Appendix 7.1

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Environmental Due Dilligence - Cornelscourt, Co. Dublin.

Technical Report Prepared For

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EXECUTIVE SUMMARY

AWN Consulting Limited (AWN) was requested by Dunnes Stores to carry out a soil quality assessment and risk assessment at the lands in Cornelscourt, Co. Dublin (Figure 1).

The investigation was undertaken to assess the current soil quality beneath the site with a particular focus on the nature of any residual contamination at the site that may be relevant to the redevelopment of the site. Site investigations (seventeen trial pits and four pilot holes), gas sampling and representative soil sample collection were carried out between 9th – 13th March 2018.

Based on the physical observations, gas and laboratory results, a localised area of residual hydrocarbon related contamination was confirmed to be present in the soil at the downgradient boundary of the adjacent petrol station (north west boundary). The extent of area impacted by residual hydrocarbon type contamination is 960m^2 – (refer to Figure 3). The contamination is most evident within a natural CLAY and the underlying gravelly Clay horizon c. 2mbgl (metres below ground level) and 3.50mbgl, respectively No free phase hydrocarbons were identified in the shallow water table or soil which indicates an older leak most likely originating from the upgradient petrol station. No evidence of contamination was identified elsewhere on site.

Representative soil samples were analysed for hydrocarbon contaminants of concern. As there are no legislative or guideline soil quality standards in Ireland, results were compared to a UK Generic Assessment Criteria (GAC) derived to be protective of human health and also ecology for a residential and commercial/industrial end use (LQM/CIEH S4ULs). No exceedances of residential or commercial thresholds have been identified for any contaminants of concern (refer to Table 1). To further assess the risk of the localised residual hydrocarbon contamination for future use of the site, AWN completed a detailed quantitative risk assessment (DQRA) using the RISC Model. RISC enables the site-specific assessment of likely risk to site end users and enables the determination of whether or not it is acceptable for soil concentrations to remain in the ground. It was concluded that there is no risk for redevelopment of the site for an apartment type development.

To investigate the suitability of soil for disposal if required as part of any future redevelopment, two soil samples were collected from within the area with residual hydrocarbon contamination and compared against Waste Acceptance Criteria (WAC). The WAC analysis is not indicative of the potential future use of the land for development but rather for identification of suitability for licenced disposal. The results identified that the soil closer to the boundary with petrol station falls under Category D – Hazardous due to the concentration of mineral oil, e.g. <500mg/kg present in the sample. The sample collected further from the petrol station is suitable for classification as Category A – Inert.

In conclusion, most of the site investigated was found to be uncontaminated. However, a localised shallow residual hydrocarbon contamination has been identified in the north west of the property with a likely extent of 960m^2. Completion of a Generic qualitative risk assessment (GQRA) and Detailed Quantitative Risk Assessment show that the site is suitable for redevelopment for residential or commercial development.

The following table summarises the overall environmental sensitivity of the site in terms of its environs.

Parameter	***Comment***	***Environmental Sensitivity***
Site location	The site is located in Cornelscourt, Co. Dublin and is mostly a greenfield site and temporary car park (Figure 1). There are no known previous uses other than agricultural. The site is immediately downgradient of a petrol station and residual hydrocarbon contamination exists in the northwest of the land holding (aerial extent of 960 m^2 Figure 3). immediately downgradient of the petrol station. The rest of the land holding was confirmed as uncontaminated. Completion of a GQRA and DQRA has shown that the site in its current state is suitable for redevelopment.	Low - Moderate
Geology and Hydrogeology	The site is underlain by Granite bedrock (which is described by the GSI as a Poor Aquifer (Pl). The aquifer vulnerability is indicated as being High based on the shallow depth to rock. There are no existing groundwater wells located in close proximity to the site. The area is generally serviced by public water supply.	Low
Surface Water	The Cabinteely Stream is located approximately 400m to the southwest of the site. There is no direct connectivity between the residual contamination and this receptor.	Low
Flooding	There is no record of flooding at this location.	Low

Table of Contents

1.0 INTRODUCTION

AWN Consulting Limited (AWN) was requested by Dunnes Stores to carry out a soil quality assessment at the lands in Cornelscourt, Co. Dublin (Figure 1).

Site investigations and representative soil and gas sample collection were carried out between 9th – 13th March 2018 to determine the vertical and horizontal extent of any residual contamination at the site.

This report summarises the data collection and provides an assessment of current soil quality at the site and likely impact of any residual contamination on redevelopment of the site for development.

1.1 Site Description & Outline of Site Investigation

The site is located 10 kilometres outside Dublin City Centre along the N11 Carriageway (Dublin to Wexford road). The site is approximately 3.8km southwest of Dublin Bay and is 1.75 hectares in total. The land is relatively flat in terms of topography with an elevation to ordinance datum (AOD Malin) ranging between 50.9m AOD – 54.6m AOD northwest to southeast. The land holding is highlighted by the red outline in the *figure* below.

Figure 1 *Site location map with trial pit locations across the site.*

The expected groundwater flow is to the southeast. The nearest watercourse is the Cabinteely Stream approximately 400 metres southeast of the site and flows northwest to southeast. There is no direct linkage between the site and this stream. The aquifer vulnerability is high based on the shallow depth to rock. The land is underlain by granite bedrock which is a Poor Aquifer (Geological Survey of Ireland Classification) and there are no known water supply wells within the area and the area is serviced by pubic mains.

Figure 1 also presents the location of investigation points. Seventeen (17) trial pits and four (4) pilot holes were constructed as part of the 2018 environmental due diligence assessment of the site at Cornelscourt to facilitate soil logging, vapour sampling and soil sample collection. Trial pit logs were constructed based on the site observations by an AWN scientist during the trial pit exercise and are presented in Appendix A.

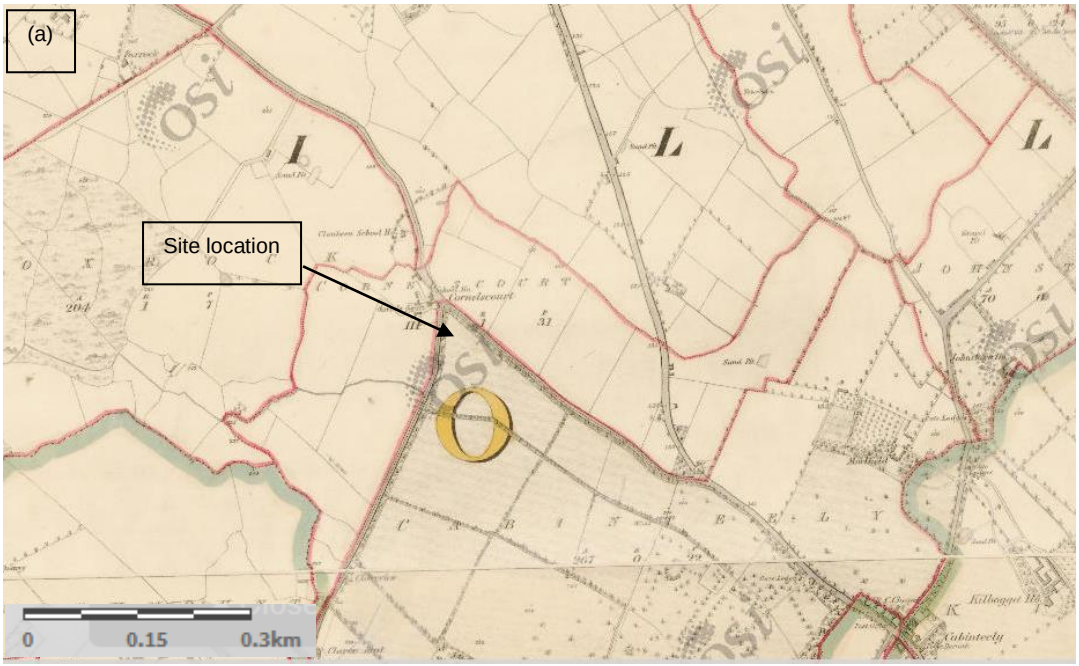
The site investigation was carried out between 9th – 13th March 2018. Trial pit depths range from 2.5m to 3.5m bgl.

1.2 Land Use

Most of the site is greenfield with part of the site (northeast) having been used in recent time as a temporary carpark.

Immediately upgradient of the north west of the site is a Texaco Service Station. This is built-up higher than the site on permeable engineering fill. The Texaco Station has a car wash, underground tanks and a store building on site. A takeaway restaurant and residential housing are located towards the western boundary of the site.

Historic maps from 1837 - 1842 and 1900s (refer to Figure 2 (a) & (b)) were reviewed and show that all available information indicates that prior land use was limited to agricultural uses only at the site. There are no quarries or historical industrial uses which could have resulted in historical sources of contamination. There are no available aerial photographs available on line since1995 but there is no evidence of any previous development other than the temporary car park.



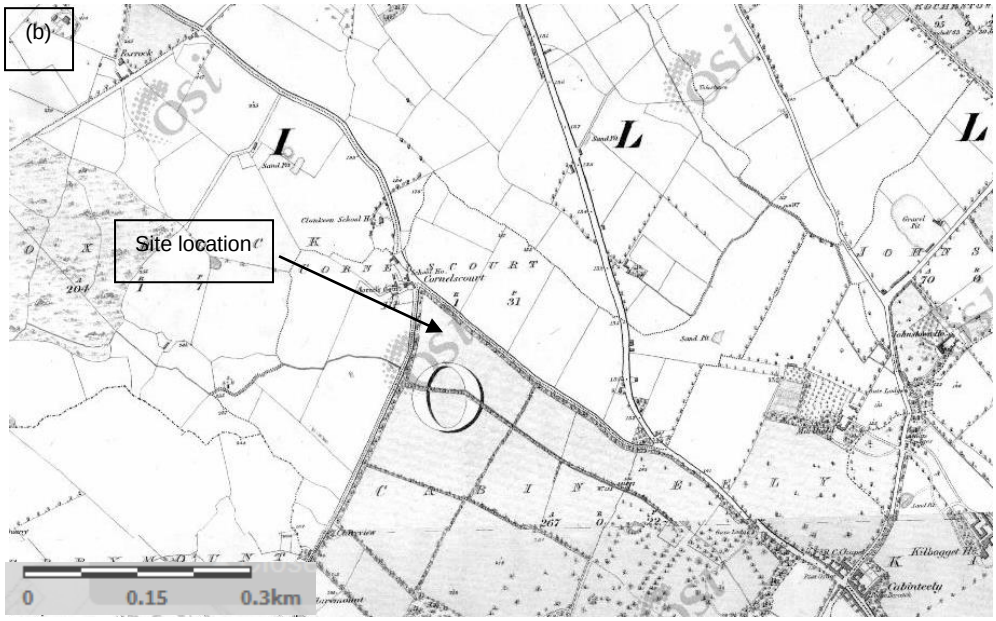


Figure 2 ***(a)*** *Historic map 1837 – 1842 of Cornelscourt.* ***(b)*** *Historic map 1900's of Cornelscourt.*

2.0 SOIL QUALITY ASSESSMENT GUIDELINES

There are no legislated threshold values for soils in Ireland. As such, the soil quality data was compared to a Generic Assessment Criteria (GAC) derived to be protective of human health and also ecology for a residential and commercial/industrial end use.

Representative soil samples were also analysed for Waste Acceptance Criteria (WAC) which indicates suitability of soil for disposable as inert, non-hazardous or hazardous. WAC results have been compared with the landfill acceptance criteria in Council Decision 2003/33/EC which determines suitable for disposal to landfill as inert, non-hazardous or hazardous.

Generic Assessment Criteria in the UK has been derived using the Contaminated Land Exposure Assessment (CLEA) model to be protective of human health for a number of different land uses. LQM (Land Quality Management) and the CIEH (Chartered Institute of Environmental Health) developed a document in July 2009 detailing their own research and derivation of their own 'LQM GACs'. A total of 82 substances including many organic substances had LQM GACs derived, for the standard land uses of residential, commercial/industrial and allotments. This was updated in 2015 following further research and the derived results are now called LQM/CIEH Suitable 4 Use Level (S4UL). The LQM/CIEH S4ULs are intended for use in assessing the potential risks posed to human health by contaminants in soil and as transparently -derived and cautious "trigger values" above which further assessment of the risks or remedial action may be needed. For each contaminant S4ULs have been derived for six land use scenarios based on assessing exposure pathways in each planning scenario. In this instance the commercial scenario has been considered. Soil type and soil organic matter (SOM) has an influence on the behaviour of contaminants. S4ULs have been derived for three SOM contents (1%, 2.5% and 6%) to cover the likely range in soils. A prudent approach has been taken by considering the lower 1% SOM content.

The UK values do not have any legal standing within the Republic of Ireland and no statutory guidance for assessing the significance of soil contamination currently exists. However, the values do provide a means of placing the data within context when considering magnitude of risk and have been used in that capacity for this assessment.

The main basis of the assessment remains the conceptual site model and consideration of the pollutant linkages: Source - Pathway – Receptor.

Refer to Table 1 for sample analysis. Table 2 below shows the soil analysis results compared to the LQM/CIEH Guideline values where available. Full laboratory results (JEL 18/3937) is presented in Appendix B.

The following samples were analysed for the following parameters.

- Waste Acceptance Criteria
- TPH CWG (speciated hydrocarbons)
- Volatiles including BTEX (Benzene, toluene, ethylbenzene, xylene), and
- Heavy Metals

Analysis	Samples
WAC analysis including asbestos	TP18-10 @ 2.30m & TP18-11 @ 3.50m **(2 in total)**
TPH CWG	TP18-02 @ 2.30m, TP18-04 @ 2.10m, TP18-06 @ 2.20m, TP18-08 @ 2.20m, TP18-09 @ 2.20m, TP18-10 @ 3.40m, TP18-11 @ 3.30m, TP18-13 @ 2.20m & TP18-16 @ 2.60m. PH18-01 @ 1.90m & PH18-04 @ 2.00 m. **(11 in total)**
Heavy Metals	TP18-02 @ 2.30m, TP18-04 @ 2.10m, TP18-06 @ 2.20m & TP18-07 @ 2.10m, TP18-09 @ 2.20m PH18-01 @ 1.90m **(6 in total)**

Table 1 *Samples sent to the laboratory for analysis.*

3.0 SITE INVESTIGATION FINDINGS

Seventeen trial pits (TP17-01 to TP17-17) and four pilot holes were excavated to a depth between 2m to 3.5m. Figure 1 presents the location of all trial pits.

3.1 Soil Logging

A total of seventeen trial pits and four pilot holes were excavated across the entire site including the car park area. The locations of these excavations are shown in Figure 1. In general, the subsoil sequence consisted of firm to stiff, brown to grey sandy gravelly CLAY with sub-angular to sub-rounded cobbles and occasional boulders. The boulders consisted of granite. Bedrock is interpreted to be approximately 3.5mgl to 4.0mgl and comprises granite.

The likely pathway is shallow perched groundwater and infiltration to the underlying bedrock aquifer. The bedrock aquifer is classified by the GSI as a 'Poor Aquifer' – bedrock which is generally unproductive expect for Local Zones. The groundwater vulnerability is classified following GSI/EPA guidelines as 'High' which infers that there is <5 metres of low permeability soils. This is consistent with the findings of the site investigations.

Hydrocarbon contamination was found in the following trial pits: TP18-10, TP18-11, TP18-12, TP18-16 and TP18-17, all located in the northwest boundary of the site. There was no other physical contamination encountered in the other trial pits and pilot holes across the site. Contamination was mainly found directly downgradient from the petrol station and along the western boundary. No source of contamination was identified within the site boundary during the site investigations.

Plate 1 *Petrol Station and area of contamination).* ***Plate 2*** *TP18-11 at boundary of petrol station. (Looking North)*

3.2 Laboratory Results

A soil sample was taken at every metre and/or change in lithology, and representative samples sent to Exova Jones Laboratory to provide a greater understanding of the soil quality in the site.

Full laboratory results (JEL 18/3937) are presented in Appendix B. Appendix B also contains a compilation of all historical soil analyses (January – February 2000) collected to date as well as the WAC analysis i.e. from the site investigation in March 2018.

Results are compared against the LQM/CIEH S4ULs for residential and commercial use (1% SOM) where available for contaminants of concern. No exceedances of residential or commercial thresholds have been identified for any contaminants of concern, refer to Table 2 below.

AWN Consulting Ltd.			Soil Samples during Site Invesitgation 2018													Guidline Values	
			Sample ID	TP18-02	TP18-04	TP18-06	TP18-08	TP18-09	TP18-10	TP18-10	TP18-11	TP18-11	TP18-13	TP18-16	PH18-01	PH18-04		
Report:	**Solid (Soil samples)**		**Depth (m)**	2.30	2.10	2.20	2.20	2.20	2.30	3.40	3.30	3.50	2.20	2.60	1.90	2.00	LQM/CIEH S4ul for HHRA Residental Threshold at 1% SOM (mg/kg)	LQM/CIEH S4ul for HHRA Commercial Threshold at 1% SOM (mg/kg)
Client:			**Containers**	V J	V J	V J	J T	J T	V J T	V J	J T	J T	J T	J T	J	V J T		
Client ref:	18_10021		**Sample Type**	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Location:	Cornelscourt, Co. Dublin		**Sampled Date**	12/03/2018	12/03/2018	12/03/2018	12/03/2018	12/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018	09/03/2018	09/03/2018		
GTC21C35AL	>C21-C35 #	mg/kg	<7	-	-	-	-	-	28	57	101	92	-	84	-	-		
GTC05C35AL	Total aliphatics C5-35	mg/kg	<19	-	-	-	-	-	229	504	719	730	-	555	-	-	-	-
TM36/PM12	>C6-C10	mg/kg	<0.1	*NT*	*NT*	*NT*	*NT*	*NT*	8.4	*NT*	*NT*	33.4	*NT*	*NT*	*NT*	*NT*	-	-
TM5/PM8/PM16	>C10-C25	mg/kg	<10	*NT*	*NT*	*NT*	*NT*	*NT*	207	*NT*	*NT*	698	*NT*	*NT*	*NT*	*NT*	-	-
TM5/PM8/PM16	>C25-C35	mg/kg	<10	*NT*	*NT*	*NT*	*NT*	*NT*	-	*NT*	*NT*	13	*NT*	*NT*	*NT*	*NT*	-	-
	Aromatics																	
GTEC05EC07AR	>C5-EC7 #	mg/kg	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	1400	26000(1220)sol
GTEC07EC08AR	>EC7-EC8 #	mg/kg	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	3900	56000(869)vap
GTEC08EC10AR	>EC8-EC10 #	mg/kg	<0.1	-	-	-	-	-	0.6	0.2	-	4.6	-	-	-	-	270	3500(613)vap
GTEC10EC12AR	>EC10-EC12 #	mg/kg	<0.2	-	-	-	-	-	24.2	53.2	23.2	85.3	-	23.2	-	-	1200	16000(364)sol
GTEC12EC16AR	>EC12-EC16 #	mg/kg	<4	-	-	-	-	-	43	95	150	181	-	134	-	-	2500	36000(169)sol
GTEC16EC21AR	>EC16-EC21 #	mg/kg	<7	-	-	-	-	-	59	121	206	190	-	176	-	-	1900	28000
GTEC21EC35AR	>EC21-EC35 #	mg/kg	<7	-	-	-	-	-	23	42	66	57	-	54	-	-	1900	28000
GTEC05EC35AR	Total aromatics C5-35 #	mg/kg	<19	-	-	-	-	-	150	311	445	518	-	387	-	-	-	-
GTC05C35ALAR	Total aliphatics and aromatics(C5-35)	mg/kg	<38	-	-	-	-	-	379	815	1164	1248	-	942	-	-	-	-
1634-04-4	MTBE #	ug/kg	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71-43-2	Benzene #	ug/kg	<5	-	-	-	-	-	0.009	0.107	-	-	-	-	-	-	380	27000
108-88-3	Toluene #	ug/kg	<5	-	-	-	-	-	0.02	0.035	-	-	-	-	-	-	3900000	56000000(869)vap
100-41-4	Ethylbenzene #	ug/kg	<5	-	-	-	-	-	0.035	0.041	-	1.073	-	-	-	-	440000	5700000(518)vap
P_M_XYLENE	m/p-Xylene #	ug/kg	<5	-	-	-	-	-	0.425	0.115	0.097	3.483	-	0.038	-	-	450000	m: 6200000(625)vap p: 5900000(576)sol
95-47-6	o-Xylene #	ug/kg	<5	-	-	-	-	-	0.062	0.091	-	-	-	-	-	-	48000	6600000(478)sol
-	Total Mineral Oil	mg/kg	<1	-	-	-	-	-	220	-	-	695	-	-	-	-	-	-

Legend

16.4	Results exceed LQM/CIEH S4ul for HHRA Residental Threshold at 1% SOM (mg/kg)
16.4	Results exceed LQM/CIEH S4ul for HHRA Commerical & Residential Threshold at 1% SOM (mg/kg)
-	Guideline threshold value not available
-	Result is below the laboratory respective limit of detection (LOD)
NT	Sample not tested for that paramter

Notes

HHRA 2015 - LQM/CIEH Suitable 4 Use Levels based on 'Commercial' and/or 'resedential' land use using 1% SOM

Sol : sol S4UL presented exceed the solubility saturation limit, which is presented in brackets

Vap: vap S4UL presented exceed the vapour stauration limit which is prensted in brackets

Table 2 *Soil analysis results for TPH CWG analysis.*

The majority of the soil samples analysed for TPH CWG recorded concentrations below the laboratory's respective limit of detection (LOD). This indicates that there is only contamination present directly downgradient from the petrol station. Refer to Table 2, above.

3.2.1 Waste Acceptance Criteria (WAC) Analysis

To investigate the suitability of soil for disposal if required, two soil samples (TP18-10 @ 2.30m & TP18-11 @ 3.50m) were collected from the area identified as having physical evidence of residual contamination. These results have been compared against Waste Acceptance Criteria (WAC) set out by the adopted EU Council Decision 2003/33/EC which established criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002).

The WAC analysis is not indicative of the potential future use of the land for development but rather for identification of suitability for licenced disposal. As such this criterion is only relevant to disposal of the soil off site.

The results identified that the soil closer to the boundary with petrol station (TP18-11(3.50m) falls under Category D – Hazardous due to the concentration of mineral oil, e.g. <500mg/kg present in the sample. The sample (TP18-10 @ 2.30m) collected further from the presumed source of the petrol station is suitable for classification as Category A – Inert.

The above assessment is carried out on the basis of only two soil samples obtained from two different trial pit locations that contained residual contamination. Should soil removal be considered as an option, additional soil sampling may be required to further refine the above soil classification. Waste acceptance criteria may vary at each potential waste receiving facility and further assessment and consultation with the proposed waste receiving facility is required. The acceptance of any waste material at a receiving facility will be subject to the approval of the facility operator in accordance with their facility permit or licence.

3.3 Ground Gas Assessment

Gas analysis was carried out using a gas analyser unit – GA5000. The GA5000 is used to measure critical gases such as % CH_4, CO_2 and O_2, H2S (up to 10000ppm), NH_3, H_2 and CO (H_2 compensated). This unit was used to measure any elevated gasses within the soil during site investigations.

Elevated gas concentrations were noted in the following trail pits; TP18-10, TP18-11, TP18-12, TP18-16 and TP18-17 where a hydrocarbon odor was noted. Elevated CH_4 concentrations were noted across these trial pits ranging from 0.1% (TP18-11) to 5.6% (TP18-16). There were no other exceedances with gas within the other trial pits and pilot holes across the site. These concentrations are classed as *'very low risk'*, according to the guidelines for 'Assessing Risks Posed by Hazardous Ground Gases to Buildings', CIRIA C665, 2007.

3.4 Summary of Soil Conditions

Most of the soil beneath the site was found to be uncontaminated based on physical observations, gas and laboratory results. This is based on field observations and laboratory analysis for twelve (12) trial pits in the greenfield area and four (4) pilot holes within the car park.

A localised area of shallow hydrocarbon contamination within soil was identified directly downgradient from the petrol station. The extent of contamination present based on physical observation and laboratory analysis is approximately 950 m^2 (delineated by the hatched area on Figure 3). Physical evidence of hydrocarbon contamination within soil was noted in trial pits TP18-10, TP18-11, TP18-12, TP18-16 and TP18-17 in the northwest boundary of the site. The hydrocarbon contaminated soil was found to be present within natural CLAY and gravelly CLAY just above expected rock head. The depth of contamination ranges from 2mbgl to 3.5mbgl. There was no evidence of free phase hydrocarbon product identified during the site assessment, which would be indicative of a recent contamination event.

Comparison of the laboratory findings with UK LQM data demonstrates the residual contaminated soil within the site are below the LQM threshold values for residential and commercial use.

Figure 3 *Extent of soil contamination within the site.*

4.0 QUANTITATIVE RISK ASSESSMENT

4.1 Description of Model

AWN have used the RISC Model to undertake a detailed quantitative risk assessment. RISC enables the site-specific assessment of likely risk to site end

users and enables the determination of whether or not it is acceptable for soil concentrations to remain in the ground.

RISC is a software package for performing fate and transport modelling, human health risk assessments and ecological risk assessments for contaminated sites. RISC can be used to estimate the potential for adverse human health impacts (both carcinogenic and non-carcinogenic) from up to nine exposure pathways.

RISC Key Features Include:

•A customisable chemical database with 82 chemicals

•The ability to calculate additive risk due to multiple pathways, compounds and receptors (such as a resident exposed as both a child and an adult)

RISC Exposure Pathways Include:

•Ingestion of soil

•Dermal contact with soil

•Ingestion of groundwater

•Dermal contact with groundwater

•Inhalation in the shower

•Inhalation of outdoor air

•Inhalation of indoor air

•Ingestion of surface water

•Dermal contact with surface water

RISC Fate and Transport Models Include:

•Johnson and Ettinger indoor air model

•Vadose zone model

•Saturated zone model

•Volatilization from groundwater to indoor and outdoor air

•Outdoor box model

4.2 Model Input Data

The most elevated levels of hydrocarbons were chosen as the input parameters to the model, this data was taken from the soil quality data collected during the site investigation (Ref Table 2).

The model input data was predominantly chosen from TP 18. It was assumed that there would be a ground floor flat within any proposed development, and that as a worst case the contamination was only 0.1m below the floor slab, which also from a worst-case point of view was assumed to be a 15cm thick concrete slab.

The details of the model input parameters are provided in Appendix C.

Once all data was uploaded, the model was run, and the model output is discussed in below.

4.3 Model Results

The model out data is provided as Appendix D.

The key parameter of concern is whether the predicted carcinogenic or non-carcinogenic health effects are such that the risk to a theoretical occupant of a future apartment development on-site would be exposed to either a cancer risk of 1in 1,000,000 per annum or a non-carcinogenic health effect of 1 in 1,000,000 per annum.

The 1 in 1000,000 threshold is the *de minimis* risk which is considered acceptable.

The carcinogenic risk is shown in Table 4.1 below and the non-carcinogenic risk is shown in Table 4.2 below. It can be seen in both cases that the predicted risk is less than 1 in 1,000,000 per annum (also known as 1E-6 per annum).

Chemical	Inhalation of Indoor Air	Inhalation of Outdoor Air	TOTAL
Ethylbenzene	2.0E-11	1.5E-16	**2.0E-11**
TPH Aliphatic C5-6	ND	ND	**ND**
TPH Aliphatic C6-8	ND	ND	**ND**
TPH Aliphatic C8-10	ND	ND	**ND**
TPH Aliphatic C10-12	ND	ND	**ND**
TPH Aliphatic C12-16	ND	ND	**ND**
TPH Aliphatic C16-35	ND	ND	**ND**
TPH Aromatic C7-8	ND	ND	**ND**
TPH Aromatic C8-10	ND	ND	**ND**
TPH Aromatic C10-12	ND	ND	**ND**
TPH Aromatic C12-16	ND	ND	**ND**
TPH Aromatic C16-21	ND	ND	**ND**
TPH Aromatic C21-35	ND	ND	**ND**
Xylenes (m-)	ND	ND	**ND**
TOTAL	**2.0E-11**	**1.5E-16**	**2.0E-11**

Table 4.1 Carcinogenic Risk Summary

Chemical	Inhalation of Indoor Air	Inhalation of Outdoor Air	TOTAL
Ethylbenzene	6.1E-08	4.7E-13	**6.1E-08**
TPH Aliphatic C5-6	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C6-8	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C8-10	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C10-12	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C12-16	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C16-35	ND	ND	**ND**
TPH Aromatic C7-8	1.6E-07	1.3E-12	**1.6E-07**
TPH Aromatic C8-10	0.0E+00	0.0E+00	**ND**
TPH Aromatic C10-12	0.0E+00	0.0E+00	**ND**
TPH Aromatic C12-16	0.0E+00	0.0E+00	**ND**
TPH Aromatic C16-21	ND	ND	**ND**
TPH Aromatic C21-35	ND	ND	**ND**
Xylenes (m-)	2.1E-08	1.7E-13	**2.1E-08**
TOTAL	**2.5E-07**	**1.9E-12**	**2.5E-07**

Table 4.2 Non-Carcinogenic Risk

5.0 CONCLUSIONS

The following conclusions are based on the site investigations carried out in March 2018 and risk assessment:

- Apart from a localised area in the northwest of the site, the site was found to be uncontaminated based on physical observations, gas and laboratory results. This is based on field observations and laboratory analysis for twelve (12) trial pits in the greenfield area and four (4) pilot holes within the car park (Figure 3).
- Localised shallow hydrocarbon contamination was found immediately downgradient of the petrol station. The extent of contamination present based on physical observation and laboratory analysis is approx. 960 square metres (delineated by the hatched area on Figure 3). Physical evidence of hydrocarbon contamination within soil was noted in trial pits TP18-10, TP18-11, TP18-12, TP18-16 and TP18-17 (all located in the northwest boundary of the site). TP18-10, TP11 & TP18-16. TP18-12 & TP18-17 also within this area were not analysed but contain contamination based on field observations. The contamination is most evident within a natural CLAY and the underlying gravelly clay horizon c. 2mbgl (metres below ground level) and 3.50mbgl, respectively.
- No source of contamination was identified. However, it is likely that the contamination is derived from a historical leak sourced from an adjacent (upgradient) petrol station. The absence of any free phase product and the significant low concentrations of volatile components of the hydrocarbons (BTEX) noted indicate an historical leak as a source.
- Two representative samples of the contaminated soil were analysed for full Waste Acceptance Criteria (WAC) testing. One sample (TP18-10 @ 2.30mblg) complies with “inert” criteria” while the second sample (TP18-11 @ 3.50mgl) is “Hazardous” due to the mineral oil content present. This criterion is only relevant to disposal of the soil off site.
- Table 1 presents the soil quality data for relevant parameters compared with LQM/CIEH thresholds concentrations for the residential and commercial use (GQRA). The results show compliance with a future use for either residential or commercial use.
- Completion of a quantitative risk assessment (DQRA) for an apartment type development on the site concluded that even assuming the worst-case exposure

scenario of an apartment dweller on the contaminated section of the site, there is no significant risk associated with the residual contamination present.

LIMITATIONS OF REPORT

The conclusions presented in this report are professional opinions based solely on the tasks outlined herein and the information made available to AWN. They are intended for the purpose outlined herein and for the indicated site and project. p.

Opinions and recommendations presented herein apply to the site conditions existing at the time of the recently completed field work and subsequent assessment. They cannot apply to changes at the site of which AWN is not aware and has not had the opportunity to evaluate. This report is intended for use in its entirety; no excerpt may be taken to be representative of this baseline assessment. All work carried out in preparing this report has utilised and is based on AWN professional knowledge and understanding of the current relevant Irish and European Community standards, codes and legislation.

APPENDIX A

Trial Pit Logs

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Trial Pit Log: **TP18-01**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722447 / 0725857	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Gravels contain some localised groundwater at 0.5m, with	0.25		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 1.2m, Groundwater Strike, slow ingress			BACKFILLED WITH ARISINGS
Detail: 2.2m, Groundwater Strike, slow ingress			
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.05		
End of Trial Pit 3.40 m			

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.5 m (depth)			
Comments: Trial pit located close to the N11	G/level (mAOD): -			
	Water Strikes (mbgl):	0.50	1.20	2.20
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-02**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722416 / 0725883	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Gravels contain some localised groundwater at 0.55m, with slow ingress.	0.25		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 1.05m, Groundwater Strike, slow ingress			
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.00		
End of Trial Pit 3.40 m			BACKFILLED WITH ARISINGS

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.5 m (depth)			
Comments: Trial pit located close to the N11	G/level (mAOD): -			
	Water Strikes (mbgl):	0.55	1.05	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-03

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722426 / 0725816	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Gravels contain some localised groundwater at 0.50m, with slow ingress.	0.25		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 2.5m, Groundwater Strike, slow ingress with an appearance of an oil slick			BACKFILLED WITH ARISINGS
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.00		
End of Trial Pit 3.35 m			

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.35 m (depth)			
Comments:	G/level (mAOD): -			
	Water Strikes (mbgl):	0.50	2.55	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-04**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722385 / 0725845	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Gravels contain some localised groundwater at 0.55m, with slow ingress.	0.25		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
End of Trial Pit 2.85 m	2.85		BACKFILLED WITH ARISINGS

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 2.85 m (depth)			
Comments:	G/level (mAOD): -			
	Water Strikes (mbgl):	0.55	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-05

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722404 / 0725768	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
MADE GROUND consisting of; yellow bricks, red bricks, plastic bags, plastic broke pipe fragments and parts of a old steel fencing.	0.20		
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Gravels are wet.	0.45		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.80		
Detail: 1.3m, Groundwater Strike, slow ingress with an appearance of an oil slick.			
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.00		
End of Trial Pit 3.1 m			

BACKFILLED WITH ARISINGS

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.10 m (depth)			
Comments: Close to the housed along the south eastern boundary of the site	G/level (mAOD): -			
	Water Strikes (mbgl):	1.30	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-06**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722401 / 0725753	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
MADE GROUND consisting of; yellow bricks, red bricks, plastic bags, plastic broke pipe fragments and parts of a old steel fencing.	0.20		
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded.	0.45		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.80		
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.00		
End of Trial Pit 3.50 m	3.50		BACKFILLED WITH ARISINGS

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.50 m (depth)			
Comments: Close to the housed along the south eastern boundary of the site	G/level (mAOD): -			
	Water Strikes (mbgl):	-	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-07

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722353 / 0725806	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Gravels within the CLAY are wet.	0.25		
Detail: 0.80m, Slow to moderate ingress of groundwater into the pit.			
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.95		
Detail: 2.65m, Sidewall and backwall collapse due to ingres of water into the pit.			
End of Trial Pit 3.20 m	3.20		

BACKFILLED WITH ARISINGS

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 2.85 m (depth)			
Comments:	G/level (mAOD): -			
	Water Strikes (mbgl):	0.80	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-08

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722363 / 0725825	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Gravels contain some localised groundwater at 0.40m, with slow ingress.	0.25		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 1.25m, Groundwater Strike, slow ingress			BACKFILLED WITH ARISINGS
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.00		
End of Trial Pit 3.40 m	3.40		

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.40 m (depth)			
Comments:	G/level (mAOD): -			
	Water Strikes (mbgl):	0.40	1.25	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-09**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	12/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722363 / 0725825	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded.	0.25		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp. Detail: 1.45m, Groundwater Strike, slow ingress	1.10		BACKFILLED WITH ARISINGS
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.12		
End of Trial Pit 3.40 m	3.40		

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.40 m (depth)			
Comments:	G/level (mAOD): -			
	Water Strikes (mbgl):	1.45	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-10**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	13/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722335 / 0725825	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded.	0.25		
Detail: 0.70m, Groundwater Strike, slow ingress			
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.80		
Detail: 1.25m, Groundwater Strike, slow ingress			
Detail: 1.80m, Strong hydrocarbon odour emitting from the pit. CLAY is stained grey to dark grey.			BACKFILLED WITH ARISINGS
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp, with a strong hydrocarbon odour.	3.05		
End of Trial Pit 3.55 m	3.55		

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.55 m (depth)			
Comments: First encounter of hydrocarbon contamination at a depth of 1.8m to 2m. Trial Pit constructed 30 metres south of the petrol station.	G/level (mAOD): -			
	Water Strikes (mbgl):	0.70	1.25	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-11**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	13/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722327 / 0725832	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
MADE GROUND consisting of; yellow bricks, red bricks, plastic bags, plastic broke pipe fragments, rubbish - litter and parts of a old steel fencing.	0.25		
Soft light brown slightly sandy, gravelly CLAY with cobbles and	0.50		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.90		
Detail: 2m, Strong hydrocarbon odour emitting from the pit. CLAY is stained grey to dark grey.			BACKFILLED WITH ARISINGS
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp, with a	3.05		
End of Trial Pit 3.25 m	3.25		

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.25 m (depth)			
Comments: First encounter of hydrocarbon contamination at a depth of 1.8m to 2m. Trial Pit constructed directly south of the petrol station.	G/level (mAOD): -			
	Water Strikes (mbgl):	-	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-12**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	13/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722337 / 0725844	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
MADE GROUND consisting of; yellow bricks, red bricks, plastic bags, plastic broke pipe fragments, rubbish - litter and parts of a old steel fencing.	0.25		
Soft light brown slightly sandy, gravelly CLAY with cobbles and	0.50		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.90		
Detail: 2m, Strong hydrocarbon odour emitting from the pit. CLAY is stained grey to dark grey.			BACKFILLED WITH ARISINGS
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp, with a	3.1		
End of Trial Pit 3.25 m	3.40		

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.40 m (depth)			
Comments: First encounter of hydrocarbon contamination at a depth of 1.8m to 2m. Trial Pit constructed directly south of the petrol station.	G/level (mAOD): -			
	Water Strikes (mbgl):	-	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-13

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AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	13/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722340 / 0725855	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
MADE GROUND consisting of; yellow bricks, red bricks, plastic bags, plastic broke pipe fragments and parts of a old steel fencing.	0.20		
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Gravels are wet.	0.45		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.80		
Detail: 1.1m, Groundwater Strike, slow to moderate ingress			
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.00		
End of Trial Pit 3.1 m			BACKFILLED WITH ARISINGS

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.10 m (depth)			
Comments: Trial pit constructed directly east of the petrol station.	G/level (mAOD): -			
	Water Strikes (mbgl):	1.10	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-14

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	13/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722426 / 0725816	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded.	0.25		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 1.2m, Groundwater Strike, slow ingress			
Detail: 2.8m, Groundwater Strike, slow ingress			
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	3.00		
End of Trial Pit 3.45 m	3.45		

BACKFILLED WITH ARISINGS

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.45 m (depth)			
Comments:	G/level (mAOD): -			
	Water Strikes (mbgl):	1.20	2.80	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-15

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	13/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722426 / 0725816	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded.	0.25		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp. Detail: 0.8m, Groundwater Strike, slow ingress	0.60		
Detail: 2.0m, no hydrocarbon odour present.			BACKFILLED WITH ARISINGS
Light brown to yellow slightly sandy GRAVELS. Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp. Detail: 3.3m, no hydrocarbon odour present.	3.00		
End of Trial Pit 3.5 m	3.50		

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 3.50 m (depth)			
Comments:	G/level (mAOD): -			
	Water Strikes (mbgl):	0.80	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-16**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	13/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722335 / 0725816	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded.	0.25		
Detail: 0.70m, Groundwater Strike, slow ingress			
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.80		
Detail: 2.1m, Strong hydrocarbon odour emitting from the pit. CLAY is stained grey to dark grey.			
	2.30		
End of Trial Pit 2.3 m			BACKFILLED WITH ARISINGS

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0** 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 **6.0**

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 2.30 m (depth)			
Comments: Contamination confirmed at western boundary of the site.	G/level (mAOD): -			
	Water Strikes (mbgl):	0.70	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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Trial Pit Log: **TP18-17**

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	13/03/2018
Ground Level (mAOD):	-				
Grid Reference:	-	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Topsoil			
Soft light brown slightly sandy, gravelly CLAY with cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded.	0.25		
Detail: 0.70m, Groundwater Strike, slow ingress			
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.80		
Detail: 2.1m, Strong hydrocarbon odour emitting from the pit. CLAY is stained grey to dark grey.			
End of Trial Pit 2.3 m	2.30		

BACKFILLED WITH ARISINGS

Excavation Method: 13 ton tracked machine	Pit dimensions: 0.6m x 2.00 m x 2.3 m (depth)			
Comments: Contamination confirmed at north-western corner of the site at the petrol station building.	G/level (mAOD): -			
	Water Strikes (mbgl):	0.70	-	-
Contractor: Breffni Contractors	Static Water Level (mbgl):	-		

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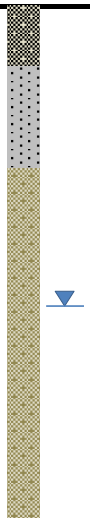
Trial Pit Log:	PH18-01

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	09/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722355 / 0725877	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Tarmac			
Grey loose gravelly FILL material used for engineering purposes	0.20		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 1.2m, Groundwater Strike, slow ingress			
	2.00		
End of Trial Pit 2.00 m			



BACKFILLED WITH GRAVELS AND

Excavation Method: Light Cable Percussive	Pilot hole			
Comments: Pilot Hole	G/level (mAOD): -			
	Water Strikes (mbgl):	1.20	-	-
Contractor: Ronan Doyle Contractor	Static Water Level (mbgl):		-	

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Trial Pit Log:	PH18-02

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	09/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722360 / 0725929	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Tarmac			
Grey loose gravelly FILL material used for engineering purposes	0.20		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 1.1m, Groundwater Strike, slow ingress			
End of Trial Pit 3.00 m	3.00		

BACKFILLED WITH GRAVELS AND

Excavation Method: Light Cable Percussive	Pilot hole			
Comments: Pilot Hole	G/level (mAOD): -			
	Water Strikes (mbgl):	1.20	-	-
Contractor: Ronan Doyle Contractor	Static Water Level (mbgl):	-		

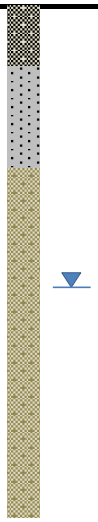
awnconsulting

Trial Pit Log:	PH18-03

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	09/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722388 / 0725912	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Tarmac			
Grey loose gravelly FILL material used for engineering purposes	0.20		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 1.1m, Groundwater Strike, slow ingress			
	2.00		
End of Trial Pit 2.00 m			



BACKFILLED WITH GRAVELS AND

Excavation Method: Light Cable Percussive	Pilot hole			
Comments: Pilot Hole	G/level (mAOD): -			
	Water Strikes (mbgl):	1.20	-	-
Contractor: Ronan Doyle Contractor	Static Water Level (mbgl):	-		

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Trial Pit Log:	PH18-04

Sheet 1/1

AWN Project Ref:	18-10021	Client:	Dunnes Stores	Excavation date:	09/03/2018
Ground Level (mAOD):	-				
Grid Reference:	0722370 / 0725900	Location:	Cornelscourt, Co. Dublin	Geology log:	CD

SUBSURFACE PROFILE	Depth mbgl	Lithology	BACKFILL
Ground surface			
Tarmac			
Grey loose gravelly FILL material used for engineering purposes	0.20		
Stiff to firm dark brown slightly sandy, slightly gravelly CLAY with some cobbles and boulders, Sand is fine to coarse. Gravels are sub-angular to sub-rounded. Damp.	0.60		
Detail: 1.3m, Groundwater Strike, slow ingress			
	2.00		
End of Trial Pit 2.00 m			

Excavation Method: Light Cable Percussive	Pilot hole			
Comments: Pilot Hole	G/level (mAOD): -			
	Water Strikes (mbgl):	1.20	-	-
Contractor: Ronan Doyle Contractor	Static Water Level (mbgl):	-		

APPENDIX B

Laboratory Results (JEL 18/3937) & Soil Analysis Tables

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

AWN Consulting
Tecpro Building
Clonshaugh Business & Technology Park
Dublin
Dublin 17
Ireland

Attention :	Colm Driver
Date :	29th March, 2018
Your reference :	18-10021
Our reference :	Test Report 18/3937 Batch 1
Location :	Cornelscourt
Date samples received :	15th March, 2018
Status :	Final report
Issue :	1

Sixty five samples were received for analysis on 15th March, 2018 of which fourteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver
JE Job No.: 18/3937

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	11-12	25-26	39-40	46	52-53	57-58	63-65	66-67	69-70	71-72	LOD/LOR	Units	Method No.
Sample ID	TP18-02	TP18-04	TP18-06	TP18-07	TP18-08	TP18-09	TP18-10	TP18-10	TP18-11	TP18-11			
Depth	2.30	2.10	2.20	2.10	2.20	2.20	2.30	3.40	3.30	3.50			
COC No / misc													
Containers	V J	V J	V J	J	J T	J T	V J T	V J	J T	J T			
Sample Date	12/03/2018	12/03/2018	12/03/2018	12/03/2018	12/03/2018	12/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018			
Antimony	-	-	-	-	-	-	2	-	-	2	<1	mg/kg	TM30/PM15
Arsenic #	10.8	9.1	11.0	9.8	-	10.7	31.5	-	-	7.5	<0.5	mg/kg	TM30/PM15
Barium #	-	-	-	-	-	-	74	-	-	46	<1	mg/kg	TM30/PM15
Cadmium #	1.5	1.9	2.2	1.9	-	2.6	1.8	-	-	0.9	<0.1	mg/kg	TM30/PM15
Chromium #	50.7	40.5	45.0	54.3	-	38.9	48.0	-	-	54.5	<0.5	mg/kg	TM30/PM15
Copper #	22	19	24	25	-	17	25	-	-	17	<1	mg/kg	TM30/PM15
Lead #	16	13	23	17	-	17	25	-	-	14	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	-	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #	-	-	-	-	-	-	4.0	-	-	2.8	<0.1	mg/kg	TM30/PM15
Nickel #	44.5	34.1	40.4	39.0	-	34.2	39.2	-	-	22.7	<0.7	mg/kg	TM30/PM15
Selenium #	<1	1	<1	1	-	1	1	-	-	<1	<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	-	-	-	-	-	-	212	-	-	152	<50	mg/kg	TM50/PM29
Water Soluble Boron #	-	-	-	-	-	-	0.6	-	-	0.3	<0.1	mg/kg	TM74/PM32
Zinc #	75	68	90	85	-	70	81	-	-	56	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	-	-	-	-	-	-	<0.04	-	-	0.30	<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	-	-	-	-	-	<0.03	-	-	0.25	<0.03	mg/kg	TM4/PM8
Acenaphthene #	-	-	-	-	-	-	<0.05	-	-	0.23	<0.05	mg/kg	TM4/PM8
Fluorene #	-	-	-	-	-	-	0.04	-	-	0.69	<0.04	mg/kg	TM4/PM8
Phenanthrene #	-	-	-	-	-	-	0.10	-	-	1.30	<0.03	mg/kg	TM4/PM8
Anthracene #	-	-	-	-	-	-	<0.04	-	-	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	-	-	-	-	-	-	<0.03	-	-	0.04	<0.03	mg/kg	TM4/PM8
Pyrene #	-	-	-	-	-	-	<0.03	-	-	0.14	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	-	-	-	-	-	<0.06	-	-	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	-	-	-	-	-	-	<0.02	-	-	0.03	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	-	-	-	-	-	-	<0.07	-	-	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	-	-	-	-	-	-	<0.04	-	-	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	-	-	-	-	-	-	<0.04	-	-	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	-	-	-	-	-	-	<0.04	-	-	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	-	-	-	-	-	-	<0.04	-	-	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	-	-	-	-	-	-	<0.04	-	-	<0.04	<0.04	mg/kg	TM4/PM8
PAH 6 Total #	-	-	-	-	-	-	<0.22	-	-	<0.22	<0.22	mg/kg	TM4/PM8
PAH 17 Total	-	-	-	-	-	-	<0.64	-	-	2.98	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	-	-	-	-	-	<0.05	-	-	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	-	-	-	-	-	<0.02	-	-	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	-	-	-	-	-	-	<1	-	-	<1	<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	-	-	-	-	-	75	-	-	73	<0	%	TM4/PM8
Mineral Oil (C10-C40)	-	-	-	-	-	-	220	-	-	695	<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver
JE Job No.: 18/3937

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	11-12	25-26	39-40	46	52-53	57-58	63-65	66-67	69-70	71-72	LOD/LOR	Units	Method No.
Sample ID	TP18-02	TP18-04	TP18-06	TP18-07	TP18-08	TP18-09	TP18-10	TP18-10	TP18-11	TP18-11			
Depth	2.30	2.10	2.20	2.10	2.20	2.20	2.30	3.40	3.30	3.50			
COC No / misc													
Containers	V J	V J	V J	J	J T	J T	V J T	V J	J T	J T			
Sample Date	12/03/2018	12/03/2018	12/03/2018	12/03/2018	12/03/2018	12/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018			
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	-	<0.1	<0.1	0.4	0.8	0.1	2.2	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	-	<0.1	<0.1	2.0	4.8	0.3	6.8	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	-	<0.1	<0.1	6.4	7.3	6.0	26.6 ++	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	-	<0.2	<0.2	34.8	75.2	80.4	100.6	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	-	<4	<4	76	178	255	242	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	-	<7	<7	81	181	276	260	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	-	<7	<7	28	57	101	92	<7	mg/kg	TM5/PM8/PM16
>C35-C40	-	-	-	-	-	-	<7	-	-	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	-	-	-	-	-	-	229	-	-	730	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics C5-35	<19	<19	<19	-	<19	<19	-	504	719	-	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	-	-	-	-	-	-	8.4	-	-	33.4	<0.1	mg/kg	TM36/PM12
>C10-C25	-	-	-	-	-	-	207	-	-	698	<10	mg/kg	TM5/PM8/PM16
>C25-C35	-	-	-	-	-	-	<10	-	-	13	<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	-	<0.1	<0.1	0.6	0.2	<0.1	4.6 ++	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	-	<0.2	<0.2	24.2	53.2	23.2	85.3	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	-	<4	<4	43	95	150	181	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	-	<7	<7	59	121	206	190	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	-	<7	<7	23	42	66	57	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	-	-	-	-	-	-	<7	-	-	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	<19	<19	-	<19	<19	-	311	445	-	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aromatics C5-40	-	-	-	-	-	-	150	-	-	518	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	-	<38	<38	-	815	1164	-	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	-	-	-	-	-	-	379	-	-	1248	<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	-	-	-	-	-	-	0.6	-	-	4.6	<0.1	mg/kg	TM36/PM12
>EC10-EC25	-	-	-	-	-	-	137	-	-	505	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	-	-	-	-	-	-	<10	-	-	<10	<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5	-	<5	<5	9	107	<5	<5	<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5	-	<5	<5	20	35	<5	<5	<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5	-	<5	<5	35	41	<5	1073	<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	<5	-	<5	<5	425	115	97	3483	<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5	-	<5	<5	62	91	<5	<5	<5	ug/kg	TM31/PM12
PCB 28 #	-	-	-	-	-	-	<5	-	-	<5	<5	ug/kg	TM17/PM8
PCB 52 #	-	-	-	-	-	-	<5	-	-	<5	<5	ug/kg	TM17/PM8
PCB 101 #	-	-	-	-	-	-	<5	-	-	<5	<5	ug/kg	TM17/PM8
PCB 118 #	-	-	-	-	-	-	<5	-	-	<5	<5	ug/kg	TM17/PM8
PCB 138 #	-	-	-	-	-	-	<5	-	-	<5	<5	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver
JE Job No.: 18/3937

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	11-12	25-26	39-40	46	52-53	57-58	63-65	66-67	69-70	71-72	LOD/LOR	Units	Method No.
Sample ID	TP18-02	TP18-04	TP18-06	TP18-07	TP18-08	TP18-09	TP18-10	TP18-10	TP18-11	TP18-11			
Depth	2.30	2.10	2.20	2.10	2.20	2.20	2.30	3.40	3.30	3.50			
COC No / misc													
Containers	V J	V J	V J	J	J T	J T	V J T	V J	J T	J T			
Sample Date	12/03/2018	12/03/2018	12/03/2018	12/03/2018	12/03/2018	12/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018			
PCB 153 #	-	-	-	-	-	-	<5	-	-	<5	<5	ug/kg	TM17/PM8
PCB 180 #	-	-	-	-	-	-	<5	-	-	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	-	-	-	-	-	-	<35	-	-	<35	<35	ug/kg	TM17/PM8
Phenol #	-	-	-	-	-	-	<0.01	-	-	<0.01	<0.01	mg/kg	TM26/PM21
Natural Moisture Content	15.2	10.5	13.0	-	14.6	12.0	11.3	10.1	12.7	9.6	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	-	-	-	-	-	-	10.2	-	-	8.8	<0.1	%	PM4/PM0
% Dry Matter 105°C	-	-	-	-	-	-	87.7	-	-	90.9	<0.1	%	NONE/PM4
Hexavalent Chromium #	-	-	-	-	-	-	<0.3	-	-	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	-	-	-	-	-	-	48.0	-	-	54.5	<0.5	mg/kg	NONE/NONE
Total Cyanide #	-	-	-	-	-	-	<0.5	-	-	<0.5	<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	-	-	-	-	-	-	0.31	-	-	0.22	<0.02	%	TM21/PM24
Sulphide	-	-	-	-	-	-	<10	-	-	<10	<10	mg/kg	TM106/PM119
Elemental Sulphur	-	-	-	-	-	-	5	-	-	5	<1	mg/kg	TM108/PM114
pH #	-	-	-	-	-	-	8.02	-	-	8.32	<0.01	pH units	TM73/PM11
Mass of raw test portion	-	-	-	-	-	-	0.1031	-	-	0.0994		kg	NONE/PM17
Mass of dried test portion	-	-	-	-	-	-	0.09	-	-	0.09		kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver
JE Job No.: 18/3937

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	81-82	99-100	106	128-130							LOD/LOR	Units	Method No.
Sample ID	TP18-13	TP18-16	PH18-01	PH18-04									
Depth	2.20	2.60	1.90	2.00									
COC No / misc													
Containers	J T	J T	J	V J T									
Sample Date	13/03/2018	13/03/2018	09/03/2018	09/03/2018									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	15/03/2018	15/03/2018	15/03/2018	15/03/2018									
Antimony	-	-	-	-							<1	mg/kg	TM30/PM15
Arsenic #	-	-	11.1	-							<0.5	mg/kg	TM30/PM15
Barium #	-	-	-	-							<1	mg/kg	TM30/PM15
Cadmium #	-	-	0.6	-							<0.1	mg/kg	TM30/PM15
Chromium #	-	-	56.8	-							<0.5	mg/kg	TM30/PM15
Copper #	-	-	20	-							<1	mg/kg	TM30/PM15
Lead #	-	-	13	-							<5	mg/kg	TM30/PM15
Mercury #	-	-	<0.1	-							<0.1	mg/kg	TM30/PM15
Molybdenum #	-	-	-	-							<0.1	mg/kg	TM30/PM15
Nickel #	-	-	42.0	-							<0.7	mg/kg	TM30/PM15
Selenium #	-	-	<1	-							<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	-	-	-	-							<50	mg/kg	TM50/PM29
Water Soluble Boron #	-	-	-	-							<0.1	mg/kg	TM74/PM32
Zinc #	-	-	64	-							<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	-	-	-	-							<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	-	-	-							<0.03	mg/kg	TM4/PM8
Acenaphthene #	-	-	-	-							<0.05	mg/kg	TM4/PM8
Fluorene #	-	-	-	-							<0.04	mg/kg	TM4/PM8
Phenanthrene #	-	-	-	-							<0.03	mg/kg	TM4/PM8
Anthracene #	-	-	-	-							<0.04	mg/kg	TM4/PM8
Fluoranthene #	-	-	-	-							<0.03	mg/kg	TM4/PM8
Pyrene #	-	-	-	-							<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	-	-	-							<0.06	mg/kg	TM4/PM8
Chrysene #	-	-	-	-							<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	-	-	-	-							<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	-	-	-	-							<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	-	-	-	-							<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	-	-	-	-							<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	-	-	-	-							<0.04	mg/kg	TM4/PM8
Coronene	-	-	-	-							<0.04	mg/kg	TM4/PM8
PAH 6 Total #	-	-	-	-							<0.22	mg/kg	TM4/PM8
PAH 17 Total	-	-	-	-							<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	-	-	-							<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	-	-	-							<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	-	-	-	-							<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	-	-	-							<0	%	TM4/PM8
Mineral Oil (C10-C40)	-	-	-	-							<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver
JE Job No.: 18/3937

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	81-82	99-100	106	128-130							LOD/LOR	Units	Method No.
Sample ID	TP18-13	TP18-16	PH18-01	PH18-04									
Depth	2.20	2.60	1.90	2.00									
COC No / misc													
Containers	J T	J T	J	V J T									
Sample Date	13/03/2018	13/03/2018	09/03/2018	09/03/2018									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	15/03/2018	15/03/2018	15/03/2018	15/03/2018									
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	3.9	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	56.1	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	192	<4	<4							<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	219	<7	<7							<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	84	<7	<7							<7	mg/kg	TM5/PM8/PM16
>C35-C40	-	-	-	-							<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	-	-	-	-							<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics C5-35	<19	555	<19	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	-	-	-	-							<0.1	mg/kg	TM36/PM12
>C10-C25	-	-	-	-							<10	mg/kg	TM5/PM8/PM16
>C25-C35	-	-	-	-							<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	23.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	134	<4	<4							<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	176	<7	<7							<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	54	<7	<7							<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	-	-	-	-							<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	387	<19	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aromatics C5-40	-	-	-	-							<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	942	<38	<38							<38	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	-	-	-	-							<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	-	-	-	-							<0.1	mg/kg	TM36/PM12
>EC10-EC25	-	-	-	-							<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	-	-	-	-							<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	38	<5	<5							<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
PCB 28 #	-	-	-	-							<5	ug/kg	TM17/PM8
PCB 52 #	-	-	-	-							<5	ug/kg	TM17/PM8
PCB 101 #	-	-	-	-							<5	ug/kg	TM17/PM8
PCB 118 #	-	-	-	-							<5	ug/kg	TM17/PM8
PCB 138 #	-	-	-	-							<5	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver
JE Job No.: 18/3937

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	81-82	99-100	106	128-130							LOD/LOR	Units	Method No.
Sample ID	TP18-13	TP18-16	PH18-01	PH18-04									
Depth	2.20	2.60	1.90	2.00									
COC No / misc													
Containers	J T	J T	J	V J T									
Sample Date	13/03/2018	13/03/2018	09/03/2018	09/03/2018									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	15/03/2018	15/03/2018	15/03/2018	15/03/2018									
PCB 153 #	-	-	-	-							<5	ug/kg	TM17/PM8
PCB 180 #	-	-	-	-							<5	ug/kg	TM17/PM8
Total 7 PCBs #	-	-	-	-							<35	ug/kg	TM17/PM8
Phenol #	-	-	-	-							<0.01	mg/kg	TM26/PM21
Natural Moisture Content	13.4	14.4	14.6	13.9							<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	-	-	-	-							<0.1	%	PM4/PM0
% Dry Matter 105°C	-	-	-	-							<0.1	%	NONE/PM4
Hexavalent Chromium #	-	-	-	-							<0.3	mg/kg	TM38/PM20
Chromium III	-	-	-	-							<0.5	mg/kg	NONE/NONE
Total Cyanide #	-	-	-	-							<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	-	-	-	-							<0.02	%	TM21/PM24
Sulphide	-	-	-	-							<10	mg/kg	TM106/PM119
Elemental Sulphur	-	-	-	-							<1	mg/kg	TM108/PM114
pH #	-	-	-	-							<0.01	pH units	TM73/PM11
Mass of raw test portion	-	-	-	-								kg	NONE/PM17
Mass of dried test portion	-	-	-	-								kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver
JE Job No.: 18/3937

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	63-65	71-72									LOD/LOR	Units	Method No.
Sample ID	TP18-10	TP18-11											
Depth	2.30	3.50											
COC No / misc													
Containers	V J T	J T											
Sample Date	13/03/2018	13/03/2018											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	15/03/2018	15/03/2018											
Dissolved Antimony #	<0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025									<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025									<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.045	0.004									<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.45	0.04									<0.03	mg/kg	TM30/PM17
Dissolved Boron #	<0.012	<0.012									<0.012	mg/l	TM30/PM17
Dissolved Boron (A10) #	<0.12	<0.12									<0.12	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005									<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005									<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015									<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015									<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007									<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07									<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005									<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05									<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.009	0.006									<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.09	0.06									<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001									<0.00001	mg/l	TM61/PM38
Mercury Dissolved by CVAF #	<0.0001	<0.0001									<0.0001	mg/kg	TM61/PM38
Phenol	<0.01	<0.01									<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1									<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3									<0.3	mg/l	TM173/PM0
Fluoride	<3	<3									<3	mg/kg	TM173/PM0
Sulphate as SO4 #	0.86	0.30									<0.05	mg/l	TM38/PM0
Sulphate as SO4 #	8.6	3.0									<0.5	mg/kg	TM38/PM0
Chloride #	<0.3	<0.3									<0.3	mg/l	TM38/PM0
Chloride #	<3	<3									<3	mg/kg	TM38/PM0
Ammoniacal Nitrogen as N #	0.05	0.07									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.5	0.7									<0.3	mg/kg	TM38/PM0
Dissolved Organic Carbon	2	3									<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	30									<20	mg/kg	TM60/PM0
Total Dissolved Solids #	98	56									<35	mg/l	TM20/PM0
Total Dissolved Solids #	980	560									<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	87.7
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%	Eluate Volume (l)	0.75

		Landfill Waste Acceptance Criteria Limits		
JEFL Job No	**18/3937**			
Sample No	**65**			
Client Sample No	**TP18-10**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**2.30**			
Sample Date	**13/03/2018**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.31	3	5	6
Sum of BTEX (mg/kg)	0.551	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg)	220	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.45	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.09	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	<3	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	8.6	1000	20000	50000
Total Dissolved Solids	980	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	90.9
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%	Eluate Volume (l)	0.82

JEFL Job No	**18/3937**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**72**			
Client Sample No	**TP18-11**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**3.50**			
Sample Date	**13/03/2018**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.22	3	5	6
Sum of BTEX (mg/kg)	4.556	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg)	695	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	2.98	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.04	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.06	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	<3	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	3.0	1000	20000	50000
Total Dissolved Solids	560	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
18/3937	1	TP18-10	2.30	63-65	Degraded diesel
18/3937	1	TP18-11	3.50	71-72	Degraded diesel

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/3937	1	TP18-10	2.30	64	26/03/2018	**General Description (Bulk Analysis)**	soil-stones
					26/03/2018	**Asbestos Fibres**	NAD
					26/03/2018	**Asbestos Fibres (2)**	NAD
					26/03/2018	**Asbestos ACM**	NAD
					26/03/2018	**Asbestos ACM (2)**	NAD
					26/03/2018	**Asbestos Type**	NAD
					26/03/2018	**Asbestos Type (2)**	NAD
					26/03/2018	**Asbestos Level Screen**	NAD
18/3937	1	TP18-11	3.50	71	26/03/2018	**General Description (Bulk Analysis)**	soil-stones
					26/03/2018	**Asbestos Fibres**	NAD
					26/03/2018	**Asbestos Fibres (2)**	NAD
					26/03/2018	**Asbestos ACM**	NAD
					26/03/2018	**Asbestos ACM (2)**	NAD
					26/03/2018	**Asbestos Type**	NAD
					26/03/2018	**Asbestos Type (2)**	NAD
					26/03/2018	**Asbestos Level Screen**	NAD

Client Name: AWN Consulting
Reference: 18-10021
Location: Cornelscourt
Contact: Colm Driver

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 18/3937						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/3937

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/3937

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes

JE Job No: 18/3937

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

JE Job No: 18/3937

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes		AD	Yes
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes		AR	Yes

JE Job No: 18/3937

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM106	Determination of Sulphide by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes
TM108	Determination of Elemental Sulphur by Reversed Phase High Performance Liquid Chromatography with Ultra Violet spectroscopy.	PM114	End over end extraction of dried and crushed soil samples for organic analysis. The solvent mix varies depending on analysis required			AD	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes
NONE	No Method Code	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Appendix - Methods used for WAC (2003/33/EC)

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS

**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

AWN Consulting Ltd.			Soil Samples during Site Invesitgation						Samples taken from Previous assessment															
Report:	**Solid (Soil samples)**		**Sample ID**	TP18-10	TP18-10	TP18-11	TP18-11	TP18-16	TPA	TPA	TPB	TPB	TPC	TPC	TPD	TPD	TPE	TPE	TPF	TPF	TPG	TPG	TPH	TPH	TPI
			Depth (m)	2.30	3.40	3.30	3.50	2.60	2.4	2.9	1.2	2.5	2	3	1.7	2.7	1.5	2.5	2.2	3.1	2.1	3.1	1.2	2.4	2.7
Client:			**Containers**	V J T	V J	J T	J T	JT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Client ref:	18_10021		**Sample Type**	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Location:	Cornelscourt, Co. Dublin		**Sampled Date**	15/03/2018	15/03/2018	15/03/2018	15/03/2018		15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000	15/02/2000
CAS Number	**Test**	**Units**																						
INTERPRETATION	EPH CWG Interpretation	None		Degraded Diesel			Degraded Diesel																		
	TPH CWG																								
	Aliphatics		**LOD**																						
GTC05C35AL	Total aliphatics C5-35	mg/kg	<19	229	504	719	730	555	*NT*																
	Aromatics																								
GTEC05EC35AR	Total aromatics C5-35 #	mg/kg	<19	150	815	1164	518	387	*NT*																
GTC05C35ALAR	Total aliphatics and aromatics(C5-35)	mg/kg	<38	379	*NT*	*NT*	1248	942																	
1634-04-4	MTBE #	mg/kg	<5	<LOD	<LOD	<LOD	<LOD	<LOD	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
71-43-2	Benzene #	mg/kg	<5	0.009	0.107	<LOD	<LOD	<LOD	2.575	1.621	1.018	0.434					<LOD	<LOD	0.611	*NT*	0.633	*NT*			
108-88-3	Toluene #	mg/kg	<5	0.02	0.035	<LOD	<LOD	<LOD	4.307	1.47	2.976	1.342					<LOD	<LOD	1.251	*NT*	0.786	*NT*			
100-41-4	Ethylbenzene #	mg/kg	<5	0.035	0.041	<LOD	1073	<LOD	14.878	6.383	9.71	5.391		*NT*			<LOD	<LOD	3.109	*NT*	4.654	*NT*		*NT*	
P_M_XYLENE	m/p-Xylene #	mg/kg	<5	0.425	0.115	0.097	3.483	38	51.732	20.461	36.362	26.448					0.028	0.028	10.365	*NT*	16.506	*NT*			
95-47-6	o-Xylene #	mg/kg	<5	0.062	0.009	<LOD	<LOD	<LOD																	
-	Total Mineral Oil	mg/kg	<1	220	*NT*	*NT*	695	*NT*	393	338	11	635	13	1	8	7	5	74	5	194	379	690	7	42	7

Legend

Other Samples collected on site during the 2018 site investigations recorded concentrations <LOD in terms of hydrocarbon parameters.

<LOD Results are below the laboratory respective limit of detection (LOD) (mg/kg)

NT Sample *'Not Tested'* for this parameter

AWN Consulting Ltd.			Soil Samples during Site Invesitgation 2018													Guidline Values	
			Sample ID	TP18-02	TP18-04	TP18-06	TP18-08	TP18-09	TP18-10	TP18-10	TP18-11	TP18-11	TP18-13	TP18-16	PH18-01	PH18-04		
Report:	**Solid (Soil samples)**		**Depth (m)**	2.30	2.10	2.20	2.20	2.20	2.30	3.40	3.30	3.50	2.20	2.60	1.90	2.00	LQM/CIEH S4ul for HHRA Residental Threshold at 1% SOM (mg/kg)	LQM/CIEH S4ul for HHRA Commercial Threshold at 1% SOM (mg/kg)
Client:			**Containers**	V J	V J	V J	J T	J T	V J T	V J	J T	J T	J T	J T	J	V J T		
Client ref:	18_10021		**Sample Type**	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Location:	Cornelscourt, Co. Dublin		**Sampled Date**	12/03/2018	12/03/2018	12/03/2018	12/03/2018	12/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018	09/03/2018	09/03/2018		
CAS Number	**Test**	**Units**																
INTERPRETATION	EPH CWG Interpretation	None							Degraded diesel			Degarded Diesel					*NA*	*NA*
	TPH CWG																	
	Aliphatics		**LOD**															
GTC05C06AL	>C5-C6 #	mg/kg	<0.1	-	-	-	-	-	0.4	0.8	0.1	2.2	-	-	-	-	160	3200 (304) sol
GTC06C08AL	>C6-C8 #	mg/kg	<0.1	-	-	-	-	-	2	4.8	0.3	6.8	-	0.1	-	-	530	7800(144)sol
GTC08C10AL	>C8-C10	mg/kg	<0.1	-	-	-	-	-	6.4	7.3	6	26.6	-	3.9	-	-	150	2000(78)sol
GTC10C12AL	>C10-C12 #	mg/kg	<0.2	-	-	-	-	-	34.8	75.2	80.4	100.6	-	56.1	-	-	770	9700(48)sol
GTC12C16AL	>C12-C16 #	mg/kg	<4	-	-	-	-	-	76	178	255	242	-	192	-	-	4400	59000(24)sol
GTC16C21AL	>C16-C21 #	mg/kg	<7	-	-	-	-	-	81	181	276	260	-	219	-	-		
GTC21C35AL	>C21-C35 #	mg/kg	<7	-	-	-	-	-	28	57	101	92	-	84	-	-	65000 (combined)	1600000 (combined)
GTC05C35AL	Total aliphatics C5-35	mg/kg	<19	-	-	-	-	-	229	504	719	730	-	555	-	-	-	-
TM36/PM12	>C6-C10	mg/kg	<0.1	*NT*	*NT*	*NT*	*NT*	*NT*	8.4	*NT*	*NT*	33.4	*NT*	*NT*	*NT*	*NT*	-	-
TM5/PM8/PM16	>C10-C25	mg/kg	<10	*NT*	*NT*	*NT*	*NT*	*NT*	207	*NT*	*NT*	698	*NT*	*NT*	*NT*	*NT*	-	-
TM5/PM8/PM16	>C25-C35	mg/kg	<10	*NT*	*NT*	*NT*	*NT*	*NT*	-	*NT*	*NT*	13	*NT*	*NT*	*NT*	*NT*	-	-
	Aromatics																	
GTEC05EC07AR	>C5-EC7 #	mg/kg	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	1400	26000(1220)sol
GTEC07EC08AR	>EC7-EC8 #	mg/kg	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	3900	56000(869)vap
GTEC08EC10AR	>EC8-EC10 #	mg/kg	<0.1	-	-	-	-	-	0.6	0.2	-	4.6	-	-	-	-	270	3500(613)vap
GTEC10EC12AR	>EC10-EC12 #	mg/kg	<0.2	-	-	-	-	-	24.2	53.2	23.2	85.3	-	23.2	-	-	1200	16000(364)sol
GTEC12EC16AR	>EC12-EC16 #	mg/kg	<4	-	-	-	-	-	43	95	150	181	-	134	-	-	2500	36000(169)sol
GTEC16EC21AR	>EC16-EC21 #	mg/kg	<7	-	-	-	-	-	59	121	206	190	-	176	-	-	1900	28000
GTEC21EC35AR	>EC21-EC35 #	mg/kg	<7	-	-	-	-	-	23	42	66	57	-	54	-	-	1900	28000
GTEC05EC35AR	Total aromatics C5-35 #	mg/kg	<19	-	-	-	-	-	150	311	445	518	-	387	-	-	-	-
GTC05C35ALAR	Total aliphatics and aromatics(C5-35)	mg/kg	<38	-	-	-	-	-	379	815	1164	1248	-	942	-	-	-	-
1634-04-4	MTBE #	ug/kg	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71-43-2	Benzene #	ug/kg	<5	-	-	-	-	-	0.009	0.107	-	-	-	-	-	-	380	27000
108-88-3	Toluene #	ug/kg	<5	-	-	-	-	-	0.02	0.035	-	-	-	-	-	-	3900000	56000000(869)vap
100-41-4	Ethylbenzene #	ug/kg	<5	-	-	-	-	-	0.035	0.041	-	1.073	-	-	-	-	440000	5700000(518)vap
P_M_XYLENE	m/p-Xylene #	ug/kg	<5	-	-	-	-	-	0.425	0.115	0.097	3.483	-	0.038	-	-	450000	m: 6200000(625)vap p: 5900000(576)sol
95-47-6	o-Xylene #	ug/kg	<5	-	-	-	-	-	0.062	0.091	-	-	-	-	-	-	48000	6600000(478)sol
-	Total Mineral Oil	mg/kg	<1	-	-	-	-	-	220	-	-	695	-	-	-	-	-	-

Legend

16.4	Results exceed LQM/CIEH S4ul for HHRA Residental Threshold at 1% SOM (mg/kg)
16.4	Results exceed LQM/CIEH S4ul for HHRA Commerical & Residential Threshold at 1% SOM (mg/kg)
-	Guideline threshold value not available

	Result is below the laboratory respective limit of detection (LOD)
NT	Sample not tested for that paramter

Notes

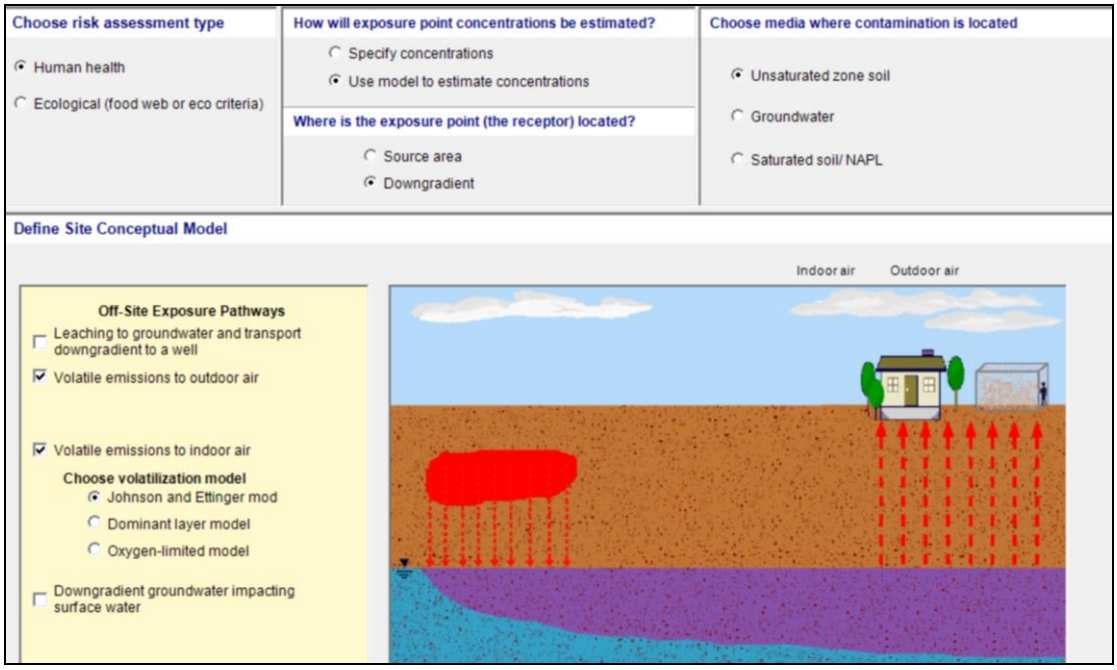
HHRA 2015 - LQM/CIEH Suitable 4 Use Levels based on 'Commercial' and/or 'resedential' land use using 1% SOM

Sol : sol S4UL presented exceed the solubility saturation limit, which is presented in brackets

Vap: vap S4UL presented exceed the vapour stauration limit which is prensted in brackets

APPENDIX C

Model Input Files


Choose risk assessment type
Human health
Ecological (food web or eco criteria)
How will exposure point concentrations be estimated?
Specify concentrations
Use model to estimate concentrations
Where is the exposure point (the receptor) located?
Source area
Downgradient
Choose media where contamination is located
Unsaturated zone soil
Groundwater
Saturated soil/ NAPL
Define Site Conceptual Model
Off-Site Exposure Pathways
Leaching to groundwater and transport downgradient to a well
Volatile emissions to outdoor air
Volatile emissions to indoor air
Choose volatilization model
Johnson and Ettinger mod
Dominant layer model
Oxygen-limited model
Downgradient groundwater impacting surface water
Indoor air
Outdoor air

Summary of Input Values Used in Fate and Transport Model

Model Description:

Source media: Unsaturated zone soil (depleting source)
Depleting source
Offsite exposure models:

Leaching to groundwater and groundwater transport to downgradient well
Offsite outdoor air emissions from groundwater
Vapour intrusion to indoor air from groundwater
Indoor air model: Johnson and Ettinger model

Unsaturated Zone Soil Source		
Depth to top of contamination	m	1.0E-01
Thickness of contamination	m	1.0E+00
Length of source	m	3.0E+01
Width of source	m	3.2E+01
Depth to groundwater (from bottom of source)	m	2.0E+00

Unsaturated Zone Properties		
Total Porosity in vadose zone	cm3/cm3	3.9E-01
Water content	cm3/cm3	1.0E-01
Depth to groundwater (from ground surface)	m	3.1E+00

Chemical Degradation Rate in Unsaturated Zone		
Ethylbenzene	1/d	3.0E-03
TPH Aliphatic C5-6	1/d	0.0E+00
TPH Aliphatic C6-8	1/d	0.0E+00
TPH Aliphatic C8-10	1/d	0.0E+00
TPH Aliphatic C10-12	1/d	0.0E+00
TPH Aliphatic C12-16	1/d	0.0E+00
TPH Aliphatic C16-35	1/d	0.0E+00
TPH Aromatic C7-8	1/d	0.0E+00
TPH Aromatic C8-10	1/d	0.0E+00
TPH Aromatic C10-12	1/d	0.0E+00
TPH Aromatic C12-16	1/d	0.0E+00
TPH Aromatic C16-21	1/d	0.0E+00
TPH Aromatic C21-35	1/d	0.0E+00
Xylenes (m-)	1/d	1.3E-02

*** Lens not used

Outdoor Box Model Parameters		
Height of box (breathing zone)	m	2.0E+00
Length of box	m	1.0E+01
Width of box	m	1.0E+01
Wind speed	m/s	2.3E+00

Aquifer Properties		
Effective porosity	cm3/cm3	2.0E-01
Fraction organic carbon	g oc/g soil	1.0E-02
Hydraulic conductivity	m/d	1.1E-01
Soil bulk density	g/cm3	1.6E+00
Hydraulic gradient	m/m	8.0E-03

Receptor Well Location

Distance downgradient	m	1.0E+00
Distance cross-gradient	m	0.0E+00
Depth to top of well screen	m	0.0E+00
Depth to bottom of well screen	m	2.0E+00
Number of vertical points used to calculate conc.	-	2.0E+00
Longitudinal dispersivity code calculated. See output file.		
Transverse dispersivity code calculated. See output file.		
Vertical dispersivity code calculated. See output file.		

Unsaturated Zone Properties Beneath Building		
Total porosity	cm3/cm3	3.9E-01
Water content	cm3/cm3	2.0E-01
Air content	cm3/cm3	1.9E-01
Distance from groundwater to building	m	3.0E+00
Bioattenuation factor	-	1.0E+00

Capillary Fringe		
Thickness of the capillary fringe	cm	3.0E+01
Air content	-	3.0E-02
Water content	-	3.6E-01

Building Parameters		
Diffusion only case		
Foundation thickness	cm	1.5E+01
Fraction of cracks	-	2.0E-03
Porosity in cracks	cm3/cm3	2.5E-01
Water content in cracks	cm3/cm3	0.0E+00
Enclosed space floor length	m	1.0E+01
Enclosed space floor width	m	1.0E+01
Enclosed space height	m	3.0E+00
Volume of building	m3	3.0E+02
Number of air changes per hour	1/hr	5.0E-01

Source Concentration for Unsaturated Zone Model (mg/kg)		
Ethylbenzene	mg/kg	1.1E+00
TPH Aliphatic C5-6	mg/kg	2.2E+00
TPH Aliphatic C6-8	mg/kg	6.8E+00
TPH Aliphatic C8-10	mg/kg	2.7E+01
TPH Aliphatic C10-12	mg/kg	1.0E+02
TPH Aliphatic C12-16	mg/kg	2.6E+02
TPH Aliphatic C16-35	mg/kg	3.8E+02
TPH Aromatic C7-8	mg/kg	1.0E-01
TPH Aromatic C8-10	mg/kg	4.6E+00
TPH Aromatic C10-12	mg/kg	8.5E+01
TPH Aromatic C12-16	mg/kg	1.8E+02
TPH Aromatic C16-21	mg/kg	2.1E+02
TPH Aromatic C21-35	mg/kg	6.6E+01
Xylenes (m-)	mg/kg	3.5E+00

Summary of Input Data for Risk Calculation

Description:

Date: **06-19-2018 22:29:09**

Receptors:
Adult Resident - Mean

Routes:
Inhalation of Indoor Air
Inhalation of Outdoor Air

Chemicals:
Ethylbenzene
TPH Aliphatic C5-6
TPH Aliphatic C6-8
TPH Aliphatic C8-10
TPH Aliphatic C10-12
TPH Aliphatic C12-16
TPH Aliphatic C16-35
TPH Aromatic C7-8
TPH Aromatic C8-10
TPH Aromatic C10-12
TPH Aromatic C12-16
TPH Aromatic C16-21
TPH Aromatic C21-35
Xylenes (m-)

Exposure Parameters

Exposure Pathway	**Units**	**Adult Resident - Mean**
Body weight	kg	71.8
Averaging time for carcinogens	yr	70
Exposure duration	yr	9

Inhalation of Indoor Air	**Units**	**Adult Resident - Mean**
Exposure frequency for indoor air	events/yr	350
Time indoors	hr/d	18.3
Inhalation rate indoors	m3/hr	0.625

Inhalation of Outdoor Air	**Units**	**Adult Resident - Mean**
Exposure frequency for outdoor air	events/yr	40
Time outdoors	hr/d	1.1
Inhalation rate outdoors	m3/hr	1.6

APPENDIX D

Model Output

SUMMARY OF CARCINOGENIC RISK

Receptor 1:
Adult Resident - Mean

Chemical	Inhalation of Indoor Air	Inhalation of Outdoor Air	TOTAL
Ethylbenzene	2.0E-11	1.5E-16	**2.0E-11**
TPH Aliphatic C5-6	ND	ND	**ND**
TPH Aliphatic C6-8	ND	ND	**ND**
TPH Aliphatic C8-10	ND	ND	**ND**
TPH Aliphatic C10-12	ND	ND	**ND**
TPH Aliphatic C12-16	ND	ND	**ND**
TPH Aliphatic C16-35	ND	ND	**ND**
TPH Aromatic C7-8	ND	ND	**ND**
TPH Aromatic C8-10	ND	ND	**ND**
TPH Aromatic C10-12	ND	ND	**ND**
TPH Aromatic C12-16	ND	ND	**ND**
TPH Aromatic C16-21	ND	ND	**ND**
TPH Aromatic C21-35	ND	ND	**ND**
Xylenes (m-)	ND	ND	**ND**
TOTAL	**2.0E-11**	**1.5E-16**	**2.0E-11**

SUMMARY OF HAZARD QUOTIENTS

Receptor 1:
Adult Resident - Mean

Chemical	Inhalation of Indoor Air	Inhalation of Outdoor Air	TOTAL
Ethylbenzene	6.1E-08	4.7E-13	**6.1E-08**
TPH Aliphatic C5-6	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C6-8	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C8-10	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C10-12	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C12-16	0.0E+00	0.0E+00	**ND**
TPH Aliphatic C16-35	ND	ND	**ND**
TPH Aromatic C7-8	1.6E-07	1.3E-12	**1.6E-07**
TPH Aromatic C8-10	0.0E+00	0.0E+00	**ND**
TPH Aromatic C10-12	0.0E+00	0.0E+00	**ND**
TPH Aromatic C12-16	0.0E+00	0.0E+00	**ND**
TPH Aromatic C16-21	ND	ND	**ND**
TPH Aromatic C21-35	ND	ND	**ND**
Xylenes (m-)	2.1E-08	1.7E-13	**2.1E-08**
TOTAL	**2.5E-07**	**1.9E-12**	**2.5E-07**