9 SOILS AND GEOLOGY

This chapter evaluates the impacts, if any, which the development will have on Soils and Geology. The methodology used for this assessment is as defined in the Environmental Protection Agency (EPA) 'Advice Notes on Current Practice (in the preparation of Environmental Impact Statements'), 2003 and the Institute of Geologists of Ireland (IGI) Geology in Environmental Impact Statements – A Guide (2002).

This chapter has drawn upon information from previous assessments of the site, the most recent of which was completed as part of an EIS and planning application submitted in 2009. A full assessment including intrusive investigations was undertaken at the site in 2005 which addressed the primary impacts potentially affecting the soils and geology aspect. This chapter will assess the impact of proposed amendments to the existing planning permission as described in Chapter 1, on the soils and geology of the site and environs. The amendments will entail some additional construction in the form of conversion of temporary office and maintenance structures respectively to permanent structures, the installation of an additional foul water treatment plant system, additional ammonia and fuel storage tanks and associated hardstanding surfaces and parking.

As the facility has now been constructed, a number of mitigation measures recommended in previous EIS's have now been implemented. This chapter therefore represents an update of the 2009 assessment identifying any further mitigation measures now required as result of the proposed amendments.

9.1 INTRODUCTION

The information regarding the existing geological environment is based on a desk study of the site and intrusive investigations completed at the site in 2000 and 2001, review of geotechnical reports based on assessments completed in 2007 and 2008, information from construction records and information from the Geological Survey of Ireland database. A copy of the most recent ground investigation report is provided in Appendix 9.1.

9.2 EXISTING GEOLOGY AND SOILS

The existing geology and soils environment is described under the two distinct units of solid bedrock geology and unconsolidated overburden deposits. The units are discussed below on both a regional and local basis.

9.2.1 Regional Geology

The site is located in a relatively narrow expanse of Carboniferous limestones that outcrops between the Lower Palaeozoic sandstones and shales of the Longford Down Massif to the north and the block of similarly aged meta-sedimentary rocks that extend between Julianstown and Balbriggan to the south (Figure 9.1). The Platin limestones extend westwards to connect with the Carboniferous rocks that underlie much of Meath. To the east and beyond Drogheda, this narrow band of limestones extends as far as the Irish Sea between the Boyne and Nanny estuaries.

9.2.2 Local Geology

The Platin outlier is fault bounded and the limestones at the nearby quarry have a general East North East strike with a shallow (10-20 degree) dip to the northwest. The deposit limestone consists of at least 300 metres deep of grainstones. The types of grainstones that have been recorded at Platin include crinoidal pepper-type, intra-clastic and skeletal. In general, the limestones are massive with few bedding structures clearly developed. The Platin limestones display karst features in and around the nearby Platin quarry.

Site specific information on the geological structure of the site has been determined from boreholes and trial pits undertaken in the course of multiple investigations. A number of additional boreholes were installed in 2010 for the site water supply and groundwater monitoring wells. A summary of the key findings is presented below.

The Carranstown site is underlain by soils from the Dunboyne-Ashbourne soil complex. The parent material of the soil is drift deposits intermixed with local limestone and shale. This type of soil is generally poorly drained.

9.2.3 Overburden Geology

The overburden geology was found to consist predominantly of brown silty clays generically known as boulder clays. These consist of medium dense brown silty clays with pebbles, cobbles and occasional boulders. The boulder clay varies in thickness across the site, ranging from four metres towards the west of the site, to in the region of 10 metres towards the centre. Sand and gravel lenses are found throughout the boulder clays.

Soil samples taken during site investigations (May 2000) indicated slightly elevated levels of heavy metals. There are no legislative guidelines for soil quality in Ireland however in general soil quality across the site is considered within normal range (including Volatile Organics, PAHs, PCBs and Pesticides). Results of soils analyses and associated trial pit logs are presented in Appendix 9.2 Results are considered indicative of the agricultural activity within the area.

9.3 PERCOLATION TESTING

Percolation testing for the installation of Puraflo™ systems to manage domestic effluent at the facility was conducted by K.T. Cullen & Co in December 2000 and PM Group as part of the Geotechnical assessments conducted in February 2009.

The test results indicated that whilst the site conditions did not meet the requirements of percolation tests for a traditional percolation area as per the EPA Waste Water Treatment Manual (Treatment Systems for Small Communities, Business, Leisure Centres and Hotels, 1999) a secondary treatment system (Puraflo) and an engineered percolation area could be constructed to comply with national guidelines and protect the underlying aquifer. Two effluent treatment systems were installed (one at the main process building and one at the site gatehouse) as part of the recent construction works.

As the proposed amendments entail the conversion of an existing temporary office block to a permanent structure, an additional waste water treatment system will be required. Further detail on the additional waste water discharge to ground is provided in Chapter 10 Groundwater/Hydrogeology.

9.4 POTENTIAL IMPACTS

The following details the potential impacts on soils and geology for both the construction and operational phases of the project.

9.4.1 Construction Phase

Relative to the scale of the construction project completed at the site for the main facility in 2010/2011, the proposed amendments will entail a significantly lower intensity of construction work and excavations. Though limited excavation works are required any minor amounts of spoil or spoil found unsuitable for reuse on site will be transported off site to a licensed facility. During the main construction works, approximately 6000m^3 of spoil was removed from site. A copy of the letter report submitted to Meath County Council in relation to the soil disposal is provided in Appendix 9.3.

Potential impacts during the construction phase would be associated with accidental spillage of potentially polluting substances including oils, paints and liquid wastes and any additional substances associated with the construction activities.

The development site is underlain by limestone which is known to be karstified in places. However, no difficulties were encountered during the construction of the existing facility. The modular office building and the centralised maintenance facility are constructed on existing concrete pads.

9.4.2 Operational Phase

The potential impacts during the operational phase would be limited to accidental spillage of potentially polluting substances including oils, paints, liquid wastes, or raw materials such as lime or ammonia or impact from discharge of sewage to ground. With good management practices in place it is expected that the development will not cause any impact on the soils and geology of the site.

The location of the facility, in close proximity to the Irish Cement quarry, has previously been assessed in relation to impacts from vibration. Blasting has been carried out at Platin Quarry site over the last 30 years at a maximum frequency of two blasts per week. The levels of vibration expected at the facility are well below the thresholds that could cause even cosmetic damage to the facility. In addition the anticipated vibration is less than 10% of the recommended vibration limit to prevent structural damage. On the basis of this analysis, it is considered that the vibration from blasting at Platin will not result in cosmetic or structural damage to the Indaver building or any of the additional structures proposed

9.5 MITIGATION MEASURES

9.5.1 Construction Phase

Construction works will be completed in accordance with the principles of CIRIA "Environmental good practice on site" (C692) and the Environmental Management Plan for the site.

All oils, chemicals, paints, fuels or other potentially polluting substances used during construction will be stored in designated storage areas which will be bunded to a volume of 110% capacity of the largest tank/container within the bunded area(s). It is anticipated that existing site storage infrastructure can be used to minimise risks during the construction period.

Filling and draw-off points will be fully located within the bunded area(s).

Drainage for the bunded area(s) will be diverted for collection and safe disposal.

All domestic effluent generated on site during construction will be managed through the existing site foul water treatment infrastructure.

The implementation of good construction management practices will minimise the risk of pollution to geology and soils.

9.5.2 Operational Phase

All substances with the potential to cause a negative impact on the soils and geology will be stored in appropriate containers and/or placed within bunded areas. Raw materials for the process will be stored mainly in containers/silos within the process building. Bulk ammonia and fuel oil storage tanks are located at the rear of the facility. Residues will be stored in the bunker and silos within the process building.

All waste entering the facility (non hazardous and hazardous EWC codes) will be stored in fully contained structures therefore in the unlikely event of a spillage or a particularly wet load of incoming waste, there will be no potential for leakage to soils. All waste storage facilities are impervious to the materials stored therein. The waste bunker has a base thickness of 1.1m and a wall thickness underground of 800mm, with a secondary containment system with fully sealed membrane and leak detection system to ensure that at all times the bunker remains water tight. The leak detection system is checked on a monthly basis. In the event that any liquid is encountered in this leak detection system the source of the liquid will be investigated and mitigation works completed as and when required.

All other concrete bunding structures (for storage of fuels and other raw materials) have been constructed as watertight structures in accordance with the requirements of relevant Codes of Practice such as BS8007 British Standard for Design and Construction of Aqueous Liquid Retaining Structures. These structures will be integrity tested in accordance with the requirements of the facility licence and guidelines given in the Code of Practice for leakage to confirm that they are watertight.

All underground piping will be maintained and regularly inspected for integrity.

All domestic effluent will be treated by an appropriate system prior to discharge to a suitable percolation area designed and constructed in accordance with current EPA requirements.

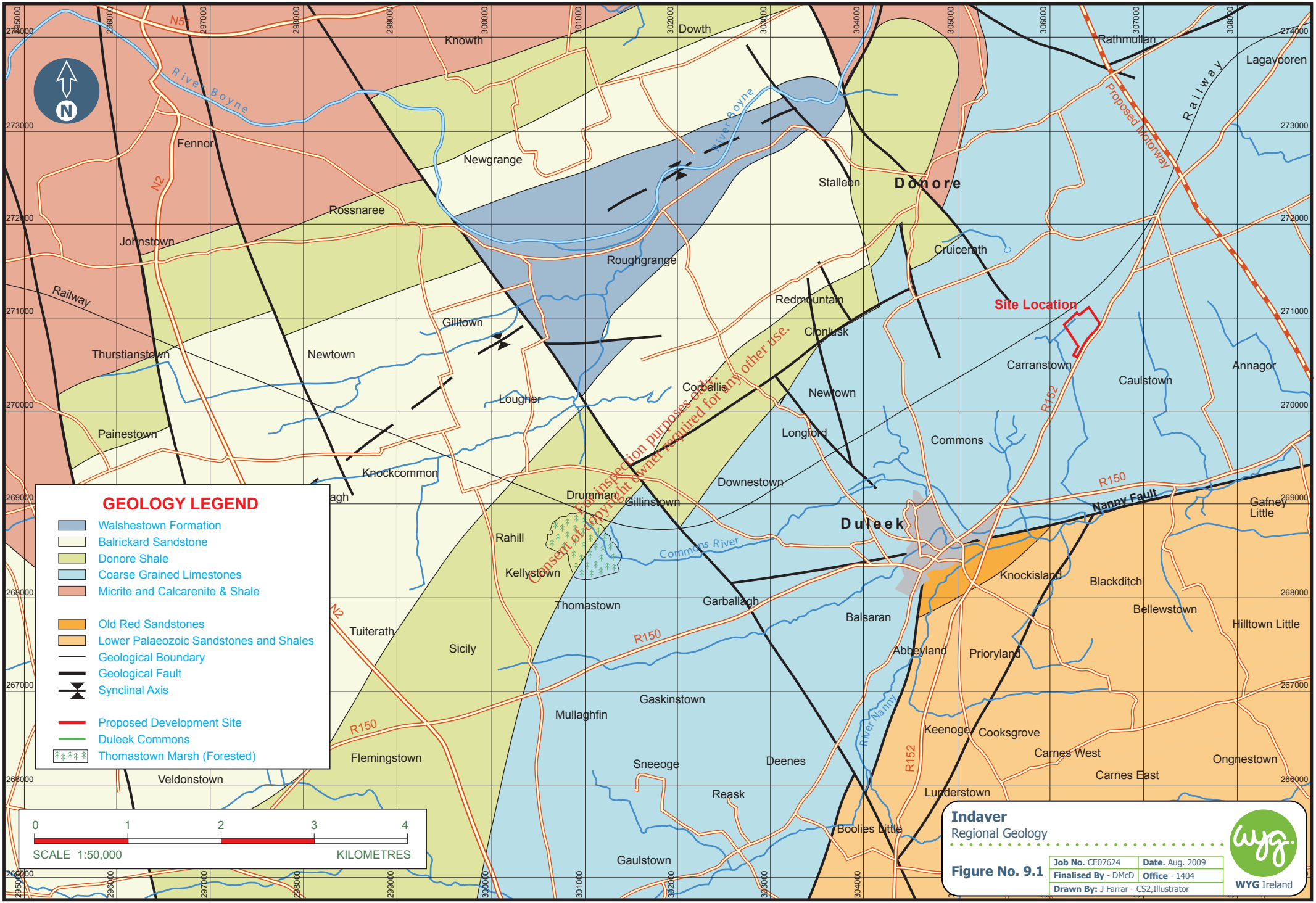
A petrol interceptor is in place on the surface water drainage outfall line from hardstanding areas to contain any leakages from vehicles on site. Full details of the proposed on site drainage network are presented in Section 11.

The Irish Cement quarry is operated under an Integrated Pollution Control (IPC) Licence issued by the EPA. The licence specifies limits on noise, vibration and overpressure resulting from explosive activity in the quarry. The limit of vibration i.e. 12mm/sec is sufficiently low to prevent interference with equipment and items of plant associated with the facility and the facility itself.

9.6 RESIDUAL IMPACTS

There are no sites of geological interest within the development property. It is anticipated that the proposed amendments will have a very minor impact on the soils and geology of the site. Excavations required for construction of the proposed amendments to the facility will be minimal when compared to the construction works completed at the site to date.

In conclusion, with the mitigation measures outlined above, the amendments to the facility will not have a significant impact on the soils and geology of the site or the surrounding lands.



Appendix 9.1

Appendix 9.2

Table 9.1: Soil Analytical Results - Metals Phenols (28/4/00)

Sample Identity	Depth (m)	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Mercury mg/kg	Nickel mg/kg	Lead mg/kg	Selenium mg/kg	Zinc mg/kg	Total Phenols mg/kg
TP1	0 - 3.3	<1	2	16	37	2	33	10	<1	54	0.01
TP2	0 - 3.4	1	<1	44	48	<1	58	13	<1	72	<0.01
TP3	0 - 3.4	<1	<1	46	26	1	46	9	<1	54	<0.01
TP4	0 - 3.5	<1	<1	49	30	<1	54	12	<1	66	<0.01
TP5	0 - 3.4	19	<1	43	25	<1	43	11	<1	51	<0.01
TP6	0 - 3.1	<1	<1	36	29	3	47	11	<1	59	<0.01
TP7	0 - 3.3	23	<1	39	37	<1	55	13	<1	60	<0.01
TP-7 Duplicate	0 - 3.3	3	<1	42	38	<1	39	9	<1	46	n.a.

Dutch MAC S Values	29	0.8	100	36	0.3	35	85	-	140	-
Dutch MAC I Values	55	12	380	190	10	210	530	-	720	-

Legend

mg/kg: milligrams per kilogram

MAC: Dutch Standard Maximum Admissible Concentration

S Value: Dutch Guidline for normal uncontaminated soil

I Value: Dutch Guideline for Intervention

"-": MAC Guideline not available

n.a. = not analysed

"<" = below detection limit

Table 9.2: Soil Analytical Results - VOCs (28/4/00)

Trace Organics (VOCs)		TP1	TP2	TP3	TP4	TP5	TP6	TP7	Dutch MACs S-Value	Dutch MACs I-Value
Dichlorofluoromethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Chloromethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Vinylchloride	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	100
Bromomethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Chloroethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Trichlorofluoromethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
trans-1,2-Dichloroethene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Dichloromethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	20,000
1,1 Dichloroethene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,1 Dichloroethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
cis-1,2-Dichloroethene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Bromochloromethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Chloroform	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
2,2-Dichloropropane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2-Dichloroethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	4,000
1,1,1-Trichloroethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,1-Dichloropropene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Benzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	50	1,000
Carbontetrachloride	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Dibromomethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2-Dichloropropane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Bromodichloromethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Trichloroethene	µg/kg	<1	<1	<1	<1	<1	<1	<1	1	60,000
cis-1,3-Dichloropropene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
trans-1,3-Dichloropropene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,1,2-Trichloroethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Toluene	µg/kg	<1	<1	<1	<1	<1	<1	<1	50	130,000
1,3-Dichloropropane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Dibromochloromethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2-Dibromoethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Tetrachloroethene	µg/kg	<1	<1	<1	<1	<1	<1	<1	10	4,000
1,1,1,2 -Tetrachloroethane	µg/kg	<1	<1	<1	<1	<1	<1	<1		
Chlorobenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Ethylbenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	50	50,000
p/m Xylenes	µg/kg	<1	<1	<1	<1	<1	<1	<1	50	25,000
Bromoform	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Styrene	µg/kg	<1	<1	<1	<1	<1	<1	<1	100	100,000
1,1,2,2-Tetrachloroethane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
o - Xylene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2,3-Trichloropropane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Isopropylbenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Bromobenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
2-Chlorotoluene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Propylbenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
4-Chlorotoluene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2,4-Trimethylbenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
4-Isopropyltoluene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,3,5-Trimethylbenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2-Dichlorobenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	10	-
1,4-Dichlorobenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	10	-
sec-Butylbenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
tert-Butylbenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,3-Dichlorobenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	10	-
n-Butylbenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2-Dibromo-3-Chloropropane	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2,4-Trichlorobenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	10	-
Naphthalene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
1,2,3-trichlorobenzene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Hexachlorobutadiene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-

LEGEND
µg/kg: micrograms per kilogram
MAC: Maximum Admissible Concentration
Dutch S-Value: Target Value
Dutch I-Value: Intervention Value
'-': MAC Guideline Not Available
< = Below current laboratory detection limit

Table 9.3: Soil Analytical Results - Polynuclear Aromatic Hydrocarbons (28/4/00)

Parameters	Depth (m)	TP1 -	TP2 -	TP3 -	TP4 -	TP5 -	TP6 -	TP7 -	Dutch MAC Values	
	Units								S-Value	I-Value
Acenaphthene	µg/kg	<1	12	<1	<1	<1	<1	5	-	-
Acenaphthylene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Benzo(B)fluoranthene	µg/kg	38	25	5	9	5	11	9	-	-
Dibenz(AH)anthracene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Fluorene	µg/kg	5	25	3	12	4	3	3	-	-
Pyrene	µg/kg	12	25	6	7	9	16	4	-	-
PAHs included in 'PAH (Sum of 10)' Dutch S and I MAC values for PAHs in soil										
Anthracene	µg/kg	28	13	9	7	4	9	5	-	-
Benzo(a)anthracene	µg/kg	65	18	5	<1	6	4	10	-	-
Benzo(a)pyrene	µg/kg	21	21	<1	<1	<1	<1	<1	-	-
Benzo(ghi)perylene	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Benzo(k)flouranthene	µg/kg	22	15	4	4	2	6	4	-	-
Chrysene	µg/kg	51	28	7	<1	2	10	7	-	-
Fluoranthene	µg/kg	17	28	8	9	12	14	5	-	-
Indeno(123-cd)pyrene	µg/kg	4	10	31	<1	<1	<1	3	-	-
Naphthalene	µg/kg	67	148	59	94	40	54	34	-	-
Phenanthrene	µg/kg	120	83	13	21	16	18	12	-	-
PAH (Sum of 10)	µg/kg	395	344	105	135	82	115	80	1000	40000
PAH (Total)	µg/kg	449	432	118	162	100	146	100	-	-

Legend

µg/kg: micrograms per kilogram

MAC: Maximum admissable concentration

S-level: Dutch guideline for normal uncontaminated soil

I-Level: Dutch guideline for Intervention

Results awaiting confirmation

"-": MAC not available

< = below laboratory detection limit

Table 9.4: Soil Analytical Results - Polychlorinated Biphenyls (28/4/00)

Parameters		TP1	TP2	TP3	TP4	TP5	TP6	TP7	Dutch MAC Values	
	Depth								S	I
	Units									
PCB Aroclor 1016	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Aroclor 1221	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Aroclor 1232	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Aroclor 1242	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Aroclor 1248	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Aroclor 1254	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Aroclor 1260	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
PCB total	µg/kg	<1	<1	<1	<1	<1	<1	<1	20	1000

Legend

µg/kg: micrograms per kilogram

MAC: Maximum admissable concentration

S-level: Dutch guideline for normal uncontaminated soil

I-Level: Dutch guideline for Intervention

-: MAC not available

< = below laboratory detection limit

Table 9.5: Soil Analytical Results - Pesticide Analysis (28/4/00)

Pesticide	Units	TP 1	TP 2	TP 3	TP 4	TP 5	TP 6	TP 7	Dutch Values	
									S- Value	I Value
Dichlorvos	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Mevinphos	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Phorate	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Alpha-BHC	µg/kg	<1	<1	<1	<1	<1	<1	<1	2.5	-
Beta-BHC	µg/kg	<1	<1	<1	<1	<1	<1	<1	1	-
Gamma-BHC	µg/kg	<1	<1	<1	<1	<1	<1	<1	0.05	-
Diazinon	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Disulfoton	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Delta-BHC	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Methyl Parathion	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Heptachlor	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Fenitrothion	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Aldrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	2.5	-
Malathion	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Parathion	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Heptachlor Epoxide	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Endosulfan I	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Dieldrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	0.5	-
4,4-DDE	µg/kg	<1	<1	<1	<1	<1	<1	<1	2.5	4000
Endrin Ketone	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Endosulfan II	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
4,4-DDD	µg/kg	<1	<1	<1	<1	<1	<1	<1	2.5	4000
Ethion	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Endrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	1	-
Endosulfan Sulphate	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
4,4-DDT	µg/kg	<1	<1	<1	<1	<1	<1	<1	2.5	4000
Methoxychlor	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-
Azinphos Methyl	µg/kg	<1	<1	<1	<1	<1	<1	<1	-	-

Legend

µg/kg: micrograms per kilogram
MAC: Maximum Admissable Concentration
S-level: Dutch guideline for normal uncontaminated soil
I-Level: Dutch guideline for Intervention
-: MAC not available
< = below laboratory detection limit

Trial Pit Records

Project No. : 2175 **Location :** Duleek, Co. Meath **Date :** 28/4/00

Drilling Method : JCB **Supervisor :** Amy Brennan

TRIAL PIT NO.1

Geology :

0 - 0.25	Dark brown organic-rich TOPSOIL
0.25 - 0.9	Medium brown silty CLAY with occasional subrounded pebbles.
0.9 - 3.0	Fine grained, homogeneous, brown SAND.
3.0 - 3.2	Brown BOULDER CLAY with occasional large limestone boulders
3.2 - 3.3	Stiff, black BOULDER CLAY

Depth to Rock : >3.3m

Rock Type :

Water Entry : None

Static Water :

Total Depth : 3.3m

Comments : Composite soil samples taken; Dry deposits. No unusual colours o odours noted.

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

Trial Pit Records

Project No. : 2175 **Location :** Duleek, Co. Meath **Date :** 28/4/00

Drilling Method : JCB **Supervisor :** Amy Brennan

TRIAL PIT NO.2

Geology :

0 - 0.2	Brown organic-rich TOPSOIL
0.2 - 1.1	Medium brown silty CLAY with occasional subangular pebbles.
1.1 - 1.6	Medium brown, silty BOULDER CLAY with large limestone boulders
1.6 - 3.4	Extremely coarse, clayey GRAVEL deposits (boulders up to 40 - 45cm), with water.

Depth to Rock : >3.4m

Rock Type :

Water Entry : 3.2m

Static Water : 3.2

Total Depth : 3.4m

Comments : Water seen to be flowing in through the gravels. Composite soil sample taken. No unusual colours or odours noted.

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Trial Pit Records

Project No. : 2175 **Location :** Duleek, Co. Meath **Date :** 28/4/00

Drilling Method : JCB **Supervisor :** Amy Brennan

TRIAL PIT NO.3

Geology :

0 - 0.15	Dark brown organic-rich TOPSOIL
0.15 - 1.9	Dark brown, moderately well-sorted , dry, clayey, sandy GRAVEL.
1.9 - 3.4	Lighter brown, clayey SAND with occasional pebbles up to 3-4cm in size.

Depth to Rock : >3.4m

Rock Type :

Water Entry : Seepage into the excavation from approx. 1.9m

Static Water :

Total Depth : 3.4m

Comments : Water was seen to be seeping in through the clayey SAND layer. Composite soil sample was taken. No unusual colours or odours.

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Trial Pit Records

Project No. : 2175 **Location :** Duleek, Co. Meath **Date :** 28/4/00

Drilling Method : JCB **Supervisor :** Amy Brennan

TRIAL PIT NO.4

Geology :

0 - 0.15	Brown organic-rich TOPSOIL
0.15 - 0.4	Medium brown subsoil.
0.4 - 1.25	Loose, light brown, silty, sandy, CLAY with occasional rounded pebbles.
1.25 - 3.45	Poorly sorted, subrounded brown, clayey, sandy, GRAVEL with some black colouration due to presence od shaley fragments.

Depth to Rock : >3.45m

Rock Type :

Water Entry : Gravels moist- Very small amount of seepage.

Static Water :

Total Depth : 3.45m

Comments : Gravel layer collapsing into the hole. No unusual colours or odours noted. Composite soil samples taken.

Trial Pit Records

Project No. : 2175 **Location :** Duleek, Co. Meath **Date :** 28/4/00

Drilling Method : JCB **Supervisor :** Amy Brennan

TRIAL PIT NO.5

Geology :

0 - 0..12	Medium brown organic-rich TOPSOIL
0.12 - 1.3	Loose, light brown, sandy CLAY.
1.3 - 2.7	Loose, fine grained, homogeneous brown SAND.
2.7 - 3.4	Quite stiff, light brown BOULDER CLAY

Depth to Rock : >3.4m

Rock Type :

Water Entry : Water seeping into the hole at approx 2.7m through the bottom of the sands.

Static Water : Not available. Hole filled up with sand.

Total Depth : 3.4m

Comments : Walls of the excavation very unstable and sand collapsing into the hole. No unusual colours or odours noted. Composite soil samples taken.

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

Trial Pit Records

Project No. : 2175 **Location :** Duleek, Co. Meath **Date :** 28/4/00

Drilling Method : JCB **Supervisor :** Amy Brennan

TRIAL PIT NO.6

Geology :

0 - 0.15	Dark brown organic-rich TOPSOIL
0.15 - 0.6	Medium brown silty CLAY with only occasional subrounded pebbles.
0.6 - 1.85	Grey brown, loose, silty CLAY with boulders up to 25cm in size.
1.85 - 3.15	Moderately well sorted, clayey GRAVEL, with occasional large boulders (up to 30cm).

Depth to Rock : >3.15m

Rock Type :

Water Entry : Spring seen to be flowing into the excavation at approx 1.85m

Static Water : 3.0m and rising

Total Depth : 3.15m

Comments : Spring flowing in from the northern side of the excavation, quite quickly. No unusual colours or odours. Composite soil sample taken.

Trial Pit Records

Project No. : 2175 **Location :** Duleek, Co. Meath **Date :** 28/4/00

Drilling Method : JCB **Supervisor :** Amy Brennan

TRIAL PIT NO.7

Geology :

0 - 0.3	Dark brown organic-rich TOPSOIL & subsoil
0.3 - 0.95	Dark brown, clayey, sandy, SILT with occasional pebbles
0.95 - 3.1	Moderatley well-sorted, dark brown, sandy, clayey, GRAVEL
3.1 - 3.3	Tight, dark brown BOULDER CLAY .

Depth to Rock : >3.3m

Rock Type :

Water Entry : None

Static Water :

Total Depth : 3.3m

Comments : Composite soil samples taken; Dry deposits. No unusual colours or odours noted.

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Appendix 9.3

Ref: SA/60050 & PL 17.219721 & SA/901467

Indaver Ref: PC012/150310

15th March 2010

Michael Griffin,
Meath County Council
Planning Enforcement
Abbey Mall
Abbey Road
Navan

Re: Waste to Energy Facility Carranstown – Removal of excess soil off site

Dear Michael,

Indaver Ireland wishes to inform Meath County Council regarding the removal of excavated soil off site to a licenced facility. It was the intention of Indaver to reuse all excavated material from the construction phase on site, however the volume of excavated material on site is larger than anticipated and as a result approximately 6,000m^3 of excess soil will be transported off site to the following licensed facility: Murphy's Environmental, Gormanstown Facility, Waste Licence Number: W0151-01.

The soil has been sampled by an Independent Environmental company and analysed by an accredited laboratory and has been classified as inert and non hazardous. The soil will be transported off site under EWC Code: 17 05 04.
All sample result certificates have been retained on site.

The removal of this material from site is due to commence on Tuesday 16 March 2010 and continue for approximately 12 days. The number of days required for this activity is dependent on weather. It is foreseen that on average 800m^3 of material will be transported off site on a daily basis which equates to a maximum of 10 trucks per hour for 12 days. Transporting of soil off site will commence on a daily basis at 7.00am and will cease at 18.00 Monday – Friday with potential movement of soil off site also on Saturdays from 07.00am – 14.00.

All vehicles removing the excess soil off site will use a tarpaulin dust cover to cover the soil and this will be checked to be insitu prior to the vehicle leaving site. All vehicles will pass through the wheel wash prior to exiting the site.

Acceptance dockets and weights as issued by the licensed facility accepting the material will be retained on site.

The licenced haulier 'Larry Kiernan Haulage, Ring of Commons (Frank Kiernan Plant Waste Collection Permit No: CPD 462-3) will be made aware of the routing restrictions to and from the site as stipulated in our planning conditions.

Should you have any queries in relation to any of the above, please do not hesitate to contact us.

Yours sincerely

Lynette Creamer.

Lynette Creamer
Site Infrastructure Manager
Indaver Ireland