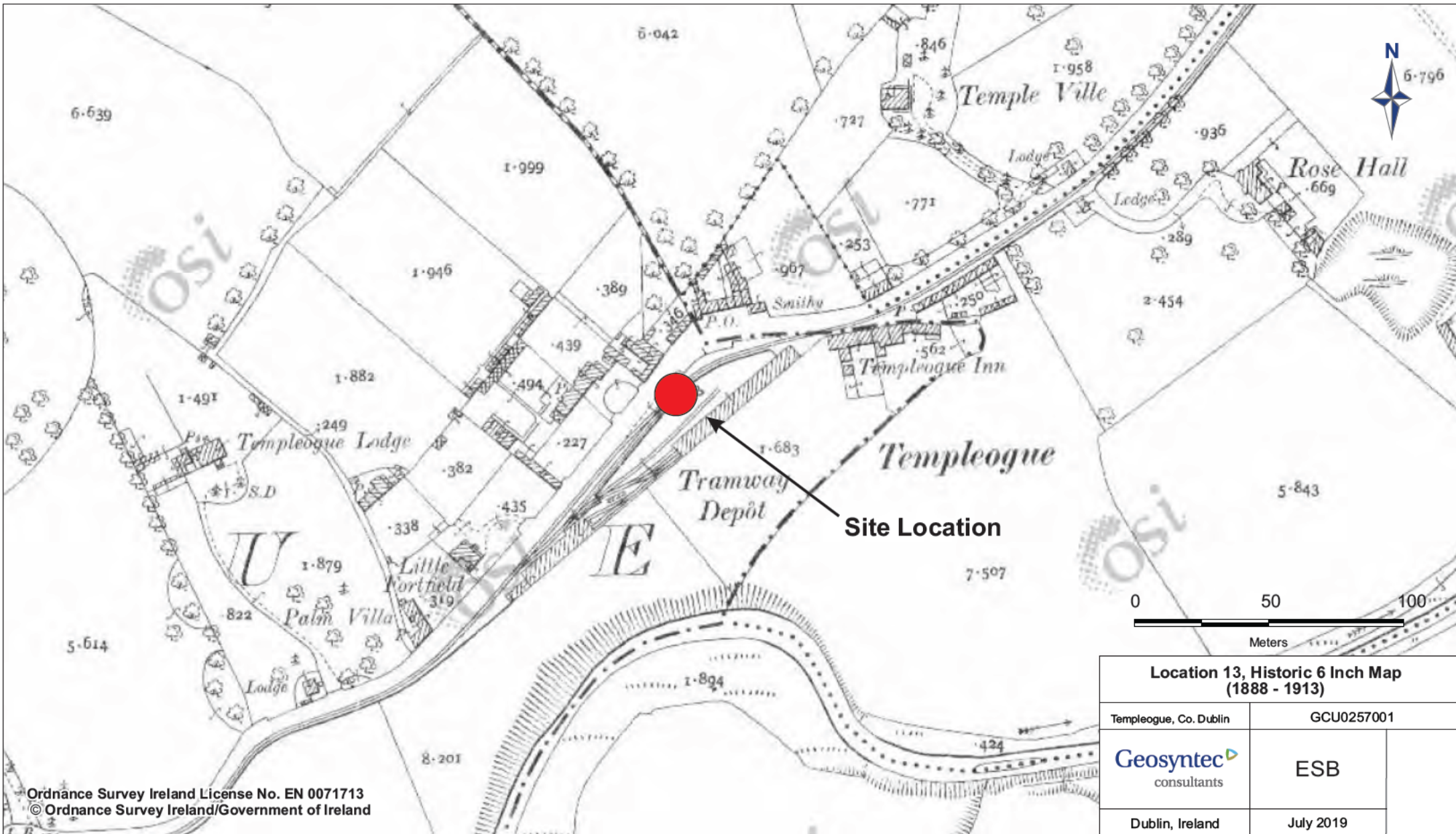
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<b>Location 13, Historic 6 Inch Map (1837 - 1842)</b>	
Templeogue, Co. Dublin	GCU0257001
<b>Geosyntec</b> consultants	ESB
Dublin, Ireland	July 2019





Location 13, Historic 6 Inch Map (1888 - 1913)	
Templeogue, Co. Dublin	GCU0257001
Geosyntec consultants	ESB
Dublin, Ireland	July 2019





Site Location



Location 13, Aerial Map (2005 - 2012)	
Templeogue, Co. Dublin	GCU0257001
<b>Geosyntec</b> consultants	ESB
Dublin, Ireland	July 2019

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Appendix C - Safety Data Sheet for Cable Fluid

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## MATERIAL SAFETY DATA SHEET

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

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

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

### 2: COMPOSITION / INFORMATION ON INGREDIENTS

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

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

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

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

### 3: HAZARDS IDENTIFICATION

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

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



## Health Effects

<u>Skin:</u>	Contact with the skin may cause irritation. Prolonged or repeated skin contact may cause drying of the skin, progressing to dermatitis. Symptoms may include itching, discolouration, swelling and blistering.
<u>Eyes:</u>	Contact with the eyes may cause irritation. Symptoms may include reddening, swelling and impaired vision.
<u>Ingestion:</u>	Ingestion of small amounts may cause nausea and vomiting.
<u>Inhalation:</u>	Due to low volatility, this product should not present an inhalation hazard under ambient conditions. Exposure to vapour or mineral oil mists may irritate the mucous membranes and cause dizziness, headaches and nausea.

## Environmental Effects

No specific hazards under normal use conditions.

## **4: FIRST AID MEASURES**

<u>Inhalation:</u>	Remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance and call a doctor. If breathing has stopped, administer artificial respiration.
<u>Skin contact:</u>	Remove contaminated clothing and wash affected skin with soap and water. If persistent irritation occurs, obtain medical attention. If high pressure injection injuries occur, obtain medical attention immediately.
<u>Eye contact:</u>	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
<u>Ingestion:</u>	Wash out mouth with water and obtain medical attention. DO NOT INDUCE VOMITING.

## **5: FIRE FIGHTING MEASURES**

<u>Suitable extinguishing media:</u>	Carbon dioxide (CO <sub>2</sub> ), dry chemical, foam or water spray.
<u>Unsuitable extinguishing media:</u>	Do not use water jets.
<u>Special exposure hazards:</u>	Combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including carbon monoxide, and unidentified organic and inorganic compounds.
<u>Special protective equipment:</u>	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.



## 6: ACCIDENTAL RELEASE MEASURES

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

## 7: HANDLING AND STORAGE

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

### Handling and Storage Materials and Coatings

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

## 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

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

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

## 9: PHYSICAL AND CHEMICAL PROPERTIES

### General Information

Appearance: Clear, colourless liquid  
Odour: Mild petroleum odour

### Health, safety and environmental information

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

### Other information

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

## 10: STABILITY AND REACTIVITY

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

Conditions to avoid: Temperatures above 140 °C

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

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

## 11: TOXICOLOGICAL INFORMATION

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

## 12: ECOLOGICAL INFORMATION

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

### 13: DISPOSAL CONSIDERATIONS

Disposal must be in accordance with local and national legislation.

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

### 14: TRANSPORT INFORMATION

This product is not classified as dangerous for transport.

### 15: REGULATORY INFORMATION

Classification/Symbol: Not Regulated

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

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

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

#### Further Guidance

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

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

Preventing dermatitis at work (INDG 233)

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

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

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

Relevant EC Directives:

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

## **16: OTHER INFORMATION**

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

### **Key References:**

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

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

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

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

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

# Safety Data Sheet

(93/112/EC)



Date of edition: October 1995

## 1. Identification of Substance/Preparation and Company

Product name:

Masse 106

Supplier:

FELTEN & GUILLEAUME Energietechnik AG

Schanzenstraße 24-30

51063 Köln

Emergency telephone number: 0221/676-3333

## 2. Composition/Information on Ingredients

Blend of highly refined mineral oils and additives.

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

## 3. Hazards Identifikation

Human Health Hazards

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

Prolonged or repeated exposure may give rise to dermatitis.

No specific hazards under normal use conditions.

Safety hazards

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

Environmental hazards

Avoid spillage.

The product is not readily biodegradable.

## 4. First Aid Measures

Inhalation

Remove to fresh air.

If breathing but unconscious, place in the recovery position.

If breathing has stopped, apply artificial respiration.

Medical attention is to be obtained immediately.

Skin

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

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

Eye

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

Ingestion

Do not induce vomiting.

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

If breathing but unconscious, place in the recovery position.

If breathing has stopped, apply artificial respiration.

Medical attention is to be obtained immediately.

Advice to physicians

Treat symptomatically

## 5. Fire Fighting Measures

Extinguishing media

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



# Safety Data Sheet

(93/112/EC)



Date of edition: October 1995

**Product name: Masse 106**

## 5. Fire Fighting Measures (continued)

Unsuitable extinguishing media

Do not use water in a jet

Specific hazards

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

## 6. Accidental Release Measures

Personal precautions

Ventilate contaminated area thoroughly.

Minimise contact with skin.

Environmental precautions

Prevent further leakage or spillage and prevent from entering drains.

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

Clean-up methods

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

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

## 7. Handling and Storage

Handling

When using do not eat or drink.

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

Prevent spillages.

Storage

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

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

## 8. Exposure Controls/Personal Protection

Engineering control measures

Use only in well ventilated areas.

Occupational exposure standards

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

Respiratory Protection

Not normally required.

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

Hand Protection

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

Eye Protection

Safety spectacles

Body Protection

Minimise all forms of skin contact.

# Safety Data Sheet

(93/112/EC)



Date of edition: October 1995

**Product name: Masse 106**

## 8. Exposure Controls and Personal Protection (continued)

### Hygiene measures

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

## 9. Physical and Chemical Properties

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

## 10. Stability/Reactivity

### Stability

stable under normal use conditions

### Materials to avoid

strong oxidising agents

### Hazardous decomposition products

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

## 11. Toxicological Information

### Toxicological Data:

#### Acute toxicity - oral

LD<sub>50</sub> is expected to be > 2000 mg/kg.

#### Irritation of skin, irritation of eye

The product is expected to be slightly irritant.

#### Sensitisation of skin

The produkt is not expected to be a skin sensitiser.

#### Prolonged and/or repeated contact

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

#### Carcinogenicity

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

#### Other information

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

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



# Safety Data Sheet

## (93/112/EC)



Date of edition: October 1995

**Product name: Masse 106**

### 12. Ecological Information

#### Basis for assessment

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

#### Mobility

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

#### Ecotoxicity

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

### 13. Disposal Considerations

#### Product

Precautions: Dispose to licensed disposal contractor.  
Waste disposal Nr. (D): 54106

#### Container disposal

Drain container thoroughly.  
Dispose to licensed disposal contractor.

#### Recommended cleaning procedure

Cleaning by disposal contractor

### 14. Transport Information

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

### 15. Regulatory Information

#### Classification

The Product is not classified as dangerous under EC criteria.

### 16. Other Information

#### Additional informations

Concawe Report 5/87 Health Aspects of Lubricants.

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

**Material Safety Data Sheet****1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING**

**Material Name** : Shell Diala Cable Oil  
**Uses** : Insulating oil.  
**Product Code** : 001D8369  
  
**Manufacturer/Supplier** : Shell UK Oil Products Limited  
 PO BOX 3  
 Ellesmere Port  
 CH65 4HB  
 United Kingdom  
  
**Telephone** : +44 (0) 151-350-4000  
**Fax** : +44 (0) 151-350-4000  
**Email Contact for MSDS** : If you have any enquiries about the content of this MSDS please email lubricantSDS@shell.com  
  
**Emergency Telephone Number** : +44-(0) 151-350-4595

**2. HAZARDS IDENTIFICATION**

**EC Classification** : Harmful.  
  
**Health Hazards** : Repeated exposure may cause skin dryness or cracking.  
 Harmful: may cause lung damage if swallowed.  
  
**Signs and Symptoms** : If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure. Defatting dermatitis signs and symptoms may include a burning sensation and/or a dried/cracked appearance. Ingestion may result in nausea, vomiting and/or diarrhoea.  
  
**Safety Hazards** : Not classified as flammable but will burn.  
**Environmental Hazards** : Not classified as dangerous for the environment.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

**Preparation Description** : Alkyl benzene.

**Hazardous Components**

Chemical Identity	CAS	EINECS	Symbol(s)	R-phrases(s)	Conc.
Benzene, C10-C13 alkyl derivatives	67774-74-7	267-051-0	Xn	R65; R66	90.00 - 100.00 %

**Additional Information** : Refer to chapter 16 for full text of EC R-phrases.

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**4. FIRST AID MEASURES**

- Inhalation** : No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
- Skin Contact** : Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.
- Eye Contact** : Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
- Ingestion** : If swallowed, do not induce vomiting; transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (37° C), shortness of breath, chest congestion or continued coughing or wheezing.
- Advice to Physician** : Treat symptomatically. Potential for chemical pneumonitis. Consider: gastric lavage with protected airway, administration of activated charcoal. Call a doctor or poison control center for guidance.

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**5. FIRE FIGHTING MEASURES**

Clear fire area of all non-emergency personnel.

- Specific Hazards** : Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
- Suitable Extinguishing Media** : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
- Unsuitable Extinguishing Media** : Do not use water in a jet.
- Protective Equipment for Firefighters** : Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

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**6. ACCIDENTAL RELEASE MEASURES**

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe the relevant local and international regulations.

- Protective measures** : Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.
- Clean Up Methods** : Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.
- Additional Advice** : Local authorities should be advised if significant spillages

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cannot be contained.

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**7. HANDLING AND STORAGE**

- General Precautions** : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
- Handling** : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
- Storage** : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: 0 - 50°C / 32 - 122°F  
The storage of this product may be subject to the Control of Pollution (Oil Storage) (England) Regulations. Further guidance may be obtained from the local environmental agency office.
- Recommended Materials** : For containers or container linings, use mild steel or high density polyethylene.
- Unsuitable Materials** : PVC.
- Additional Information** : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion. Exposure to this product should be reduced as low as reasonably practicable. Reference should be made to the Health and Safety Executive's publication "COSHH Essentials".

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**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

**Occupational Exposure Limits**

- Exposure Controls** : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances.  
Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
- Personal Protective Equipment** : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- Respiratory Protection** : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne

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- concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)] meeting EN141.
- Hand Protection** : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
- Eye Protection** : Wear safety glasses or full face shield if splashes are likely to occur. Approved to EU Standard EN166.
- Protective Clothing** : Skin protection not ordinarily required beyond standard issue work clothes. It is good practice to wear chemical resistant gloves.
- Monitoring Methods** : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
- Environmental Exposure Controls** : Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

- Appearance : Colourless. Liquid at room temperature.
- Odour : Slight hydrocarbon.
- pH : Not applicable.
- Initial Boiling Point and Boiling Range : > 280 °C / 536 °F estimated value(s)
- Pour point : < -60 °C / -76 °F Data not available
- Flash point : Typical 140 °C / 284 °F (PMCC / ASTM D93)
- Upper / lower Flammability or Explosion limits : Typical 1 - 10 %(V)
- Auto-ignition temperature : > 320 °C / 608 °F
- Vapour pressure : < 0.5 Pa at 20 °C / 68 °F (estimated value(s))
- Density : Typical 857 kg/m<sup>3</sup> at 20 °C / 68 °F
- Water solubility : Negligible.
- n-octanol/water partition coefficient (log Pow) : > 6 (based on information on similar products)
- Kinematic viscosity : Typical 4.2 mm<sup>2</sup>/s at 40 °C / 104 °F
- Vapour density (air=1) : > 1 (estimated value(s))
- Evaporation rate (nBuAc=1) : Data not available

**Material Safety Data Sheet****10. STABILITY AND REACTIVITY**

<b>Stability</b>	: Stable.
<b>Conditions to Avoid</b>	: Extremes of temperature and direct sunlight.
<b>Materials to Avoid</b>	: Strong oxidising agents.
<b>Hazardous Decomposition Products</b>	: Hazardous decomposition products are not expected to form during normal storage.

**11. TOXICOLOGICAL INFORMATION**

<b>Basis for Assessment</b>	: Information given is based on data on the components and the toxicology of similar products.
<b>Acute Oral Toxicity</b>	: Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.
<b>Acute Dermal Toxicity</b>	: Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
<b>Acute Inhalation Toxicity</b>	: Not considered to be an inhalation hazard under normal conditions of use.
<b>Skin Irritation</b>	: Expected to be slightly irritating. Repeated exposure may cause skin dryness or cracking.
<b>Eye Irritation</b>	: Expected to be slightly irritating.
<b>Respiratory Irritation</b>	: Inhalation of vapours or mists may cause irritation.
<b>Sensitisation</b>	: Not expected to be a skin sensitiser.
<b>Repeated Dose Toxicity</b>	: Not expected to be a hazard.
<b>Mutagenicity</b>	: Not considered a mutagenic hazard.
<b>Carcinogenicity</b>	: Components are not known to be associated with carcinogenic effects.
<b>Reproductive and Developmental Toxicity</b>	: Not expected to be a hazard.
<b>Additional Information</b>	: Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible.

**12. ECOLOGICAL INFORMATION**

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

<b>Acute Toxicity</b>	: Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract).
<b>Mobility</b>	: Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
<b>Persistence/degradability</b>	: Expected to be inherently biodegradable.
<b>Bioaccumulation</b>	: Has the potential to bioaccumulate.
<b>Other Adverse Effects</b>	: Product is a mixture of non-volatile components, which are not

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expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

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**13. DISPOSAL CONSIDERATIONS**

- Material Disposal** : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
- Container Disposal** : Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
- Local Legislation** : Disposal should be in accordance with applicable regional, national, and local laws and regulations.  
EU Waste Disposal Code (EWC): 13 03 08 synthetic insulating and heat transmission oils. Classification of waste is always the responsibility of the end user.  
Hazardous Waste (England and Wales) Regulations 2005.

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**14. TRANSPORT INFORMATION****ADR**

This material is not classified as dangerous under ADR regulations.

**RID**

This material is not classified as dangerous under RID regulations.

**ADNR**

This material is not classified as dangerous under ADNR regulations.

**IMDG**

This material is not classified as dangerous under IMDG regulations.

**IATA (Country variations may apply)**

This material is not classified as dangerous under IATA regulations.

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**15. REGULATORY INFORMATION**

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

- EC Classification : Harmful.  
EC Symbols : Xn Harmful.  
EC Risk Phrases : R65 Harmful: may cause lung damage if swallowed.  
R66 Repeated exposure may cause skin dryness or cracking.  
EC Safety Phrases : S62 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.



**Material Safety Data Sheet****Chemical Inventory Status**

EINECS	:	All components listed or polymer exempt.
TSCA	:	All components listed.
Classification triggering components	:	Contains alkyl benzene derivatives.
Other Information	:	Environmental Protection Act 1990 (as amended). Health and Safety at Work Act 1974. Consumers Protection Act 1987. Control of Pollution Act 1974. Environmental Act 1995. Factories Act 1961. Carriage of Dangerous Goods by Road and Rail (Classification, Packaging and Labelling) Regulations. Chemicals (Hazard Information and Packaging for Supply) Regulations 2002. Control of Substances Hazardous to Health Regulations 1994 (as amended). Road Traffic (Carriage of Dangerous Substances in Packages) Regulations. Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations. Road Traffic (Carriage of Dangerous Substances in Road Tankers in Tank Containers) Regulations. Road Traffic (Training of Drivers of Vehicles Carrying Dangerous Goods) Regulations. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations. Health and Safety (First Aid) Regulations 1981. Personal Protective Equipment (EC Directive) Regulations 1992. Personal Protective Equipment at Work Regulations 1992.

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**16. OTHER INFORMATION**

## R-phrases(s)

R65	Harmful: may cause lung damage if swallowed.
R66	Repeated exposure may cause skin dryness or cracking.

<b>MSDS Version Number</b>	:	1.0
<b>MSDS Effective Date</b>	:	16.09.2010
<b>MSDS Revisions</b>	:	A vertical bar ( ) in the left margin indicates an amendment from the previous version.
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