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Mr Brian Meaney
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Johnstown Castle Estate,
Co Wexford.

Date: 6th of September 2016

Licence Ref. No: W0184-02

LICENCE REVIEW SUBMISSION II

Dear Mr Meaney,

In response to the queries detailed in your letter dated the 12th of July, please find attached the company's' response, which for simplicity is laid out in the same order and structure as set out in your letter.

A revised Non-Technical Summary has also been enclosed.

As requested one original signed document, one copy and two CD-ROMS have been provided.

We would very much welcome the opportunity to discuss the content of the submissions made to date and clarify any queries the Agency may have in regard to the information.

Yours Sincerely

Gareth Kelly
Director

INDUSTRIAL EMISSIONS LICENCE REVIEW

Enva Ireland Ltd
Clonminam Industrial Estate
Portlaoise
Co. Laois

NON-TECHNICAL SUMMARY DOCUMENT

September 2016

1. INTRODUCTION

Enva Ireland Ltd. (Enva) is the holder of Industrial Emissions Licence Registration W0184-01 (‘the Licence’) which permits the facility at Clonminam Industrial Estate, Portlaoise, Co. Laois (‘the Facility’) to accept, store and process a range of primarily hazardous wastes. The EPA (‘the Agency’), in accordance with sections 90(4) and 98A of the Environmental Protection Agency Act 1992 has initiated a review of the Licence.

This document sets out in non-technical terms the key elements of Enva’s submission to the review.

Site Ownership

The site is owned by Enva.

Nature of the Facility

The nature of the proposed activity to be covered under this review process is largely the same as the current licensed operation. There are a number of changes to the proposed operations as well as to the air emissions abatement procedures, but the nature of the activity remains largely unchanged.

The principle change to the proposed operations is that any reversion to treating waste oil by way of high temperatures as practised prior to January 2016 will be only occur on foot of installation of appropriate emissions abatement infrastructure.

The activities at the facility will entail accepting, holding and consolidating hazardous and non-hazardous wastes, waste processing and the onward shipment of the waste to licenced recycling / recovery or disposal facilities. A number of tanks within the main tank farm are also used exclusively for the distribution of virgin fuels (e.g. diesel and kerosene).

The principle elements of the facility comprise:

- An office building including the on-site laboratory;
- A large tank farm associated with the bulk storage and processing of hazardous liquids (e.g. waste oil, effluent and fuel oils) and associated plant & equipment;.
- An effluent treatment plant used to process effluent prior to discharge to sewer;
- Waste handling building (sorting, crushing, shredding and repackaging);
- Large Building used for both waste storage as well as for sorting, crushing, shredding and repacking of wastes;
- A packaged waste staging area for the receiving and inspection of waste prior to storage/processing;
- Waste storage areas;
- Soil Remediation Building;
- Tanker wash out bay (used to wash out tankers and also used to repackage wastes);
- Building for storage of supplies (non-waste);
- Non-waste Storage/Vehicle parking areas;
- Building containing workshop, laundry and offices;
- Welfare facilities and ancillary offices (located within the Emo building)
- Two weighbridges and one wheelwash;

The normal hours for accepting waste at the facility are 07:30 to 21:00 Monday to Sunday. However, Enva also collect waste oils from ships which can occur outside of these hours. In addition our Emergency Spill Response services may mean having to occasionally receive waste onsite outside of normal acceptance hours.

The site normally operates between the hours of 07:00 and 23:00 although the heating of tank contents occurs continuously including overnight (as it would be inefficient to stop heating outside the normal operational hours).

2. ACTIVITIES

2.1 Existing Activities

The existing activities at the Facility can be summarised as follows:

- The processing of waste oils (including engine oils, hydraulic oils, fuel oils etc.) to recover fuel products for specific applications;
- The treatment of water based effluent/waste water prior to discharge to sewer;
- The sorting, crushing, shredding and repackaging of wastes (including oil filters, fluorescent tubes, paint & surface coatings, adhesive/sealants, contaminated packaging/PPE/absorbent etc.) prior to onward shipment to third party licensed facilities for recovery or disposal; Washing of packaging for reuse, recovery or disposal;
- Processing of contaminated soil using physical, biological and chemical treatment techniques and including the recovery of stone and aggregates for reuse;
- The bulking and mixing of compatible wastes for onward shipment to third party licensed facilities for recovery or disposal (both in bulk and packaged form);
- The storage of waste (in particular hazardous waste) for onward shipment for recovery or disposal (including batteries, aerosols, paint, wastes contaminated with residues of hazardous substances, contaminated soil, filtercake, sludges etc.)

The technical references to these activities are further detailed at 'Existing Classes of Licensed Activities' in Appendix 1.

2.2 New Activities

A number of new activities are proposed for the facility summarised as follows:

- The recovery of an inorganic waste stream containing useful concentrations of nitrogen and sulphate which can be used as a replacement fertiliser. Processing of the stream will only involve basic filtering of the waste stream to remove any unwanted particulate contaminants, neutralisation (e.g. pH adjustment) and the potential addition of additional micro nutrients followed by analysis to confirm the recovered material meets the desired specification.
- The biological treatment of soils that are classified as non-hazardous. This is identical to the existing remediation process operated at the facility for hazardous soils. The output of the process would facilitate disposal or recovery as inert material.
- Enva currently sorts, shreds, crushes and repackages a range of hazardous wastes and it is proposed to provide for the mixing of certain compatible hazardous wastes with non-hazardous wastes (already destined for energy recovery) together to physically condition and homogenise the wastes to facilitate its' direct use in a cement kiln or other

appropriately licensed energy recovery facility. Without such physical conditioning the wastes would not be in a suitable condition for direct use as fuel at these plants.

The technical references to these activities are further detailed at 'Additional Classes of Licensable Activities' in Appendix 1.

2.3 Proposed Waste Types and Quantities

WASTE TYPES	Proposed Maximum Tonnes per annum
Waste Oil/Hydrocarbons (including interceptor wastes and tank bottoms, solvents and other flammable liquids)	30,000
Bulk wastes: including soil, contaminated soil, filtercakes, drilling mud, sludges and other bulk wastes)	40,000
Other hazardous wastes (including automotive wastes, industrial wastes, civic amenity wastes)	10,000
Inorganic Waste (for recovery)	10,000
Non-hazardous wastes (aqueous effluents, RDF or similar combustible waste streams);	20,000
Total Waste (Unchanged)	**110,000**

Note: *Additional wastes (hazardous or non-hazardous) may be also handled or processed and volumes interchanged between categories subject, however, to the prior receipt of agreement from the Agency as required by the Licence.*

3. EMISSIONS

3.1 The potential emissions from activities at the site include:

1. Air Emissions (e.g. hydrocarbons, odour & dust);
2. Noise;
3. Discharges to surface/storm water; and
4. Discharges to sewer;

3.2 Current Air Emissions:

RPS Environmental Consultants were engaged in the early 2016 to carry out a series of source tests at stacks and vents as well as fugitive emissions across the site to inform the ongoing air emissions abatement improvement programme.

There are a number of sources of air emissions at the facility including from:

- steam raising boiler;
- tankers offloading/loading
- storage & process tanks
- processing of oil (e.g. filtering, centrifuging)
- processing of wastewater;
- soil remediation;
- storage of waste (eg soil, filtercake etc);
- sorting, crushing/shredding and repackaging of waste;

Steam raising boiler: The existing steam raising boiler is fuelled by either natural gas or oil. The boiler has an associated emissions stack (approx. 18m high, Ref A1-1) through which the combustion gases are emitted to atmosphere. This is subjected to annual monitoring (of combustion gases) in accordance with the existing licence.

Tanker Loading/Unloading: The loading/unloading of tankers is not considered a significant source of air emissions as the majority of products handled are not particularly volatile. Where potentially odorous wastes are being offloaded the tankers are then fitted with vacuum valves to prevent air emissions but allow air into the tanker as it is offloaded. Tankers loading volatile liquids (e.g. solvents, petrol etc.) use a vapour recovery system to return displaced air from the tankers as it fills back into the storage tank.

Storage and Processing Tanks: Since January 2016, the company has ceased to use the oil drying technique where oil was heated to ~100^{o}C and air sparged to drive off the remaining water. Since then this technique has been replaced with one where the oil is chemically dewatered at a lower temperature (~80^{o}C) with the tank vent ducted to an air filter. Furthermore all waste storage and oil/wastewater processing tanks now have their vents ducted to air filters rather than directly discharging to atmosphere. These filters now include an activated carbon filter to abate odours and volatile organic compounds (VOCs) such as benzene. Activated carbon is a very effective and commonly employed technique to remove odours and VOCs.

Processing of oil: The processing of waste oils include filtering and centrifuging steps which are carried out in an enclosed area. Since March 2016, the filtering area has been further enclosed and had an extraction system installed which draws air from the filtering area through an activated carbon filter to remove odours and VOCs before discharging to atmosphere. The discharge from this carbon filter is a new emission point included in this application (A3-52) which may be relocated to an adjacent area.

Processing of Wastewater: The handling and processing of wastewaters at the facility can present the potential for odours and other fugitive emissions. To manage this wastewaters are treated as required with agents to neutralise the potentially odorous compounds. In addition the wastewater system is enclosed to prevent uncontrolled releases to atmosphere. Since April 2016, an extraction system has been installed on the main effluent transfer point to draw air from this point through a scrubber and an activated carbon filter to remove potential odours and VOCs. The discharge from this carbon filter is a new emission point included in this application (A3-57).

Soil Remediation: Soil Remediation activities are carried out within the soil remediation building. Potential emissions include dust, odour and VOCs from contaminants within the soil. Existing measures to control dust, odour and VOC emissions include use of a mobile water/odour abatement aerosoling unit. In February/March 2016 Enva enclosed the building on two sides (i.e. the northern & eastern elevations) which has significantly reduced the potential for dust generation. During 2016 planning permission was applied for and subsequently granted to fully enclose this building (including roller shutter doors). To date the soil remediation activities have not presented any significant odour or air emission source and it is not considered necessary to install any further mitigation measures other than potentially completing enclosure of the building (if this proves necessary).

Storage of Waste: Wastes are stored in both bulk and packaged form at the site. All wastes are stored within buildings except for the storage of packaged low flashpoint liquids (e.g. solvents, mixed fuels etc.) and the tanker wash out bay. While not considered to present a significant source of air emissions it is now proposed to roof these areas. While the storage area for packages containing low flashpoint waste will be open at the sides to provide necessary ventilation, the tanker wash out bay will be fully enclosed and provided with an air extraction system discharging through a carbon filter to control VOC and the potential for odours.

Sorting, Crushing, Shredding and Repackaging of Waste: A variety of handling and physical processing activities are carried out on wastes all of which occur within buildings. Monitoring within these areas has shown the levels of VOC emissions to present no significant impact.

3.3 Air Emissions Monitoring & Improvement Programme

Vapour Balancing

Currently the vents from both process and waste storage tanks are ducted to a number of individual activated carbon filters. Works currently underway intend to duct each tank vent to a central ring main which would serve to interconnect the vapour space of each tank. This would provide a means of balancing the vapours between tanks and reduce the volume of air displaced as liquids are pumped from one tank to another. The vapour balance ring main will allow vapours being displaced from one tank (e.g. as it is being filled) to return to the tank being emptied via the ducting. The ducting will vent as necessary through the proposed Regenerative Thermal Oxidiser (RTO, emission Ref A2-1) or if unavailable (e.g. due to RTO maintenance) an activated carbon filter – see 'Proposed RTO' below.

Tank Cleaning

A new large activated carbon filter is proposed to facilitate the cleaning of large oil storage/processing tanks. The new carbon filter will be capable of handling ~10,000m^3/hr of air flow and thereby providing 5-10 air changes per hour to the largest oil processing tanks in use at the facility (tanks 18, 19). This carbon filter will also provide abatement for the tanker wash out bay as outlined below (emission Ref A3-54).

Additional Enclosure Measures

It is proposed to provide increased enclosure to a number of waste handling areas across the site, specifically:

i) Soil Remediation Area – In 2016 this was enclosed on two sides (i.e. northern & eastern elevations) which significantly reduced the dust & odour potential. Planning permission has since been obtained to enclose this on the remaining two open sides to provide better control of fugitive emissions associated with soil handling/processing activities if this proves necessary;

ii) Tanker Wash Out Bay – currently this is not enclosed and it is proposed to fully enclose this which will reduce the volume of contaminated rainwater generated in the area as well as provide better control of potential odour emissions from tanker cleaning operations. The new building will be fitted with an air extraction system connected to a new activated carbon filter for use when odorous materials are being handled.

3.4 Proposed RTO

Enva will not recommence the previous form of thermal drying technique where oil, heated in batches to ~100^{o}C, was air sparged to remove residual water unless an effective abatement technology is in place. This type of oil drying technique will not be used unless it can be clearly demonstrated to the Agency that the proposed RTO is adequately sized.

However, notwithstanding the amended process since January, 2016 under which chemical de-emulsification alone has been used to remove water from waste oil, consideration is being given to introduce an alternative thermal drying technique which would be carried out in a continuous manner rather than the previously employed batch mode. This process would be more thermally efficient than the previous batch mode and would also provide greater operational efficiencies. The thermal drying process currently under consideration is a process whereby the oil would be heated in a pipeline by means of a steam powered heat exchanger and placed under pressure prior to entry into an expansion vessel where the more volatile components would become gaseous and be removed from the liquid oil stream. The gaseous fraction (mainly water but including VOCs) would be routed to an RTO for treatment before discharging to the atmosphere via a new stack adjacent to the existing stack associated with the site boiler.

Any use of a thermal oil drying process will include an automated control of the flow rates and VOC loading in the airstream to be treated by the RTO to ensure the RTO is operated within its capacity and meets BAT (See 'Best Available Techniques Reference' below). Emissions from the RTO unit will meet the BAT emission limits for VOCs of 20mg/Nm^3.

It is proposed that both techniques (i.e. chemical dewatering and thermal dewatering) will be potentially used in the processing of waste oils. Any process for thermal drying of oils will not be used until an RTO plant of sufficient capacity is approved and installed.

3.5 Other Emissions

Noise:

Noise emissions may arise from operational plant and traffic to and from the site. However, the majority of waste operations take place under enclosed conditions (excluding tanker/truck offloading). The site has adjacent industrial activities as well as being bounded by a mainline railway line. The site undertakes noise monitoring surveys as part of the existing licence conditions and these surveys have not indicated any noise issue of concern emanating from the facility.

Discharges to Surface Water:

Surface water run-off from internal roadways and yard pavement, is collected in the surface water drainage system. In addition water building up within the main tank farm is also discharged to the surface water system after inspection. The surface water drainage system includes gully traps, silt traps and Class 1 interceptors to control discharges to the municipal surface water drainage system.

All surface water discharges are subjected to a routine monitoring programme under the Licence and have a high level of conformance with the existing discharge parameters.

Discharges to Sewer:

Process wastewater generated at the facility arises largely from the processing of waste oils and effluent. Some additional effluent is generated from run off from soil remediation areas, tanker washing and container washing. All effluent arising is treated as necessary to meet the discharge limits in the Licence prior to discharge to sewer. Discharge of process wastewater is via a flow proportional auto sampler and includes the ability to electronically control the timing and rate of discharge.

In addition domestic type discharge associated with the on-site tea/coffee room, sanitary facilities are also discharged to sewer.

The Company has engaged with Irish Water with a view to exploring the potential to amend the existing discharge parameters for discharges to sewer. Irish Water is carrying out a review of the Drainage Management Area Plan for Portlaoise and is unable to progress any review until this work is completed.

4. BEST AVAILABLE TECHNIQUES REFERENCE (BREF) DOCUMENTS

As part of the Licence review the relevant pan European reference documents associated with the Industrial Emissions Directive were reviewed. These documents list the Best Available Technology ('BAT') to be used as reference guidance for facilities licenced under the Directive.

The relevant BREFs were identified as:

i) Waste Treatment Industries (2006);
ii) Emissions from Storage (2006);
iii) Energy Efficiency (2009);

No other BREFs were considered to be materially relevant to the activities at the facility that are not already covered by the BREFs reviewed above. These were reviewed and while not constituting legal requirements it was confirmed by the review that the facility applies a high level of the Best Available Techniques across the various site activities. BAT can be demonstrated by the following non-exhaustive list:

- Operation of an independently accredited Environmental (and Safety) Management system;
- Use of waste acceptance procedures to control waste accepted at the site;
- Use of enclosed tanks and vessels to store and process waste with abatement provided by means of adsorption filters on such tanks & vessels;
- Provision of secondary containment for all tanks and waste storage areas;
- Utilisation of sealed containers for storage and transportation of waste;
- PC/SCADA control of oil & effluent processes to provide automated controls of the process (e.g. control temperatures, prevent overfills etc.);
- Use of thermal oxidation/ adsorption filters to control emissions to atmosphere.
- Monitoring of all significant emissions to air, sewer and storm water;
- Effective waste tracking systems;

However, as outlined above, a number of improvement measures are planned or underway to improve the level of compliance with BREF documents including:

- Introduction of RTO & vapour balancing ducting to reduce the level of emissions to atmosphere from tanks and also the loading on abatement systems;
- Enclosure of Soil remediation building
- Enclosure of tanker wash out bay to reduce contaminated water generation and provide extraction system for odour abatement when required (including waste repackaging);
- Roofing of packaged flammable liquids store to reduce rainwater build up;

5. RECOVERY OF FUEL OILS

The facility recovers a range of fuel products from waste oils for use in a number of limited industrial applications (asphalt production & steam raising boilers). A technical and legal review was carried out which re-confirms that the recovered fuel oils are no longer considered waste based on the relevant legislation and a technical assessment of the recovered products produced at the facility.

6. BASELINE REPORT SUMMARY

A baseline report has been prepared for this application in line with the guidance presented in the "*European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions*" (reference 2014/C 136/03). This guidance sets out a standard eight stage process that includes highly prescriptive requirements to complete a baseline. This report is included in the application and identifies the "relevant hazardous substances" on the site and their associated risk along with a summary of the historic groundwater quality and soil analysis.

7. SCREENING REPORT SUMMARY

An Appropriate Assessment Screening was carried out in respect of the facility and its activities. Appropriate Assessment is a process whereby a comprehensive ecological impact assessment is carried out of the sites activities, examining its implications (on its own or in combination with other plans and projects) on one or more designated European Sites taking into account the conservation objectives of any relevant designated sites, as referred to in Article 6(3) of the EU Habitats Directive.

The Screening process identified four Special Areas of Conservation (SACs) and two Special Protection Areas (SPAs) within a 15 kilometre zone of influence of the facility. The Enva facility itself is not situated within a European Site; the nearest is the Slieve Bloom Mountains SPA, which is approximately 8 kilometres to the west of the facility.

Given the distance between the Enva site and the European Sites, the Screening exercise concluded that there is no potential for significant effects on the identified European Sites and a Stage 2 Appropriate Assessment is not required.

8. PROPOSED INSTALLATION SCHEDULE

For clarity the proposed installation of key site infrastructure is outlined below:

	Description	Timing
i)	RTO & Vapour Balance Ring Main	To commence after approved from the EPA;
ii)	Thermal Drying of waste oil	After RTO installation (with EPA approval);
iii)	Enclosure of the Tanker Dig out bay	Q4 2016;
iv)	Enclosure of the Soil Remediation Area	Not considered necessary currently;

For further details relating to this Non Technical Summary Document, please refer to the full Enva submission which can be found at www.epa.ie

Appendix 1

Existing Classes of Licensed Activities

Enva wish to retain all existing classes of activities currently licensed (as listed below). It is no longer proposed to operate a sludge drying plant as currently permitted under the Licence.

11.1 The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required;

11.2 (a) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving biological treatment;

11.2 (b) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment;

11.2 (c) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving blending or mixing prior to submission to any of the other activities listed in paragraph 11.2 or 11.3;

11.2 (d) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving repackaging prior to submission to any of the other activities listed in paragraph 11.2 or 11.3;

11.2 (g) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving regeneration of acids or bases;
While this has not commenced it is to be retained to facilitate proposed recovery of an acidic stream for reuse in an industrial production process currently under negotiation;

11.2 (j) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving re-refining or other reuses of oil;

11.4 (a)(ii) Disposal or recovery of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment;

11.6 Temporary storage of hazardous waste, (other than waste referred to in paragraph 11.5) pending any of the activities referred to in paragraph 11.2, 11.3, 11.5 or 11.7 with a total capacity exceeding 50 tonnes, other than temporary storage, pending collection, on the site where the waste is generated;

Additional Classes of Licensable Activities being sought:

11.2 (f) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving recycling or reclamation of inorganic materials other than metals or metal compounds;
This is to facilitate the recovery of liquid wastes suitable for reuse as a beneficial fertiliser;

11.4 (b)(i) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving biological treatment;

11.4 (b)(i) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving biological treatment;
These two classes are to facilitate the recovery or disposal of non-hazardous soils grits and other similar non-hazardous wastes using bioremediation;

11.4 (b)(ii) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving pre-treatment of waste for incineration or co-incineration;
This is to facilitate the preparation and mixing of suitable non-hazardous wastes with hazardous wastes to condition the wastes for handling at a third party incineration or co incineration plant;

6th September 2016

Query 1:
Explain the use of the term "Existing" in the header of table 6.2 of your response dated 17/5/2016 and explain the table entries under that heading i.e. "yes" or blank.

Response

The column headed "Existing" was included to indicate which specific hazardous waste codes the Agency has formally approved for acceptance at the facility previously. A "Yes" indicates the hazardous waste (i.e. EWC code) has been specifically approved for acceptance at the facility. A blank indicates that the waste code has not been specifically approved to date. However in general non-hazardous wastes have not been indicated either way as it is understood that non-hazardous wastes are in general acceptable at the facility (subject to their proper control and not presenting any additional hazards).

6th September 2016

Query 2:
Summarise your standard operating procedures regarding PCBs in the context of waste acceptance (including analysis and screening of incoming waste) and operations (unit processes) involving PCBs.

Waste oils that are determined to present a significant risk of contamination/presence of PCBs are not collected until the levels of PCBs in the waste have been quantified. These waste sources include all waste oils collected from electrical transformers or other electrical switchgear (e.g. capacitors, electrical cables etc). Only waste oil that has a PCB content of less than 10ppm is collected for processing and recovery into recovered fuel oil at the Portlaoise facility. Records of analysis (or declarations that PCB oils are not present) are obtained from all producers of waste oil associated with electrical switchgear where available prior to collection. Furthermore, in addition to pre-collection controls, all waste oils collected from such high risk sources are also analysed for PCBs by Enva (i.e. using our on-site laboratory) on arrival at the facility. Any waste oils with higher levels of PCBs (>10 ppm) are collected and packaged separately for onward shipment to an appropriately licensed facility.

All recovered fuels produced at the facility are analysed for PCBs to ensure they meet the relevant fuel specification.

Query 3: *Table 6.2 of your response dated 17/5/2016:*

a. There are LoW codes in the waste oil recovery column of table 6.2 (as well as in table 8.1) of your response dated 17/5/16) hat are not listed in Schedule G.3 of your licence. This schedule limits the feedstocks for the production of your 19LS material. Clarify whether the non-Schedule G.3' LoW codes listed in table 6.2 will be used in the production of 11LS.

Response

The 'Non-Schedule G3' LoW codes listed in table 6.2 may be used in the production of 11LS subject to the waste oil being suitable for processing (i.e. the output will meet the 11LS fuel specification).

b. It is stated that bituminous mixtures containing coal tar (17 03 01) are treated by way of soil remediation so that contaminant levels are, as stated in table 6.1 of your response dated 17/5/16, reduced to facilitate disposal to non-hazardous landfills, recovery at inert landfills or other suitable facilities. Please clarify and explain the process.*

Response

The inclusion of this waste (17 03 01) was to provide for the potential to screen and separate contaminated soils containing such waste into different fractions (e.g. based on size) which may then present the potential for subsequent remediation of some of the separated fractions (as the contamination is often more closely associated with a particular size fraction). However it is accepted that may be a less likely scenario for this particular waste stream and that such waste is more than likely to be shipped onward for treatment or disposal rather than remediated on site.

c. Table 6.2 states that petrol (13 07 02) may be put through the waste oil recovery unit process. Page 1 of your response to our Query 7 states that petrol does not enter the oil recovery process. Please clarify.*

Response

Petrol is not put through the full recovery process and in particular would not be heated, however the inclusion of this code under the oil recovery process is to allow for waste petrol to undergo basic processing at the facility (e.g. filtering to remove solids or removal or free water by gravity decanting etc.). While such opportunities are very rare the company wish to have the ability to carry out such processes whereby such wastes may be prepared for reuse (once it can be brought back to product specification).

Treatment of waste oil and contaminated soil (Ref item 7)

> ***Query 4***. *With regard to the proposed flash distillation process, provide detailed information on the process, its objectives, its design parameters and its process outputs and emissions (gas, liquid, solid).*

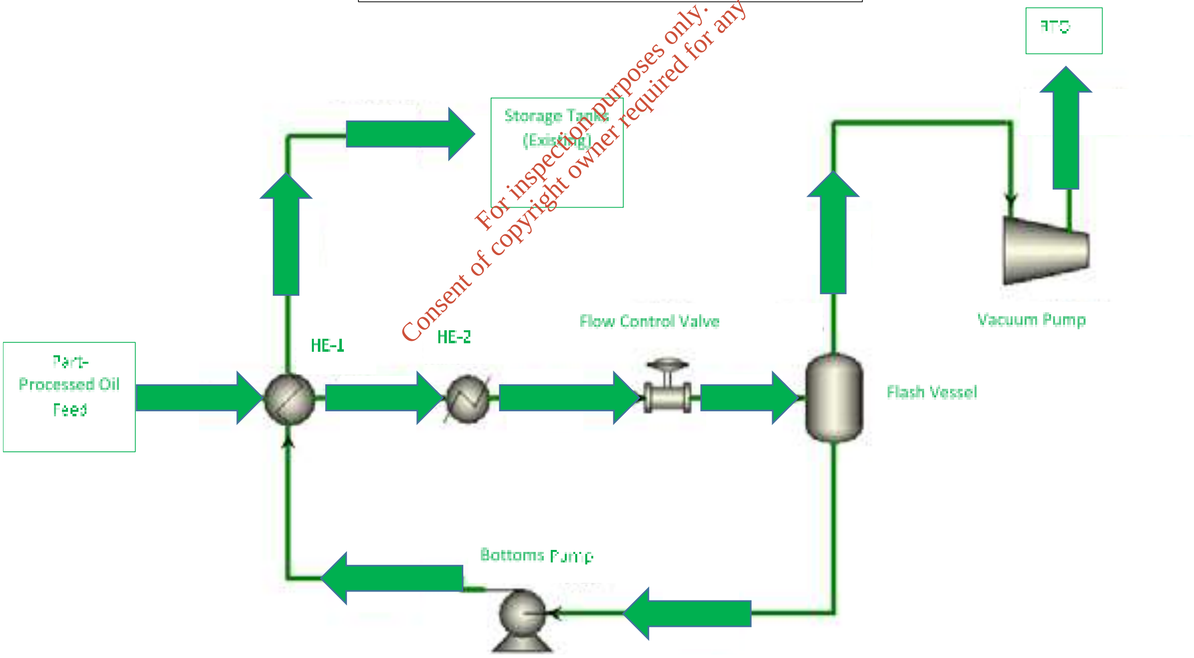
Response

The objective of the proposed flash distillation step is to remove the water remaining in the oil that has not been removed in the prior process stages. The Flash Distillation step is simply an alternative to the current practice whereby the same objective is achieved using a de-emulsifying chemical (or as was previously achieved by air sparging oil at 100°C).

Process Details

The proposed process is a relatively simple single stage flash distillation process with no distillation column involved (See Figure 4.1).

FIGURE 4.1 DIAGRAM OF PROPOSED FLASH DISTILLATION STEP



'HE' denotes a Heat Exchanger

The flash vessel is initially purged using nitrogen, to ensure an inert atmosphere in the vessel before the process commences. Waste oil that has already been processed through the preliminary dewatering and physical processing stages, is pumped from an existing tank through up to two heat exchangers to heat the oil before flashing across the flow control valve into the flash vessel. The flash vessel is a simple pressure tank/vessel similar to an air receiver or boiler blowdown vessel with no significant internal components). In order to successfully "flash" the heated feed into the flash vessel, the feed delivery pressure will be approximately 8 bar, at the maximum design feed-rate (10 tonne/hr).

6th September 2016

The flow-rate of waste oil will be measured by a flowmeter, with the flow automatically controlled by the flow-control valve. The waste oil passes through the heat exchangers HE-1 and HE-2 to heat the oil to the desired temperature for flashing (up to 175°C). The heat exchanger HE-1 will provide some initial heating of the waste oil whereby heat is recovered from the oil after it has undergone the Flash Distillation step. A second heat exchanger (HE-2) will be steam powered (steam from the existing on site boiler) and will ensure the oil is heated to the desired process temperature (up to 175°C). before flashing across the flow-control valve into the Flash Vessel. In the flashing process, the light hydrocarbons and water are primarily vaporized, while the heavier hydrocarbons remain in the liquid phase. The vapour and liquid phases are then separated in the Flash Vessel with the light hydrocarbon/vapours being drawn out of the vessel under a slight vacuum and on to the proposed RTO (Emission Point A2-1). The temperature of the incoming oil is measured by a thermocouple, and controlled by a steam flow-control valve which supplies steam heating to the heat exchanger (HE-2). Flow of steam is shut-off by a steam control valve when the system is being shut-down, or during a process/safety alarm event. Condensate from HE-2 is purged via a steam trap out to the existing condensate collection system.

Liquid level in the Flash vessel is monitored continuously and controlled by manipulating the flow of liquid via a level control valve. At steady-state, the rate of treated oil ("bottoms") being pumped out of the Flash Vessel by the Bottoms Pump will approximately match the incoming flow of untreated oil (allowing for a small amount of light fraction hydrocarbons and water being removed as distillate). The dewatered oil removed from the Flash Vessel passes through the heat exchanger HE-1 (to transfer heat to input oil to the flash distillation process), prior to pumping the dewatered oil to an existing storage tank.

The discharge of bottoms from the Flash Vessel may be diverted so as to circulate it around and back into the flash vessel, in a start-up (heat-up) mode. Pressure and temperature in the flash vessel are monitored continuously and alarmed. A high-level switch protects against overfilling the flash vessel, while a low-level switch stops the Bottoms Pump. An over-pressure relief valve protects the flash vessel; similarly a separate relief valve protects the steam side of HE-2. The vacuum pump on the exit of the Flash Vessel maintains a low vacuum pressure (approx. 75 mbar) in the Flash Vessel and transfers the extracted vapours to the proposed RTO.

Design Parameters

The Design specification of the Flash Distillation equipment will be a maximum of 10,000 litres per hour however an operational throughput of between 5,000 and 6,000 litres per hours operated 10 hours a day for 5.5 days would satisfy current throughput requirements.

Process Outputs/Emissions

There are only two output streams arising from the Flash Distillation process namely:

i) Liquid Stream - Dewatered Oil
ii) Gas Stream - Extracted vapours (both water vapour and light hydrocarbons)

The dewatered oil will be practically identical to the current dewatered oil or indeed the dewatered oil arising from the historic dewatering process involving heating the oil to 100C and air sprging the oil to remove the water. The dewatered oil is the finished product and its composition is as per the information already provided regarding the test results on batches of 11Ls and 19Ls.

The extracted vapours removed by the vacuum pump from the Flash Vessel will consist mainly of water vapour and the more volatile hydrocarbon components contained the waste oil. Typically this will include any petrol, kerosene and solvent components within the collected waste oil.

Individual Petroleum products such as petrol, kerosene, and diesel are composed of a range of hydrocarbons normally grouped by their boiling point in a distillation column. Petrol typically consists of the hydrocarbons within the range C4 to C12 and typically consist of a mixture of alkanes, cycloalkanes, aromatics and alkenes. EU limits place a maximum % content of 18% on alkenes, 35% on aromatics and 1% on benzene. Kerosene typically consists of hydrocarbons in the range C6 to C16 and mainly consists of alkanes and cycloalkanes (typically 70%) with aromatic hydrocarbons accounting for approximately 25% (including both single chain and polycyclic) and alkenes less than 5%. Waste oil will consist of a variety of different petroleum classes mixed together in varying composition depending on their source and subsequent handling. Due to these factors it is not possible to characterise the vapour phase formed by the proposed flash distillation process in any simple definitive manner, however Table 4. 1 below lists constituents commonly present within waste oils which will be present in the vapour from thermal dewatering. The concentrations of these individual molecules will vary with the feed input.

Table 4.1 Constituents present in the Vapour from Flash Distillation

Class	**Examples of constituents in Waste Oil**
Alkanes	Hexanes, Heptanes, Octanes, Nonanes, Decanes, Undacanes, Dodacanes, Tridecanes, Tetradecanes, Pentadecanes, Hexadacanes, etc
Cycloalkanes	Cyclohexanes, cyclopentanes
Aromatic	Benzene and its derivatives (e.g. ethyl, methyl, propyl benzenes etc), Toluene, Xylenes, Phenols, Carbazole, Dibenzofuran etc;
Poly Aromatic Hydrocarbons	Naphtalenes, Fluorene, Phenanthrene, Benzo(a)pyrene, etc.;
Other Compounds	Methyl Tertiary Butyl Ether (MTBE), Trichloromethane, Chloroethane, etc.;

The VOC load from the reintroduction of a thermal dewatering technique (e.g. the proposed Flash Distillation unit) will vary with the composition of the waste oil but this will be monitored continuously using an inline FID meter (for TOC monitoring). This meter in combination with a flow meter to ensure the loading on the RTO does not exceed the design capacity. If the TOC load is at any time approaching the maximum set point (160 kg/hr) then the SCADA will automatically reduce the flow throughput in the Flash Distillation process (or ceases it altogether) and thus reduce the VOC loading on the RTO. In addition if the proposed Flash Distillation process is installed it will be configured so as to only remove sufficient water to meet the desired specification which may result in a reduced operating temperature. Any such reduction in operating temperature would also reduce the mass of VOCs being directed to the RTO.

Similarly there is the potential to use a drying technique involving air sparging heated oil (~100^{o}C) to remove water, with the resulting vapours being directed to the proposed RTO. The TOC loading on the RTO will be continuously monitored and managed (e.g. by reducing the volume of air delivered by air sparging and/or reducing the application of steam) to remain within the capacity of the proposed RTO. As such, there will be an enclosed and fully controlled monitoring system in operation that will facilitate the accurate determination of flows and loads to the RTO from all processes. Prior to the use of air sparging of heated oil (~100^{o}C) to dewater the oil , a series of batch trials can be agreed in advance with the EPA to allow for the full determination of flows and loads from the process to the RTO to demonstrate that the proposed RTO is sufficiently capable of treating the vapours and meeting BAT.

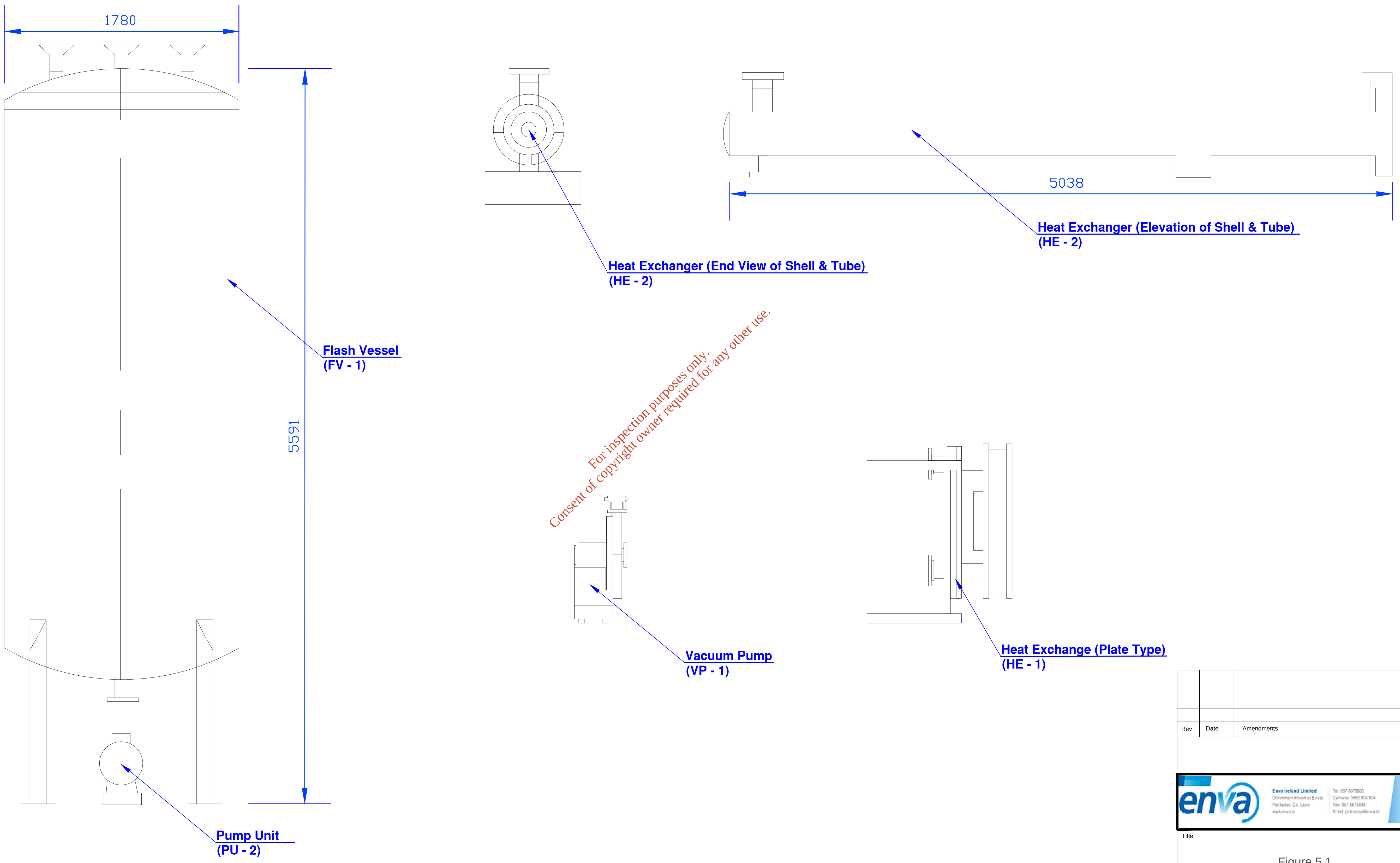
Query 5.

Drawing no. Figure 2.3 indicates that the proposed flash distillation unit will be installed in the process room. Please indicate the scale and size of the machine by comparison to the space available in this room and outline the factors that make this a suitable location for the new machine. Clarify whether the waste oil filters and centrifuges are also located in this room.

Response

The equipment associated with the proposed flash distillation process is relatively compact. The proposed flash vessel is approximately 5 m high and 1.8m diameter and the associated steam powered heat exchanger (HE2) being similar to the existing heat exchangers in this location (shell & tube) but larger (~400mm diameter and ~5m long). The heat exchanger HE1 is a compact plate type exchanger of approximately 1.2m x 1.2m x 0.8m (See figure 5.1).

This location is being proposed as it is where the current heat exchangers are located and an existing steam supply is available. The building is where the existing oil filters and centrifuges are located and the general area has the space available to locate the flash vessel and associated components. A final design layout has not yet been completed but the flash vessel would most likely be located external to (but adjacent to) the existing oil processing building.



Rev	Date	Amendments

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Title

Figure 5.1
Main Components of Proposed Flash Distillation Process

Drawn by.	Checked by.	Scale.	Sheet No.	Date.
CK	AP	1:30 @ A3	5	05-09-2016

Drawing no.
ENV-1605-09

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Query 6.

With regard to the proposed flash distillation process, and by reference to your statement at the bottom of page 2 of item 7 that "this additional process would substitute for the current technique of chemical dewatering of oils":

a. please provide a more precise description of what exactly the new process will replace;

b. illustrate this by way of process flow (schematic) diagrams that compare past (up to 2016), current (2016) and proposed unit processes for the treatment of waste oil; and

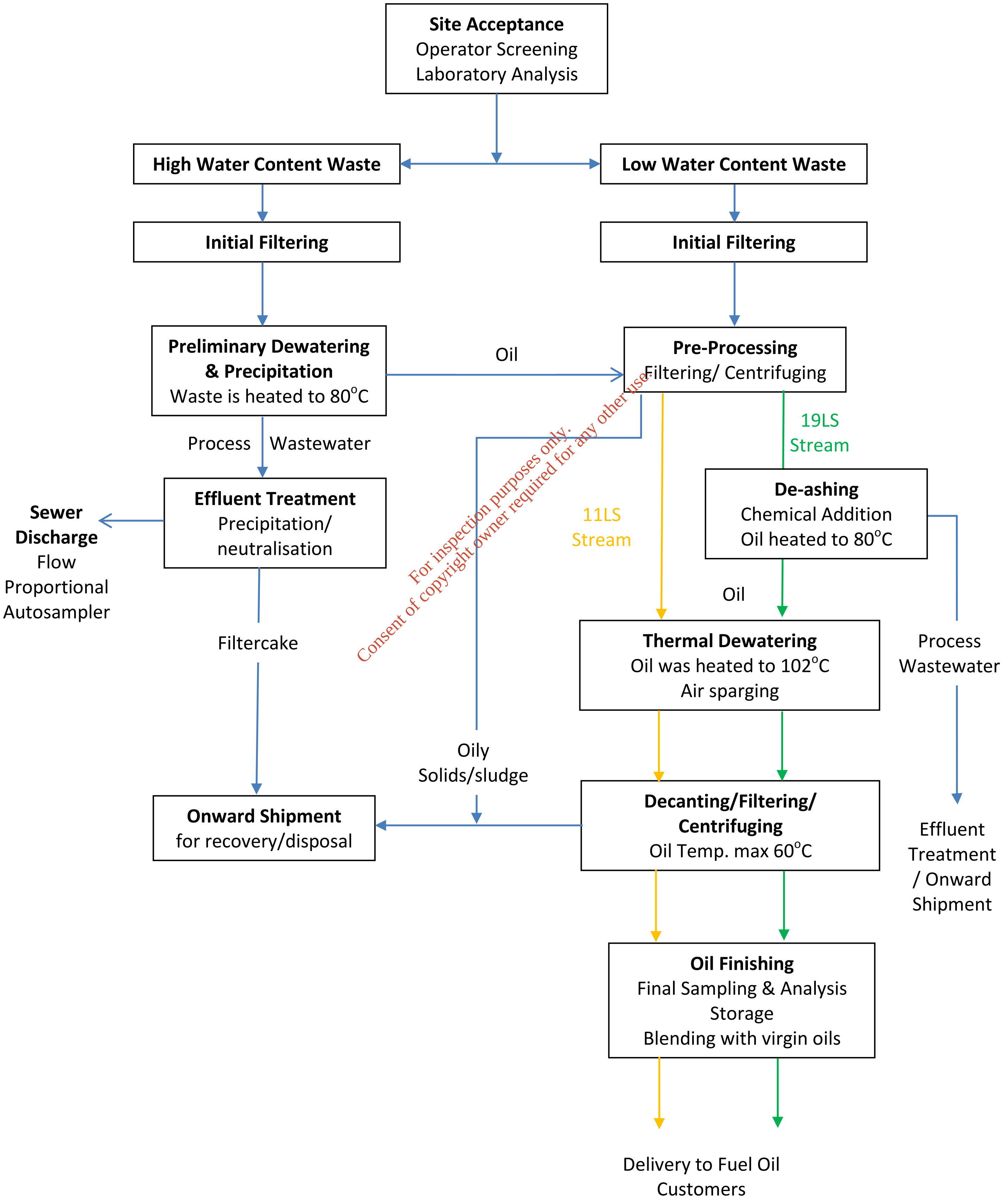
c. to the extent possible when dealing with a. and b. above, where relevant, distinguish between the unit process lines for the production of 1LS and 19LS.

Response

The proposed Flash Distillation process would provide an alternative to the chemical dewatering step currently employed at the facility. Note however that the company would propose to be able to carry out both techniques (i.e. chemical dewatering and thermal dewatering (e.g. flash distillation)).

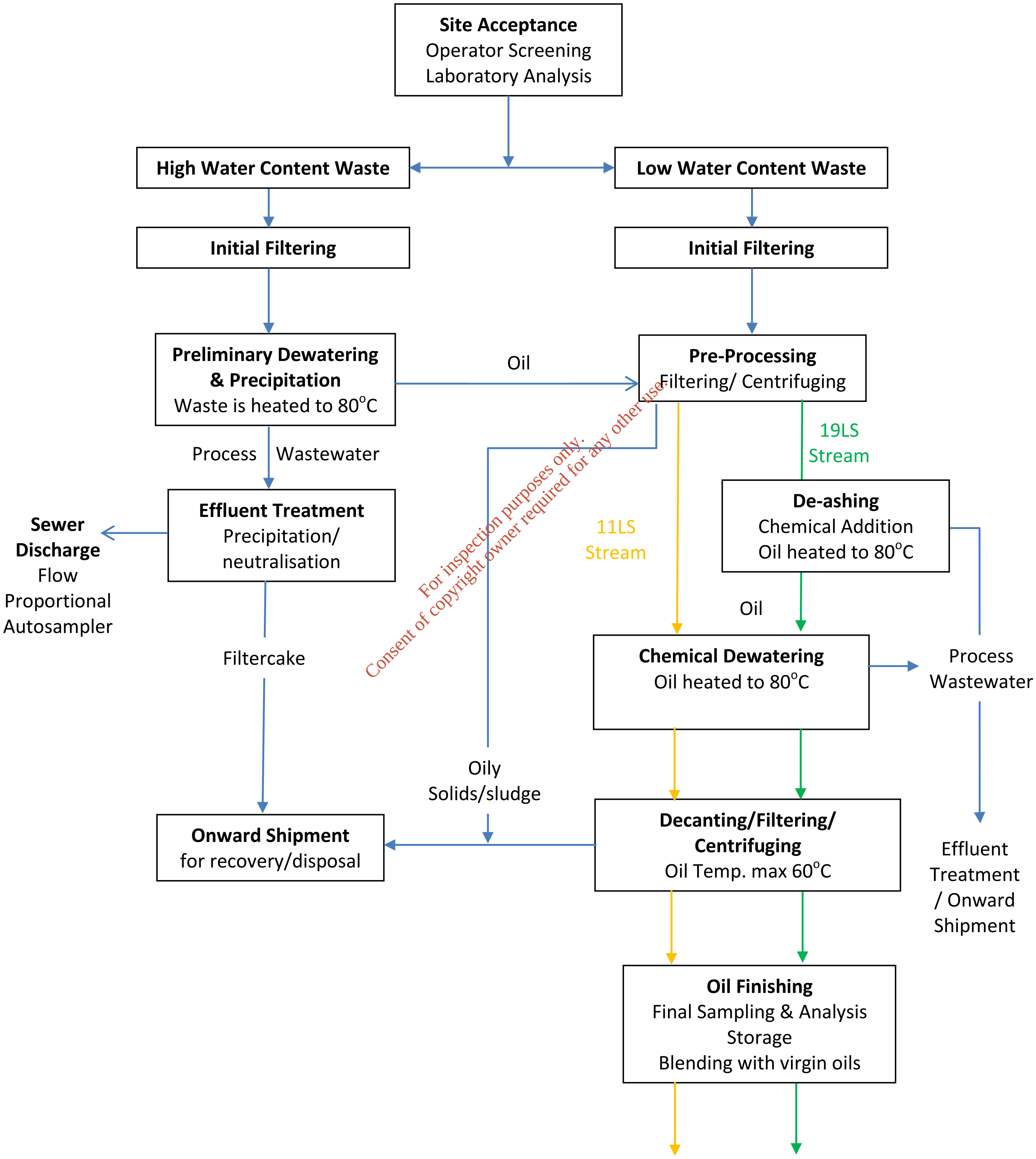
The process flow diagrams are provided in figures 6.1, 6.2 & 6.3

Figure 6.1 Historic Fuel Oil Recovery Process Flow (Discontinued)



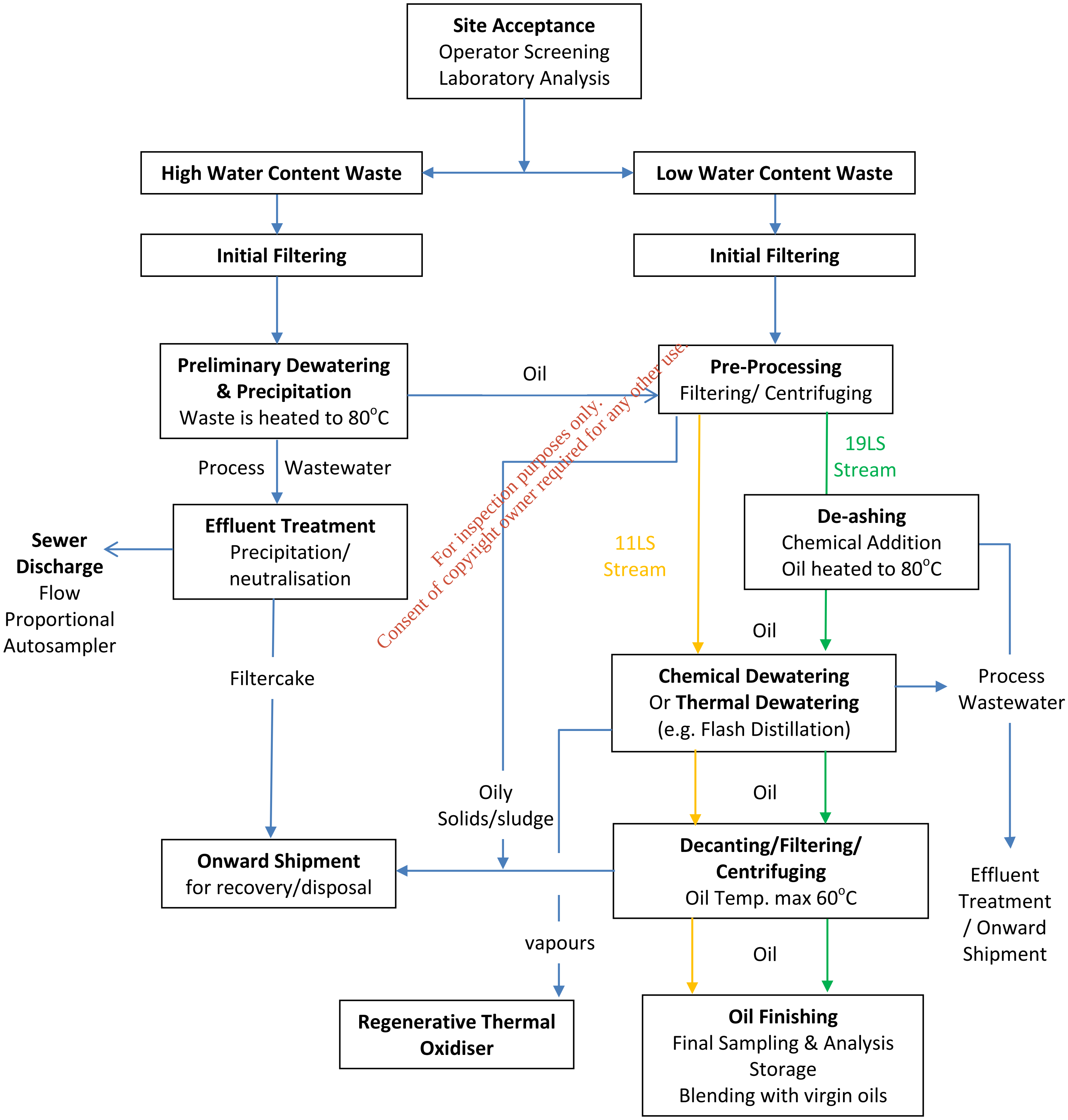
6th September 2016

Figure 6.2 Existing Fuel Oil Recovery Process Flow



6th September 2016

Figure 6.3 Proposed Fuel Oil Recovery Process Flow



Query 7.

Identify and describe any dependencies that the flash distillation process will have on the other unit processes, e.g. tank farm processes, filtration and centrifugation processes, carbon filters and regenerative thermal oxidiser, and what dependencies these other processes will have on the flash distillation process.

Response

The proposed Flash Distillation will as indicated in the response to Query 6 simply be an alternative for the dewatering step of the oil recovery process. As such input waste oils to the flash distillation process would (as is currently the practice for other methods of dewatering) be already part processed having been already subject to the preliminary dewatering, filtering/centrifuging and chemical precipitation stages as appropriate to the waste oil being processed and fuel being produced. However each of these initial stages is independent of and separate to the proposed flash distillation process. Once the waste oil has been processed to the extent necessary by these pre-processing stages the flash distillation stage may then be employed as the final dewatering step in the production of the recovered fuel.

The Flash Distillation process would however require the proposed Regenerative Thermal Oxidiser (RTO) to be operating simultaneous to the Flash Distillation process. Thus the gaseous emissions from the Flash Distillation process would be routed directly to the RTO for abatement. Scada interlocks will ensure that there is sufficient volume available in the tank receiving the dewatered oil for the process to operate (otherwise the flash distillation process would be automatically stopped).

In the scenario where the proposed RTO is operating (i.e. proposed normal operation) then the RTO would be employed to abate emissions from the thermal dewatering (e.g. Flash Distillation), Vapour Balancing ring main (proposed for the tank farm) as well as the extraction system from the oil filtering room. In the event that the RTO were not operating (e.g. fault/maintenance) then carbon filters would be used to abate emissions from the Vapour Balancing system and the extraction system for the oil filtering room. Any thermal dewatering process (e.g. Flash Distillation) would not be operated without the RTO operating.

Query 8.

Specify the source of energy for the steam powered heat exchangers that will form part of the flash distillation process. If there is a new boiler provide:

a. the information sought in the template table W.1(i), and

b. evidence in the form of an air dispersion model completed in accordance with Agency Guidance AG4 that emissions to air from any new boiler, individually as well as cumulatively with other relevant emissions, will not cause exceedence of relevant air quality standards in the vicinity of the installation.

Response

The existing boiler will provide steam to the proposed heat exchanger HE 2 while the other heat exchanger will be used to recover heat from hot oil (no steam power). The existing boiler is capable of providing sufficient steam to power the flash distillation process and no new boiler is required or proposed.

Query 9.

In relation to the dispatch of treated contaminated soil and BATC no. 11, describe the inert criteria that are used to differentiate between:

- *a. a treated soil that is suitable for recovery as backfill at a soil recovery facility.*
- *b. a treated soil that is disposed of at an inert landfill*

Response

The criteria used for treated soil sent to either soil recovery or inert facilities must meet the following parameters in addition to any site specific criteria set for the specific facility/landfill under it's Permit/Licence:

Table 9.1: Criteria for Inert Recovery Facility/Landfill

Parameter	**Leachate Limit mg/kg (based on 10 l/kg test)**
Arsenic (as As)	0.5
Barium (as Ba)	20.0
Cadmium (as Cd)	0.04
Total Chromium (as Cr)	0.5
Copper (as Cu)	2.0
Mercury (as Hg)	0.01
Molybdenum (as Mo)	0.5
Nickel (as Ni)	0.4
Lead (as Pb)	0.5
Antimony (as Cb)	0.06
Selenium (as Se)	0.1
Zinc (as Zn)	4.0
Chloride	800.0
Fluoride	10.0
Sulphate	1000.0
Phenol Index	1.0
Dissolved Organic Carbon (DOC)	500.0
Total Dissolved Solids (TDS)	4000.0

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Parameter	**Mass Limit** **mg/kg**
Total Organic Carbon (TOC)	30,000
BTEX	6.0
PCB (7 congeners)	1.0
Mineral Oil (C10-C40)	500.0
Total PAH	6.0

Query 10.

With reference to tables 8.2 and 8.3 of your response dated 17/5/2016 and BATC no. 11, state how waste with LoW codes 13 05 01 and 13 05 03* is treated so that it is classified as inert waste for recovery or deposit in inert landfill.*

Response

The waste codes noted relate to some solids from grit traps/interceptors and interceptor sludges. While currently these wastes are bulked for export with similar solid wastes (e.g. contaminated soils, filter cakes etc.) it is proposed to allow remediation of suitable material. Where these wastes are determined to be of low contamination (typically from silt traps and petrol station interceptors) the waste is initially dewatered (using gravity) in the tanker dig out bay.

Wastes removed from tankers would be visually inspected after discharge to assess if the waste has a significant level of oil contamination present. If the waste does not have significant visual evidence of oil contamination then it may (after gravity dewatering) be transferred to the soil remediation area where it would be sampled and analysed for the relevant parameters (as per waste acceptance SOP) before being bulked with similar material and processed in the same way as contaminated soil (e.g. bioremediation) to reduce the levels of hydrocarbons present to non-hazardous or inert levels. Where the type of hydrocarbons identified are less amenable to bioremediation (e.g. long chain, cyclic compounds) then the waste will be bulked with other waste (e.g. contaminated soils) for onward shipment (i.e. export under TFS).

All remediated materials are tested prior to dispatch to an appropriate licensed/permitted facility (see answer to Query 9 above) in Ireland or alternative route (e.g. exported under TFS).

Query 11.

Page 4 of the non-technical summary refers to emission point A2-1 as a new emission point from a carbon filter treating tank head gases. Table E.1(ii) of your response dated 17/5/2016 refers to emission point A2-1 as an emission from a regenerative thermal oxidiser. Please clarify.

A2-1 is the reference assigned to the main emission point from the proposed regenerative thermal oxidiser (RTO) as presented in Table E.1(ii) of the May 2016 data submitted to the EPA. This is the correct reference and the reference to A2-1 in the non-technical summary submitted in May is in error.

This carbon filter referred to in non-technical summary is the filter which was installed in early 2016 to treat tank head gases from the oil filtration plant. This carbon filter is designated as a minor emission point (A3-52) as per the justification provided in response to EPA Query 24 in this document.

It should also be noted that the non-technical summary makes reference to a further main emission point (A2-2) but this is also an error. This emission point is the carbon filter serving the Hodgefield Interceptor installed in early 2016 to treat tank head gases from the interceptor. This carbon filter is designated as a minor emission point (A3-53) as per the justification provided in response to EPA Query 25 in this document.

The errors have been corrected in the revised the Non-Technical Summary provided with this submission.

Query 12.

Complete table E.1(i) in full in relation to emission point A1-1 from the existing boiler.

Response

Please see overleaf for the requested table.

Table E.1 (i) BOILER EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point:

Emission Point Ref. Nº:	A1-1	
Location:	Boiler House	
Grid Ref. (12 digit, 6E,6N):	646054, 697812	
Vent Details	Diameter: 0.5m	Height above Ground(m): 18m
Date of commencement of emission:	2001	

Characteristics of Emission:

Boiler rating Steam Output: Thermal Input:			7,000 kg/hr MW
Boiler fuel Type: Maximum rate at which fuel is burned % sulphur content:			Natural Gas kg/hr <0.1%
NOx			200 mg/Nm^3 0^{o}C. 3% O$_2$(Liquid or Gas), 6% O$_2$(Solid Fuel)
Maximum volume* of emission			1,500 m^3/hr 0^{o}C, 3 % O$_2$ (liquid or gas), 6 % O$_2$ (solid fuel)
Minimum efflux velocity			0.8 m.sec^{-1}
Temperature	100^{o}C(max)	200 ^{o}C(min)	150 ^{o}C(avg)

* Volume flow limits for emissions to atmosphere shall be based on Normal conditions of temperature and pressure, (i.e. 0^{o}C,101.3kPa), dry gas; 3% oxygen for liquid and gas fuels; 6% oxygen for solid fuels.

(i) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up/shutdown to be included):*

Periods of Emission (avg)	60 min/hr 12 hr/day 260 day/yr

Query 13.

Please *provide a short report on monitoring of emissions from A1-1 that describes the monitoring carried out in accordance with condition 8.1 and Schedule D 8 of the existing licence. The report should cover the periods 2014, 2015 & 2016.*

Response

Air emissions monitoring of A1-1 is currently carried out as per Schedule D8 of the existing waste licence.

All monitoring is carried out by an external contractor on an annual basis.

Currently there are no emission limit values set against discharges to air from this monitoring point, however all monitoring data shows the emissions to be within the relevant TA Luft limits as summarised in Table 13.1 below.

Table 13.1 Summary Emissions to Air from the sites steam raising boiler

Parameter	2013 (mg/m^3)	2014 (mg/m^3)	2015 (mg/m^3)	Average (mg/m^3)	TA Luft Limit (mg/m^3)
Carbon Monoxide (CO)	3	<1.7	2.8	2.5	50
Oxides of Nitrogen (NOx) as NO_2	94	130.2	110.5	111.6	200
Sulphur Dioxide (SO_2)	<5	<6.1	18.3	9.8	10

Query 14.

Present the monitoring results for all parameters in Schedule D 8.1 and monitored annually. The following is a proposed format for the presentation of results, aggregated annually.

Response

Summary of emissions to air (Boiler A-01)

Year	Parameter and Unit	Unit of measurement	Limit value in licence or licensee's trigger level	Maximum value recorded during the period	Average value during the period	Number of exceedences of limit value during the period
2013	Carbon monoxide (CO)	mg/Nm3	N/A	3	3	N/A
	Nitrogen oxides (NOx/NO2)	mg/Nm3	N/A	94	94	N/A
	Sulphur oxides (SOx/SO2)	mg/Nm3	N/A	5	5	N/A
2014	Carbon monoxide (CO)	mg/Nm3	N/A	<1.7	<1.7	N/A
	Nitrogen oxides (NOx/NO2)	mg/Nm3	N/A	130.2	130.2	N/A
	Sulphur oxides (SOx/SO2)	mg/Nm3	N/A	<6.1	<6.1	N/A
2015	Carbon monoxide (CO)	mg/Nm3	N/A	2.8	2.8	N/A
	Nitrogen oxides (NOx/NO2)	mg/Nm3	N/A	110.5	110.5	N/A
	Sulphur oxides (SOx/SO2)	mg/Nm3	N/A	18.3	18.3	N/A

Query 15.

Provide evidence in the form of an air dispersion model completed in accordance with Agency Guidance AG4 that emissions to air from A1-1 will not cause exceedence of relevant air quality standards in the vicinity of the installation. Link to the air dispersion model for any new boiler, as mentioned above and as appropriate.

Response

A1-1 is the reference for the existing 7,000kg/hr natural gas fired steam raising boiler located on site. The response to items 13 and 14 outline the measured emissions from this source and this data is summarised in table 15.1 below as the source emission data from A1-1. Also listed are the TA Luft Guidelines (Paragraph 5.4.1.2.3) for emissions from a gas fired boiler (in the absence of sector specific BAT Guidelines). The historic results show levels of CO and NO_2 well below the TA Luft Guidelines. An elevated SO_2 level in 2015 has skewed this average to be only marginally below the TA Luft Guideline. Given that the guidelines are greater than the measured values the TA Luft guidelines are employed in the model.

Parameter	2013 (mg/m^3)	2014 (mg/m^3)	2015 (mg/m^3)	Average (mg/m^3)	TA Luft Limit (mg/m^3)	Mass Emission (kg/hr)	Emission Factor (g/s)
Carbon Monoxide (CO)	3	<1.7	2.8	2.5	50	0.075	0.02083
Oxides of Nitrogen (NOx) as NO_2	94	130.2	110.5	111.6	200	0.300	0.08333
Sulphur Dioxide (SO_2)	<5	<6.1	18.3	9.8	10	0.015	0.00416

Table 15.1 Summary emissions data from A1-1

Note: Mass Emission and Emission Factors based on an estimated volume flow of 1,500Nm^3/hour as actual volume flow cannot be determined in a boiler due to temperature constraints.

This emission source is modelled as per AG4 and the pathway and receptor characteristics supplied for the RTO model (report reference MDE0973Rp0103) are identical. The source data applied is as per table 15.2 below:

Parameter	A1-1
Grid Reference	646054, 697812
Emission Height (m)	18
Diameter (m)	0.5
Volume Flow (m^3/hr)	1,500
Temperature (^{0}C)	150
NO_x (g/s)	0.08333
CO (g/s)	0.02083
SO_2 (g/s)	0.00416

Table 15.2 Source Data

NO_x modelling has been carried for the boiler operating at the emission characteristics presented above operating continuously for 24 hours per day 7 days per week for the full year. Background levels for the Portlaoise area are also included as well as the cumulative impact of the RTO. The results of the NO_x modelling are presented in table 15.3 below for annual averages for each of the receptors. The annual average levels contributed by the boiler at Enva are less than 1% of the limit for the protection of human health. When combined with the background levels and the worst case RTO emissions, the overall impact remains low and will not breach the limit.

Reference	Background (μg/m^3)	RTO Impact (μg/m^3)	Boiler Impact (μg/m^3)	Cumulative Impact (μg/m^3)	Limit (μg/m^3)
R1	16	1.81	0.17	17.98	40
R2		2.03	0.20	18.23	
R3		2.78	0.29	19.07	
R4		3.67	0.32	19.99	
R5		4.04	0.28	20.32	
R6		7.00	0.32	23.32	
R7		6.12	0.35	22.47	
R8		3.51	0.34	19.85	

Table 15.3: Results of NO_2 Modelling (annual averages)

The results of the NO_x modelling are presented in table 15.4 below for 1-hour averages for each of the receptors. As above, the impact of the boiler alone is less than 1% of the limit and when combines with the background and RTO the boiler has little impact on the predicted levels.

Reference	Background (µg/m^3)	RTO Impact (µg/m^3)	Boiler Impact (µg/m^3)	Cumulative Impact (µg/m^3)	Limit (µg/m^3)
R1	16	31.67	7.90	55.57	200
R2		33.68	7.61	57.29	
R3		40.43	8.03	64.46	
R4		49.15	8.42	73.57	
R5		53.55	7.88	77.43	
R6		73.78	6.20	95.98	
R7		61.30	6.98	84.28	
R8		42.12	7.95	66.07	

Table 15.4: Results of NO_2 Modelling (1-hour averages as 98th percentile)

The results of the CO modelling are presented in table 15.5 below for each of the receptors as 8-hour averages. Background levels for the Portlaoise area are also included as are the contribution of the RTO. As with NO_X, the boiler has very low impact on the CO levels predicted.

Reference	Background (mg/m^3)	RTO Impact (mg/m^3)	Boiler Impact (mg/m^3)	Cumulative Impact (mg/m^3)	Limit (mg/m^3)
R1	0.5	0.030	0.001	0.531	10
R2		0.033	0.001	0.534	
R3		0.033	0.001	0.534	
R4		0.032	0.001	0.533	
R5		0.032	0.001	0.533	
R6		0.037	0.001	0.538	
R7		0.053	0.001	0.554	
R8		0.047	0.001	0.548	

Table 15.5: Results of CO Modelling

The results of the SO_2 modelling are presented in table 15.6 below for annual averages for each of the receptors. Background levels for the Portlaoise area (2014 average) are also included but there is no contribution from the RTO so this is excluded from the table. The results indicate that the boiler has minimal impact on the levels of SO_2 in the area around the site.

Reference	Background (µg/m^3)	Boiler Impact (µg/m^3)	Cumulative Impact (µg/m^3)	Limit (µg/m^3)
R1	5	0.009	5.009	20
R2		0.010	5.010	
R3		0.015	5.015	
R4		0.016	5.016	
R5		0.014	5.014	
R6		0.016	5.016	
R7		0.017	5.017	
R8		0.017	5.017	

Table 15.6: Results of SO_2 Modelling

Query 16.

Table E.1(iii) refers to emission point reference number A2-3. The source and nature of this emission is not clear. Please clarify.

Response

The reference to A2-3 is an error and this should read A2-1 as reference to the air emission from the proposed RTO.

6th September 2016

Query 17.

Please provide a short report on monitoring of discharges at SW1 and SW2 that describes the monitoring carried out in accordance with condition 8.1 and Schedule D.4 of the existing licence. The report should cover the periods 2014, 2015 and 2016 to date.

Response

Surface Water emissions are monitored through two on site emission points (SW01 & SW02). Surface water is generated onsite from run off from hard standing areas such as traffic routes and other non-waste processing or storage areas.

SW01 serves the southern end of the site, collecting surface water run off around the waste oil processing plant and tank farm and areas external to the following storage areas to C, D, E, F, G, K, L & M.

SW02 serves the northern end of the site collecting surface water from the external areas adjacent to soil treatment areas (Area A & B) and Area J.

A weekly grab sample is taken via an existing in line auto-sampler and tested for pH and COD. A monthly check is carried out for mineral oils. In addition to this a monthly sample is also tested for suspended solids (even though suspended solids are only required to be conducted biannually)

Sampling and monitoring is largely carried out by the onsite laboratory. Where Enva cannot carry out the required testing samples are sent to an accredited laboratory. External laboratories are also used to provide additional quality control checks for the various different test methods employed.

Trigger levels for pH were requested by the Agency to be established in 2014 and agreed with the Agency in June 2014.

There have been no exceedences against Schedule D4 monitoring requirements during 2014, 2015 & 2016.

6th September 2016

Query 18.

Present the monitoring results for all parameters in Schedule D.4.

Response

Please find attached summary of monitoring data as per Schedule D 4.

SW01 Summary of weekly analysis carried out from 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Average value*	No. of exceedences of limit value during the period.
Jan-14	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.82	7.40	0
	COD mg/l	250	125.00	64.36	0
	Suspended solids mg/l	60	29.00	20.50	0
Feb-14	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.37	7.00	0
	COD mg/l	250	53.00	33.00	0
	Suspended solids mg/l	60	31.00	27.25	0
Mar-14	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.93	7.36	0
	COD mg/l	250	80.00	57.88	0
	Suspended solids mg/l	60	42.00	23.75	0
Apr-14	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.91	7.71	0
	COD mg/l	250	94.50	62.70	0
	Suspended solids mg/l	60	42.00	26.80	0
May-14	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.89	7.63	0
	COD mg/l	250	104.00	67.63	0
	Suspended solids mg/l	60	48.00	26.50	0

6th September 2016

SW01 Summary of weekly analysis carried out from 2014 to date					
Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (in absence of Limit value)**	**Maximum value recorded in period**	**Average value***	**No. of exceedences of limit value during the period.**
Jun-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.89	7.47	0
	COD mg/l	250	72.00	45.10	0
	Suspended solids mg/l	60	36.00	14.20	0
Jul-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.03	7.87	0
	COD mg/l	250	89.00	64.75	0
	Suspended solids mg/l	60	58.00	33.00	0
Aug-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.04	7.77	0
	COD mg/l	250	67.00	26.00	0
	Suspended solids mg/l	60	9.00	6.50	0
Sep-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.85	7.60	0
	COD mg/l	250	66.00	31.20	0
	Suspended solids mg/l	60	10.00	6.60	0
Oct-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.54	7.89	0
	COD mg/l	250	79.50	41.88	0
	Suspended solids mg/l	60	18.00	13.25	0
Nov-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.89	7.72	0
	COD mg/l	250	49.00	35.63	0
	Suspended solids mg/l	60	14.00	7.50	0
Dec-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.97	7.65	0
	COD mg/l	250	85.00	57.50	0

6th September 2016

SW01 Summary of weekly analysis carried out from 2014 to date					
Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (in absence of Limit value)**	**Maximum value recorded in period**	**Average value***	**No. of exceedences of limit value during the period.**
	Suspended solids mg/l	60	31.00	14.50	0
Jan-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.96	7.68	0
	COD mg/l	250	146.00	85.25	0
	Suspended solids mg/l	60	41.00	22.00	0
Feb-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.10	7.84	0
	COD mg/l	250	161.00	78.50	0
	Suspended solids mg/l	60	42.00	24.50	0
Mar-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.93	7.65	0
	COD mg/l	250	141.00	88.60	0
	Suspended solids mg/l	60	59.00	43.20	0
Apr-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.37	8.07	0
	COD mg/l	250	49.00	36.13	0
	Suspended solids mg/l	60	13.00	7.25	0
May-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.88	7.76	0
	COD mg/l	250	179.00	73.75	0
	Suspended solids mg/l	60	56.00	17.75	0
Jun-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.01	7.88	0
	COD mg/l	250	181.00	75.60	0
	Suspended solids mg/l	60	21.00	10.80	0

6th September 2016

SW01 Summary of weekly analysis carried out from 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Average value*	No. of exceedences of limit value during the period.
Jul-15	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.13	7.85	0
	COD mg/l	250	227.00	113.38	0
	Suspended solids mg/l	60	23.00	16.00	0
Aug-15	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.76	7.61	0
	COD mg/l	250	70.00	39.20	0
	Suspended solids mg/l	60	15.00	11.60	0
Sep-15	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.73	7.55	0
	COD mg/l	250	88.00	71.25	0
	Suspended solids mg/l	60	21.00	15.25	0
Oct-15	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.79	7.49	0
	COD mg/l	250	134.50	82.75	0
	Suspended solids mg/l	60	28.00	15.00	0
Nov-15	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.12	7.78	0
	COD mg/l	250	93.00	61.13	0
	Suspended solids mg/l	60	34.00	12.25	0
Dec-15	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.95	7.73	0
	COD mg/l	250	67.00	53.75	0
	Suspended solids mg/l	60	23.00	16.00	0
Jan-16	pH	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.80	7.56	0
	COD mg/l	250	124.00	69.25	0

SW01 Summary of weekly analysis carried out from 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Average value*	No. of exceedences of limit value during the period.
	Suspended solids mg/l	60	53.00	24.50	0
Feb-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.96	7.80	0
	COD mg/l	250	134.00	77.70	0
	Suspended solids mg/l	60	54.00	26.00	0
Mar-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.81	7.71	0
	COD mg/l	250	88.00	59.25	0
	Suspended solids mg/l	60	13.00	11.75	0
Apr-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.87	7.75	0
	COD mg/l	250	80.00	53.88	0
	Suspended solids mg/l	60	12.00	11.25	0
May-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.92	7.78	0
	COD mg/l	250	54.50	42.30	0
	Suspended solids mg/l	60	12.00	6.00	0
Jun-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.88	7.75	0
	COD mg/l	250	204.00	100.88	0
	Suspended solids mg/l	60	42.00	21.00	0
Jul-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.82	7.65	0
	COD mg/l	250	150.50	77.10	0
	Suspended solids mg/l	60	40.00	16.80	0

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SW01 Summary of monthly analysis carried out from 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period (ug/l)	Average value (mg/l)*	No. of exceedances of limit value during the period.
2014	**Mineral oil by GC ug/l**	5000	<10	<10	0
2015	**Mineral oil by GC ug/l**	5000	2830	285.13	0
2016	**Mineral oil by GC ug/l**	5000	2830	410.83	0

SW02 Summary of weekly analysis carried out from 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Average value*	No. of exceedances of limit value during the period.
Jan-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.83	7.56	0
	COD mg/l	250	38.00	27.50	0
	Suspended solids mg/l	60	59.00	45.25	0
Feb-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.66	7.01	0
	COD mg/l	250	37.00	21.00	0
	Suspended solids mg/l	60	39.00	30.50	0
Mar-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.97	7.47	0
	COD mg/l	250	44.00	21.25	0
	Suspended solids mg/l	60	22.00	15.00	0

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SW02 Summary of weekly analysis carried out from 2014 to date					
Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (in absence of Limit value)**	**Maximum value recorded in period**	**Average value***	**No. of exceedances of limit value during the period.**
Apr-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.00	7.51	0
	COD mg/l	250	144.00	69.90	0
	Suspended solids mg/l	60	44.00	29.40	0
May-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.04	7.63	0
	COD mg/l	250	28.50	14.25	0
	Suspended solids mg/l	60	57.00	26.25	0
Jun-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.01	7.57	0
	COD mg/l	250	61.00	30.10	0
	Suspended solids mg/l	60	49.00	19.80	0
Jul-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.95	7.60	0
	COD mg/l	250	123.00	65.00	0
	Suspended solids mg/l	60	27.00	12.50	0
Aug-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.06	7.63	0
	COD mg/l	250	10.00	7.75	0
	Suspended solids mg/l	60	24.00	11.25	0
Sep-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.71	7.47	0
	COD mg/l	250	87.00	42.80	0

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SW02 Summary of weekly analysis carried out from 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Average value*	No. of exceedances of limit value during the period.
	Suspended solids mg/l	60	10.00	7.00	0
Oct-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.96	7.76	0
	COD mg/l	250	85.00	50.25	0
	Suspended solids mg/l	60	35.00	22.50	0
Nov-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.74	7.66	0
	COD mg/l	250	60.00	50.25	0
	Suspended solids mg/l	60	53.00	26.50	0
Dec-14	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.80	7.56	0
	COD mg/l	250	61.00	51.50	0
	Suspended solids mg/l	60	36.00	28.25	0
Jan-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.35	7.85	0
	COD mg/l	250	118.00	63.50	0
	Suspended solids mg/l	60	25.00	18.00	0
Feb-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.02	7.83	0
	COD mg/l	250	59.00	36.50	0
	Suspended solids mg/l	60	40.00	23.00	0

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SW02 Summary of weekly analysis carried out from 2014 to date					
Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (in absence of Limit value)**	**Maximum value recorded in period**	**Average value***	**No. of exceedances of limit value during the period.**
Mar-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.12	7.77	0
	COD mg/l	250	75.00	42.20	0
	Suspended solids mg/l	60	22.00	13.60	0
Apr-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.87	7.71	0
	COD mg/l	250	46.00	29.13	0
	Suspended solids mg/l	60	17.50	12.13	0
May-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.15	7.78	0
	COD mg/l	250	46.00	33.75	0
	Suspended solids mg/l	60	27.00	15.00	0
Jun-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.86	7.60	0
	COD mg/l	250	133.00	55.40	0
	Suspended solids mg/l	60	12.00	6.60	0
Jul-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.73	7.57	0
	COD mg/l	250	132.00	62.25	0
	Suspended solids mg/l	60	8.00	5.00	0
Aug-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.94	7.69	0
	COD mg/l	250	43.00	28.60	0

SW02 Summary of weekly analysis carried out from 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Average value*	No. of exceedances of limit value during the period.
	Suspended solids mg/l	60	48.00	22.20	0
Sep-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.02	7.74	0
	COD mg/l	250	76.00	45.75	0
	Suspended solids mg/l	60	50.00	35.50	0
Oct-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.68	7.56	0
	COD mg/l	250	168.00	82.25	0
	Suspended solids mg/l	60	19.00	13.75	0
Nov-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.86	7.74	0
	COD mg/l	250	55.50	38.63	0
	Suspended solids mg/l	60	27.00	15.75	0
Dec-15	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.90	7.76	0
	COD mg/l	250	104.00	56.00	0
	Suspended solids mg/l	60	43.00	22.25	0
Jan-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.74	7.66	0
	COD mg/l	250	71.00	36.50	0
	Suspended solids mg/l	60	35.00	14.50	0

6th September 2016

SW02 Summary of weekly analysis carried out from 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Average value*	No. of exceedances of limit value during the period.
Feb-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.32	7.94	0
	COD mg/l	250	106.00	73.30	0
	Suspended solids mg/l	60	53.00	33.80	0
Mar-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.99	7.86	0
	COD mg/l	250	53.00	49.00	0
	Suspended solids mg/l	60	47.00	26.50	0
Apr-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.15	7.88	0
	COD mg/l	250	68.00	48.75	0
	Suspended solids mg/l	60	54.00	22.50	0
May-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	8.03	7.70	0
	COD mg/l	250	85.00	55.40	0
	Suspended solids mg/l	60	39.00	15.00	0
Jun-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.82	7.73	0
	COD mg/l	250	44.00	28.25	0
	Suspended solids mg/l	60	17.00	8.50	0
Jul-16	**pH**	Upper Action 8.65 Upper warning 8.35 Lower Warning 6.90 Lower action 6.57	7.91	7.71	0
	COD mg/l	250	53.00	42.40	0

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SW02 Summary of weekly analysis carried out from 2014 to date					
Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (in absence of Limit value)**	**Maximum value recorded in period**	**Average value***	**No. of exceedances of limit value during the period.**
	Suspended solids mg/l	60	27.00	14.40	0

SW02 Summary of monthly analysis carried out from 2014 to date					
Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (in absence of Limit value)**	**Maximum value recorded in period**	**Average value***	**No. of exceedances of limit value during the period.**
2014	**Mineral oil by GC ug/l**	5000	<10	<10	0
2015	**Mineral oil by GC ug/l**	5000	130	20	0
2016 to date	**Mineral oil by GC ug/l**	5000	210	47.5	0

Query 19.

State whether the sewer discharge point is to be known as FS1 or SE 1 in any revised licence.

Response

The sewer discharge point is to be referred to as SE-1 in any future Licence.

6th September 2016

Query 20.

It is noted that table 10.1 of your response dated 17/5/2016 quotes emission limit values for FS1/SE1 that are different to those in the licence. Please Clarify.

Response

The emission limit values were amended after consultation with Laois County Council and subsequently approved by the Agency in 2006, please see attached Agency letter.

052/06

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Ms Anne Phelan
Health, Safety & Environmental Executive, & Safety Officer
Atlas Environmental Ireland Limited
Clonminam Industrial Estate
Portlaoise
County Laois

26/10/06 Our Ref: W0184-01/ap14jmce_emissions to sewer.doc

Dear Ms Phelan

I refer to your correspondence dated 18/05/06 received by the Agency on 05/05/06 and to Laois County Council's correspondence dated 05/05/06 received by the Agency 04/05/06 in relation to proposed changes to the emissions to sewer emission limit values.

I am to advise you that the proposal submitted is to the satisfaction of the Agency contingent upon the following.

- The emissions conform to the limits specified in the correspondence from Laois County Council dates 04/05/06 received 22/05/06. Accordingly, a revised version of Schedule C.4 is attached.
- Discharge to sewer shall take place only between the hours of 11 pm and 6am.
- The emissions to sewer conform to the conditions stipulated in Laois County Council's correspondence dated 05/05/06 received by the Agency 04/05/06 and to Condition 6.9 of your Waste Licence Reg. No. W0184-01.

If you have any queries please contact John McEntagart at 053-9160681. Please quote the above reference in any future correspondence in relation to this matter.

Yours sincerely

John McEntagart

John McEntagart
Office of Environmental Enforcement

C.4 Sewer Emission Limits

Emission Point Reference No.: FS1 as per Drawing No At-Wst2, and Table H10 of the application

Name of Receiving Sewer: Laois County Council Foul Sewer

Location : Yard to rear of Canteen

Volume to be emitted Note 1**:** ***Maximum in any one day :*** 50 m^3

Hourly discharge rates (m^3/hr): ***Maximum***
2300 to 0600 Note 2 10

Parameter	Emission Limit Value
Parameter	**Emission Limit Value**
Temperature	43°C (max.)
PH	6-8.5
Chemical Oxygen Demand (kg/day)	280
	mg/l
Suspended Solids	400
Sulphates	1000
Chlorides	6000
Total Phosphorus (as P)	150
Ammonia	80
Phenols (as C_6H_5OH)	50
Copper	1
Zinc	1
Lead	0.5
Cadmium	0.15
Fats, Oils & Greases	100

Note 1: Subject to compliance with Condition 6.9.6.
Note 2: Discharge to sewer shall take place only between the hours of 11 pm and 6am

6th September 2016

Query 21.

Please provide a short report on monitoring of discharges to sewer at emission point FS1/SE/1 that describes the monitoring carried out in accordance with condition 8.1 and Schedule D.4 of the existing licence. The report should cover the periods 2014, 2015 and 2016 to date.

Response

Sewer emissions monitoring is carried out as per Schedule C4 (as amended October 2006).

During effluent handling various checks are carried out on effluent quality to ensure compliance with discharge limits. Effluent is generally prepared for release on a batch basis. COD loading of the effluent is determined prior to commencement of discharge and once established the permissible effluent volume (based on load) is set up for automated release (via SCADA).

Effluent is released through a flow proportional sampler. Sampling and monitoring is in the main carried out by the onsite laboratory personnel. Quality control checks are carried out on all in house tests. Where Enva cannot carry out the required testing in it's own on-site laboratory, samples are sent to an external commercial laboratory. Commercial laboratories are also used to provide additional quality control checks.

Daily checks are carried out COD, Ammonia and Suspended solids. On a weekly basis testing is carried out for Sulphates, Chlorides, Total Phosphorous, Phenols, Copper, Zinc, Lead, Cadmium and Fats, Oils and Greases. This test is carried out on a composite sample of the effluent released in that week.

6th September 2016

Query 22.

Present the monitoring results for all parameters listed in Schedule D.5.. The following is a proposed format for the presentation of results, aggregated monthly.

Response

Daily Sewer Emissions - 2014 to date						
Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (kg/day) (in absence of Limit value)**	**Maximum value recorded in period (kg/day)**	**Minimum value (kg/day) recorded during the period (pH only)**	**Average value* (kg)**	**No. of exceedances of limit value during the period.**
Jan-14	**COD Kg**	280	163.24	63.59	126.88	0
Feb-14	**COD Kg**	280	145.13	56.14	119.95	0
Mar-14	**COD Kg**	280	169.21	75.22	101.05	0
Apr-14	**COD Kg**	280	169.21	75.22	115.16	0
May-14	**COD Kg**	280	205.07	64.21	122.37	0
Jun-14	**COD Kg**	280	259.33	79.32	149.70	0
Jul-14	**COD Kg**	280	239.02	70.01	165.75	0
Aug-14	**COD Kg**	280	150.69	75.26	118.12	0
Sep-14	**COD Kg**	280	231.48	61.65	177.11	0
Oct-14	**COD Kg**	280	162.01	55.60	112.89	0
Nov-14	**COD Kg**	280	164.25	69.74	89.57	0
Dec-14	**COD Kg**	280	160.53	89.38	119.98	0
Jan-15	**COD Kg**	280	172.72	92.39	130.10	0
Feb-15	**COD Kg**	280	258.26	122.36	208.08	0
Mar-15	**COD Kg**	280	212.77	55.91	147.38	0
Apr-15	**COD Kg**	280	145.18	35.60	92.64	0
May-15	**COD Kg**	280	111.26	71.03	84.24	0
Jun-15	**COD Kg**	280	150.50	100.22	126.07	0
Jul-15	**COD Kg**	280	140.07	32.72	102.11	0
Aug-15	**COD Kg**	280	204.82	10.89	119.38	0
Sep-15	**COD Kg**	280	194.08	44.35	119.37	0
Oct-15	**COD Kg**	280	154.45	90.25	132.53	0
Nov-15	**COD Kg**	280	144.31	51.72	90.61	0
Dec-15	**COD Kg**	280	163.46	30.89	109.84	0
Jan-16	**COD Kg**	280	144.50	10.51	115.75	0
Feb-16	**COD Kg**	280	204.59	12.82	129.37	0
Mar-16	**COD Kg**	280	166.46	38.42	119.46	0
Apr-16	**COD Kg**	280	165.97	63.32	122.58	0
May-16	**COD Kg**	280	211.69	70.17	124.23	0
Jun-16	**COD Kg**	280	228.05	51.09	122.58	0
Jul-16	**COD Kg**	280	168.20	42.99	113.55	0

6th September 2016

Daily Sewer Emissions - 2014 to date						
Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (in absence of Limit value)**	**Maximum value recorded in period**	**Minimum value recorded during the period (pH only)**	**Average value***	**No. of exceedances of limit value during the period.**
Jan-14	Ammonia mg/l	80	66.10	19.20	40.14	0
Feb-14	Ammonia mg/l	80	57.80	33.10	40.65	0
Mar-14	Ammonia mg/l	80	52.70	25.50	38.28	0
Apr-14	Ammonia mg/l	80	52.70	25.50	38.83	0
May-14	Ammonia mg/l	80	63.00	19.90	40.27	0
Jun-14	Ammonia mg/l	80	78.00	27.80	44.92	0
Jul-14	Ammonia mg/l	80	66.30	40.30	52.32	0
Aug-14	Ammonia mg/l	80	57.10	39.00	47.82	0
Sep-14	Ammonia mg/l	80	51.10	17.20	35.59	0
Oct-14	Ammonia mg/l	80	39.70	18.10	29.39	0
Nov-14	Ammonia mg/l	80	26.40	13.20	19.04	0
Dec-14	Ammonia mg/l	80	32.20	23.90	27.44	0
Jan-15	Ammonia mg/l	80	43.10	21.70	30.49	0
Feb-15	Ammonia mg/l	80	40.10	21.90	30.36	0
Mar-15	Ammonia mg/l	80	39.00	13.20	22.79	0
Apr-15	Ammonia mg/l	80	31.60	19.50	26.20	0
May-15	Ammonia mg/l	80	27.00	14.80	22.03	0

Jun-15	Ammonia mg/l	80	38.00	12.50	26.08	0
Jul-15	Ammonia mg/l	80	36.00	15.90	26.90	0
Aug-15	Ammonia mg/l	80	65.35	15.05	37.08	0
Sep-15	Ammonia mg/l	80	34.20	7.80	20.59	0
Oct-15	Ammonia mg/l	80	63.50	25.70	44.70	0
Nov-15	Ammonia mg/l	80	66.00	17.30	37.71	0
Dec-15	Ammonia mg/l	80	47.30	26.20	36.43	0
Jan-16	Ammonia mg/l	80	31.00	11.50	22.51	0
Feb-16	Ammonia mg/l	80	35.50	20.00	28.51	0
Mar-16	Ammonia mg/l	80	39.50	18.00	30.17	0
Apr-16	Ammonia mg/l	80	50.10	25.50	34.21	0
May-16	Ammonia mg/l	80	40.00	21.85	34.50	0
Jun-16	Ammonia mg/l	80	79.00	30.00	50.12	0
Jul-16	Ammonia mg/l	80	74.20	27.30	51.15	0

Daily Sewer Emissions - 2014 to date

Month (2014-2106)	**Parameter and Unit**	**Limit value or Trigger value level (in absence of Limit value)**	**Maximum value recorded in period**	**Minimum value recorded during the period (pH only)**	**Average value***	**No. of exceedances of limit value during the period.**
Jan-14	**pH**	**6-8.5**	8.21	6.91	7.72	0
Feb-14	**pH**	**6-8.5**	8.18	7.64	7.82	0
Mar-14	**pH**	**6-8.5**	8.33	7.13	7.79	0
Apr-14	**pH**	**6-8.5**	8.33	7.13	7.75	0
May-14	**pH**	**6-8.5**	8.34	7.50	8.00	0
Jun-14	**pH**	**6-8.5**	8.16	6.55	7.39	0
Jul-14	**pH**	**6-8.5**	8.19	6.65	7.56	0

Aug-14	pH	6-8.5	8.16	6.82	7.68	0
Sep-14	pH	6-8.5	8.41	6.88	7.32	0
Oct-14	pH	6-8.5	8.28	7.63	8.01	0
Nov-14	pH	6-8.5	8.38	7.13	7.88	0
Dec-14	pH	6-8.5	8.21	7.40	7.84	0
Jan-15	pH	6-8.5	8.41	7.77	8.02	0
Feb-15	pH	6-8.5	8.31	6.59	7.45	0
Mar-15	pH	6-8.5	8.15	7.21	7.70	0
Apr-15	pH	6-8.5	8.32	7.65	7.93	0
May-15	pH	6-8.5	8.41	7.02	8.04	0
Jun-15	pH	6-8.5	8.25	7.51	7.78	0
Jul-15	pH	6-8.5	8.29	7.60	7.91	0
Aug-15	pH	6-8.5	8.32	6.77	7.45	0
Sep-15	pH	6-8.5	7.98	6.74	7.43	0
Oct-15	pH	6-8.5	8.09	7.32	7.68	0
Nov-15	pH	6-8.5	8.29	7.77	8.08	0
Dec-15	pH	6-8.5	8.39	7.39	7.98	0
Jan-16	pH	6-8.5	8.23	7.30	7.71	0
Feb-16	pH	6-8.5	8.05	6.97	7.60	0
Mar-16	pH	6-8.5	7.81	7.00	7.32	0
Apr-16	pH	6-8.5	8.23	6.71	7.41	0
May-16	pH	6-8.5	8.43	6.84	7.54	0
Jun-16	pH	6-8.5	8.41	6.67	7.44	0
Jul-16	pH	6-8.5	8.17	7.03	7.57	0

Daily Sewer Emissions - 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Minimum value recorded during the period (pH only)	Average value*	No. of exceedances of limit value during the period.
Jan-14	Suspended solids mg/l	400	349.50	44.00	95.41	0
Feb-14	Suspended solids mg/l	400	154.00	40.50	91.58	0
Mar-14	Suspended solids mg/l	400	130.00	31.00	67.57	0
Apr-14	Suspended solids mg/l	400	130.00	31.00	76.19	0
May-14	Suspended solids mg/l	400	299.00	32.70	89.64	0

Jun-14	Suspended solids mg/l	400	249.00	18.00	77.64	0
Jul-14	Suspended solids mg/l	400	316.00	42.00	115.50	0
Aug-14	Suspended solids mg/l	400	216.00	34.00	91.36	0
Sep-14	Suspended solids mg/l	400	114.00	21.00	54.22	0
Oct-14	Suspended solids mg/l	400	221.00	33.00	94.21	0
Nov-14	Suspended solids mg/l	400	117.00	37.00	61.14	0
Dec-14	Suspended solids mg/l	400	197.00	48.00	84.22	0
Jan-15	Suspended solids mg/l	400	165.00	41.00	93.14	0
Feb-15	Suspended solids mg/l	400	166.00	11.00	95.63	0
Mar-15	Suspended solids mg/l	400	341.00	19.00	81.65	0
Apr-15	Suspended solids mg/l	400	81.00	21.00	47.25	0
May-15	Suspended solids mg/l	400	102.00	12.00	45.77	0
Jun-15	Suspended solids mg/l	400	148.50	22.10	58.58	0
Jul-15	Suspended solids mg/l	400	172.50	31.00	74.36	0
Aug-15	Suspended solids mg/l	400	170.00	3.00	50.35	0
Sep-15	Suspended solids mg/l	400	139.00	28.00	61.59	0
Oct-15	Suspended solids mg/l	400	140.00	33.00	75.43	0
Nov-15	Suspended solids mg/l	400	119.00	17.00	51.08	0
Dec-15	Suspended solids mg/l	400	102.00	13.00	47.00	0
Jan-16	Suspended solids mg/l	400	109.00	12.00	62.21	0
Feb-16	Suspended solids mg/l	400	180.00	10.00	66.43	0
Mar-16	Suspended solids mg/l	400	93.00	14.00	54.57	0

Apr-16	**Suspended solids mg/l**	**400**	173.00	17.00	62.53	0
May-16	**Suspended solids mg/l**	**400**	235.00	18.00	93.20	0
Jun-16	**Suspended solids mg/l**	**400**	200.00	44.00	92.88	0
Jul-16	**Suspended solids mg/l**	**400**	293.50	15.00	81.76	0

Daily Sewer Emissions - 2014 to date

Month (2014-2106)	Parameter and Unit	Limit value or Trigger value level (in absence of Limit value)	Maximum value recorded in period	Minimum value recorded during the period (pH only)	Average value*	No. of exceedances of limit value during the period.
Jan-14	**Temp °C**	**43**	34.33	7.56	25.69	0
Feb-14	**Temp °C**	**43**	35.14	14.70	22.54	0
Mar-14	**Temp °C**	**43**	34.04	15.17	22.05	0
Apr-14	**Temp °C**	**43**	34.04	15.17	23.75	0
May-14	**Temp °C**	**43**	38.47	19.27	28.74	0
Jun-14	**Temp °C**	**43**	41.20	23.19	31.73	0
Jul-14	**Temp °C**	**43**	41.32	21.75	33.88	0
Aug-14	**Temp °C**	**43**	41.12	25.29	34.38	0
Sep-14	**Temp °C**	**43**	38.92	17.53	31.16	0
Oct-14	**Temp °C**	**43**	38.71	23.89	33.11	0
Nov-14	**Temp °C**	**43**	31.60	21.04	27.37	0
Dec-14	**Temp °C**	**43**	32.18	16.07	24.55	0
Jan-15	**Temp °C**	**43**	32.46	22.68	27.07	0
Feb-15	**Temp °C**	**43**	34.90	17.38	27.98	0
Mar-15	**Temp °C**	**43**	44.00	14.06	28.14	1**
Apr-15	**Temp °C**	**43**	34.00	14.27	24.12	0
May-15	**Temp °C**	**43**	34.00	16.08	26.65	0
Jun-15	**Temp °C**	**43**	40.00	20.00	30.95	0
Jul-15	**Temp °C**	**43**	36.00	22.00	29.16	0
Aug-15	**Temp °C**	**43**	30.94	21.03	27.65	0
Sep-15	**Temp °C**	**43**	36.10	19.70	29.43	0
Oct-15	**Temp °C**	**43**	39.49	22.95	30.80	0
Nov-15	**Temp °C**	**43**	39.35	17.14	30.20	0
Dec-15	**Temp °C**	**43**	41.69	20.46	32.57	0

Jan-16	**Temp °C**	**43**	31.42	5.76	25.37	0
Feb-16	**Temp °C**	**43**	33.00	12.25	22.54	0
Mar-16	**Temp °C**	**43**	38.40	10.79	26.80	0
Apr-16	**Temp °C**	**43**	36.53	14.77	29.54	0
May-16	**Temp °C**	**43**	39.48	22.50	32.70	0
Jun-16	**Temp °C**	**43**	40.96	23.94	34.11	0
Jul-16	**Temp °C**	**43**	39.76	22.04	31.88	0

**Within 1.2 times the limit.

Weekly sewer emissions - 2014 to date

Month (2014-2106)	Parameter	Limit value or Trigger value level (mg/l) (in absence of Limit value)	Maximum value recorded in period (mg/l)	Minimum value recorded during the period (mg/l)	Average value* (mg/l)	No. of exceedances of limit value during the period.
Jan-14	**Cadmium**	**0.15**	0.004	0.000	0.001	0
Feb-14	**Cadmium**	**0.15**	0.010	0.000	0.004	0
Mar-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Apr-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
May-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jun-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jul-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Aug-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Sep-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Oct-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Nov-14	**Cadmium**	**0.15**	0.005	0.001	0.003	0
Dec-14	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jan-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Feb-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Mar-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Apr-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
May-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jun-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jul-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Aug-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Sep-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Oct-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Nov-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Dec-15	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jan-16	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Feb-16	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Mar-16	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Apr-16	**Cadmium**	**0.15**	0.010	0.001	0.003	0

Weekly sewer emissions - 2014 to date						
Month (2014-2106)	**Parameter**	**Limit value or Trigger value level (mg/l) (in absence of Limit value)**	**Maximum value recorded in period (mg/l)**	**Minimum value recorded during the period (mg/l)**	**Average value* (mg/l)**	**No. of exceedances of limit value during the period.**
May-16	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jun-16	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jul-16	**Cadmium**	**0.15**	0.001	0.001	0.001	0
Jan-14	**Chlorides**	**6000**	1300.0	940.0	1112.5	0
Feb-14	**Chlorides**	**6000**	1410.0	1010.0	1270.0	0
Mar-14	**Chlorides**	**6000**	2000.0	765.0	1371.3	0
Apr-14	**Chlorides**	**6000**	2140.0	1030.0	1570.0	0
May-14	**Chlorides**	**6000**	2580.0	920.0	1482.5	0
Jun-14	**Chlorides**	**6000**	1890.0	1170.0	1487.5	0
Jul-14	**Chlorides**	**6000**	1610.0	1000.0	1268.0	0
Aug-14	**Chlorides**	**6000**	1310.0	1140.0	1226.7	0
Sep-14	**Chlorides**	**6000**	1445.0	1190.0	1311.7	0
Oct-14	**Chlorides**	**6000**	1770.0	790.0	1156.0	0
Nov-14	**Chlorides**	**6000**	630.0	570.5	600.3	0
Dec-14	**Chlorides**	**6000**	1360.0	670.0	985.0	0
Jan-15	**Chlorides**	**6000**	1310.0	1070.0	1213.3	0
Feb-15	**Chlorides**	**6000**	1320.0	995.0	1138.3	0
Mar-15	**Chlorides**	**6000**	1320.0	860.0	1086.3	0
Apr-15	**Chlorides**	**6000**	2410.0	560.0	1439.1	0
May-15	**Chlorides**	**6000**	1680.0	1210.0	1455.0	0
Jun-15	**Chlorides**	**6000**	1470.0	300.0	965.0	0
Jul-15	**Chlorides**	**6000**	2430.0	950.0	1418.0	0
Aug-15	**Chlorides**	**6000**	1380.0	1255.0	1335.0	0
Sep-15	**Chlorides**	**6000**	1450.0	1005.0	1186.3	0
Oct-15	**Chlorides**	**6000**	1500.0	990.0	1220.0	0
Nov-15	**Chlorides**	**6000**	2940.0	570.0	1485.0	0
Dec-15	**Chlorides**	**6000**	1560.0	380.0	1015.0	0
Jan-16	**Chlorides**	**6000**	1220.0	900.0	1081.3	0
Feb-16	**Chlorides**	**6000**	1680.0	1110.0	1430.0	0
Mar-16	**Chlorides**	**6000**	3070.0	1300.0	2159.0	0
Apr-16	**Chlorides**	**6000**	2200.0	1270.0	1802.5	0
May-16	**Chlorides**	**6000**	3600.0	1270.0	1887.5	0
Jun-16	**Chlorides**	**6000**	4490.0	2680.0	3115.0	0
Jul-16	**Chlorides**	**6000**	4280.0	940.0	2915.0	0
Jan-14	**Copper**	**1**	0.030	0.010	0.020	0
Feb-14	**Copper**	**1**	0.100	0.005	0.042	0
Mar-14	**Copper**	**1**	0.007	0.007	0.007	0
Apr-14	**Copper**	**1**	0.007	0.001	0.004	0
May-14	**Copper**	**1**	0.007	0.007	0.007	0

6th September 2016

Weekly sewer emissions - 2014 to date						
Month (2014-2106)	Parameter	Limit value or Trigger value level (mg/l) (in absence of Limit value)	Maximum value recorded in period (mg/l)	Minimum value recorded during the period (mg/l)	Average value* (mg/l)	No. of exceedances of limit value during the period.
Jun-14	**Copper**	**1**	0.007	0.007	0.007	0
Jul-14	**Copper**	**1**	0.007	0.007	0.007	0
Aug-14	**Copper**	**1**	0.007	0.007	0.007	0
Sep-14	**Copper**	**1**	0.007	0.007	0.007	0
Oct-14	**Copper**	**1**	0.007	0.007	0.007	0
Nov-14	**Copper**	**1**	0.007	0.007	0.007	0
Dec-14	**Copper**	**1**	0.012	0.007	0.008	0
Jan-15	**Copper**	**1**	0.007	0.007	0.007	0
Feb-15	**Copper**	**1**	0.007	0.007	0.007	0
Mar-15	**Copper**	**1**	0.007	0.007	0.007	0
Apr-15	**Copper**	**1**	0.007	0.007	0.007	0
May-15	**Copper**	**1**	0.007	0.007	0.007	0
Jun-15	**Copper**	**1**	0.007	0.007	0.007	0
Jul-15	**Copper**	**1**	0.007	0.007	0.007	0
Aug-15	**Copper**	**1**	0.007	0.007	0.007	0
Sep-15	**Copper**	**1**	0.007	0.007	0.007	0
Oct-15	**Copper**	**1**	0.007	0.007	0.007	0
Nov-15	**Copper**	**1**	0.007	0.007	0.007	0
Dec-15	**Copper**	**1**	0.007	0.007	0.007	0
Jan-16	**Copper**	**1**	0.007	0.007	0.007	0
Feb-16	**Copper**	**1**	0.007	0.007	0.007	0
Mar-16	**Copper**	**1**	0.007	0.007	0.007	0
Apr-16	**Copper**	**1**	0.009	0.007	0.008	0
May-16	**Copper**	**1**	0.007	0.007	0.007	0
Jun-16	**Copper**	**1**	0.007	0.007	0.007	0
Jul-16	**Copper**	**1**	0.007	0.007	0.007	0
Jan-14	**FOG's**	**100**	9.4	2.4	4.6	0
Feb-14	**FOG's**	**100**	5.1	2.2	3.6	0
Mar-14	**FOG's**	**100**	10.0	10.0	10.0	0
Apr-14	**FOG's**	**100**	6.1	0.0	2.6	0
May-14	**FOG's**	**100**	1.9	0.0	0.5	0
Jun-14	**FOG's**	**100**	0.6	0.0	0.2	0
Jul-14	**FOG's**	**100**	8.5	0.0	1.7	0
Aug-14	**FOG's**	**100**	2.7	1.9	2.2	0
Sep-14	**FOG's**	**100**	5.9	0.8	3.2	0
Oct-14	**FOG's**	**100**	0.7	0.0	0.1	0
Nov-14	**FOG's**	**100**	0.01	0.01	0.01	0
Dec-14	**FOG's**	**100**	7.9	0.0	3.6	0
Jan-15	**FOG's**	**100**	11.2	0.2	4.2	0

6th September 2016

Weekly sewer emissions - 2014 to date

Month (2014-2106)	Parameter	Limit value or Trigger value level (mg/l) (in absence of Limit value)	Maximum value recorded in period (mg/l)	Minimum value recorded during the period (mg/l)	Average value* (mg/l)	No. of exceedances of limit value during the period.
Feb-15	**FOG's**	**100**	25.0	2.4	11.7	0
Mar-15	**FOG's**	**100**	13.7	10.0	10.9	0
Apr-15	**FOG's**	**100**	10.0	10.0	10.0	0
May-15	**FOG's**	**100**	0.4	0.0	0.2	0
Jun-15	**FOG's**	**100**	1.0	0.0	0.3	0
Jul-15	**FOG's**	**100**	0.9	0.0	0.2	0
Aug-15	**FOG's**	**100**	2.4	0.0	1.0	0
Sep-15	**FOG's**	**100**	1.8	0.0	0.8	0
Oct-15	**FOG's**	**100**	1.8	0.4	1.0	0
Nov-15	**FOG's**	**100**	3.1	0.0	1.0	0
Dec-15	**FOG's**	**100**	1.9	1.1	1.5	0
Jan-16	**FOG's**	**100**	9.6	1.1	4.8	0
Feb-16	**FOG's**	**100**	11.6	0.0	5.8	0
Mar-16	**FOG's**	**100**	8.7	0.0	3.1	0
Apr-16	**FOG's**	**100**	6.0	0.0	2.2	0
May-16	**FOG's**	**100**	4.6	0.0	2.6	0
Jun-16	**FOG's**	**100**	7.4	2.2	4.7	0
Jul-16	**FOG's**	**100**	10.0	0.4	4.0	0
Jan-14	**Lead**	**0.5**	0.020	0.000	0.008	0
Feb-14	**Lead**	**0.5**	0.100	0.000	0.036	0
Mar-14	**Lead**	**0.5**	0.006	0.005	0.006	0
Apr-14	**Lead**	**0.5**	0.008	0.001	0.005	0
May-14	**Lead**	**0.5**	0.005	0.005	0.005	0
Jun-14	**Lead**	**0.5**	0.008	0.006	0.007	0
Jul-14	**Lead**	**0.5**	0.011	0.007	0.009	0
Aug-14	**Lead**	**0.5**	0.014	0.008	0.011	0
Sep-14	**Lead**	**0.5**	0.012	0.008	0.010	0
Oct-14	**Lead**	**0.5**	0.007	0.005	0.006	0
Nov-14	**Lead**	**0.5**	0.005	0.005	0.005	0
Dec-14	**Lead**	**0.5**	0.012	0.009	0.010	0
Jan-15	**Lead**	**0.5**	0.015	0.005	0.008	0
Feb-15	**Lead**	**0.5**	0.005	0.005	0.005	0
Mar-15	**Lead**	**0.5**	0.006	0.005	0.005	0
Apr-15	**Lead**	**0.5**	0.019	0.005	0.011	0
May-15	**Lead**	**0.5**	0.022	0.005	0.014	0
Jun-15	**Lead**	**0.5**	0.019	0.005	0.014	0
Jul-15	**Lead**	**0.5**	0.013	0.005	0.010	0
Aug-15	**Lead**	**0.5**	0.017	0.006	0.011	0
Sep-15	**Lead**	**0.5**	0.024	0.011	0.016	0

Weekly sewer emissions - 2014 to date

Month (2014-2106)	Parameter	Limit value or Trigger value level (mg/l) (in absence of Limit value)	Maximum value recorded in period (mg/l)	Minimum value recorded during the period (mg/l)	Average value* (mg/l)	No. of exceedances of limit value during the period.
Oct-15	**Lead**	**0.5**	0.017	0.005	0.010	0
Nov-15	**Lead**	**0.5**	0.020	0.016	0.018	0
Dec-15	**Lead**	**0.5**	0.018	0.004	0.012	0
Jan-16	**Lead**	**0.5**	0.009	0.005	0.006	0
Feb-16	**Lead**	**0.5**	0.005	0.005	0.005	0
Mar-16	**Lead**	**0.5**	0.005	0.005	0.005	0
Apr-16	**Lead**	**0.5**	0.007	0.005	0.006	0
May-16	**Lead**	**0.5**	0.006	0.005	0.005	0
Jun-16	**Lead**	**0.5**	0.005	0.005	0.005	0
Jul-16	**Lead**	**0.5**	0.005	0.005	0.005	0
Jan-14	**Phenols**	**50**	35.5	5.6	15.2	0
Feb-14	**Phenols**	**50**	11.5	7.2	9.9	0
Mar-14	**Phenols**	**50**	14.5	2.9	9.4	0
Apr-14	**Phenols**	**50**	14.1	8.2	11.2	0
May-14	**Phenols**	**50**	17.2	6.5	10.0	0
Jun-14	**Phenols**	**50**	11.7	6.9	9.6	0
Jul-14	**Phenols**	**50**	18.0	3.7	9.1	0
Aug-14	**Phenols**	**50**	13.7	6.3	9.3	0
Sep-14	**Phenols**	**50**	13.3	10.4	11.6	0
Oct-14	**Phenols**	**50**	11.2	7.4	8.9	0
Nov-14	**Phenols**	**50**	9.9	8.6	9.2	0
Dec-14	**Phenols**	**50**	25.2	14.8	21.0	0
Jan-15	**Phenols**	**50**	16.3	15.1	15.6	0
Feb-15	**Phenols**	**50**	23.5	15.7	19.6	0
Mar-15	**Phenols**	**50**	16.6	12.7	14.6	0
Apr-15	**Phenols**	**50**	14.6	10.3	12.2	0
May-15	**Phenols**	**50**	14.4	7.2	9.6	0
Jun-15	**Phenols**	**50**	12.7	6.0	9.0	0
Jul-15	**Phenols**	**50**	11.5	9.5	10.0	0
Aug-15	**Phenols**	**50**	14.9	8.4	11.7	0
Sep-15	**Phenols**	**50**	18.8	2.3	8.1	0
Oct-15	**Phenols**	**50**	7.3	3.7	6.2	0
Nov-15	**Phenols**	**50**	12.4	3.3	7.5	0
Dec-15	**Phenols**	**50**	8.3	3.7	6.1	0
Jan-16	**Phenols**	**50**	11.0	6.3	9.2	0
Feb-16	**Phenols**	**50**	14.0	8.4	11.2	0
Mar-16	**Phenols**	**50**	10.5	5.6	7.6	0
Apr-16	**Phenols**	**50**	14.1	10.8	11.9	0
May-16	**Phenols**	**50**	12.7	7.1	9.9	0

6th September 2016

Weekly sewer emissions - 2014 to date						
Month (2014-2106)	Parameter	Limit value or Trigger value level (mg/l) (in absence of Limit value)	Maximum value recorded in period (mg/l)	Minimum value recorded during the period (mg/l)	Average value* (mg/l)	No. of exceedances of limit value during the period.
Jun-16	**Phenols**	**50**	11.3	2.9	7.6	0
Jul-16	**Phenols**	**50**	13.0	10.1	11.6	0
Jan-14	**Sulphates**	**1000**	656.8	19.7	281.0	0
Feb-14	**Sulphates**	**1000**	66.1	52.4	57.0	0
Mar-14	**Sulphates**	**1000**	74.2	39.8	59.7	0
Apr-14	**Sulphates**	**1000**	249.6	18.5	119.4	0
May-14	**Sulphates**	**1000**	68.5	9.1	40.2	0
Jun-14	**Sulphates**	**1000**	704.5	36.7	232.7	0
Jul-14	**Sulphates**	**1000**	936.0	63.8	284.7	0
Aug-14	**Sulphates**	**1000**	63.0	11.5	45.8	0
Sep-14	**Sulphates**	**1000**	112.5	8.0	61.4	0
Oct-14	**Sulphates**	**1000**	149.9	11.4	88.0	0
Nov-14	**Sulphates**	**1000**	59.9	56.7	58.3	0
Dec-14	**Sulphates**	**1000**	341.4	25.8	227.8	0
Jan-15	**Sulphates**	**1000**	32.2	0.5	16.6	0
Feb-15	**Sulphates**	**1000**	579.8	62.6	332.7	0
Mar-15	**Sulphates**	**1000**	823.0	66.2	361.1	0
Apr-15	**Sulphates**	**1000**	361.1	18.2	118.9	0
May-15	**Sulphates**	**1000**	186.2	16.6	82.4	0
Jun-15	**Sulphates**	**1000**	46.2	9.6	30.0	0
Jul-15	**Sulphates**	**1000**	97.9	8.6	36.0	0
Aug-15	**Sulphates**	**1000**	211.1	12.6	83.6	0
Sep-15	**Sulphates**	**1000**	132.2	4.6	55.0	0
Oct-15	**Sulphates**	**1000**	62.1	7.7	33.5	0
Nov-15	**Sulphates**	**1000**	222.0	3.1	81.0	0
Dec-15	**Sulphates**	**1000**	56.2	1.3	27.0	0
Jan-16	**Sulphates**	**1000**	49.9	6.7	18.7	0
Feb-16	**Sulphates**	**1000**	58.9	5.0	22.3	0
Mar-16	**Sulphates**	**1000**	146.5	0.6	42.5	0
Apr-16	**Sulphates**	**1000**	175.1	53.6	125.8	0
May-16	**Sulphates**	**1000**	436.3	112.4	200.7	0
Jun-16	**Sulphates**	**1000**	489.0	283.0	353.4	0
Jul-16	**Sulphates**	**1000**	456.2	84.0	229.2	0
Jan-14	**Total Phosphorus**	**150**	88.0	68.0	74.3	0
Feb-14	**Total Phosphorus**	**150**	99.5	88.0	92.2	0
Mar-14	**Total Phosphorus**	**150**	78.5	53.0	67.1	0
Apr-14	**Total Phosphorus**	**150**	108.0	74.0	86.7	0

Weekly sewer emissions - 2014 to date

Month (2014-2106)	Parameter	Limit value or Trigger value level (mg/l) (in absence of Limit value)	Maximum value recorded in period (mg/l)	Minimum value recorded during the period (mg/l)	Average value* (mg/l)	No. of exceedances of limit value during the period.
May-14	**Total Phosphorus**	**150**	100.0	65.0	78.5	0
Jun-14	**Total Phosphorus**	**150**	120.0	68.6	97.7	0
Jul-14	**Total Phosphorus**	**150**	117.0	35.0	90.7	0
Aug-14	**Total Phosphorus**	**150**	102.0	89.0	94.7	0
Sep-14	**Total Phosphorus**	**150**	135.0	110.0	124.0	0
Oct-14	**Total Phosphorus**	**150**	101.0	54.0	86.9	0
Nov-14	**Total Phosphorus**	**150**	49.0	49.0	49.0	0
Dec-14	**Total Phosphorus**	**150**	79.0	68.0	74.9	0
Jan-15	**Total Phosphorus**	**150**	73.0	60.0	65.3	0
Feb-15	**Total Phosphorus**	**150**	81.5	55.0	70.7	0
Mar-15	**Total Phosphorus**	**150**	79.0	17.0	57.3	0
Apr-15	**Total Phosphorus**	**150**	89.0	57.3	72.5	0
May-15	**Total Phosphorus**	**150**	57.5	49.0	52.0	0
Jun-15	**Total Phosphorus**	**150**	68.0	58.0	62.8	0
Jul-15	**Total Phosphorus**	**150**	108.5	62.5	81.8	0
Aug-15	**Total Phosphorus**	**150**	98.0	63.4	78.5	0
Sep-15	**Total Phosphorus**	**150**	91.0	47.0	65.3	0
Oct-15	**Total Phosphorus**	**150**	98.0	7.0	64.8	0
Nov-15	**Total Phosphorus**	**150**	86.0	2.0	55.8	0
Dec-15	**Total Phosphorus**	**150**	82.0	62.0	72.3	0
Jan-16	**Total Phosphorus**	**150**	89.0	74.0	80.5	0
Feb-16	**Total Phosphorus**	**150**	129.0	79.0	94.4	0
Mar-16	**Total Phosphorus**	**150**	124.5	75.0	97.7	0
Apr-16	**Total Phosphorus**	**150**	89.0	81.0	84.5	0
May-16	**Total**	**150**	96.0	75.0	84.8	0

Weekly sewer emissions - 2014 to date

Month (2014-2106)	Parameter	Limit value or Trigger value level (mg/l) (in absence of Limit value)	Maximum value recorded in period (mg/l)	Minimum value recorded during the period (mg/l)	Average value* (mg/l)	No. of exceedances of limit value during the period.
	Phosphorus					
Jun-16	Total Phosphorus	150	91.0	65.0	76.4	0
Jul-16	Total Phosphorus	150	114.0	59.0	77.8	0
Jan-14	Zinc	1	0.165	0.108	0.141	0
Feb-14	Zinc	1	0.156	0.009	0.095	0
Mar-14	Zinc	1	0.006	0.003	0.004	0
Apr-14	Zinc	1	0.008	0.001	0.004	0
May-14	Zinc	1	0.059	0.004	0.025	0
Jun-14	Zinc	1	0.462	0.012	0.129	0
Jul-14	Zinc	1	0.019	0.006	0.010	0
Aug-14	Zinc	1	0.008	0.003	0.006	0
Sep-14	Zinc	1	0.011	0.004	0.007	0
Oct-14	Zinc	1	0.020	0.010	0.013	0
Nov-14	Zinc	1	0.018	0.005	0.012	0
Dec-14	Zinc	1	0.079	0.019	0.038	0
Jan-15	Zinc	1	0.013	0.006	0.010	0
Feb-15	Zinc	1	0.058	0.009	0.030	0
Mar-15	Zinc	1	0.108	0.003	0.036	0
Apr-15	Zinc	1	0.036	0.005	0.016	0
May-15	Zinc	1	0.019	0.006	0.011	0
Jun-15	Zinc	1	0.141	0.010	0.046	0
Jul-15	Zinc	1	0.013	0.003	0.007	0
Aug-15	Zinc	1	0.008	0.006	0.007	0
Sep-15	Zinc	1	0.010	0.004	0.007	0
Oct-15	Zinc	1	0.012	0.005	0.008	0
Nov-15	Zinc	1	0.008	0.007	0.007	0
Dec-15	Zinc	1	0.019	0.006	0.012	0
Jan-16	Zinc	1	0.007	0.004	0.005	0
Feb-16	Zinc	1	0.011	0.005	0.007	0
Mar-16	Zinc	1	0.515	0.003	0.109	0
Apr-16	Zinc	1	0.328	0.021	0.175	0
May-16	Zinc	1	0.073	0.007	0.036	0
Jun-16	Zinc	1	0.087	0.011	0.040	0
Jul-16	Zinc	1	0.384	0.003	0.146	0

Query 23.

Please assign an emission point reference number to the proposed activated carbon filter to be installed at Building K (as described on page 2 of Item 11 of your response dated 17/05/2016).

Response

This emission point has been installed at the site since the Licence Review application was lodged in May 2016. The purpose of this carbon filter is to contain and treat fugitive vapours from the Paint Tin De-packer which was designated as a fugitive emission source (A4-9) in the Licence Review submission made in May 2016. This potential fugitive source has been enclosed and all fugitive vapours are contained, extracted and treated through a local carbon filter (which currently discharges back into the building).

Monitoring of fugitive emissions in the Paint Tin De-packer area in May 2016 identified fugitive emissions of 13.5mg/m^3 (as Total Organic Carbon) measured using a Flame Ionisation Detector in accordance with EN12619:2013. This fugitive concentration (13.5mg/m^3) is now captured in a fan (fan rating 2,220m^3/hr) and routed through a carbon filter for treatment and the emissions are largely eliminated. Based on the concentration and flow, the mass loading to the carbon filter would be 0.03kg/hour which is 6% of the TA Luft threshold for mass emissions of VOCs. As such, even before carbon filtration the emissions are not considered "significant" and will reduce further after the carbon filter. Applying the EPA designation criteria to this emission source (i.e. less than 20% of the BAT limit) the emission point is designated as "minor".

It is not currently proposed that air extracted from the pain tin de-packer be directed to the proposed RTO.

Any future connection to the RTO would only be with agreement from the Agency.

Query 24.

State the maximum flow rate to be discharged through emission point A3-52 and provide data on monitoring events that have taken place at this point. Provide justification for the emission being classified as a minor emission point.

Response

A3-52 is the Carbon Filter for Oil Filtration Plant and was installed in early 2016. The fan rating on the extract fan is 0.56m^3/s and hence the maximum flow through the stack is 2,220m^3/hour**.** Monitoring undertaken to date at this emission point that the actual volumetric flow is circa 1,488Nm^3/hour. On commissioning of the proposed RTO this emission will cease and discharge through A2-1 but remain in place as a contingency measure (i.e. if the RTO is unavailable e.g. due to maintenance).

To date there have been three monitoring events undertaken at the emission point A3-52 to confirm the level of emissions. All monitoring has been undertaken by Axis Environmental in May and June 2016 using a Flame Ionisation Detector in accordance with EN12619:2013. The results of the monitoring are listed in the following table. The results indicate Mass Emissions of the order of 0.01 to 0.06kg/hr which is a combination of the low concentrations and the low volumetric flow rate.

Table 24.1 Emissions Monitoring from A3-52.

Event	Total Organic Carbon (as C) mg/m^3	Volumetric Flow (m^3/hr)	Mass Emission (kg/hr)	Notes
1	20.5	1,488	0.0305	Garage Oil feedstock (May 2016)
2	<7.06	1,488	0.0105	Garage Oil feedstock (June 2016)
3	42.7	1,488	0.0635	Ship Oil feedstock (May 2016)

There is no mass emission rate specified for this section in the Final Draft BAT Guidance Note on Best Available Techniques for the Waste Sector: Waste Transfer and Materials Recovery (December 2011). In the absence of an industry specific factor, the TA Luft Guidelines are employed as a standard resource that is applied in other sectors in Ireland. For Organic Substances, paragraph 5.2.5 of TA Luft specifies the following:

> *With regard to organic substances contained in waste gas, except organic particulate matter,*
> *a total mass flow of **0.50 kg/h***
> *or*
> *a total mass concentration of 50 mg/m^3,*
> *each of which to be indicated as total carbon, shall not be exceeded.*

It is clear from the results to date on A3-52 that the measured mass emission rates are significantly lower than the TA Luft mass emission rate of 0.5kg/h. Furthermore, the EPA "*IPPC Application*

Guidance Notes V4/12" (used as reference for all licence application and reviews) states the following criteria for determining whether an emission point is "main" (A2-*X*) or "minor" (A3-*X*):

> *Main Emissions will include all emissions of environmental significance. Where a mass emission threshold is used in the BAT Guidance Note (e.g. 3 kg/h), all emissions greater than 20% of such a threshold are regarded as significant. (In some cases emissions below 20% of a threshold can still be significant and will qualify as Main Emissions.)*

It is clear for the actual monitored data at A3-52 that the mass emission rates range from 2% to 13% of the TA Luft mass emission limit of 0.5kg/hr. Hence, applying the relevant criteria these emissions are not considered significant and A3-52 is classified as a minor emission point in the licence review.

It should be noted however that on commissioning of the proposed RTO this emission point (A3-52) will cease and only operate as a contingency measure (i.e. if the RTO were to be unavailable). The extracted air from the oil filtration room will normally be directed to the RTO (once installed) and thereby exhaust at A2-1 (which is designated as a main emission point).

Query 25.

Clarify whether the "Hodgefield" oil water separator is the unit illustrated as "Grill Over Interceptor (SW1)" illustrated in drawing no. "Figure 2.2". State the maximum flow rate to be discharged through the new emission point A3-53 as well as the concentration of VOCs monitored in the discharge during each monitoring event. Provide justification for the emission being classified as a minor emission point.

Response

The "Hodgefield" oil water separator is located immediately adjacent to Tanks 18 and 19 in the Tank Farm (see Figure 25.1 overleaf). In Figure 2.2 (of the May submission) it is referenced as Hodgefield Tank and Holding Tank. This separator treats process effluent whereby it retains free phase oil and facilitates the passage of effluent to the effluent treatment plant. The oil water separator indicated at the location '*Grill Over Interceptor (SW1)*' in Figure 2.2 refers to the oil water separator servicing the surface water from the southern portion of the sites drainage infrastructure (this was the sites original surface water interceptor).

The carbon filter (post caustic scrubber) that serves the 'Hodgefield' separator was installed in early 2016 and is referenced as A3-53 in the licence review application. As with A3-52, the fan capacity for the unit is 2,220Nm^3/hour but monitoring undertaken to date shows that the actual volumetric flow is much lower at 331Nm^3/hour. Emissions tests have been carried out on this unit during effluent transfers in 2016 when the source represents a worst case and the results of both sample events are presented in the table 25.1.

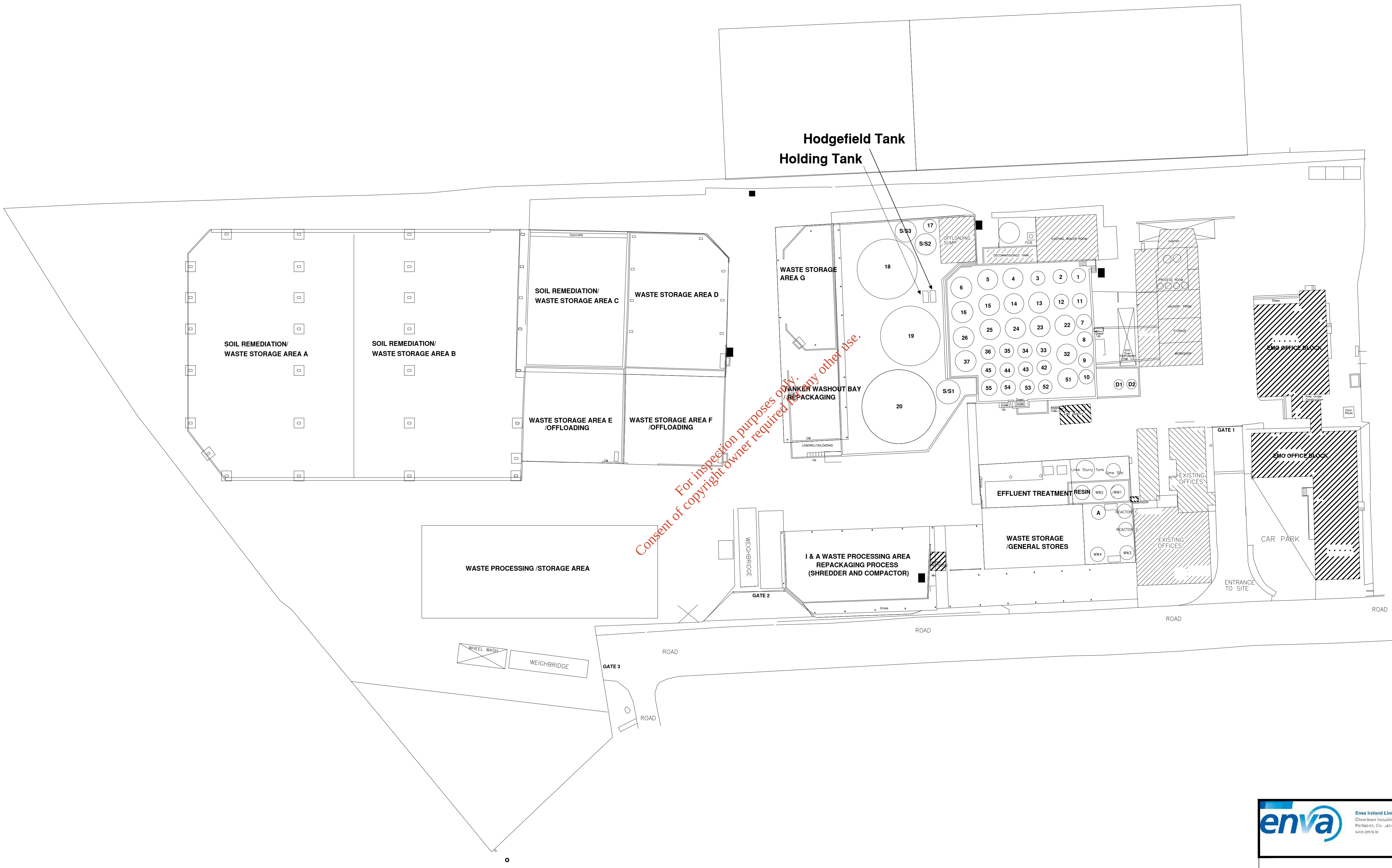
Table 25.1 Emissions Monitoring from A3-53.

Event	Total Organic Carbon (as C) mg/m^3	Volumetric Flow (m^3/hr)	Mass Emission (kg/hr)	Notes
1	88.3	331	0.0292	May 2016
2	141	331	0.0467	June 2016

As with A3-52, the mass emissions from A3-53 are very low and equate to 6-9% of the TA Luft mass emission rate. Again, as these emissions are less than the 20% threshold, this emission point is classified as a "minor" emission point in the licence review.

It is not currently proposed that air extracted from the 'Hodgefield' separator be directed to the proposed RTO.

Any future connections to the RTO would only be with agreement from the Agency.



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Title

Figure 25.1
Location of Hodgefield Oil Water Seperator

Drawn by.	Checked by.	Scale.	Sheet No.	Date.
MC	REFER TO DWG	1:750 @ A3	1	11-05-2016

Drawing no.
ENV-1605-25.1

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Query 26.

Provide justification for the proposed emission A3-54 from "the new large activated carbon filter" with a flow of up to 10,000m^3/hour being classified as a minor emission point.

Response

For clarity, A3-54 refers to the carbon filter that will be installed adjacent to Tanks 18, 19 and 20 to the north of the tank farm. This carbon filter will have two specific functions as follows:

- **Normal operation** – this carbon filter will be available to treat the headspace air from the "Tanker Dig Out" area which is located directly north of the tank farm and is used to manually desludge the road tankers and temporarily store/dewater sludge or repackage waste in an enclosed bund. Currently this area is open but it is proposed to enclose the area so as to be able to capture the headspace air and treat with a carbon filter if necessary. While the activities in this area have not been associated with any significant odour source to date (over the past 15 years) the proposed infrastructure would provide a means to control such a scenario which would not be easily achieved currently. In the licence review lodged in May 2016, this area is labelled as fugitive emission source A4-5 but on installation of A3-54, the fugitive source A4-5 will be removed.
- **Periodic operation** – on a periodic basis (e.g. annual basis) each of Tanks 18 and 19 are normally cleaned to remove the solid residues that settle out and build up in these tanks. It is proposed that the new large carbon filter would be used to treat extracted air from the tank while cleaning activities take place and prevent potential nuisance odours. If carried out annually the cleaning operation should take approximately 1-2 weeks per tank. This operation was last carried out in the summer of 2015 and was the source of several odour complaints from local residents. This cleaning operation has since been discontinued by site management pending the introduction of this infrastructure.

In the normal operation scenario, the potential for odour arises from the periodic tanker cleaning and the presence of sludge in the bund. Sensory observations undertaken throughout 2016 indicate that this operation is low risk for odour and there is limited odour generated by the cleaning operation and the temporary sludge storage. This is supported by periodic measurements undertaken in the area using a Photo Ionisation Detector (PID) during 2016 that illustrate that the levels of TOC are less than 5mg/m^3. This area is currently circa 20m x 10m and with a proposed roof height of circa 5m this area will comprise of a volume of circa 1,000m^3 and given that best practice suggests 3-6 air exchanges per hour, the extraction fan will have a capacity of 10,000m^3/hr (equivalent to up to 10 air exchanges per hour). This normal operation air stream will be a high volume (max 10,000m^3/hr) low concentration fugitive emission (<5mg/m^3 VOC) stream resulting in a combined mass emission rate of 0.05kg/hour loading to the carbon filter with only 5,000m^3/hr of extraction (i.e. ~5 air changes/hr). As with the other filters, as these emissions are less than the 20% mass emission threshold, this emission point is classified as a "minor" emission point during normal operations.

Tanks 18 and 19 each have a capacity of 900m^3 and these tanks are periodically cleaned on an annual basis. During cleaning there is risk of significant odour being generated from these tanks resulting in a potentially high concentration, low volume (900m^3) source being discharged to the proposed carbon filter A3-54. Given the potentially high concentration in the tanks during cleaning, it is anticipated that between 5 and 10 air exchanges per hour may be required (e.g. 4,500-9,000m^3/hr) with the proposed carbon filter designed to meet this flow range. The carbon filter proposed is primarily to provide odour abatement as the level of VOCs is expected to be relatively low as these tanks are regularly heated to ca. 80^{o}C and thus will have driven off the more volatile compounds, however the sludge has a significant odour potential due to the potential for anaerobic microbial activity. When tank 19 was being cleaned in 2015 it was initially the suspected source of odour complaints although the sludge repackaging activity was subsequently identified as the main source of odour until it was relocated indoors. The measures subsequently employed during cleaning of the tank (and successfully preventing nuisance odours), included:

- Venting the Disab (vacuum tanker) exhaust back onto the tank and thereby reducing the volume of air emitted from the tanks to a negligible amount;
- Closing the tank manlid when cleaning activates were not active;
- Operation of the Independent Rotary Atomiser to neutralise odour;
- Repackaging of the sludge removed from the tanks within the Warehouse (in future this could be carried out in the enclosed tanker dig out bay where extraction will also be available).

With the added control measure of extraction from the tank through a carbon filter (and repackaging if sludge in an enclosed building) this activity is considered to be sufficiently well controlled and mitigated so as not to lead to any nuisance odours. Furthermore, given that this operation is only normally expected to take place over 10 -15 days per annum and extraction from the tanker dig out bay expected to be rarely required (based on experience to date), the emissions from the carbon filter are considered to fall under the “minor” classification for the normal operation as applied.

Query 27.

With regard to the remaining "A3-" emissions listed Table E.1(iv) of your response dated 17/05/2016, it is apparent that many of these will be grouped and ducted through the ring main for treatment in a single process. Please group the A3- emission points according to the emission point that they will ultimately discharge through. Identify which, if any, will remain as individual emission points. For any that will be individual emission points, state the maximum flow rate to be discharges and provide justification for each being classified individually as a minor emission.

Response

The following table lists all of the A3 minor emission points listed in the licence review and the relevant details requested. There are two further minor emission points added to the list since lodgement of the licence review as follows:

- A3-56 – Contingency Carbon Filter serving the ring main vapour balancing unit (further details in Note 1 to this Query response) in the event that the RTO is not operational.
- A3-57 – Carbon filter serving the effluent storage tanks WW1 and WW2 (further details in Note 2 to this Query response).

These new filters are referenced in the table 27.1 below and a justification for their classification is included in the response to this Query. For clarity, all minor emission points that will no longer be relevant (i.e. through rationalisation to other emission points) are highlighted in grey.

Table 27.1 Update on Air Emission Points

Minor Reference	Source	Final Discharge Point	Justification for Minor Emissions
A3-1	Tank 1	A2-1 (RTO) and A3-56 (Contingency carbon filter serving the ring main)	See Note 1
A3-2	Tank 2		See Note 1
A3-3	Tank 3		See Note 1
A3-4	Tank 4		See Note 1; Tank/source removed source but will be replaced; See Note 1
A3-5	Tank 5		See Note 1
A3-6	Tank 6		See Note 1
A3-7	Tank 7		See Note 1
A3-8	Tank 8		See Note 1
A3-9	Tank 9		See Note 1
A3-10	Tank 10		See Note 1
A3-11	Tank 11		See Note 1
A3-12	Tank 12		See Note 1
A3-13	Tank 13		See Note 1

A3-14	Tank 14	A2-1 (RTO) and A3-56 (Contingency carbon filter serving the ring main)	See Note 1
A3-15	Tank 15		See Note 1
A3-16	Tank 16		See Note 1
A3-17	Tank 18		See Note 1
A3-18	Tank 19		See Note 1
A3-19	Tank 20		See Note 1
A3-20	Tank 22		See Note 1
A3-21	Tank 23		See Note 1
A3-22	Tank 24		See Note 1
A3-23	Tank 25		See Note 1
A3-24	Tank 26		See Note 1
A3-25	Tank 32		See Note 1
A3-26	Tank 33		See Note 1
A3-27	Tank 34	A3-27	All tanks are ambient storage tanks currently used by Emo and are not used to heat oils. Monitoring of ambient tanks shows that the mass emission rate is 0.08kg/hr and hence less than 20% of the TA Luft Threshold
A3-28	Tank 35	A3-28	
A3-29	Tank 36	A2-1 (RTO) and A3-56 (Contingency carbon filter serving the ring main)	See Note 1
A3-30	Tank 37		See Note 1
A3-31	Tank 42	A3-31	All tanks are ambient storage tanks currently used by Emo and are not used to heat oils. Monitoring of ambient tanks shows that the mass emission rate is 0.08kg/hr and hence less than 20% of the TA Luft Threshold
A3-32	Tank 43	A3-32	
A3-33	Tank 44	A3-33	
A3-34	Tank 45	A3-34	
A3-35	Tank 51	A2-1 (RTO) and A3-56 (Contingency carbon filter serving the ring main)	See Note 1
A3-36	Tank 52		See Note 1
A3-37	Tank 54	A3-37	All tanks are ambient storage tanks currently used by Emo and are not used to heat oils. Monitoring of ambient tanks shows that the mass emission rate is 0.08kg/hr and hence less than 20% of the TA Luft Threshold
A3-38	Tank 55	A3-38	
A3-39	Tank SS 1	A2-1 (RTO) and A3-56 (Contingency carbon filter serving the ring main)	See Note 1
A3-40	Tank SS 2		See Note 1
A3-41	Tank SS 3		See Note 1
A3-42	WW1	A3-57 (Carbon filter serving the effluent tanks)	See Note 2
A3-43	WW2		
A3-58	WW3		

A3-59	WW4	A3-57 (Carbon filter serving the effluent tanks)	See Note 2
A3-44	Decanter Tank 1	A2-1 (RTO) and A3-56 (Contingency carbon filter serving the ring main)	See Note 1
A3-45	Decanter Tank 2		See Note 1
A3-46	(Effluent) Reactor 1	A3-57 (Carbon filter serving the effluent tanks)	See Note 2
A3-47	(Effluent) Reactor 2		
A3-48	Lab Fume Hood 1	A3-48	Negligible and periodic emissions from laboratory
A3-49	Lab Fume Hood 2	A3-49	Negligible and periodic emissions from laboratory
A3-50	Back Up Generator	A3-50	Gas Oil fired and less than 5MW
A3-51	Boiler for Office Areas	A3-51	Gas Oil fired and less than 5MW
A3-52	Carbon Filter for the Oil Filtration Plant	A3-52	Refer to the response listed for Query 24 above.
A3-53	Carbon Filter for the Hodgefield	A3-53	Refer to the response listed for Query 25 above.
A3-54	Carbon Filter the Tanker Dig out and Tank 18/19 Cleaning	A3-54	Refer to the response listed for Query 26 above.
A3-55	Carbon Filter for the Paint De-packer	A3-55	Refer to the response listed for Query 23 above.
A3-56	Contingency carbon Filter serving the ring main vapour balancing unit	A3-56	See Note 1 below
A3-57	Carbon filter serving the effluent handling tanks WW1, WW2, WW3, WW4, R1 & R2	A3-57	See Note 2 below

Note 1: RTO (A2-1) & Contingency Carbon Filter (A3-56)

The RTO (main emission point A2-1) is proposed to provide routine abatement for the vapour balancing ring main that will be connected to each of the tanks to collect headspace air. In addition, the proposed carbon filter at A3-56 will act as contingency abatement for the vapour balancing ring main (i.e. normally abated by the proposed RTO). The carbon filter is only provided as a backup for situations where the proposed RTO is not available (e.g. maintenance/repair). Initially there are 34 tanks proposed to be connected to the vapour balancing ring main (see table 27.2 below) including storage tanks (for waste oil and product at ambient temperatures) as well as the nine tanks currently used for heating oils (highlighted in orange). Further additions to the ring main are possible in the future as the tank farm evolves (e.g. tanks replaced or additional tanks installed). The ducting layout of the Vapour Balancing Ring Main provided previously (see figure 2.3 of the May submission) is preliminary and subject to route changes on installation.

Please note that Tank 17 is redundant (and is to be decommissioned) and there are no Tank currently numbered 21, 27, 28, 29, 30, 31, 38, 39, 40, 41, 46, 47, 48, 49, or 50.

Table 27.2 Initial tanks to be vented to the proposed vapour balance ring main.

Licence Reference No	Source
A3-1	Tank 1
A3-2	Tank 2
A3-3	Tank 3
A3-4	Tank 4 (when replaced)
A3-5	Tank 5
A3-6	Tank 6
A3-7	Tank 7
A3-8	Tank 8
A3-9	Tank 9
A3-10	Tank 10
A3-11	Tank 11
A3-12	Tank 12
A3-13	Tank 13
A3-14	Tank 14
A3-15	Tank 15
A3-16	Tank 16
A3-17	Tank 18
A3-18	Tank 19
A3-19	Tank 20
A3-20	Tank 22
A3-21	Tank 23
A3-22	Tank 24
A3-23	Tank 25
A3-24	Tank 26
A3-25	Tank 32
A3-26	Tank 33
A3-29	Tank 36
A3-30	Tank 37
A3-35	Tank 51
A3-36	Tank 52
A3-39	Tank SS 1
A3-40	Tank SS 2
A3-41	Tank SS 3
A3-44	Decanter Tank 1
A3-45	Decanter Tank 2

The VOC emissions (pre-abatement) generated after installation of the vapour balance ring main are difficult to ascertain accurately however a conservative approach has been taken to estimate this. The concentrations of VOCs within the ring main itself will inevitably be high as there is little opportunity for oxygen/air to enter the ring main system (other than air sparging, discussed below). This will be similar if not identical to the headspace of an oil tank (with no natural ventilation) with concentrations of circa 15,000mg/m^3. However the volume of vapours discharged from the ring main will be low as vapours can simply be displaced from one tank (being filled) and effectively return to another tank (i.e. that being emptied) with little cause for emissions from the ring main itself. Thus the transfer of between tanks within the vapour balance system is estimated to lead to less than 10m^3/hr of vapour being expelled from the vapour ring main for abatement in the RTO. This equates to circa 0.15kg/hr of VOCs exiting the ring main for abatement in the RTO.

While the practice of air sparging hot oil (~100°C) to dry oil has ceased currently, air sparging of oil at much lower temperatures (<30°C) is occasionally employed to ensure the contents of a tank are homogenous. However the practice of air sparging (prior to the introduction of the RTO) will be limited to oil with a temperature of less than 30°C and with all air emissions arising being passed through a carbon filter. The volume of air emitted from a tank when the air sparge was on is below that accurately measurable (using standard flow measurement methods as per AG2) but estimated at circa 65m^3/hr. Based on evidence to date it is assumed that the concentrations from this air sparging will be circa 1,000 mg/m3 in an estimated flow of circa 65m^3/hr. This would equate to a mass emission of approximately 0.065 kg of VOCs per hour.

Tanks where the contents are heated will generate an increased volume of vapour (than unheated tanks) and vapours will not be largely contained within the ring main system as will occur in transfers between tanks. While the flows are below the flow levels that can be accurately measured (using standard flow measurement methods as per AG2) the volume of vapour emitted has been estimated at circa 20m^3 per hour. An emission of 20m^3 per hour with VOC concentrations of circa 15,000mg/m^3 would generate a 0.3kg/hr VOC loading on the proposed RTO per tank. This is consistent with the calculations determined in 2013 when Enva employed a predictive modelling tool, the USEPA TANKS model, to simulate the mass emissions from the heated tanks at the facility. The results of the modelling of the heated tanks indicated that the average mass emissions of VOCs from these tanks was of the order of 0.366kg/hr (although this involved temperatures up to 100°C) as reported to the Agency. While three tanks are typically heated at any one time (i.e. circa 0.9kg/hr VOCs) theoretically there could be up to 21 tanks being heated (if every tank currently capable of being heated were to be heated) equating to a loading of up to ca. 6.3kg of VOCs on the RTO (however this is not only theoretical and is practised).

Combining the VOC emission associated with tank transfers (circa 0.15kg/hr), air sparging 0.065kg/hr), oil filtering <0.5kg/hr) and (3 no.) heated tanks would create an estimated loading of circa <2kg per hour to the RTO. If in a theoretical worst case scenario where 9 tanks were heated simultaneously (even though this is not practiced) the loading on the RTO could increase to circa 4kg/hr.

The proposed RTO will have a design capacity of 160kg/hour ensuring adequate capacity to deal with loads such as that identified above from the vapour balancing ring main. Initially it was proposed to proceed with installation of the vapour balancing ring main in advance of the RTO installation however these two proposed projects will now be combined and both the Vapour Balancing ring main and RTO will be installed and commissioned after the Licence review process has been completed and all details agreed with the Agency.

Carbon filter A3-56 will only be employed for short durations where the RTO is undergoing maintenance to ensure that continuous abatement infrastructure is available. Given this short term duration of operation, this carbon filter is classified as a "minor" emission point.

Note 2: Carbon Filter A3-57

Tanks WW1 and WW2 are 60m^3 each and used to hold processed effluent prior to discharge. Tanks WW3 & WW4 as well as Reactor Tanks 1 & 2 (where lime etc. can be added) are tanks of the order of 10-50m^3 in volume and are also associated with effluent handling prior to discharge. It is proposed to vapour balance these 6 tanks through a carbon filter (A3-57). Monitoring of a carbon filter (installed during 2016) currently abating air emissions from WW1 & 2 has been carried out during effluent transfer into tank WW1 during May 2016 for both VOCs and H_2S. The monitoring indicates average VOC emissions of 603.4mg/m^3 as well as trace levels of H_2S (see Table 27.3 below).

Tank filling takes several hours as the pumping rate is 8m^3/hr hour and estimated to displace circa 10m^3 of headspace air per hour (as only one tank can be filled at any one time). As a result, emissions from these tanks at 603.4mg/m^3 in a 10m^3 volume would lead to a mass emission of 0.006kg/hr from the filter. This emission from the filter is <2% of the BAT mass emission limit for VOCs and hence this carbon filter is classed as a "minor" emission point.

Table 27.3 Details of monitoring from Tank WW1

Licence Reference No	Source	Parameter	Emission (mg/m^3)	Average Emission (mg/m^3)	Notes
A3-42	WW1	Total VOC	380.9	603.4	While tank was being filled with treated effluent.
			825.9		
		H_2S	0.93	0.93	

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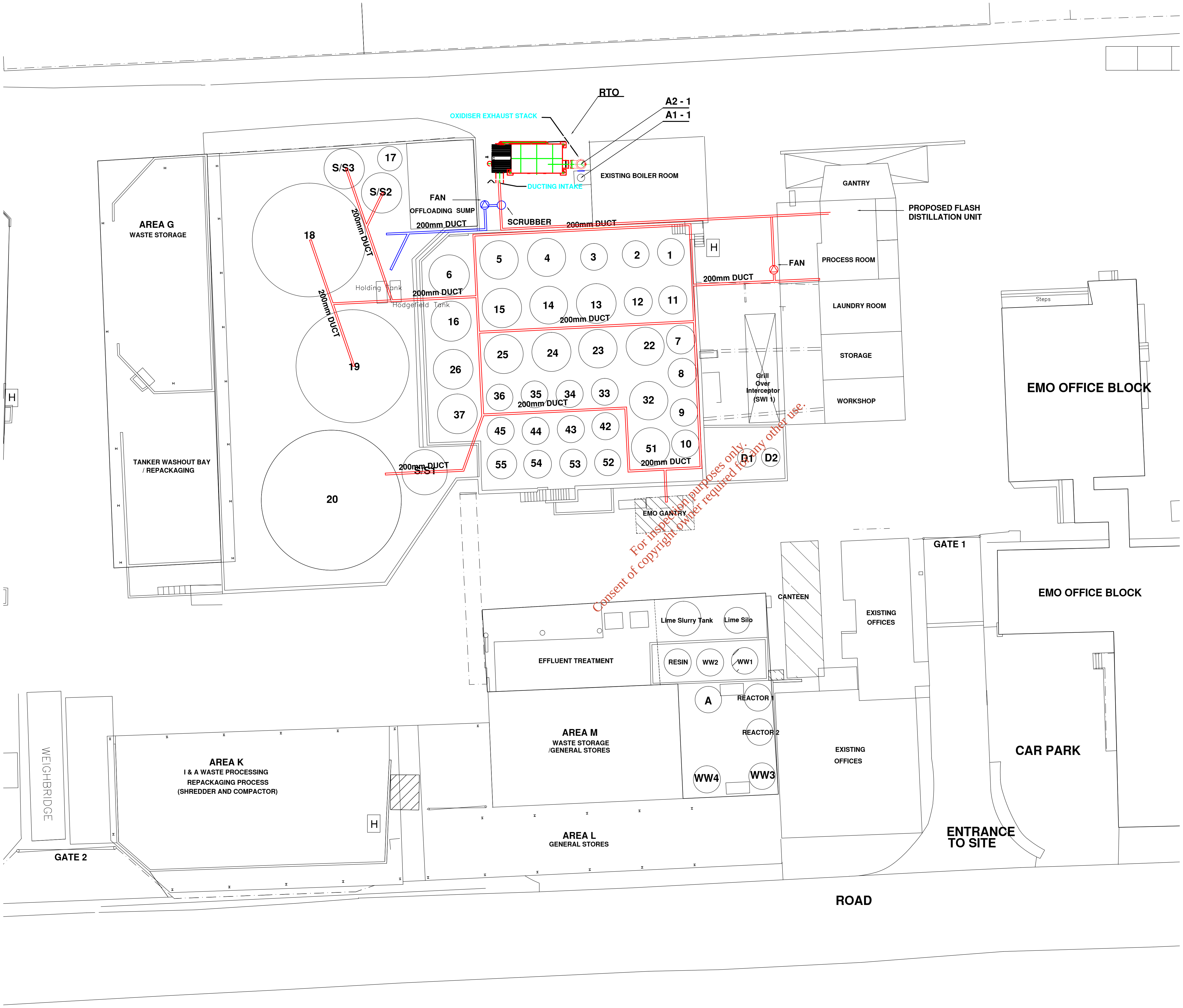
Query 28.

Provide an updated drawing showing the location of all existing emission points to air (other than minor) that you are seeking to be listed and authorised in a revised licence.

Response

Please see Figure 28.1 overleaf.



🟥	Vapour Balancing System

Rev	Date	Amendments

enva

Enva Ireland Limited
Clonminam Industrial Estate
Portlaoise, Co. Laois
www.enva.ie

Tel: 057 8678600
Callsave: 1850 504 504
Fax: 057 8678699
Email: portlaoise@enva.ie

Title

Figure 28.1
Main Air Emission Points

Drawn by.	Checked by.	Scale.	Sheet No.	Date.
CK	AP	1:400 @ A3	1	05-09-2016

Drawing no.
ENV-1605-12

● Carbon Filter

— Vapour Balancing System

Rev	Date	Amendments

Enva Ireland Limited
Clonminam Industrial Estate
Portlaoise, Co. Laois
www.enva.ie

Tel: 057 8678600
Callsave: 1850 504 504
Fax: 057 8678699
Email: portlaoise@enva.ie

Title

Figure 28.2
Location of Carbon Filters

Drawn by.	Checked by.	Scale.	Sheet No.	Date.
CK	AP	1:400 @ A3	2	05-09-2016

Drawing no.
ENV-1605-13

Query 29.

Taking into consideration the detailed information provided in your response dated 17.5/2016 and the information that will address the questions asked above, please check that you have done the following:

- *a. Each emission point to air sought for authorisation should be fully described and characterised in terms of source (include all "A3-" sources as appropriate), flowrate, treatment, nature and constituents.*
- *b. Use the template tables E.1(i) and (ii), where not already completed, as a starting point for each emission point sought for authorisation and elaborate where necessary in order to ensure you are satisfying bullet point a.*
- *c. Propose and emission limit value (where not already specified) for relevant parameters for each emission point.*
- *d. Provide evidence that the emissions to air, if compliant with the proposed limit values, individually or cumulatively, will not have an adverse environmental impact.*

Response

In answer to this query and to further clarify the information presented in response to Query 27, the minor emissions may be broadly presented as five separate groups as follows:

- **Oil Product Storage** – There are 8 minor emission sources that are simply the vents for oil storage tanks with the vent in place for safety reasons only. Each of these tanks is used (currently by Emo) to store oil product at ambient temperatures prior to tanker loading. As such there are no direct VOC constituent emissions from these tanks as the flow rate is negligible. Monitoring of ambient storage tanks at the Enva facility shows that the maximum mass emission rate from these tanks is 0.08kg/hr but that is considered an overestimation for these 8 tanks. As such, there is currently no proposed treatment (abatement) proposed for these tanks. This group includes the following minor emission points: A3-27, A3-28, A3-31, A3-32, A3-33, A3-34, A3-37 and A3-38.
- **Lad Fume Hoods** – There are two lab fume hoods with low and periodic emissions (A3-48 and A3-49) and as these are not significant these are deemed as minor emission in line with EPA nomenclature. There is no treatment of these emission sources.
- **Minor Combustion** – Other than the main boiler (A1-1 detailed for Query 12) there are two minor boiler emissions (A3-50 and A3-51), i.e. the Back Up Generator and the Boiler for Office Areas. Both are less than 5MW and fired by gas oil and are hence designated as minor emissions under the EPA definition. There is no treatment of these emission sources.
- **Carbon Filters** – There are four existing (A3-52, A3-53, A3-55 and A3-57) carbon filters at the Enva facility and a further two proposed (A3-54, and A3-56). These have been detailed in the responses to Queries 23 to 27 with justification for the designation as minor emission points included. Q29

These carbon filter minor emission sources have designated flow rates, formal treatment processes, known details on constituents, etc. As such, to fully respond to Query 29b, details of these carbon filters are presented in the format of Tables E1(i) and (ii) of a standard application form. These table templates are typically used to present details of “main” emission points (as per A2-1 the RTO) but are presented here for “minor” emission points to fully address the EPA query.

For the other minor emission points, the relevant data has been presented in the form of Table E.1(iv) of the data supplied in May 2016 and this remains unchanged.

In response to Query 29d, an emission limit value has been presented for the Carbon Filters. There is no mass emission rate specified for this sector in the Final Draft BAT Guidance Note on Best Available Techniques for the Waste Sector: Waste Transfer and Materials Recovery (December 2011). In the absence of an industry specific factor, the TA Luft Guidelines are employed as a standard resource that is applied in other sectors in Ireland. For Organic Substances, paragraph 5.2.5 of TA Luft 2002 specifies that with regard to organic substances contained in waste gas, except organic particulate matter, a total mass flow of **0.50 kg/hour** shall not be exceeded**.**

It is considered likely that additional minor abatement measures (e.g. carbon filters) may be required in future to ensure the facility continues to manage potential odour sources. This may arise in particular as equipment is either replaced or new equipment installed. For example the installation of more automated washing equipment is being considered to replace the current manual process of washing containers (i.e. power washing) for subsequent reuse. While such developments may not require any additional abatement other similar infrastructural development may warrant abatement even on a precautionary basis. It is therefore requested that any revised licence provide an appropriate mechanism to facilitate additional ‘minor’ emission’ points if required.

TABLE E.1(ii) EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. Nº:	A3-52
Source of Emission:	Carbon Filter from Oil Filtration Plant (only until connected to the RTO)
Location:	Adjacent to the Tank Farm
Grid Ref. (12 digit, 6E,6N):	646059, 697800
Vent Details Diameter: Height above Ground(m):	 0.2m 3m
Date of commencement:	2016

Characteristics of Emission:

(i) Volume to be emitted:			
Average/day	Nm^3/d	Maximum/day	Nm^3/d
Maximum rate/hour	$2,220 Nm^3/h$	Min efflux velocity	$20\ m.sec^{-1}$
(ii) Other factors			
Temperature	25°C(max) °C(min)		20°C(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. ________$\%O_2$			

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	__60__min/hr __8__hr/day __260__day/yr

TABLE E.1(iii): EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: ***A3-52***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Total VOCs (as C)[Note 2]									0.5		

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0°C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.
2 From TA Luft 2002 (paragraph 5.2.5) Organic Substances

TABLE E.1(ii) EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. Nº:	A3-53
Source of Emission:	Carbon Filter from the Hodgefield
Location:	Adjacent to the Boiler House
Grid Ref. (12 digit, 6E,6N):	646058, 697828
Vent Details Diameter: Height above Ground(m):	 0.2m 3m
Date of commencement:	2016

Characteristics of Emission:

(i) Volume to be emitted:			
Average/day	Nm^3/d	Maximum/day	Nm^3/d
Maximum rate/hour	2,220Nm^3/h	Min efflux velocity	20 m.sec^{-1}
(ii) Other factors			
Temperature	25°C(max) °C(min)		20°C(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. ________%O_2			

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	60 min/hr 12 hr/day 200 day/yr

TABLE E.1(iii): EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: ***A3-53***

Parameter	Prior to treatment[(1)]				Brief description of treatment	As discharged[(1)]					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Total VOCs (as C)$^{\text{Note 2}}$									0.5		

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0°C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.
2 From TA Luft 2002 (paragraph 5.2.5) Organic Substances

TABLE E.1(ii) EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. Nº:	A3-54
Source of Emission:	Carbon Filter from The Tanker Dig Out Area and the Tank 18/19 Cleaning
Location:	Adjacent to Tanks 18 and 19 within the Bund
Grid Ref. (12 digit, 6E,6N):	646038, 697851
Vent Details Diameter: Height above Ground(m):	 0.5m 3m
Date of commencement:	2016

Characteristics of Emission:

(i) Volume to be emitted:			
Average/day	Nm^3/d	Maximum/day	Nm^3/d
Maximum rate/hour	10,000Nm^3/h	Min efflux velocity	14 $m.sec^{-1}$
(ii) Other factors			
Temperature	25°C(max)	°C(min)	20°C(avg)
For Combustion Sources: Volume terms expressed as :	☐ wet.	☐ dry.	________$\%O_2$

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	__60__min/hr __24__hr/day __60__day/yr

TABLE E.1(iii): MAIN EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: ***A3-54***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Total VOCs (as C)Note 2									0.5		

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0°C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.
2 From TA Luft 2002 (paragraph 5.2.5) Organic Substances

6th September 2016

TABLE E.1(ii) MAIN EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. Nº:	A3-55
Source of Emission:	Carbon Filter from the Paint De-packer
Location:	Within Building K
Grid Ref. (12 digit, 6E,6N):	645991, 697859
Vent Details Diameter: Height above Ground(m):	 0.2m 2m
Date of commencement:	2016

Characteristics of Emission:

(i) Volume to be emitted:			
Average/day	Nm^3/d	Maximum/day	Nm^3/d
Maximum rate/hour	$2,220 Nm^3/h$	Min efflux velocity	$20\ m.sec^{-1}$
(ii) Other factors			
Temperature	25°C(max)	°C(min)	20°C(avg)
For Combustion Sources: Volume terms expressed as :	☐ wet.	☐ dry.	________$\%O_2$

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	__60__min/hr __8__hr/day __260__day/yr

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TABLE E.1(iii): MAIN EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: ***A3-55***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Total VOCs (as C)[Note 2]									0.5		

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0°C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.
2 From TA Luft 2002 (paragraph 5.2.5) Organic Substances

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TABLE E.1(ii) EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. Nº:	A3-56
Source of Emission:	Carbon Filter from the Ring Main (in the event the RTO is not available e.g. maintenance)
Location:	South of the Tank Farm
Grid Ref. (12 digit, 6E,6N):	646047, 697849
Vent Details Diameter: Height above Ground(m):	 0.5m 3m
Date of commencement:	2016

Characteristics of Emission:

(i) Volume to be emitted:			
Average/day	Nm^3/d	Maximum/day	Nm^3/d
Maximum rate/hour	2,220Nm^3/h	Min efflux velocity	14 $m.sec^{-1}$
(ii) Other factors			
Temperature	25°C(max)	°C(min)	20°C(avg)
For Combustion Sources: Volume terms expressed as :	☐ wet.	☐ dry.	________$\%O_2$

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	60 min/hr 24 hr/day 20 day/yr

6th September 2016

TABLE E.1(iii): MAIN EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: ***A3-56***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm3		kg/h			mg/Nm3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Total VOCs (as C)Note 2									0.5		

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0°C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.
2 From TA Luft 2002 (paragraph 5.2.5) Organic Substances

6th September 2016

TABLE E.1(ii) MAIN EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. Nº:	A3-57
Source of Emission:	Carbon Filter from WW1 and WW2
Location:	Adjacent to Effluent Treatment Area
Grid Ref. (12 digit, 6E,6N):	646005, 697813
Vent Details Diameter: Height above Ground(m):	 0.2m 1m
Date of commencement:	2016

Characteristics of Emission:

(i) Volume to be emitted:			
Average/day	Nm^3/d	Maximum/day	Nm^3/d
Maximum rate/hour	2,220Nm^3/h	Min efflux velocity	20 $m.sec^{-1}$
(ii) Other factors			
Temperature	25°C(max)	°C(min)	20°C(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. ________$\%O_2$			

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	60 min/hr 8 hr/day 260 day/yr

6th September 2016

TABLE E.1(iii): MAIN EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: ***A3-57***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Total VOCs (as C)Note 2									0.5		

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0°C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.
2 From TA Luft 2002 (paragraph 5.2.5) Organic Substances

To satisfy Query 29d, each of the Carbon Filters has been modelled operating at the emission limit values and flow rates specified in the Tables 29.1 (annual average) and 29.2 (1-hour average). It is assumed that all filters are operating at the limits continuously which is a significant overestimation as much of these filter operations will be dependent on production. In addition, Carbon filter A3-56 (from the ring main) will only operate as back-up to the RTO so these will not operate simultaneously. Finally, Carbon filter A3-52 (oil filtration plant) will only operate temporarily until this source is connected to the RTO. However, for a conservative assessment, the RTO and all six carbon filter sources have been modelled as emitting simultaneously. The cumulative emissions are modelled as per AG4 and the pathway and receptor characteristics supplied for the RTO model (report reference MDE0973Rp0103) are identical.

Background levels (for all BTEX, calculated at 8μg/m^3 for the period March to December 2015) for the Portlaoise area are also included as published by the EPA in the "*Second Interim Report: Monitoring of Ambient Air Quality adjacent to ENVA Ireland Limited, Portlaoise, EPA Licence Reg. No. W0184-01*" (June 2016). In addition, the cumulative impact of the RTO on top of the carbon filters is included in the results. The results of the TOC modelling are presented in the following table for annual averages for each of the receptors. The table illustrates that the combined operation of 6 carbon filters has a greater impact that the single RTO. This is in part due to the number of carbon filters but also the lower discharge heights compared to the RTO as well as the lower temperature (and hence thermal buoyancy) of the carbon filter emissions compared to the RTO.

There is no specific limit for Total VOCs in ambient air so a set of comparator values are used for BTEX (as employed by the EPA) and these are outlined as follows for annual averages:

•	Benzene	5μg/m^3 (EU Limit Value)
•	Toluene	1,910μg/m^3 (UK Environment Agency Guideline)
•	Ethylbenzene	4,410μg/m^3 (UK Environment Agency Guideline)
•	Xylenes	2,200μg/m^3 (UK Environment Agency Guideline)

The annual average levels contributed cumulatively by the RTO and Carbon filters at Enva are less than 0.4% of the guideline for Toluene and Xylenes and less than 0.2% of the guideline for Ethylbenzene. Based on this analysis the cumulative impact of the simulated worst case scenario (all carbon filters and RTO operating continuously for the full year) the impact to human health at the nearest receptors would not be significant.

The limit for benzene is much lower than the other aromatics given the known carcinogenicity of benzene and the predicted results of the cumulative TOC impact from Enva (RTO and Carbon Filters) would result in levels excess of the annual benzene limit. However, it is important to note that there is no evidence to suggest the TOC emissions from the Enva facility contain elevated levels of benzene. The EPA study of benzene levels in the area in the vicinity of Enva concluded that "*for benzene, the highest average concentrations are actually noted when winds are from the north east (i.e. not related to ENVA)*" and "*that there are other local sources of benzene, which could include combustion sources (such as transport) or emissions from local commercial/industrial activities*".

Based on the detailed EPA data collated for 2015 for the existing operation, it would appear that benzene from the Enva facility may have a maximum potential contribution of 0.5 to 1μg/m^3 in the area. The EPA noted that in all cases the measured values are below the relevant guideline values. With the proposed control measures in place (carbon filters and RTO) these low levels of benzene would actually decrease so a comparison with the benzene limit for cumulative TOC emissions for this analysis is not valid.

Table 29.1: Results of Annual Average Model

Reference	2015 Background (μg/m³)	RTO Impact (μg/m³)	Carbon Filter Impact (μg/m³)	Cumulative Impact (μg/m³)
R1	8	0.136	6.01	14.146
R2		0.186	6.23	14.416
R3		0.283	7.82	16.103
R4		0.308	7.33	15.638
R5		0.287	6.10	14.387
R6		0.249	5.54	13.789
R7		0.259	7.59	15.849
R8		0.261	7.89	16.151

Table 29.1 shows the maximum 1-hour concentrations for all receptors with the RTO and all carbon filters operating simultaneously at the emission limit values specified. As with the annual averages, the cumulative impact of the carbon filters is considerably greater than the RTO for the same reasons outlined.

Again, there is no specific limit for Total VOCs in ambient air over a 1-hour average so a set of comparator values are used for BTEX (as employed by the EPA) and these are outlined as follows for annual averages:

- Benzene 320μg/m³ (Derived from NIOSH 15 minute limit)
- Toluene 8,000μg/m³ (WHO and UK Environment Agency Guideline)
- Ethylbenzene 55,200μg/m³ (UK Environment Agency Guideline)
- Xylenes 66,200μg/m³ (UK Environment Agency Guideline)

As with the annual averages, the predicted maximum 1-hour concentrations at the sensitive receptors are less than 5% of the relevant guideline for Toluene and less than 1% of the relevant guidelines for Ethylbenzene and the Xylenes. Based on this analysis, the simulated worst case impact of the RTO and all carbon filters operating simultaneously at the ELVs, will not give rise to ground level concentrations that have a significant impact on human health.

As outlined above, a comparison with the benzene 1-hour guideline is not valid given the low risk of significant benzene emissions from the Enva facility.

Table 29.2: Results of Annual Average Model

Reference	Background (μg/m³)	RTO Impact (μg/m³)	Carbon Filter Impact (μg/m³)	Cumulative Impact (μg/m³)
R1	8	8	327	343
R2		7	243	258
R3		7	222	237
R4		6	198	212
R5		6	165	179
R6		6	201	215

R7		7	254	269
R8		8	265	281

BAT Conclusions (Ref item 12)

Response

Query 30.

Your response dated 17/5/2016 refers to BATC no. 9e from Waste Treatment BREF as not applicable other than waste oil in drums. Please clarify.

Wastes accepted in drums (or wheelie bins) include oil filters, paint cans, aerosols, absorbent/rags and pesticides. All of these wastes are currently shipped onward for final recovery/disposal and other than a visual inspection if the materials are repackaged at the facility are not sampled. Paint containers are de-packed and the liquid paint bulked up prior to sampling (i.e. for flashpoint testing). Most of the waste handled in this way do not lend themselves to any meaningful sampling or analysis routines other than visual inspection prior to onward shipment.

Query 31.

BATC no. 10a: Elaborate on what laboratory analysis for hazardous waste is available at the installation and what is carried out elsewhere. Please state whether and what accreditation is in place at the on-site laboratory.

Response

The laboratory is not accredited but participates in both the EPA Inter-calibration scheme and the Oil Recycling Association's (UK Body) proficiency testing (PT) scheme to ensure the test methods are sufficiently accurate. All solids analysis (including soils) are currently carried out using third party commercial laboratories.

Table 31.1 details the available analysis relating to aqueous liquids:

Parameter	Method	Participation in EPA Inter-calibration Scheme
pH	In-House (calibrated) Multimeter	Y
COD	Standard Methods for the Examination of Water and Wastewater, 21st edition, 2005 – Chemical Oxygen Demand. 5220C Closed Reflux Titrimetric Method.	Y
Suspended Solids Gravimetric	Standard Methods for the Examination of Water and Wastewater, 21st edition, 1995, Part 2540, D - Solids.	Y
Dissolved Copper	Standard Methods for the Examination of Water and Wastewater, 18th edition, Metals by Flame Atomic Absorption Spectrometry – Direct Air-Acetylene Flame Method. 3111B).	N
Dissolved Zinc	Standard Methods for the Examination of Water and Wastewater, 18th edition, Metals by Flame Atomic Absorption Spectrometry – Direct Air-Acetylene Flame Method. 3111B).	N
Ammonia	Standard Methods for the Examination of Water and Wastewater, 21th edition, 1995, Part 4000, section 4500 –Nitrogen (Ammonia) F Phenate Method.	N
Chlorides	Standard Methods for the Examination of Water and Wastewater, 18th edition, 1995, Part 4500 – Cl^- - C, Mercuric Nitrate Method.	N

Phenols	Standard Methods for the Examination of Water and Wastewater, 21st edition, 1995, Part 5530 C. Chloroform extraction method, Phenols.	N
Sulphates	Standard Methods for the Examination of Water and Wastewater, 21st edition, 1995, Part 4500 - $SO4^{2-}$ E.	N
Total Phosphorus	Standard Methods for the Examination of Water and Wastewater, 21st edition, 1995, Part 4500–E, Phosphorus Ascorbic Acid Method.	N
All Other Parameters	External Third Party Laboratory	Varies

Table 31.2 details the available analysis relating to oils

Parameter	Method	ORA PT Scheme
Viscosity @ 40°C	IP 71 S11/97	✓
Water	IP 74	✓
Strong Acid Number	IP 139	✓
Sulfated Ash content	IP 550	✓
Flash Point (°C)	IP 523	✓
Sulphur	ASTM D2622	✓
Total Halogens/Chlorine	IP 503	✓
PCB	IP462	✓
Zinc	IP 593	✓
Copper	IP 593	✓
Lead	IP 593	✓
Nickel	IP 593	✓
Chromium	IP 593	✓
Arsenic	IP 593	✓
Cadmium	IP 593	✓
Thallium	IP 593	✓
Antimony	IP 593	✓
Cobalt	IP 593	✓
Manganese	IP 593	✓
Vanadium	IP 593	✓
Mercury	IP 593	✓
Carbon residue	BS2000-398	✓
Total Sediment	IP375	✓
Ashphaltene	IP 143/04	N/A
Ash	IP 4	N/A
Water	IP 356/99 Karl Fisher	N/A
Density	IP 160/99 (Hydrometer)	N/A

Query 32.

BATC nos. 10b and 10d: Clarify location of the waste quarantine area and the waste inspection area.

Response

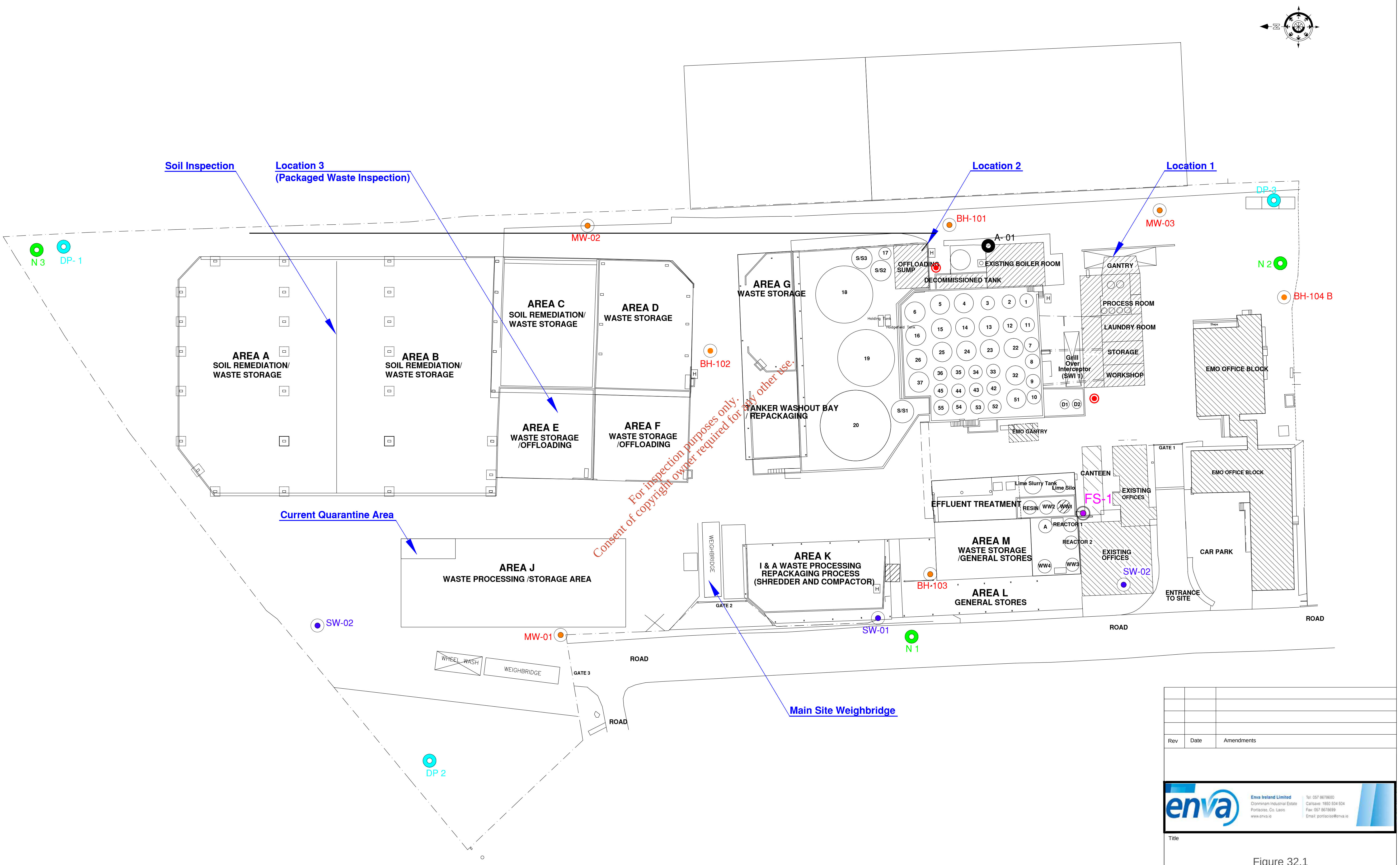
There are a number of waste inspection areas utilised as the different wastes types are inspected at their point of off-loading within the facility. This occurs after an initial inspection of paperwork and weigh in at the sites weighbridge.

Tankers of waste for offloading into the main tankfarm are inspected at the offloading locations 1 & 2 shown in Figure 32.1. Location 1 is used for easily pumpable (i.e. low solids) liquid wastes while location 2 is utilised for wastes that have a greater solid content (e.g. tank cleaning, interceptor wastes etc).

Bulk liquid wastes which are determined for quarantine may be either returned to the customer or offloaded either to a designated tank within the tank farm or to IBCs depending on the assessment of the particular waste. There is no dedicated quarantine tank within the tank farm.

All packaged wastes (e.g. wheelie bins, drums, IBC's, ASP etc.) are offloaded in Location 3 for inspection. Packaged which are not deemed acceptable are placed in the quarantine area in Area J (See Fig 32.1).

Contaminated soils are inspected as they are tipped within the soil remediation area, the exact location depends on the available space at the time. Contaminated soils which are placed in quarantine are segregated as a separate soil pile within the existing soil storage area (Areas A, B & C).



Rev	Date	Amendments

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Figure 32.1
Location of Quarantine & Waste Inspection Areas

Drawn by.	Checked by.	Scale.	Sheet No.	Date.
CK	AP	1:750 @ A3	3	05-09-2016

Drawing no.
ENV-1605-10

Query 33.

BATC no. 10h: State when techniques will be in place.

Response

This is currently in place for all wastes that are being shipped for onward recovery or disposal. It is not however proposed to place unique identifiers on wheelie bins containing waste and subsequently processed on site as these are processed with a few days of arrival at the site (generally the next day) and therefore it is not considered a worthwhile practice to have to uniquely identify these for tracking. Where the waste from these containers is subsequently bulked up (e.g. into IBCs) the containers are uniquely identified (i.e. barcoded) and tracked.

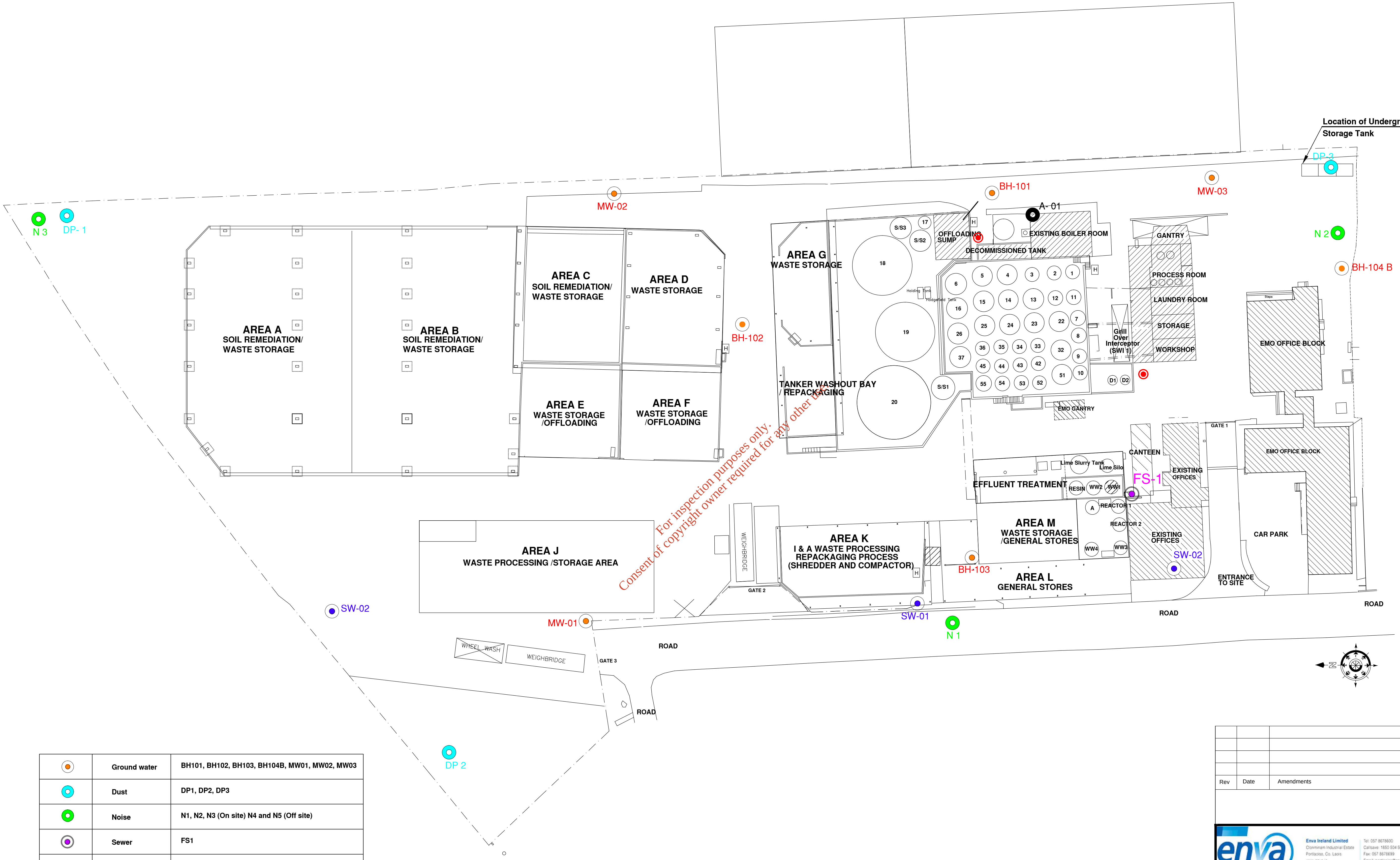
Query 34.

BATC No 24h: Provide information on the location, nature, operation and contents of underground storage tanks.

Response

There is one underground storage tank (UST) (excluding gravity fed collection sumps/ interceptors associated with the sites drainage infrastructure). The UST can store up to 30,000 litres having 3 individual compartments of 10,000 litres. The tank is located in the south eastern corner of the site (see Figure 34.1 overleaf) and was installed in 2002. The UST is of steel (double skin) construction with a leak detection system whereby the interstitial space between the two skins is monitored visa the sites Scada system. The UST is also pressure tested every three years as part of the preventative maintenance regime at the facility.

The three tank compartments are used to store low flashpoint waste including mixed fuels (diesel & petrol mixed) or other liquid wastes contaminated by solvents. These wastes are normally collected in drums and then pumped into the UST using a pump suitable for low flashpoint liquids. There is no underground pipelines associated with the tank with all three compartments being filled by a direct fill method. The fill point for each compartment is located within a sealed manhole chamber with a vapour proof man lid. The vents from each of the three compartment are joined together by a manifold with a single vent incorporating a flame arrestor. The manifold allows for full vapour recovery during tanker loading from the UST.



●	Ground water	BH101, BH102, BH103, BH104B, MW01, MW02, MW03
●	Dust	DP1, DP2, DP3
●	Noise	N1, N2, N3 (On site) N4 and N5 (Off site)
●	Sewer	FS1
●	Surface Water	SW01, SW02
●	Air - Boiler	A1-1 (existing - A01)
●	Carbon Filter	

Rev	Date	Amendments

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Figure 34.1
Location of Underground Storage Tank

Drawn by.	Checked by.	Scale.	Sheet No.	Date.
CK	AP	1:750 @ A3	4	05-09-2016

Drawing no.
ENV-1605-11

6th September 2016

Query 35.

BATC 26a and 26b: State when technique will be in place

Response

While most tanks are currently labelled this needs to be refreshed, in addition while some pipework is currently labelled further labelling is planned. These works will be completed before December 31st 2016.

Soil Treatment Area (Ref item 19)

Query 36.

In place of an air extraction and treatment system in the soil treatment area, please clarify how the building will be ventilated following complete enclosure (i.e. "on all sides") and whether the internal air will be moisture, dust and/or VOC laden due to the use of aerosols, spray bars and chemicals in the management of dust and odours. Provide a simple drawing showing the nature of the enclosure and location of doors. State how fugitive emissions will be avoided when the doors are opened.

Response

The soil treatment building is now enclosed on all sides with the exception of two sections along the western and northern facades of the building to allow access and egress of vehicles. Prior to this the building was open on all sides allowing an open pathway for fugitive emissions to atmosphere. Potential fugitive emissions include dust and VOCs. To determine the risk of dust and VOCs within the building and the extent of any requirement for mechanical ventilation, data has been collated to determine the extent of the risk.

Enva are required to carry out dust deposition monitoring at three locations around the perimeter of the site. Location DP1 is located along the north eastern boundary of the site adjacent to the soil treatment building. The results of the dust deposition levels at DP1 are shown in Table 36.1.

Table 36.1: Summary of Dust Deposition Monitoring at DP1

Period	DP1 Result (mg/m^2/day)
Quarter 1 2015	249.1
Quarter 2 2015	61.3
Quarter 3 2015	36.46
Quarter 4 2015	90.5
Quarter 1 2015	106.59
Quarter 2 2015	11.50
Quarter 3 2015	120.70
Quarter 4 2015	7.55
Quarter 1 2016	92.86
Average	**86**
Limit	**350**

Table 36.1 illustrates that for the last 9 monitoring events location DP1 is in full compliance with the limit expressed in the licence. Furthermore, the average emission is circa 25% of the limit illustrating a very low level at this point. Consequently, the monitoring to date indicates that fugitive dust emissions from the soil recovery area are low. This is verified through a number of visual assessments undertaken by RPS in early 2016 to determine the nature of the risk. In short, the

evidence base indicates a low risk of fugitive dust and dust generation within the soil recovery building. Furthermore the enclosure of the building will reduce the potential for soils to dry out (through exposure to wind) and create any potential dust issue.

Similarly, monitoring of Total Gaseous Organic Carbon (TOC) in the soil recovery area was undertaken during operations over several weeks using a PID and using an FID in May 2016. This monitoring indicated levels of VOC in the immediate area of the soil remediation area of <10mg/m^3. This level is compared to the Health and Safety Authority "Code of Practice for the Chemical Agents Regulations 2016", Occupational Exposure Limit Value (8-hour reference period) for Diesel Fume/Kerosene of 100mg/m^3. Again the levels of VOCs in the soil recovery area are considerably lower that the relevant criteria for human exposure (< 10%) indicating a low risk of fugitive VOCs in the area.

As noted in the information supplied to the EPA in May 2016, it is not considered necessary to install any further mitigation measures other than the complete enclosure of the building and the continued use (when appropriate) of hoses to dampen dust, a mobile Independent Rotary Atomiser and additional misting equipment planned for the soil screening equipment. The Independent Rotary Atomiser is only used as required where dusts are generated and is localised to the area where the dust in generated. Similarly the misting equipment will only be employed directly adjacent to the soil screener. As such, there is low level moisture content expected in the localised air around the dispensing equipment but not across the entire building. It should be noted that the volume of the building is relatively large comprising of approximately 25,000m^3 and provides a significant dispersion potential for any localised use of such equipment.

Notwithstanding the low risk, Enva have completed the enclosure of the soil recovery area with the exception of an entrance/exit along the western and northern façades (completed in Q2 2016). In May 2016 a planning application was lodged with Laois County Council (Planning Reference 16/256) for the installation of 3 roller shutter doors (4.8m high and 7.5 m wide) on the western façade and 1 roller shutter door on the northern façade (3.8m high and 5.6m wide) of the building. Permission was granted in July 2016 and the plan of the building is presented in Figure 36.1.

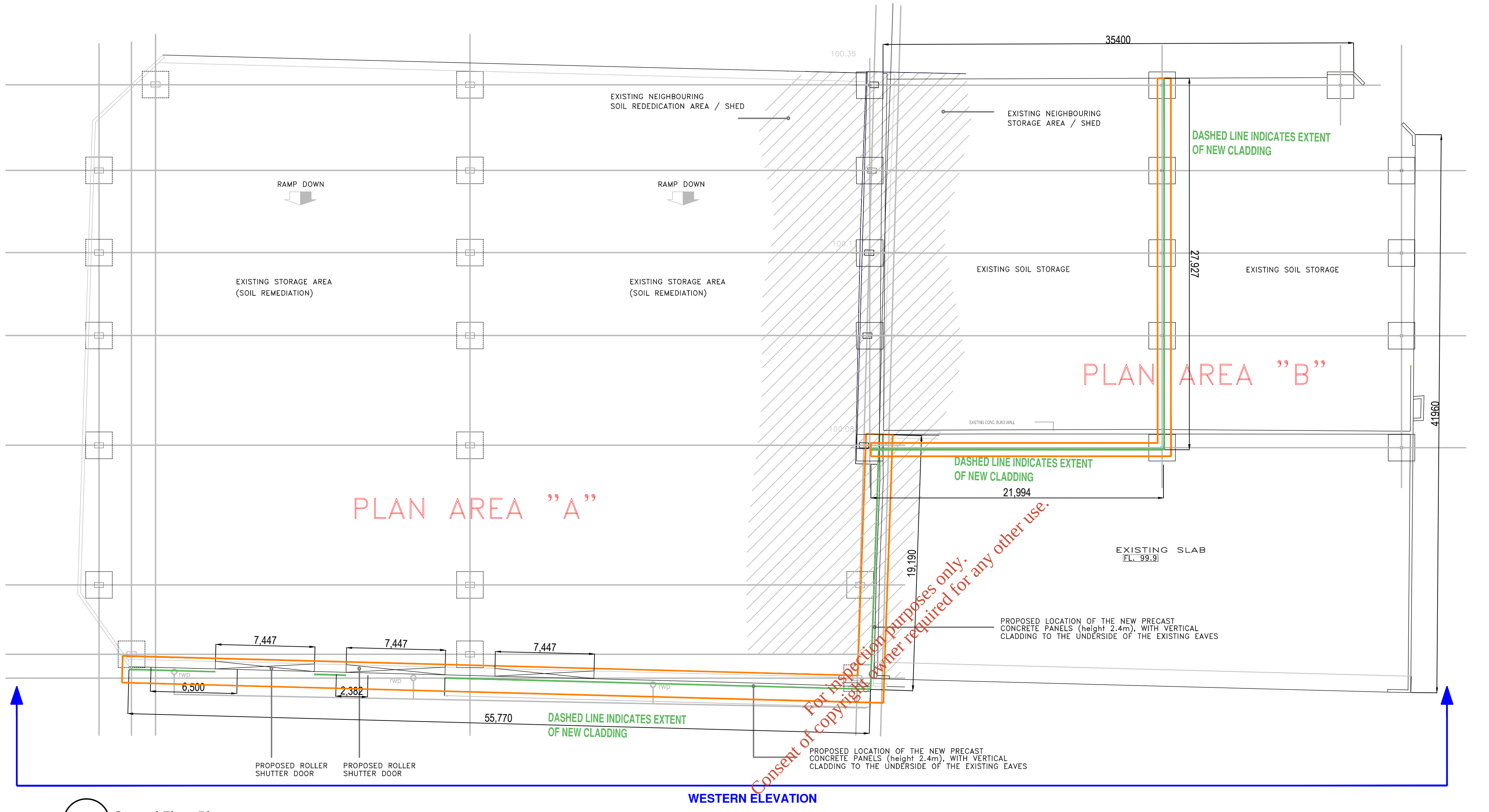
Where a potential odour risk is determined relating to soil handling these doors will be retained in the closed position to ensure that the integrity of the building enclosure is maintained. When material is being delivered to or from the building the appropriate number of doors will be opened for the duration to allow access/egress and then will be closed afterwards to minimise the potential for fugitive emissions.

In the event of higher risk (e.g. dusty/odorous) material on a load entering or leaving the building the use of the dust/odour suppression techniques (e.g. water hoses, sweeper/bowser, Independent Rotary Atomiser) and will be employed to dampen the surface of the material or covered loads so as to mitigate the potential for fugitive emissions. This is not expected to be routinely required based on the experience in operating the soil remediation process for past 15 years.

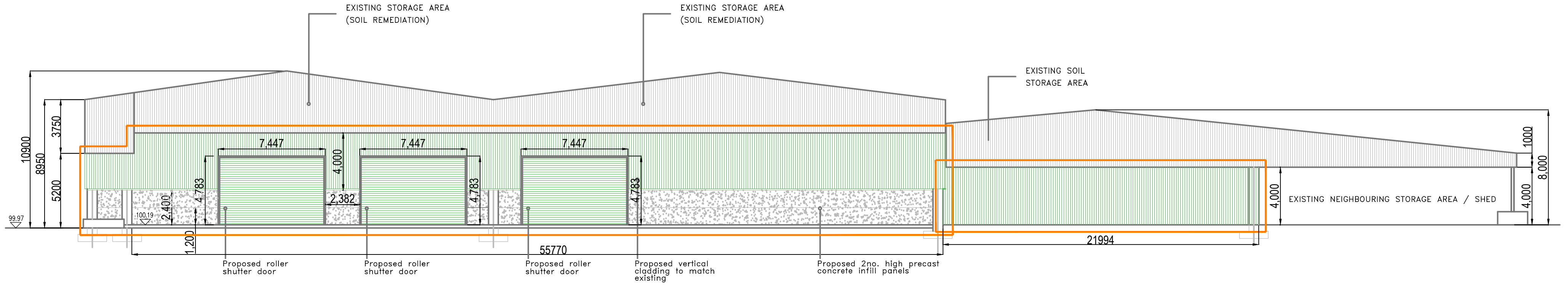
Based on the low level of dust and VOC risk identified in the soil recovery building, mitigation through containment is considered the optimum option to break the source-pathway linkage from the soil to the ambient environment. This containment is achieved through the investment in the building enclosure and the roller doors as described. Breaking the source-pathway linkage will ensure a reduced risk of fugitive emissions of dust and VOC from the existing scenario on sensitive receptors in the area. In addition, the low levels encountered within the building during operations indicate a low exposure risk for operators and hence there is no proposed extraction/treatment or other mechanical ventilation system proposed or considered necessary at this point.

Ongoing monitoring of dust deposition at DP1 and occupational exposure for operators within the building will be carried out to ensure the low risk of emissions continues.

While it was proposed to proceed to enclose this building (as per the May submission) once planning was granted, however it is now proposed to only proceed with the enclosure if it actually proves necessary. Monitoring of activities in this area (including over the recent warmer summer months) has not led to any dust or odour nuisance even with increased levels of activity. However should this situation change the company would very promptly proceed to enclose this area fully. As noted in the previous (May submission) it is more common for such activities across Europe not to be fully enclosed.



ENV-1605-14
Dwg. 06
Ground Floor Plan
Scale 1:400
PLAN "A" & "B"



ENV-1605-14
Dwg. 06
Western Elevation
Scale 1:400

Key

🟩 Area indicating the location of the proposed precast concrete and vertical cladding wall

🟧 Area indicating the location of the proposed precast concrete and vertical cladding wall

☐ Area of neighbouring storage area / shed

Rev	Date	Amendments

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Title

Figure 36.1
Proposed enclosure of Soil Remediation Area

Drawn by.	Checked by.	Scale.	Sheet No.	Date.
CK	AP	1:400 @ A3	6	06-09-2016

Drawing no.
ENV-1605-14

Query 37.

If not confidential information, and by reference to page 2 of your response to question 7 of our notice dated 26/1/2016, state which waste oils are selected (e.g. by LoW code) for production of 19LS. State whether this will change if and when the new thermal expansion unit process is introduced.

Response

Only the LoW waste codes listed in Schedule G3 are used for the production of 19LS. This is not proposed to change if the proposed Flash Distillation stage or any other form of thermal drying is introduced.

6th September 2016

Query 38.

In table 19.2 of your response dated 17/05/2016, explain the significance of the exceedences for sulphated ash, nickel and vanadium in batches no. 35 and 36. By reference to your statement that the "process is either extended or part of the process repeated to ensure the batch meets the desired specification", state how process extension or repeat of the process reduced or would have reduced the concentration of sulphated ash, nickel and vanadium to the desired specification.

Response

The sulphated ash result for batch 35 is a typographical error and should have read 0.0839%, the correct result being within specification.

The results stated for nickel and vanadium in batches 36 while correct should not have been included in the table provided as this batch was a not 19LS but rather a 20LS batch. 20 LS differs from 19LS in having approximately 20% Heavy Fuel Oil (HFO) blended into the 19LS to achieve the desired viscosity for the 20LS product. As HFO contains nickel and vanadium the levels of these parameters can rise after the addition of HFO.

The reference to extending the process refers to the potential to repeat dose the batch to increase precipitation or allow an extended settlement time for precipitation to occur over.

6th September 2016

Query 39.

The legal opinion provided with your response dated 17/5/2016 refers to REACH. Please clarify the status of 11LS and 19LS in the context of REACH.

Response

The recovery of waste fuels back to a fuel product (and outside of the waste regime) is relatively straight forward under the Reach Directive due to the exemption available under Article 2(7)d of the Reach Directive as it relates to recovery of a product for the same originally intended use (i.e. a fuel). However this is not applicable to waste lubricating oils which are recovered for subsequent use as a fuel. Lubricating oils have not been placed on the market as a fuel and are therefore not registered under Reach by their producers as a fuel and therefore the exemption provided under this Article of the Reach Directive does not apply.

Enva pre-registered and subsequently registered as a producer of used lubricating oil for use as a fuel under the Reach Directive. This entailed joining the SIEF for this substance and participating in the process of compiling the necessary registration dossier which was subsequently submitted to ECHA in November 2010 ahead of the prescribed deadline. Enva's Reach registration number issued under this process is 01-2119517646-35-0006. This allows Enva to recover used lubricating oils and place them on the market for use as a fuel.

6th September 2016

Baseline report (Ref. item 20)

Query 40.

In relation to groundwater monitoring, please provide a short report on the quarterly monitoring of groundwater quality at all monitored boreholes. The report should cover the years 2014, 2015 and 2016 to date. The following is the proposed format for monitoring results. One table should be generated for each monitoring borehole.

Year and Quarter	**Parameter and Unit**	**Value recorded**	**Relevant hazardous substance, if any, for which the parameter is an indicator**

Response

The following tables provide a list of all groundwater data gathered at the Enva site in the period 2014, 2015 and 2016 to date. A summary of the results is presented below:

- Schedule D.1 of the Licence (Register No: 184-1) requires Enva to carry out groundwater monitoring at 7 locations (BH101, BH102, BH103, BH104 and three monitoring points in the bedrock aquifer). Enva routinely carry out monitoring at 8 monitoring locations and these four additional monitoring points are labelled MW01, MW02, MW03 and MW04.
- The monitoring requirements for these boreholes is presented in Table D.6.1 of the licence and the results for the period 2014 to date are presented in the following tables (one each per borehole).
- The results for monitoring location BH101 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of trace **Naphthalene** (0.011µg/l) in Q3 2015.
- The results for monitoring location BH102 illustrate low levels or inorganic parameters and all organic parameters are undetected.
- The results for monitoring location BH103 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:
    - Levels of **MTBE** of the order of 1.2 - 3.1µg/l were detected in Q1 to Q3 of 2015 and again in Q1 and Q2 of 2016.
    - Trace levels of PAHs periodically detected including **Naphthalene** (0.04µg/l in Q1 2015), **Acenaphthene** (0.022 to 0.087µg/l from Q1 2015 to Q2 2016), **Fluorene** (0.022 to 0.027µg/l from Q3 2015 to Q2 2016), **Phenathrene** (0.011 to 0.014µg/l in Q4 2015 and Q2 2016), **Pyrene** (0.018µg/l in Q3 2015) and **Benzo(b)fluoranthene** (0.011 in Q1 and Q2 2016).

  - Petroleum Hydrocarbons detected throughout 2015 and 2016 in particular the **aliphatic fraction C16 to C35** (54 to 1,760μg/l), **aliphatic fraction C35 to C44** (14μg/l) and the **aromatic fraction C21 -C35** (14 to 509μg/l).
- The results for monitoring location BH104B illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:
  - Trace levels of PAHs periodically detected including **Naphthalene** (0.05 to 0.035μg/l from Q1 2015 to Q1 2016), **Acenaphthene** (0.027 to 0.042μg/l from Q1 2015 to Q1 2016), **Fluorene** (0.041 to 0.07μg/l from Q1 2015 to Q1 2016), **Phenathrene** (0.011 μg/l in Q3 2015), **Pyrene** (0.028 to 0.036μg/l from Q1 to Q3 2015).
  - Petroleum Hydrocarbons detected throughout 2015 and 2016 in particular the **aliphatic fraction** (11 to 3,360μg/l) and the **aromatic fraction** (15 to 1,380μg/l) detected from Q3 2014 to Q1 2016.
  - 4-Chloro-3-methylphenol detected at low levels (1.37μg/l) in Q1 2015.
- The results for monitoring location MW01 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:
  - Trace levels of PAHs periodically detected including **Phenanthrene** (0.014μg/l in Q1 2015), **Fluoranthene** (0.016μg/l in Q1 2015), **Pyrene** (0.021μg/l in Q1 2015 and 0.011μg/l in Q2 2016), **Benzo(b)fluoranthene** (0.010μg/l in Q1 2015), **Benzo(a)pyrene** (0.011μg/l in Q1 2015), **Indeno(1,2,3-cd)pyrene** (0.011μg/l in Q1 2015), **Dibenz(a,h)anthracene** (0.010μg/l in Q1 2015), **Benzo(g,h,i)perylene** (0.010μg/l in Q1 2015).
  - Petroleum Hydrocarbons detected in Q3 2014 for the **aliphatic fraction C5-C35** (410μg/l).
  - Chloroethane detected (1.1μg/l) in Q2 2016.
- The results for monitoring location MW02 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:
  - Levels of PAHs detected in Q2 2016 including **Phenanthrene** (0.01μg/l), **Fluoranthene** (0.012μg/l), **Benzo(b)fluoranthene** (0.01μg/l), **Benzo(a)pyrene** (0.01μg/l), **Benzo(g,h,i)perylene** (0.011μg/l).
- The results for monitoring location MW03 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:
  - Levels of **MTBE** of the order of 1.8 - 2.9μg/l were detected in Q1 2015 to Q2 of 2016.
  - Trace levels of **PAHs** periodically detected from Q1 2015 to Q4 2014. The range of PAHs and the concentrations are similar to those presented for MW01.
  - Petroleum Hydrocarbons detected in Q3 2014 for the **aliphatic fraction C16-C35** (14-46μg/l) and the **aliphatic fraction C25-C44** (12μg/l) as well as the **C12-C16 aromatic fraction** (14μg/l). These were predominately detected in Q1 2015 only.
  - **Vinyl Chloride** (0.8μg/l) and **Dichloroethane** (1.8μg/l) were detected in Q1 2015.
  - **Styrene** (1.1μg/l), **p&m-Xylene** (1.1μg/l) and **1,2,4-trimethlybenzene** (1.1μg/l) were detected in Q1 2016.
  - **1,1-dichlorothene** was detected (1.7μg/l) in Q2 of 2016.
- The results for monitoring location MW04 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:
  - Levels of **MTBE** of the order of 2.1 - 2.7μg/l were detected in Q1 2015 to Q2 of 2016.

- Trace levels of PAHs periodically detected including **Naphthalene** (0.067 to 0.18µg/l), **Acenaphthene** (0.01µg/l in Q2 2016) and **Fluorene** (0.013µg/l).
- Petroleum Hydrocarbons are detected the **C10-C16 aromatic fraction** (13-21µg/l) and the **C16-C21 aromatic fraction** (29µg/l).
- **Vinyl Chloride** (0.9-1.1µg/l) and **Chloroethane** (7.8-12.6µg/l) and **1,1-dichlorothene** (3.6-6.6µg/l) were detected periodically through the period.

In summary, the groundwater data indicates the periodic presence of some VOCs (MTBE), chlorinated VOCs (Vinyl Chloride, Chloroethane, 1,1-dichlorothene), PAHs and petroleum hydrocarbons (both aliphatic and aromatic) across the site but in particular in the area to the southeast of the site around BH104B and MW03. Borehole BH102 at the centre of the site is the only location to indicate and absence of these parameters in the period 2014 to date.

A groundwater investigation on the site conducted in 2008 indicated that the most likely sources of observed groundwater contamination at the site are:

- Historical soil contamination from former oil receptor sump
- An off-site automotive repair workshop to the south of the site
- Irish rail site, also off site, to the east of the site

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Alkalinity (mg/l)	180	NA
	Calcium (mg/l)	68.0	NA
	Manganese (mg/l)	0.074	NA

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
	Sulphate (mg/l)	29.6	NA
	Cyanide (Total) (mg/l)	<0.01	NA
	Chloride (mg/l)	5.8	Sodium Hypochlorite
	Sodium (mg/l)	15	Sodium Hydroxide & Sodium Hypochlorite
	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q4 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Alkalinity (mg/l)	288	NA
	Calcium (mg/l)	89	NA

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
	Manganese (mg/l)	<0.007	NA
	Sulphate (mg/l)	28.2	NA
	Cyanide (Total) (mg/l)	<0.009	NA
	Chloride (mg/l)	55.9	Sodium Hypochlorite
	Sodium (mg/l)	60.5	Sodium Hydroxide & Sodium Hypochlorite
	BTEX & MTBE (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (μg/l)	All <0.01 except Naphthalene (0.011)	Waste Oil and Recovered Fuel Oil
	Total Phenols (μg/l)	<5.0	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	SVOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	VOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (μg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q4 2015	BTEX & MTBE (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (μg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
	Total Phenols (μg/l)	<5.0	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	SVOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	VOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (μg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2016	BTEX & MTBE (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (μg/l)	All <0.10	Waste Oil and Recovered Fuel Oil
	Total Phenols (μg/l)	<5.0	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	SVOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	VOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	Petroleum Hydrocarbons (μg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2016	BTEX & MTBE (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	PAHs (μg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
	Total Phenols (μg/l)	<5.0	Waste Oil and Recovered Fuel Oil
	Speciated Phenols (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	SVOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
	VOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Alkalinity (mg/l)	250	NA
Q3 2014	Calcium (mg/l)	120	NA
Q3 2014	Manganese (mg/l)	1.1	NA
Q3 2014	Sulphate (mg/l)	25.1	NA
Q3 2014	Cyanide (Total) (mg/l)	<0.01	NA
Q3 2014	Chloride (mg/l)	26	Sodium Hypochlorite
Q3 2014	Sodium (mg/l)	21	Sodium Hydroxide & Sodium Hypochlorite
Q3 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q4 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Alkalinity (mg/l)	226	NA
Q3 2015	Calcium (mg/l)	89.5	NA
Q3 2015	Manganese (mg/l)	0.876	NA
Q3 2015	Sulphate (mg/l)	25.5	NA
Q3 2015	Cyanide (Total) (mg/l)	<0.009	NA
Q3 2015	Chloride (mg/l)	7	Sodium Hypochlorite
Q3 2015	Sodium (mg/l)	6.04	Sodium Hydroxide & Sodium Hypochlorite
Q3 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q4 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2016	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2016	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q2 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Alkalinity (mg/l)	220	NA
Q3 2014	Calcium (mg/l)	118	NA
Q3 2014	Manganese (mg/l)	1.2	NA
Q3 2014	Sulphate (mg/l)	16.0	NA
Q3 2014	Cyanide (Total) (mg/l)	<0.01	NA
Q3 2014	Chloride (mg/l)	6.8	Sodium Hypochlorite
Q3 2014	Sodium (mg/l)	74	Sodium Hydroxide & Sodium Hypochlorite
Q3 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q4 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2015	BTEX & MTBE (µg/l)	All <1.0 except MTBE (1.2)	Waste Oil and Recovered Fuel Oil
Q1 2015	PAHs (µg/l)	All <0.01 except Naphthalene (0.04), Acenaphthylene (0.022)	Waste Oil and Recovered Fuel Oil
Q1 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	VOCs (µg/l)	All <1.0 except MTBE (1.2)	Waste Oil and Recovered Fuel Oil
Q1 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aliphatic C16-C35 (54), Aromatic C21-C35 (14)	Waste Oil and Recovered Fuel Oil
Q2 2015	BTEX & MTBE (µg/l)	All <1.0 except MTBE (1.2)	Waste Oil and Recovered Fuel Oil
Q2 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	VOCs (µg/l)	All <1.0 except MTBE (1.2)	Waste Oil and Recovered Fuel Oil
Q2 2015	Petroleum Hydrocarbons (µg/l)	All <200 except Aliphatic C16-C35 (1760), Aromatic C21-C35 (509)	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Alkalinity (mg/l)	341	NA
Q3 2015	Calcium (mg/l)	130	NA
Q3 2015	Manganese (mg/l)	1.03	NA
Q3 2015	Sulphate (mg/l)	19.6	NA
Q3 2015	Cyanide (Total) (mg/l)	<0.009	NA
Q3 2015	Chloride (mg/l)	28.8	Sodium Hypochlorite
Q3 2015	Sodium (mg/l)	14.4	Sodium Hydroxide & Sodium Hypochlorite
Q3 2015	BTEX & MTBE (µg/l)	All <1.0 except MTBE (3.1)	Waste Oil and Recovered Fuel Oil
Q3 2015	PAHs (µg/l)	All <0.01 except Acenaphthene (0.071), Fluorene (0.022)	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	VOCs (µg/l)	All <1.0 except MTBE (3.1)	Waste Oil and Recovered Fuel Oil
Q3 2015	Petroleum Hydrocarbons (µg/l)	All <10 except	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
		Aliphatic C16-C35 (72), Aromatic C21-C35 (17)	
Q4 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	PAHs (µg/l)	All <0.01 except Naphthalene (0.095), Acenaphthene (0.062), Fluorene (0.022), Phenanthrene (0.014), Pyrene (0.018)	Waste Oil and Recovered Fuel Oil
Q4 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aliphatic C16-C35 (231) & C35-C44 (14), Aromatic C21-C35 (60)	Waste Oil and Recovered Fuel Oil
Q1 2016	BTEX & MTBE (µg/l)	All <1.0 except MTBE (1.4)	Waste Oil and Recovered Fuel Oil
Q1 2016	PAHs (µg/l)	All <0.01 except Acenaphthene (0.087), Fluorene (0.025), Benzo(b)fluoranthene (0.011)	Waste Oil and Recovered Fuel Oil
Q1 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Petroleum Hydrocarbons (µg/l)	All <40 except Aliphatic C16-C35 (132)	Waste Oil and Recovered Fuel Oil
Q2 2016	BTEX & MTBE (µg/l)	All <1.0 except MTBE (1.2)	Waste Oil and Recovered Fuel Oil
Q2 2016	PAHs (µg/l)	All <0.01 except Acenaphthene (0.073), Fluorene (0.027), Phenanthrene	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
		(0.011), Benzo(b)fluoranthene (0.011)	
Q2 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	VOCs (µg/l)	All <1.0 except MTBE (1.2)	Waste Oil and Recovered Fuel Oil
Q2 2016	Petroleum Hydrocarbons (µg/l)	All <10 except Aliphatic C16-C35 (150), Aromatic C21-C35 (57)	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Alkalinity (mg/l)	170	NA
Q3 2014	Calcium (mg/l)	105	NA
Q3 2014	Manganese (mg/l)	0.0051	NA
Q3 2014	Sulphate (mg/l)	62.8	NA
Q3 2014	Cyanide (Total) (mg/l)	<0.01	NA

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q3 2014	Chloride (mg/l)	55	Sodium Hypochlorite
Q3 2014	Sodium (mg/l)	74	Sodium Hydroxide & Sodium Hypochlorite
Q3 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	Petroleum Hydrocarbons (µg/l)	All <10, except aliphatic C5-C35 (410 µg/l)	Waste Oil and Recovered Fuel Oil
Q4 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	PAHs (µg/l)	All <0.01 except Naphthalene (0.05), Acenaphthene (0.027), Fluorene (0.041), Pyrene (0.028)	Waste Oil and Recovered Fuel Oil
Q1 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Speciated Phenols (µg/l)	All <1.0 except4-Chloro-3-methylphenol (1.37)	Waste Oil and Recovered Fuel Oil
Q1 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aliphatic C16-C35 (11), Aromatic C12-C16 (27) & C16-C21 (15)	Waste Oil and Recovered Fuel Oil
Q2 2015	BTEX & MTBE (µg/l)	All <2.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q2 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	VOCs (µg/l)	All <2.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Petroleum Hydrocarbons (µg/l)	All <200 except Aliphatic C12-C16 (225) & C16-C35 (332)	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Alkalinity (mg/l)	202	NA
Q3 2015	Calcium (mg/l)	66	NA
Q3 2015	Manganese (mg/l)	0.0703	NA
Q3 2015	Sulphate (mg/l)	22.4	NA
Q3 2015	Cyanide (Total) (mg/l)	<0.009	NA
Q3 2015	Chloride (mg/l)	20.1	Sodium Hypochlorite
Q3 2015	Sodium (mg/l)	31.1	Sodium Hydroxide & Sodium Hypochlorite
Q3 2015	BTEX & MTBE (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	PAHs (µg/l)	All <0.01 except Acenaphthene (0.042), Fluorene (0.07), Phenanthrene (0.011), Pyrene (0.036)	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	VOCs (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aliphatic C10-C12 (13) C12-C16 (40) & C16-C35 (62), Aromatic C12-C16 (39) C16-C21 (37) & C21-C35 (28)	Waste Oil and Recovered Fuel Oil
Q4 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	PAHs (µg/l)	All <0.1	Waste Oil and Recovered Fuel Oil
Q4 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q4 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aliphatic C10-C12 (495), C12-C16 (3080) & C16-C35 (3360), Aromatic C12-C16 (879), C16-C21 (1380) & C21-C35 (694)	Waste Oil and Recovered Fuel Oil
Q1 2016	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	PAHs (µg/l)	All <0.01 except Naphthalene (0.034), Acenaphthene (0.034), Fluorene (0.051)	Waste Oil and Recovered Fuel Oil
Q1 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Petroleum Hydrocarbons (µg/l)	All <200	Waste Oil and Recovered Fuel Oil
Q2 2016	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	PAHs (µg/l)	All <0.10	Waste Oil and Recovered Fuel Oil
Q2 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Alkalinity (mg/l)	230	NA
Q3 2014	Calcium (mg/l)	70.2	NA
Q3 2014	Manganese (mg/l)	0.010	NA
Q3 2014	Sulphate (mg/l)	30.2	NA
Q3 2014	Cyanide (Total) (mg/l)	<0.01	NA
Q3 2014	Chloride (mg/l)	13	Sodium Hypochlorite
Q3 2014	Sodium (mg/l)	22	Sodium Hydroxide & Sodium Hypochlorite
Q3 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	Petroleum Hydrocarbons (µg/l)	All <10 EXCEPT ALIPHATIC C5-C35 (410 µg/l)	Waste Oil and Recovered Fuel Oil
Q4 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2015	PAHs (µg/l)	All <0.01 except Phenanthrene (0.014), Fluoranthene (0.016), Pyrene (0.021), Benzo(b)fluoranthene (0.010), Benzo(a)pyrene (0.011), Indeno(1,2,3-cd)pyrene (0.011), Dibenz(a,h)anthracene (0.010), Benzo(g,h,i)perylene (0.010)	Waste Oil and Recovered Fuel Oil
Q1 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Alkalinity (mg/l)	298	NA
Q3 2015	Calcium (mg/l)	67.4	NA
Q3 2015	Manganese (mg/l)	0.0685	NA
Q3 2015	Sulphate (mg/l)	22.4	NA
Q3 2015	Cyanide (Total) (mg/l)	<0.009	NA
Q3 2015	Chloride (mg/l)	16.2	Sodium Hypochlorite
Q3 2015	Sodium (mg/l)	18.2	Sodium Hydroxide & Sodium Hypochlorite
Q3 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q3 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q4 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2016	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	PAHs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2016	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	PAHs (µg/l)	All <0.01 except Pyrene (0.011)	Waste Oil and Recovered Fuel Oil
Q2 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	VOCs (µg/l)	All <1.0 except Chloroethane (1.1)	Waste Oil and Recovered Fuel Oil
Q2 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Alkalinity (mg/l)	310	NA
Q3 2014	Calcium (mg/l)	63.6	NA
Q3 2014	Manganese (mg/l)	0.0087	NA
Q3 2014	Sulphate (mg/l)	23.0	NA
Q3 2014	Cyanide (Total) (mg/l)	<0.01	NA
Q3 2014	Chloride (mg/l)	14	Sodium Hypochlorite
Q3 2014	Sodium (mg/l)	24	Sodium Hydroxide & Sodium Hypochlorite
Q3 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q4 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Alkalinity (mg/l)	295	-
Q3 2015	Calcium (mg/l)	58.9	NA
Q3 2015	Manganese (mg/l)	0.0115	NA
Q3 2015	Sulphate (mg/l)	19.4	NA
Q3 2015	Cyanide (Total) (mg/l)	<0.009	NA
Q3 2015	Chloride (mg/l)	13.8	Sodium Hypochlorite
Q3 2015	Sodium (mg/l)	20.3	Sodium Hydroxide & Sodium Hypochlorite
Q3 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q4 2015	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2016	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	PAHs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2016	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	PAHs (µg/l)	All <1.0 except Phenanthrene (0.01), Fluoranthene (0.012), Benzo(b)fluoranthene (0.01), Benzo(a)pyrene (0.01), Benzo(g,h,i)perylene (0.011)	Waste Oil and Recovered Fuel Oil
Q2 2016	Total Phenols (µg/l)	All <5.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q2 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Alkalinity (mg/l)	360	NA
Q3 2014	Calcium (mg/l)	146	NA
Q3 2014	Manganese (mg/l)	0.33	NA
Q3 2014	Sulphate (mg/l)	20.9	NA
Q3 2014	Cyanide (Total) (mg/l)	<0.01	NA
Q3 2014	Chloride (mg/l)	240	Sodium Hypochlorite
Q3 2014	Sodium (mg/l)	120	Sodium Hydroxide & Sodium Hypochlorite
Q3 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q4 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
MWQ4 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2015	BTEX & MTBE (µg/l)	All <1.0 except MTBE (2.9)	Waste Oil and Recovered Fuel Oil
Q1 2015	PAHs (µg/l)	All <0.01 except Acenaphthene (0.022)	Waste Oil and Recovered Fuel Oil
Q1 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2015	VOCs (µg/l)	All <1.0 except Vinyl Chloride (0.8), 1,1-dichloroethene (1.8), MTBE (2.9)	Waste Oil and Recovered Fuel Oil
Q1 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aliphatic C16-C35 (46) & C35-C44 (12), Aromatic C12-C16 (14)	Waste Oil and Recovered Fuel Oil
Q2 2015	BTEX & MTBE (µg/l)	All <2.0	Waste Oil and Recovered Fuel Oil
Q2 2015	PAHs (µg/l)	All <0.01 except Pyrene (0.015)	Waste Oil and Recovered Fuel Oil
Q2 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	VOCs (µg/l)	All <2.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Petroleum Hydrocarbons (µg/l)	All <20	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Alkalinity (mg/l)	261	NA
Q3 2015	Calcium (mg/l)	132	NA
Q3 2015	Manganese (mg/l)	0.337	NA
Q3 2015	Sulphate (mg/l)	18.6	NA
Q3 2015	Cyanide (Total) (mg/l)	<0.009	NA
Q3 2015	Chloride (mg/l)	241	Sodium Hypochlorite
Q3 2015	Sodium (mg/l)	110	Sodium Hydroxide & Sodium Hypochlorite
Q3 2015	BTEX & MTBE (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	PAHs (µg/l)	All <0.01 except Naphthalene (0.031), Acenaphthene (0.095), Fluorene (0.125), Fluoranthene (0.015), Pyrene (0.1), Benzo(a)anthracene (0.038), Chrysene (0.025), Benzo(b)fluoranthene (0.025), Benzo(a)pyrene (0.052), Dibenz(a,h)anthra	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
		cene (0.012), Benzo(g,h,i)perylene (0.053)	
Q3 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	VOCs (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aliphatic C16-C35 (14)	Waste Oil and Recovered Fuel Oil
Q4 2015	BTEX & MTBE (µg/l)	All <4.0	Waste Oil and Recovered Fuel Oil
Q4 2015	PAHs (µg/l)	All <0.01 except Acenaphthene (0.052), Fluorene (0.08), Fluoranthene (0.029), Pyrene (0.226), Benzo(a)anthrancene (0.084), Chrysene (0.147), Benzo(b)fluoranthene (0.065), Benzo(k)fluoranthene (0.012), Benzo(a)pyrene (0.108), Indeno((1,2,3-cd)pyrene (0.026), Dibenz(a,h)anthracene (0.030)Benzo(g,h,i)perylene (0.131)	Waste Oil and Recovered Fuel Oil
Q4 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	VOCs (µg/l)	All <4.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2016	BTEX & MTBE (µg/l)	All <1.0 except MTBE (2.2), p&m-xylene (1.1)	Waste Oil and Recovered Fuel Oil
Q1 2016	PAHs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	VOCs (µg/l)	All <1.0 except Styrene (1.1), 1,2,4-trimethylbenzene (1.1), MTBE (2.2)	Waste Oil and Recovered Fuel Oil
Q1 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2016	BTEX & MTBE (µg/l)	All <1.0 except MTBE (1.8)	Waste Oil and Recovered Fuel Oil
Q2 2016	PAHs (µg/l)	All <0.10	Waste Oil and Recovered Fuel Oil
Q2 2016	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	VOCs (µg/l)	All <1.0 except 1,1-dichlroethene (1.7), MTBE (1.8)	Waste Oil and Recovered Fuel Oil
Q2 2016	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q1 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q1 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q2 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil

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Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q2 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Alkalinity (mg/l)	420	NA
Q3 2014	Calcium (mg/l)	130	NA
Q3 2014	Manganese (mg/l)	0.003	NA
Q3 2014	Sulphate (mg/l)	15.2	NA
Q3 2014	Cyanide (Total) (mg/l)	<0.01	NA
Q3 2014	Chloride (mg/l)	220	Sodium Hypochlorite
Q3 2014	Sodium (mg/l)	110	Sodium Hydroxide & Sodium Hypochlorite
Q3 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q3 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q3 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q4 2014	BTEX & MTBE (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q4 2014	Total Phenols (µg/l)	<0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	Speciated Phenols (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	SVOCs (µg/l)	All <0.05	Waste Oil and Recovered Fuel Oil
Q4 2014	VOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2014	Petroleum Hydrocarbons (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q1 2015	BTEX & MTBE (µg/l)	All <1.0 except MTBE (2.7)	Waste Oil and Recovered Fuel Oil
Q1 2015	PAHs (µg/l)	All <0.01 except Naphthalene (0.18)	Waste Oil and Recovered Fuel Oil
Q1 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2015	VOCs (µg/l)	All <1.0 except Chloroethane (9.6), Vinyl Chloride (0.9), 1,1-dichloroethene (6.6), MTBE (2.7)	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q1 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aromatic C12-C16 (15)	Waste Oil and Recovered Fuel Oil
Q2 2015	BTEX & MTBE (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2015	PAHs (µg/l)	All <0.01	Waste Oil and Recovered Fuel Oil
Q2 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2015	VOCs (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q2 2015	Petroleum Hydrocarbons (µg/l)	All <40	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Alkalinity (mg/l)	523	NA
Q3 2015	Calcium (mg/l)	153	NA
Q3 2015	Manganese (mg/l)	1.73	NA
Q3 2015	Sulphate (mg/l)	<4.4	NA
Q3 2015	Cyanide (Total) (mg/l)	<0.009	NA
Q3 2015	Chloride (mg/l)	267	Sodium Hypochlorite
Q3 2015	Sodium (mg/l)	126	Sodium Hydroxide & Sodium Hypochlorite
Q3 2015	BTEX & MTBE (µg/l)	All <10	Waste Oil and Recovered Fuel Oil
Q3 2015	PAHs (µg/l)	All <0.10	Waste Oil and Recovered Fuel Oil
Q3 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q3 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q3 2015	VOCs (µg/l)	All <10 except Chloroethane (12.6)	Waste Oil and Recovered Fuel Oil
Q3 2015	Petroleum Hydrocarbons (µg/l)	All <10 except Aromatic C10-C12 (18) & C16-C21 (29)	Waste Oil and Recovered Fuel Oil
Q4 2015	BTEX & MTBE (µg/l)	All <4.0	Waste Oil and Recovered Fuel Oil
Q4 2015	PAHs (µg/l)	All <0.01 except Naphthalene (0.067), Fluorene (0.013)	Waste Oil and Recovered Fuel Oil
Q4 2015	Total Phenols (µg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q4 2015	Speciated Phenols (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q4 2015	SVOCs (µg/l)	All <1.0	Waste Oil and Recovered Fuel Oil

Year and Quarter	Parameter and Unit	Value recorded	Relevant hazardous substance, if any, for which the parameter is an indicator
Q4 2015	VOCs (μg/l)	All <4.0 except Chloroethane (7.8), 1,1-dichloroethene (4.1),	Waste Oil and Recovered Fuel Oil
Q4 2015	Petroleum Hydrocarbons (μg/l)	All <10 except Aromatic C10-C12 (13) & C12-C16 (21)	Waste Oil and Recovered Fuel Oil
Q1 2016	BTEX & MTBE (μg/l)	All <1.0 except MTBE (2.1)	Waste Oil and Recovered Fuel Oil
Q1 2016	PAHs (μg/l)	All <0.10 except Naphthalene (0.153)	Waste Oil and Recovered Fuel Oil
Q1 2016	Total Phenols (μg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q1 2016	Speciated Phenols (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	SVOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q1 2016	VOCs (μg/l)	All <1.0 except Vinyl Chloride (1.1)	Waste Oil and Recovered Fuel Oil
Q1 2016	Petroleum Hydrocarbons (μg/l)	All <10 except Aromatic C12-C16 (15)	Waste Oil and Recovered Fuel Oil
Q2 2016	BTEX & MTBE (μg/l)	All <1.0 except (1.7)	Waste Oil and Recovered Fuel Oil
Q2 2016	PAHs (μg/l)	All <0.01 except Acenaphthene (0.01), Fluorene (0.013)	Waste Oil and Recovered Fuel Oil
Q2 2016	Total Phenols (μg/l)	<5.0	Waste Oil and Recovered Fuel Oil
Q2 2016	Speciated Phenols (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	SVOCs (μg/l)	All <1.0	Waste Oil and Recovered Fuel Oil
Q2 2016	VOCs (μg/l)	All <1.0 except 1,1-dichloroethene (3.6), MTBE (1.7)	Waste Oil and Recovered Fuel Oil
Q2 2016	Petroleum Hydrocarbons (μg/l)	All <10 except Aromatic C12-C16 (20)	Waste Oil and Recovered Fuel Oil

Query 41.

Provide any information on soil measurements carried out at the installation.

Response

In March 2001, URS Consultants carried out the drilling and installation of the four shallow groundwater monitoring wells (BH101 to BH104) at the site. This exercise included the collection and analysis of soil samples at varying depths from each of the boreholes. The details of the soil analysis undertaken in 2001 are presented in the following table. This information is presented in the baseline report and the 2001 URS is appended to the baseline report (soil analysis is presented in Tables 3-6 of the URS report).

The soil results at the time were compared to the Dutch Intervention Values as a reference for significance. These Dutch values are commonly used reference criteria to determine site remediation practices and where levels exceed the intervention values, remediation options should be considered.

The results indicate the following trends:

- Diesel range organics were detected during the installation of all four boreholes at all depths in 2001. The only Dutch Intervention value is for Mineral Oil (5,000mg/kg) and the levels detected in the Enva boreholes were less than 1% of this guideline.
- BTEX were detected in BH102 and BH104 with the highest levels detected in BH104. Again the detected levels were compared against the Dutch Intervention Values and illustrate levels less than 3% of these values.
- PAHs are detected across the site in all four boreholes. The predominant PAH is Naphthalene but a range of other compounds are noted across the site. The Dutch Intervention Value for Total PAH is 40mg/kg and the levels detected in Enva are of the order of 3.15 to 6.16mg/kg.
- A range of metals were detected in the soil analysis carried out at the site as noted in the table. The levels vary across the site depending on the metal with no clear trend. In all cases the levels of metals detected in the soils samples at Enva are well below the Dutch Intervention Values/.

In June 2003, Enva removed the sump on eastern side of site and this project included for the collection and analysis of soil samples. No detailed information or tabular results on this data set are available but reference to the monitoring is reproduced in this report. Visual and olfactory evidence of localised soil contamination was observed in the immediate vicinity of the block wall. All visually contaminated material was removed. Samples of remaining soil were analysed and recorded low concentrations (<10 mg/kg) of hydrocarbons including Petrol Range Organics (PRO) and Polycyclic Aromatic Hydrocarbons. Benzene was not detected. Toluene, ethylbenzene and xylene recorded concentrations of less than 1 mg/kg.

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Location		BH101.1	BN101.2	BH102.1	BH102.2	BH103.1	BH103.2	BH104.1	BH104.2
Depth (mbgl)		0.5	5.2	1.5	4.8	2.3	4.0	0.6	4.6
Parameter	Unit								
Diesel Range Organics	mg/kg	69	21	68	29	40	25	28	18
Mineral Oil	mg/kg	45	9	31	13	18	11	13	8
C10-C20 Compounds	mg/kg	34	13	34	18	24	15	17	11
C21-C30 Compounds	mg/kg	27	6	27	9	12	7	8	6
C31-C40 Compounds	mg/kg	7	2	7	3	4	2	3	2
GRO (C4-C13)	mg/kg	ND		0.023		ND		0.408	
Benzene	mg/kg	ND		ND		ND		0.022	
Toluene	mg/kg	ND		0.022		ND		0.063	
Ethylbenzene	mg/kg	ND		ND		ND		ND	
Total Xylenes	mg/kg	ND		ND		ND		0.045	
PAH Compounds									
Naphthalene	mg/kg	2.35		5.78		3		2.97	
Acenaphthylene	mg/kg	0.034		0.15		0.061		0.036	
Phenanthrene	mg/kg	0.35		0.12		0.12		0.066	
Fluoranthene	mg/kg	0.23		0.038		0.05		0.031	
Benzo(a)anthracene	mg/kg	0.082		0.024		0.018		0.012	
Chrysene	mg/kg	0.083		0.022		0.02		0.016	
Benzo(a)pyrene	mg/kg	0.037		0.011		0.006		0.005	
Benzo (g.h.i)perylene	mg/kg	0.022		0.007		0.003		0.003	
Benzo(k)fluoranthene	mg/kg	0.044		0.009		0.006		0.006	
Indeno(1,2,3-cd)pyrene	mg/kg	0.024		0.008		0.003		0.002	
PAHs 10(sum)	*mg/kg*	*3.25*		*6.16*		*3.29*		*3.15*	
Acenaphthene	mg/kg	0.26		0.057		0.32		0.24	
Fluorene	mg/kg	0.16		0.26		0.13		0.085	
Anthracene	mg/kg	0.069		0.032		0.026		0.017	
Pyrene	mg/kg	0.19		0.033		0.041		0.025	
Benzo(b)fluoranthene	mg/kg	0.11		0.025		0.015		0.015	
Dibenzo(a.h)anthracene	mg/kg	0.005		0.005		0.001		0.001	
Metals									
Arsenic	mg/kg	2		4		1		ND	
Barium	mg/kg	69		117		113		18	
Cobalt	mg/kg	3		4		3		3	
Chromium	mg/kg	10		18		18		8	
Copper	mg/kg	9		16		11		7	
Molybdenum	mg/kg	ND		2		2		ND	
Nickel	mg/kg	10		11		12		11	
Lead	mg/kg	7		45		6		2	
Antimony	mg/kg	3		3		2		1	
Zinc	mg/kg	29		28		23		16	
Cadmium	mg/kg	ND		ND		ND		ND	
Mercury	mg/kg	ND		ND		ND		ND	

Query 42.

Provide, in accordance with Regulation 9(2)(n) of the Environmental Protection Agency (Industrial Emissions)(Licensing) Regulations 2013, a baseline report. The baseline report should, in accordance with Section 86B of the EPA Act 1992 as amended, contain the information necessary to determine the state of contamination of soil and groundwater at the time the report is drawn up in order that a qualified comparison may be made to the state of the site upon the permanent cessation of the activity.

Response

The baseline report submitted with the review application in May 2016 has been amended based on information gathered in response to EPA Query 40 and 41 (outlined above). This updated report is included in this submission overleaf.

RPS®

Enva Ireland Limited

IE Licence Review
Baseline Report

Document Control Sheet

Client:	Enva Ireland Limited
Project Title:	IE Licence Review
Document Title:	Baseline Environmental Report
Document No:	MDE0973Rp0104

Text Pages:	30	Appendices:	3

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Rev.	Status	Date	Author(s)		Reviewed By		Approved By	
F02	Final	30th August 2016	DC		AOT	Ashley O' Toole	PC	

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APPENDICES

Appendix A **Hazard Classes for Hazardous Substances**

Appendix B **Borehole Logs**

Appendix C **URS 2001 Report on Borehole Installation**

1 INTRODUCTION

Enva Ireland Limited operates under an Industrial Emissions Licence (Register No. W0184-01) from the EPA for the facility in Clonminam Industrial Estate, Portlaoise, County Laois. Enva is currently licensed for the following class of activities:

> *11.2(j): Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving oil re-defining or other reuses of oil*
>
> *11.1: The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.*
>
> *11.2(a): Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving biological treatment*
>
> *11.2(b): Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment*
>
> *11.2(c): Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving blending or mixing prior to submission to any of the other activities listed in 11.2 or 11.3*
>
> *11.2(d): Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving repackaging prior to submission to any of the other activities listed in paragraph 11.2 or 11.3*
>
> *11.2(g): Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving regeneration of acids or bases*
>
> *11.4(a) (ii): Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities: physico-chemical treatment;*
>
> *11.6: Temporary storage of hazardous waste, (other than waste referred to in paragraph 11.5) pending any of the activities referred to in paragraph 11.2, 11.3, 11.5 or 11.7 with a total capacity exceeding 50 tonnes, other than temporary storage, pending collection, on the site where the waste is generated.*

On the 26th January 2016, the EPA gave notice to Enva Ireland Limited that the EPA was initiating a review of the licence in accordance with the provisions of Sections 90(4) and 98A of the EPA Act 1992 as amended. The EPA notification contains a detailed list of information that is sought as part of the review and, in particular, Requirement 20 requires Enva to prepare a baseline report in accordance with Regulation 9(2)(n) of the EPA (Industrial Emissions) Regulations 2013.

In July 2016 the EPA sought further information on the groundwater monitoring data for the site and the details of any known soil analysis undert6aken for the site. In addition, the EPA also requested the update of the baseline report accordingly. This report has been updated to reflect the information sought by the EPA and to fully characterise the baseline condition of the site.

The report has been prepared in line with the guidance presented in the “European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions” (reference 2014/C 136/03). This guidance sets out a standard eight stage process that includes highly prescriptive requirements to complete the report and this report is set out on a stage by stage process as per the guidance below:

- Stage 1: Identifying the hazardous substances that are currently used, produced or released at the installation
- Stage 2: Identifying the relevant hazardous substances
- Stage 3: Assessment of the site-specific pollution possibility
- Stage 4: Site history
- Stage 5: Environmental setting
- Stage 6: Site characterisation
- Stage 7: Site investigation
- Stage 8: Production of the baseline report

2 STAGE 1: IDENTIFYING THE HAZARDOUS SUBSTANCES

2.1 GUIDANCE REQUIREMENTS

The draft guidelines from the Commission require the following details for Stage 1:

Identify which hazardous substances are used, produced or released at the installation and produce a list of these hazardous substances.

"Hazardous substance" is defined in the Guidance as substances or mixtures as defined in Article 3 of Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures.

Article 3 of Regulation (EC) No 1272/2008 defines hazardous substances and mixtures and specification of hazard classes as follows:

A substance or a mixture fulfilling the criteria relating to physical hazards, health hazards or environmental hazards, laid down in ***Parts 2 to 5 of Annex I*** *is hazardous and shall be classified in relation to the respective hazard classes provided for in that Annex.*

Where, in Annex I, hazard classes are differentiated on the basis of the route of exposure or the nature of the effects, the substance or mixture shall be classified in accordance with such differentiation.

A full list of the relevant hazard classes applicable are presented in **Appendix A** for reference.

2.2 APPLICANT DETAILS

A full list of all substances and mixtures used, produced or released at the Enva facility has been compiled and are presented in the following sections along with details of the nature of the hazardous substances identified. The Commission Guidance state that substances must include raw materials, products, intermediaries, by-products, emissions or wastes at the facility.

2.2.1 Substances Used

The main substances used at the Enva facility include raw materials and chemical treatments. Table G.1(i) of the IE application lists details of materials used on the site and identifies the following "hazardous substances" listed in **Table 2.1**. Laboratory chemicals have been excluded from the list but all relevant materials, water treatment chemicals and boiler chemicals are included in the list.

Table 2.1 – List of “Hazardous Substances” used at the Enva facility

Substance	Hazardous Category	Use
Sodium Hydroxide	H290: May be corrosive to metals H314: Causes severe skin burns and eye damage	Wastewater Treatment
Nitric Acid	H314: Causes severe skin burns and eye damage	Water Treatment (pH Adjustment)
Sodium Hypochlorite	H290: May be corrosive to metals H314: Causes severe skin burns and eye damage	Wastewater Treatment
Hydrogen Peroxide	H272: May intensify fire; oxidiser. H302: Harmful if swallowed. H315: Causes skin irritation. H318: Causes serious eye damage. H335: May cause respiratory irritation	Wastewater Treatment (Hodgefield Dosing)
Waste Oil (Garage & Shipping)	H226: Flammable liquid and vapour H304: May be fatal if swallowed and enters airways H315: Causes skin irritation H332: Harmful if inhaled H351: Suspected of causing cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H373: May cause damage to organs (state all organs affected, if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H411: Toxic to aquatic life with long lasting effects	Raw Material for Remediation
Aquatreat	H302: Harmful if swallowed H315: Causes skin irritation H335: May cause respiratory irritation H411: Toxic to aquatic life with long lasting effects	Boiler
Fuel Additive A	H226: Flammable liquid and vapour H302: Harmful if swallowed	Oil Processing (Enhance Combustion & Reduce Emissions)

	H315: Causes skin irritation H411: Toxic to aquatic life with long lasting effects	
Fuel Additive B	H302: Harmful if swallowed	Oil Processing (Inhibitor)
Oil De-Emulsifier	H302: Harmful if swallowed H315: Causes skin irritation H318: Causes serious eye damage H410: Very toxic to aquatic life with long lasting effects	Oil Processing (Demulsifier)
De-ashing chemical	H302: Harmful if swallowed H314: Causes severe skin burns and eye damage H318: Causes serious eye damage H412: Harmful to aquatic life with long lasting effects	Oil Processing
Fuel Additive C	H302: Harmful if swallowed H315: Causes skin irritation H318: Causes serious eye damage H373: May cause damage to organs (state all organs affected, if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	Oil Processing

2.2.2 Substances Produced

The products processed at the Enva facility are listed below in **Table 2.2**.

Table 2.2 – List of "Hazardous Substances" produced at the Enva facility

Substance	Hazardous Category
Reclaimed Fuels (11LS & 19LS)	H304: May be fatal if swallowed and enters airways H332: Harmful if inhaled H350: May cause cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H361: Suspected of damaging fertility or the unborn child (state specific effect if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H372 Causes damage to organs through prolonged or repeated exposure by skin H410: Very toxic to aquatic life with long lasting effects
Marked Kerosene	H226: Flammable liquid and vapour H304: May be fatal if swallowed and enters airways H315: Causes skin irritation H336: May cause drowsiness or dizziness H411: Toxic to aquatic life with long lasting effects
Marked Gas Oil	H304: May be fatal if swallowed and enters airways H315: Causes skin irritation H332: Harmful if inhaled H351: Suspected of causing cancer H373: May cause damage to organs through prolonged or repeated exposure H411: Toxic to aquatic life with long lasting effects

2.2.3 Substances Released

The only releases from the Enva facility are as follows:

- Discharges of dust to air which are restricted by Schedule C.2 of the current licence to ensure that there shall be no emissions to air of environmental significance.
- Discharges of surface water which are restricted by Schedule C.3 of the current licence to ensure that there shall be no emissions to water of environmental significance.
- Discharges to the Laois County Council foul sewer, which are controlled by Schedule C.4 of the current licence to ensure that the discharged water is of a quality that can be adequately assimilated into the main outfall.

Given the nature of the above discharges there are no substances released from the Enva facility that may be considered as hazardous substances and substances released are not considered further in this assessment.

Wastes generated by the operation may be considered as “produced” or “released” from the operation and have been included in this assessment. The Waste quantities as reported in the 2015 AER have been referenced to determine the potential for hazardous substances to be present in the waste fractions. The waste streams that are identified as “hazardous substances” are presented in **Table 2.3** and include the following:

3 STAGE 2: IDENTIFYING THE RELEVANT HAZARDOUS SUBSTANCES

3.1 GUIDANCE REQUIREMENTS

The draft guidelines from the Commission require the following details for Stage 2:

Identify which of the hazardous substances from Stage 1 are 'relevant hazardous substances' (see Section 4.2).

Discard those hazardous substances that are incapable of contaminating soil or groundwater. Justify and record the decisions taken to exclude certain hazardous substances.

'Relevant hazardous substances' (are defined in the guidance as those substances or mixtures defined within Article 3 of Regulation (EC) No 1272/2008 (Identified in Stage 1) which, as a result of their hazardousness, mobility, persistence and biodegradability (as well as other characteristics), are capable of contaminating soil or groundwater and are used, produced and/or released by the installation.

3.2 APPLICANT DETAILS

For each of the hazardous substances identified in Stage 1, a review of the following parameters derived from the MSDS has been completed to determine which, if any of the substances are considered "relevant hazardous substances". Where an MSDS was not available for a substance due to its nature (e.g. reclaimed fuel oil is a mixture of one or more substances), the MSDS for the most hazardous component of this substance was used:

- Physical state
- Solubility
- Toxicity
- Mobility
- Persistence
- Biodegradability
- Environmental Hazard (Part 4 of Regulation (EC) No 1272/2008)

Each of the above is identified and used to determine what substances are included as "relevant hazardous substances" along with a rationale for the decision making. This element is presented in **Table 3.1.** Details of the chemical characteristics and environmental fate of these substances has been derived from the following websites:

- European Chemicals Agency (ECHA http://echa.europa.eu/information-on-chemicals) as prescribed by the Commission Guidance.
- The US National Center for Biotechnology Information (NCBI) PubChem website (http://pubchem.ncbi.nlm.nih.gov).

Based on the analysis the following are listed as "relevant hazardous substances" at the Enva facility:

Table 3.1 – Assessment of "Hazardous Substances" at the Enva facility

Substance	Physical State	Soluble in Water	Toxicity	Mobility	Persistence	Biodegradability	Environmental Hazard	Relevant Hazardous Substance	Rationale
Sodium Hydroxide	Viscous Liquid	Completely soluble	Acute dermal toxicity	Soluble in water	No data	No data	Acute aquatic toxicity	Yes	Capable of contaminating soil and groundwater
Nitric Acid	Liquid	Miscible	Acute toxicity	Highly water soluble	Readily biodegradable	Readily biodegradable	Low toxicity to water organisms	Yes	Capable of contaminating soil and groundwater
Sodium Hypochlorite	Liquid	Completely soluble	Toxic	Soluble in water	Quickly decomposes in water and soil	Quickly decomposes in water and soil	Very toxic to all aquatic organisms	Yes	Capable of contaminating soil and groundwater
Hydrogen Peroxide	Liquid	No data	Acute toxicity	No data	No data	No data	Harmful to aquatic life	Yes	Capable of contaminating soil and groundwater
Waste Oil (Garage & Shipping)*	Semi solid	N/A	Acute toxicity	Residue fuel oil will absorb to soil particles	Residue fuel oil components may persist in the aquatic environment.	Residue fuel oil components may persist in the aquatic environment.	Some short term toxicity to aquatic and marine organisms.	Yes	Capable of contaminating soil and groundwater
Aquatreat	Aqueous solution	Completely miscible	Toxic by inhalation, skin contact and ingestion	No data	No data	Moderate to fully biodegradable	Will contribute to BOD and COD of receiving waters	Yes	Capable of contaminating soil and groundwater
Fuel Additive A	Liquid	Negligible	Toxic by inhalation, skin contact and ingestion	No data	No data	No data	May be harmful to aquatic life and waterfowl	Yes	Capable of contaminating soil and groundwater

Fuel Additive B	Liquid	N/A	Acute toxicity	No data	Persistent	No data	Toxic to aquatic life	Yes	Capable of contaminating soil and groundwater
Oil De-Emulsifier	Liquid	Completely miscible	Acute toxicity Category 4	No data	Not readily biodegradable	Not readily biodegradable	Very toxic to aquatic life with long lasting effects	Yes	Capable of contaminating soil and groundwater
De-ashing chemical	Liquid	Soluble	Acute toxicity Category 4	Readily absorbed into soil	Biodegradable	Biodegradable	Harmful to aquatic organisms. Harmful to soil organisms.	Yes	Capable of contaminating soil and groundwater.
Fuel Additive C	Liquid	Soluble	Acute toxicity	No data	Readily biodegradable	Readily biodegradable	Toxic to aquatic life	Yes	Capable of contaminating soil and groundwater.
Marked Kerosene	Liquid	Negligible	May be fatal if swallowed and enters airways	On release to water, hydrocarbons will float on the surface and since they are sparingly soluble, the only significant loss is volatilization to air. It is possible that some of the higher molecular weight hydrocarbons will be adsorbed on sediment.	Non-persistent	Not readily biodegradable but inherently biodegradable since their hydrocarbon components can be degraded by microorganisms.	Toxic to aquatic organisms, with the potential to cause long term adverse effects in the aquatic environment	Yes	Capable of contaminating soil and groundwater
Marked Gas Oil	Liquid	Negligible	Acute toxicity Category 4	On release to water, hydrocarbons will float on the surface and since they are sparingly soluble, the only significant	Non-persistent	Not readily biodegradable but inherently biodegradable since their hydrocarbon	Toxic to aquatic life with long lasting effects	Yes	Capable of contaminating soil and groundwater

				loss is volatilization to air. It is possible that some of the higher molecular weight hydrocarbons will be adsorbed on sediment.		components can be degraded by microorganisms.			
Reclaimed Fuel Oil*	Semi solid	N/A	Acute toxicity	Residue fuel oil will absorb to soil particles	Residue fuel oil components may persist in the aquatic environment.	Residue fuel oil components may persist in the aquatic environment.	Some short term toxicity to aquatic and marine organisms.	Yes	Capable of contaminating soil and groundwater

*MSDS for Heavy Fuel Oil used as this is the most hazardous component of this substance (used for Waste Oil (shipping and garage oil) and for Reclaimed Fuel Oil)

4 STAGE 3: ASSESSMENT OF THE SITE-SPECIFIC POLLUTION POSSIBILITY

4.1 GUIDANCE REQUIREMENTS

The draft guidelines from the Commission require the following details for Stage 3:

For each relevant hazardous substance brought forward from Stage 2, identify the actual possibility for soil or groundwater contamination at the site of the installation, including the probability of releases and their consequences, and taking particular account of:

- *the quantities of each hazardous substance or groups of similar hazardous substances concerned;*
- *how and where hazardous substances are stored, used and to be transported around the installation;*
- *where they pose a risk to be released;*
- *In case of existing installations also the measures that have been adopted to ensure that it is impossible in practice that contamination of soil or groundwater takes place.*

4.2 APPLICANT DETAILS

For each of the relevant hazardous substances identified in Stage 2, a risk assessment of the potential for ground contamination is provided in the following sections. The assessment includes a review of potential breaches caused by:

- Accidents/Incidents
- Routine Operations
- Planned Emissions

Table 4.1 – Sodium Hydroxide

Criteria	Description
Substance	Sodium Hydroxide
Annual Usage	26,000Ltrs (1000Ltr IBC's)
Storage Location	Stores & dosing area
Description of Use	Effluent/ Waste Water treatment
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • IBC's in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly

Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.2 – Nitric Acid

Criteria	Description
Substance	Nitric Acid
Annual Usage	4,000Ltrs (1000Ltr ASP's)
Storage Location	Stores & dosing area
Description of Use	Effluent/ Waste water Treatment
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • IBC's in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.3 – Sodium Hypochlorite

Criteria	Description
Substance	Sodium Hypochlorite
Annual Usage	4,000Ltrs (1000Ltr ASP's)
Storage Location	Stores & dosing area
Description of Use	Effluent/ Waste Water treatment.
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • IBC's in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.4 – Hydrogen Peroxide

Criteria	Description
Substance	Hydrogen Peroxide
Annual Usage	30,000Ltrs (1000Ltr ASP's)
Storage Location	Stores & dosing area
Description of Use	Treatment of Hydrogen sulphide /odour/ contaminated soil
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • IBC's in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.5 – Waste Oil (Shipping oil and garage oil)

Criteria	Description
Substance	Waste Oil
Annual Usage	13,000,000
Storage Location	Tank farm
Description of Use	Resale as fuel
Mode of Transport	Hard piped on site. Delivered to site on road tankers.
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • Tanks in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low – double containment but evidence of historic spills/leaks on site.
Consequence of Incident	Moderate to High depending on the extent of any spill or leak
Risk of Soil or Groundwater Contamination	Medium

Table 4.6 - Aquatreat

Criteria	Description
Substance	Aquatreat
Annual Usage	< 1000Ltrs (25ltr Drums)
Storage Location	Boiler House
Description of Use	Boiler water treatment
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Drums are stored on a spill tray/Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.7 - Fuel Additive A

Criteria	Description
Substance	Fuel Additive A
Annual Usage	<1000Ltrs (25Ltr drums)
Storage Location	Stores & dosing area
Description of Use	Fuel additive
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • Drums in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.8 – Fuel Additive B

Criteria	Description
Substance	Fuel Additive B
Annual Usage	10,000Ltrs (200Ltr Drums)
Storage Location	Stores & dosing area
Description of Use	Fuel additive
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • Drums in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.9 – Oil De-Emulsifier

Criteria	Description
Substance	Oil De-Emulsifier
Annual Usage	15,000Ltrs (1,000Ltr IBC's)
Storage Location	Stores & dosing area
Description of Use	Water removal in oil process
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • IBC's in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.10 – De-ashing chemical

Criteria	Description
Substance	De-ashing chemical
Annual Usage	50,000Ltrs (1,000Ltr IBC's)
Storage Location	Stores & dosing area
Description of Use	De-Ashing of oil
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • IBC's in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.11 – Fuel Additive C

Criteria	Description
Substance	Fuel Additive C
Annual Usage	10,000Ltrs (200Ltr Drums)
Storage Location	Stores & dosing area
Description of Use	Fuel additive
Mode of Transport	Forklift
Potential Pathways to Ground	Spill caused by handling or storage.
Existing Mitigation	• Stored in bunded area. • Drums in use are stored on a spill tray/bund which is also located in a concrete bund. • Bunds are tested regularly
Probability of Release to Ground	Low
Consequence of Incident	Moderate
Risk of Soil or Groundwater Contamination	Low to Medium

Table 4.12 – Marked Kerosene

Criteria	Description
Substance	Marked Kerosene
Annual Usage	3,400,000Ltrs.
Storage Location	Tank Farm
Description of Use	Resale
Mode of Transport	Road tanker
Potential Pathways to Ground	Spill caused by handling or storage
Existing Mitigation	• Storage tanks are tested • Storage tanks are located in a concrete bunds are tested regularly
Probability of Release to Ground	Low – double containment cc but evidence of historic spills/leaks on site.
Consequence of Incident	Moderate to High depending on the extent of any spill
Risk of Soil or Groundwater Contamination	Medium

Table 4.13 – Marked Gas Oil

Criteria	Description
Substance	Marked Gas Oil
Annual Usage	3,730,000Ltrs.
Storage Location	Tank Farm
Description of Use	Resale
Mode of Transport	Road tanker
Potential Pathways to Ground	Spill caused by handling or storage
Existing Mitigation	• Storage tanks are tested • Storage tanks are located in a concrete bunds are tested regularly
Probability of Release to Ground	Low – double containment but evidence of historic spills/leaks on site.
Consequence of Incident	Moderate to High depending on the extent of any spill
Risk of Soil or Groundwater Contamination	Medium

Table 4.14 – Reclaimed Fuel Oil

Criteria	Description
Substance	Reclaimed Fuel Oil
Annual Usage	12,850,000Ltrs.
Storage Location	Tank Farm
Description of Use	Resale as fuel
Mode of Transport	Road tanker
Potential Pathways to Ground	Spill caused by handling or storage
Existing Mitigation	• Storage tanks are tested • Storage tanks are located in a concrete bunds are tested regularly
Probability of Release to Ground	Low – double containment but evidence of historic spills/leaks on site.
Consequence of Incident	Moderate to High depending on the extent of any spill
Risk of Soil or Groundwater Contamination	Medium

4.2.1 Stage 3 Summary

The risk assessment for each of the "relevant hazardous substances" presented in this stage of the report indicates that the volumes of the substance employed, the nature of the containment system and the consequences of the events are varied but in all cases the risk assessment indicates that the current risk of ground or groundwater contamination by a relevant hazardous substance is **low to medium.** However, it should be noted that there is historic evidence of ground contamination within the site s further outlined in the following sections.

5 STAGE 4: SITE HISTORY

5.1 GUIDANCE REQUIREMENTS

The draft guidelines from the Commission require the following details for Stage 4:

Provide a site history. Consider available data and information:

- *In relation to the present use of the site, and on emissions of hazardous substances which have occurred and which may give rise to pollution. In particular, consider accidents or incidents, drips or spills from routine operations, changes in operational practice, site surfacing, changes in the hazardous substances used.*
- *Previous uses of the site that may have resulted in the release of hazardous substances, be they the same as those used, produced or released by the existing installation, or different ones.*

Review of previous investigation reports may assist in compiling this data.

5.2 LICENCE HISTORY

Waste oil processing and storage activities have been carried out at the Enva Ireland Ltd. facility since the late 1970's. From 2004, Atlas Environmental Ireland Ltd. expanded activities on-site to include the processing of additional wastes including the treatment of contaminated soil, repacking of oily contaminated wastes, and recovering paint wastes. The facility also stores waste in containers prior to transfer offsite for recovery or disposal.

From the commencement of activities until 2000, activities were carried out under the environmental enforcement remit of Laois County Council.

In 2000, Atlas Oil Laboratories Ltd. was granted an Integrated Pollution Control (IPC) licence (IPC Reg. No. 472) by the EPA to carry on the activity of the use of heat for the manufacture of fuel from waste, the refining and reuse of waste oils, recovery of waste oil filters, treatment of oily solid wastes and treatment/bioremediation of contaminated soils.

IPC Licence Reg. No. 472 was reviewed and in early 2004, Waste Licence Reg. No. W0184-01 was granted in substitution to Atlas Environmental Ireland Ltd.

Since 2004, the licence has been amended by the EPA on four occasions by way of technical amendment.

Technical Amendments:

- Technical Amendment A (2005) inserted additional conditions relating to Resource Use and Energy Efficiency, Accident Prevention and Decommissioning & Residuals Management.
- Technical Amendment B (2011) replaced and inserted conditions and schedules relating to Reprocessed Oil Quality, Monitoring and Input Restrictions.

- Technical Amendment C (2013) as required by the provisions of the European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended.
- Technical Amendment D (2014) IED amendment to achieve conformity of the licence with the Industrial Emissions Directive.

5.3 INCIDENT HISTORY

A history of the reported incidents from 2008 to 2015 is presented in **Table 5.1**. There have been no known incidents at the Enva facility that pose a risk to groundwater or soil contamination in this period.

Table 5.1 – Incident History at the Enva Facility

Year	No. Of Incidents	Incidents with Potential for Ground Contamination	Details
2015	2	0	n/a
2014	2	0	n/a
2013	2	0	n/a
2012	2	0	n/a
2011	6	0	n/a
2010	3	0	n/a
2009	6	0	n/a
2008	27	0	n/a

5.4 SITE GROUND CONDITIONS

A total of eight boreholes have been drilled at the site and the general sequence of ground conditions is presented in **Table 5.2.** The borehole logs for these wells are included in **Appendix B.**

Table 5.2 – Ground Conditions

Strata	Extent	Thickness	Description
Made Ground	BH104	0-3.5 m	Predominantly concrete, with hardcore fill, and clay.
Boulder Clay	All boreholes	<8.5 m	Includes fine to medium, well rounded gravels.
Sand and Gravel	Confined to south east corner of site (BH101, BH104 and MW03)	0-2 m	In general the transition from boulder clay to sand is gradual with changes from gravel, to sandy gravel, to sand.
Limestone Bedrock	Encountered in MW01, MW02 and MW03	Top of limestone ranges from 7.7m to 9m below ground level.	Pale grey, fine-grained bedrock, differentiated from boulders by its un-weathered nature.

5.5 HISTORY OF KNOWN GROUND INVESTIGATIONS

In March 2001, URS Consultants carried out the drilling and installation of the four shallow groundwater monitoring wells (BH101 to BH104) at the site. This exercise included the collection and analysis of soil samples at varying depths from each of the boreholes. The details of the soil analysis undertaken in 2001 are presented in **Table 5.3**. The 2001 URS report is included in **Appendix C**.

The soil results at the time were compared to the Dutch Intervention Values as a reference for significance. These Dutch values are commonly used reference criteria to determine site remediation practices and where levels exceed the intervention values, remediation options should be considered.

The results indicate the following trends:

- Diesel range organics were detected during the installation of all four boreholes at all depths in 2001. The only Dutch Intervention value is for Mineral Oil (5,000mg/kg) and the levels detected in the Enva boreholes were less than 1% of this guideline.
- BTEX were detected in BH102 and BH104 with the highest levels detected in BH104. Again the detected levels were compared against the Dutch Intervention Values and illustrate levels less than 3% of these values.
- PAHs are detected across the site in all four boreholes. The predominant PAH is Naphthalene but a range of other compounds are noted across the site. The Dutch Intervention Value for Total PAH is 40mg/kg and the levels detected in Enva are of the order of 3.15 to 6.16mg/kg.
- A range of metals were detected in the soil analysis carried out at the site as noted in the table. The levels vary across the site depending on the metal with no clear trend. In all cases the levels of metals detected in the soils samples at Enva are well below the Dutch Intervention Values/.

In June 2003, Enva removed the sump on eastern side of site and this project included for the collection and analysis of soil samples. No detailed information or tabular results on this data set are available but reference to the monitoring is reproduced in this report. Visual and olfactory evidence of localised soil contamination was observed in the immediate vicinity of the block wall. All visually contaminated material was removed. Samples of remaining soil were analysed and recorded low concentrations (<10 mg/kg) of hydrocarbons including Petrol Range Organics (PRO) and Polycyclic Aromatic Hydrocarbons. Benzene was not detected. Toluene, ethylbenzene and xylene recorded concentrations of less than 1 mg/kg.

In July 2004 approximately 25cm of light non-aqueous phase liquid (LNAPL) was encountered on groundwater in BH104 during a routine quarterly monitoring round. The LNAPL was removed together with surrounding soils which did not show visual evidence of contamination. Whole oil analysis of the product recovered indicated that it comprised ‘unweathered diesel’. BH104 was converted into a sump constructed of perforated concrete rings and was replaced by BH104B which was drilled immediately next to it.

Table 5.3 – Soil Analysis undertaken in 2001

Location		**BH101 .1**	**BN101 .2**	**BH102 .1**	**BH102 .2**	**BH103 .1**	**BH103 .2**	**BH104 .1**	**BH104 .2**
Depth (mbgl)		0.5	5.2	1.5	4.8	2.3	4.0	0.6	4.6
Parameter	Unit								
Diesel Range Organics	mg/kg	69	21	68	29	40	25	28	18
Mineral Oil	mg/kg	45	9	31	13	18	11	13	8
C10-C20 Compounds	mg/kg	34	13	34	18	24	15	17	11
C21-C30 Compounds	mg/kg	27	6	27	9	12	7	8	6
C31-C40 Compounds	mg/kg	7	2	7	3	4	2	3	2
GRO (C4-C13)	mg/kg	ND		0.023		ND		0.408	
Benzene	mg/kg	ND		ND		ND		0.022	
Toluene	mg/kg	ND		0.022		ND		0.063	
Ethylbenzene	mg/kg	ND		ND		ND		ND	
Total Xylenes	mg/kg	ND		ND		ND		0.045	
PAH Compounds									
Naphthalene	mg/kg	2.35		5.78		3		2.97	
Acenaphthylene	mg/kg	0.034		0.15		0.061		0.036	
Phenanthrene	mg/kg	0.35		0.12		0.12		0.066	
Fluoranthene	mg/kg	0.23		0.038		0.05		0.031	
Benzo(a)anthracene	mg/kg	0.082		0.024		0.018		0.012	
Chrysene	mg/kg	0.083		0.022		0.02		0.016	
Benzo(a)pyrene	mg/kg	0.037		0.011		0.006		0.005	
Benzo (g.h.i)perylene	mg/kg	0.022		0.007		0.003		0.003	
Benzo(k)fluoranthene	mg/kg	0.044		0.009		0.006		0.006	
Indeno(1,2,3-cd)pyrene	mg/kg	0.024		0.008		0.003		0.002	
PAHs 10(sum)	*mg/kg*	*3.25*		*6.16*		*3.29*		*3.15*	
Acenaphthene	mg/kg	0.26		0.057		0.32		0.24	
Fluorene	mg/kg	0.16		0.26		0.13		0.085	
Anthracene	mg/kg	0.069		0.032		0.026		0.017	
Pyrene	mg/kg	0.19		0.033		0.041		0.025	
Benzo(b)fluoranthene	mg/kg	0.11		0.025		0.015		0.015	
Dibenzo(a.h)anthracene	mg/kg	0.005		0.005		0.001		0.001	
Metals									
Arsenic	mg/kg	2		4		1		ND	
Barium	mg/kg	69		117		113		18	
Cobalt	mg/kg	3		4		3		3	
Chromium	mg/kg	10		18		18		8	

Copper	mg/kg	9		16		11		7	
Molybdenum	mg/kg	ND		2		2		ND	
Nickel	mg/kg	10		11		12		11	
Lead	mg/kg	7		45		6		2	
Antimony	mg/kg	3		3		2		1	
Zinc	mg/kg	29		28		23		16	
Cadmium	mg/kg	ND		ND		ND		ND	
Mercury	mg/kg	ND		ND		ND		ND	

5.6 GROUNDWATER DATA SUMMARY

Schedule D.1 of the Licence (Register No. 184-1) requires Enva to carry out groundwater monitoring at 7 locations (BH101, BH102, BH103, BH104 and three monitoring points in the bedrock aquifer). Enva routinely carry out monitoring at 8 monitoring locations and these four additional monitoring points are labelled MW01, MW02, MW03 and MW04. The location of these monitoring boreholes are presented in **Figure 5.1**.

The monitoring requirements for these boreholes is presented in Table D.6.1 of the licence and the results for the period 2014 to date are summarised in the following section.

The results for monitoring location BH101 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of trace **Naphthalene** (0.011µg/l) in Q3 2015.

The results for monitoring location BH102 illustrate low levels or inorganic parameters and all organic parameters are undetected.

The results for monitoring location BH103 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:

- Levels of **MTBE** of the order of 1.2 - 3.1µg/l were detected in Q1 to Q3 of 2015 and again in Q1 and Q2 of 2016.
- Trace levels of PAHs periodically detected including **Naphthalene** (0.04µg/l in Q1 2015), **Acenaphthene** (0.022 to 0.087µg/l from Q1 2015 to Q2 2016), **Fluorene** (0.022 to 0.027µg/l from Q3 2015 to Q2 2016), **Phenathrene** (0.011 to 0.014µg/l in Q4 2015 and Q2 2016), **Pyrene** (0.018µg/l in Q3 2015) and **Benzo(b)fluoranthene** (0.011 in Q1 and Q2 2016).
- Petroleum Hydrocarbons detected throughout 2015 and 2016 in particular the **aliphatic fraction C16 to C35** (54 to 1,760µg/l), **aliphatic fraction C35 to C44** (14µg/l) and the **aromatic fraction C21 -C35** (14 to 509µg/l).

The results for monitoring location BH104B illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:

- Trace levels of PAHs periodically detected including **Naphthalene** (0.05 to 0.035µg/l from Q1 2015 to Q1 2016), **Acenaphthene** (0.027 to 0.042µg/l from Q1 2015 to Q1 2016), **Fluorene**

(0.041 to 0.07µg/l from Q1 2015 to Q1 2016), **Phenathrene** (0.011 µg/l in Q3 2015), **Pyrene** (0.028 to 0.036µg/l from Q1 to Q3 2015).

- Petroleum Hydrocarbons detected throughout 2015 and 2016 in particular the **aliphatic fraction** (11 to 3,360µg/l) and the **aromatic fraction** (15 to 1,380µg/l) detected from Q3 2014 to Q1 2016.
- 4-Chloro-3-methylphenol detected at low levels (1.37µg/l) in Q1 2015.

The results for monitoring location MW01 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:

- Trace levels of PAHs periodically detected including **Phenanthrene** (0.014µg/l in Q1 2015), **Fluoranthene** (0.016µg/l in Q1 2015), **Pyrene** (0.021µg/l in Q1 2015 and 0.011µg/l in Q2 2016), **Benzo(b)fluoranthene** (0.010µg/l in Q1 2015), **Benzo(a)pyrene** (0.011µg/l in Q1 2015), **Indeno(1,2,3-cd)pyrene** (0.011µg/l in Q1 2015), **Dibenz(a,h)anthracene** (0.010µg/l in Q1 2015), **Benzo(g,h,i)perylene** (0.010µg/l in Q1 2015).
- Petroleum Hydrocarbons detected in Q3 2014 for the **aliphatic fraction C5-C35** (410µg/l).
- Chloroethane detected (1.1µg/l) in Q2 2016.

The results for monitoring location MW02 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:

- Levels of PAHs detected in Q2 2016 including **Phenanthrene** (0.01µg/l), **Fluoranthene** (0.012µg/l), **Benzo(b)fluoranthene** (0.01µg/l), **Benzo(a)pyrene** (0.01µg/l), **Benzo(g,h,i)perylene** (0.011µg/l).

The results for monitoring location MW03 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:

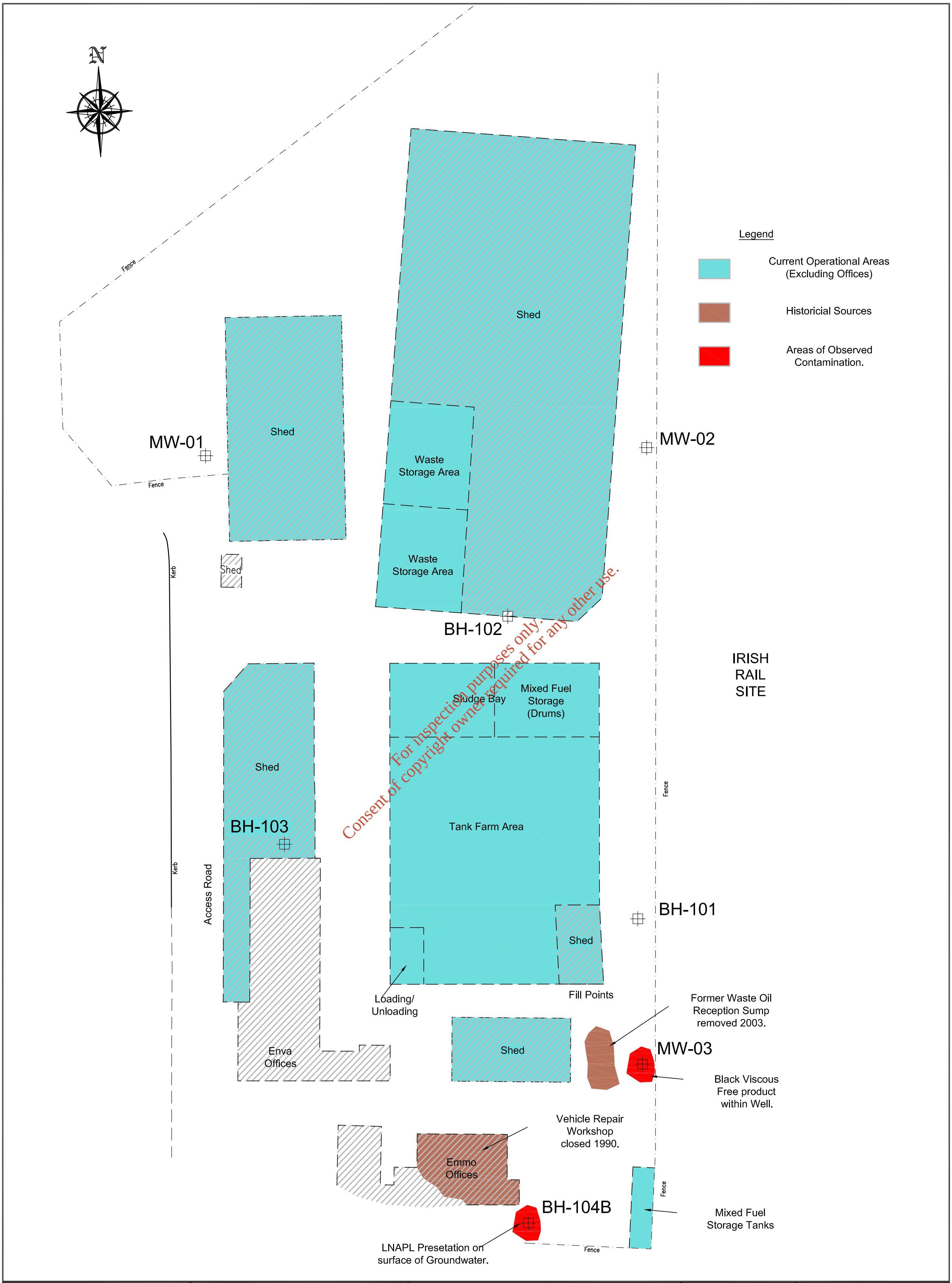
- Levels of **MTBE** of the order of 1.8 - 2.9µg/l were detected in Q1 2015 to Q2 of 2016.
- Trace levels of **PAHs** periodically detected from Q1 2015 to Q4 2014. The range of PAHs and the concentrations are similar to those presented for MW01.
- Petroleum Hydrocarbons detected in Q3 2014 for the **aliphatic fraction C16-C35** (14- 46µg/l) and the **aliphatic fraction C25-C44** (12µg/l) as well as the **C12-C16 aromatic fraction** (14µg/l). These were predominately detected in Q1 2015 only.
- **Vinyl Chloride** (0.8µg/l) and **Dichloroethane** (1.8µg/l) were detected in Q1 2015.
- **Styrene** (1.1µg/l), **p&m-Xylene** (1.1µg/l) and **1,2,4-trimethlybenzene** (1.1µg/l) were detected in Q1 2016.
- **1,1-dichlorothene** was detected (1.7µg/l) in Q2 of 2016.

The results for monitoring location MW04 illustrate low levels or inorganic parameters and all organic parameters are undetected with the exception of the following:

- Levels of **MTBE** of the order of 2.1 - 2.7µg/l were detected in Q1 2015 to Q2 of 2016.
- Trace levels of PAHs periodically detected including **Naphthalene** (0.067 to 0.18µg/l), **Acenaphthene** (0.01µg/l in Q2 2016) and **Fluorene** (0.013µg/l).

- Petroleum Hydrocarbons are detected the **C10-C16 aromatic fraction** (13-21μg/l) and the **C16-C21 aromatic fraction** (29μg/l).
- **Vinyl Chloride** (0.9-1.1μg/l) and **Chloroethane** (7.8-12.6μg/l) and **1,1-dichlorothene** (3.6-6.6μg/l) were detected periodically through the period.

In summary, the groundwater data indicates the periodic presence of some VOCs (MTBE), chlorinated VOCs (Vinyl Chloride, Chloroethane, 1,1-dichlorothene), PAHs and petroleum hydrocarbons (both aliphatic and aromatic) across the site but in particular in the area to the southeast of the site around BH104B and MW03. Borehole BH102 at the centre of the site is the only location to indicate and absence of these parameters in the period 2014 to date.



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Project:
Enva Groundwater Trend Analysis

Title:
Plan of Contamination Sources

Issue Details
Drawn: TD
Checked: YMcG
Approved: JQ
Scale: 1/1000
Date: 30/10/08

Office Use Only
Job No. MDE0788
File Ref. MDE0788-Figure6
Fig No. Figure 5.1
Rev. A

6 STAGE 5: ENVIRONMENTAL SETTING

6.1 GUIDANCE REQUIREMENTS

The draft guidelines from the Commission require the following details for Stage 5:

Identify the site's environmental setting including:

- *Topography;*
- *Geology;*
- *Direction of groundwater flow;*
- *Other potential migration pathways such as drains and service channels;*
- *Environmental aspects (e.g. particular habitats, species, protected areas etc.); and*
- *Surrounding land use.*

6.2 APPLICANT DETAILS

6.2.1 Topography

The site slopes very gently upward from the south of the site (circa 101 mOD) to the north-east of the site (103 mOD). Much of the surrounding area is relatively flat and of a similar elevation.

6.2.2 Geology

The Geological Survey of Ireland indicates that the regional geology of Portlaoise is typified by Carboniferous Limestone. In the vicinity of the site itself the solid geology comprises the Ballysteen Formation, a micaceous-bioclastic limestone. This well-bedded limestone, with interbeds of shale, is extensively folded, with axes trending north-east to south-west, and becomes increasingly muddy towards the top of the formation. North-east to south-west trending faults are found in the region, with one located approximately 500m to the east of the site. The subsoils in the region comprise mainly Made Ground, around the industrial area, and Limestone Till in the surrounding regions.

6.2.3 Direction of Groundwater Flow

Groundwater flow across the site is from south-west to north-east.

6.2.4 Other Potential Migration Pathways

There are two drainage networks at the Enva facility as follows:

- A storm water discharge system that takes unpolluted rainwater from the buildings and paved areas and discharges at a discharge point, SW1 (formerly SW01) along the western boundary of the site.

- There is one emission to sewer, SE1 (formerly FS1), which diverts all process water which is collected and discharged to Laois County Council's foul sewer.

These networks are used to transfer aqueous based liquids to the treatment or discharge options. No "relevant hazardous substances" are transported in these networks and there is no potential pathway for such substances to enter these networks and form a pathway to ground.

6.2.5 Environmental Aspects

There are no designated EU (Natura 200, SAC or SPA) or national (NHA) designed sites in close proximity to the Enva site. The nearest designed ecological site is the Slieve Bloom Mountains (site code 004160) which is located approximately 7.7km to the west of the site. This SPA is a protected area for the Hen Harrier (*Circus cyaneus*) [A082].

An AA Screening report is included in the IE licence application which demonstrates that the Enva operation will not impact on this or any site in the Natura 2000 network.

6.2.6 Surrounding Land Use

The site is located on the outskirts of Portlaoise in an area of agricultural and light industrial development. The site is bounded to the north and east by land belonging to Irish rail, comprising sidings and general storage areas. To the south is a vehicle repair garage, which is elevated above the level of the site by approximately 1.5 m. To the west the site is adjoined by further industrial land, as well as residential land.

7 STAGE 6: SITE CHARACTERISATION

7.1 GUIDANCE REQUIREMENTS

The draft guidelines from the Commission require the following details for Stage 6:

Use the results of Stages 3 to 5 to describe the site, in particular demonstrating the location, type, extent and quantity of historic pollution and potential future emissions sources noting the strata and groundwater likely to be affected by those emissions – making links between sources of emissions, the pathways by which pollution may move and the receptors likely to be affected.

7.2 APPLICANT DETAILS

The results of Stages 3 to 5 have been collated and are presented in a standard Source-Pathway-Receptor model to establish the potential pollutant linkages, if any, for the relevant hazardous substances identified to cause or have caused ground contamination.

In addition, the findings of a series of groundwater risk assessments undertaken at the site have been reviewed to assist in the site characterisation.

7.2.1 Source Details

Based on the Stage 2 analysis the listed "relevant hazardous substances" at the Enva facility are those listed in the following tables. Current storage and handling of these substances pose a low risk to ground and groundwater contamination as described in Section 4.

Substance	Source
Sodium Hydroxide	Stores and dosing area
Nitric Acid	Stores and dosing area
Sodium Hypochlorite	Stores and dosing area
Hydrogen Peroxide	Stores and dosing area
Waste Oil (Garage & Shipping)	Tank Farm
Aquatreat	Stores and dosing area
Fuel Additive A	Stores and dosing area
Fuel Additive B	Stores and dosing area
Fuel Additive C	Stores and dosing area
Oil De-emulsifier	Stores and dosing area
Deashing Chemical	Stores and dosing area
Marked Kerosene	Tank Farm
Marked Gas Oil	Tank Farm
Reclaimed Fuel Oil	Tank Farm

While current handling and storage pose a low risk as source, there are areas of known historic ground contamination on the site as evidenced by the site history and the current groundwater monitoring data. The primary sources of historic ground contamination are unknown and could be derived from historical activities at the site or off-site sources. The hydrocarbon contamination observed within the two areas around BH104 and MW03 represent secondary sources of contamination.

LNAPL (light non aqueous phase liquid) identified in the vicinity of BH104 has been identified as diesel. Diesel is comprised of approximately 98% Aliphatic (straight chain) hydrocarbons and 2% Aromatic (ringed) hydrocarbons. Aromatic compounds are more mobile in groundwater than aliphatic compounds and therefore, dissolved phase contaminants derived from the free phase diesel are likely to comprise predominantly aromatic compounds. Being more mobile these compounds generally present a greater risk to groundwater and surface water receptors. Polycyclic aromatic hydrocarbons (PAHs) have been detected within groundwater.

Free product in MW03 is unidentified and its exact positioning in relation to the water table is unknown as it appears to be smeared up the borehole casing and does not form a measurable layer on groundwater surface. The groundwater analysis does not record any hydrocarbons in this area suggesting that this product is immobile and does not mix readily with water. DCA and PAHs have been detected within groundwater.

7.2.2 Pathway Details

Groundwater flow across the site is from south-west to north-east.

The regional geology of Portlaoise is typified by Carboniferous Limestone. The limestone is classified by the Geological Survey of Ireland (GSI) as a Locally Important Karstified Aquifer (Ll). Porosity is predominantly in the form of fractures, in this aquifer, however the muddy nature of this formation greatly reduces permeability.

The underlying groundwater body is the South Eastern groundwater body which is classed as poorly productive but with moderate to high vulnerability. This vulnerability is as a result of the shallow made ground soil/subsoil layer.

Contaminants may enter the groundwater via dissolution from NAPL and migrate in the direction of groundwater flow.

In the case of the LNAPL film within BH104, groundwater flow is assumed to be taking place predominantly within the glacial deposits in the direction of BH101, which is located adjacent to the eastern site boundary.

In the case of product film within MW03, groundwater flow is occurring within a discrete fracture zone at a depth of approximately 15 mbgl. The direction of flow and the degree of connectivity with other fracture zones within the bedrock is not known. There is a potential for vertical dissolved phase migration of contaminants along preferential pathways created by vertical fractures within the limestone.

Along the lateral migration pathway contaminants will be subject to the following attenuation processes:

- Dispersion, which is the spreading of the dissolved phase plume as it moves through the porous aquifer.
- Adsorption, which is the process by which contaminant molecules temporarily partition to the surface of mineral grains and thus travel more slowly in the aquifer with respect to groundwater.
- Biodegradation, which is the decay of organic contaminants in biological reactions catalysed by micro-organisms within the aquifer.
- Restriction of floating, free phase (LNAPL) product migration within vertically/steeply inclined, fractured limestone, caused by the orientation of fractures and floating nature of the product.

7.2.3 Receptor Details

The public water supply for Portlaoise is derived from groundwater, utilising three groundwater abstraction well fields comprising of two abstraction wells in each well field. This supply currently comes from the Straboe area, approximately 5.5 km to the north-east of the site. The source protection zone for this water supply extends to within 3.2 km of the Enva site but does not encompass the Enva site.

The GSI record a number of other dug wells and boreholes within the Portlaoise area, including the boreholes installed on the site. The accuracy of the locations of these wells varies. One well, which was drilled in 1899 is recorded as being located immediately to the south of the Enva site. The use of this well is not known and its location is only accurate to 1 km. A second borehole, drilled in 1973 is recorded 1.5 km to the north of the site at Clonrooosk; the accuracy of this location is also 1 km so it could be closer or further from the site. The use of this well is not known but its yield is recorded as being poor. There are no other wells recorded within 1 km of the site.

Enva is not aware of any abstraction boreholes within the immediate vicinity of their site.

7.2.4 Conclusion

Assessment of the potential Source-Pathway-Receptor pollutant linkages described above concludes that as no source to receptor pathway is present at the Enva facility, there are no pollutant linkages to ground or groundwater associated with the site’s current activities. While there is a pathway to receptor linkage, the nature of the strata underlying the facility is such that any contaminant plume would be short lived. The risk of current activities at the Enva facility causing pollution to ground or groundwater is low to medium.

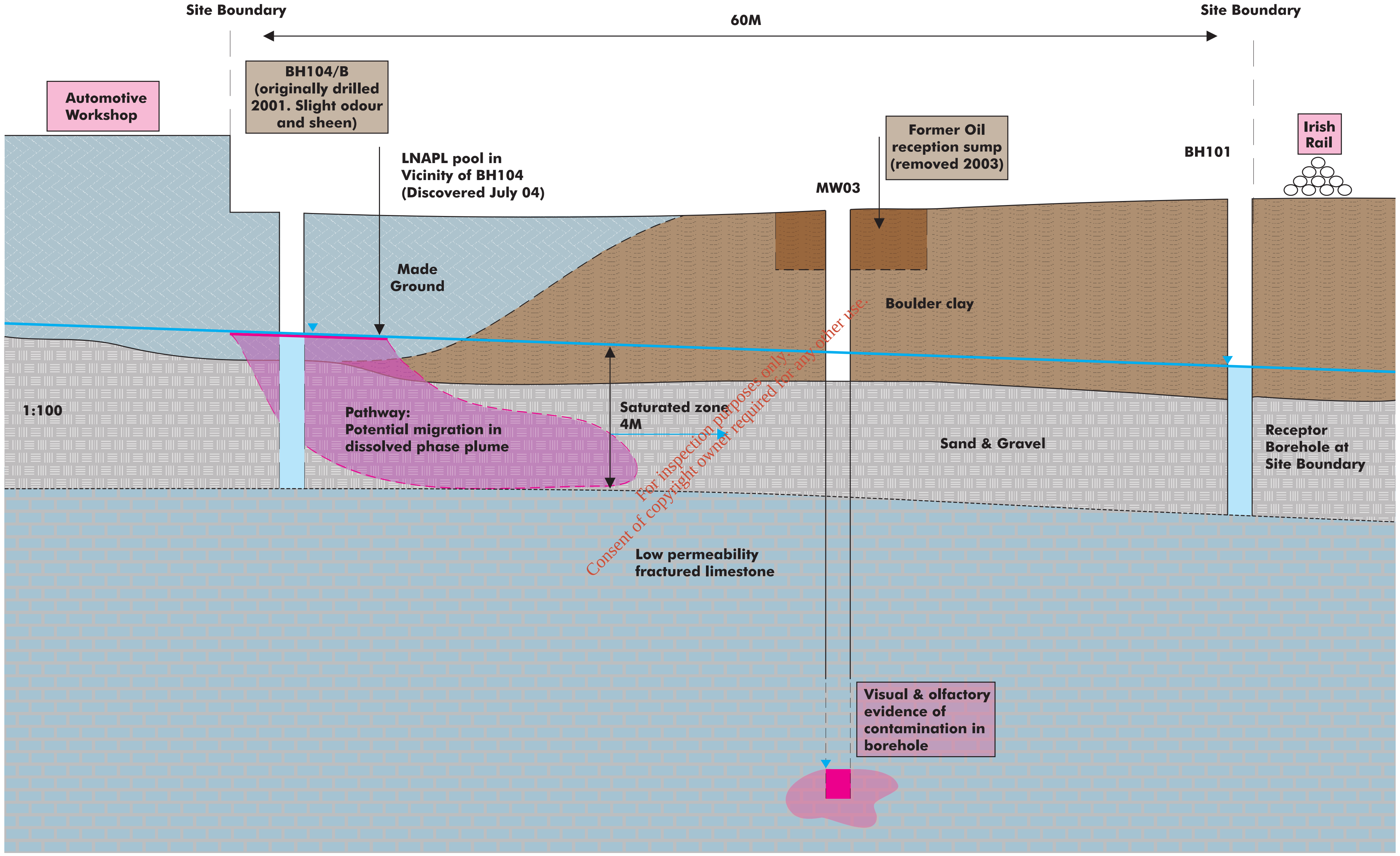
There are two known sources of historic ground contamination on site, i.e. the thin LNAPL film within BH104B and the unidentified product within MW03. Both represent a source of dissolved phase concentrations within groundwater. However, the compounds that comprise the product are generally hydrophobic and will not preferentially partition to the dissolved phase and, as such, significant off-site migration is very unlikely and these contaminants are not considered to present a risk to the wider shallow or deeper groundwater. This has been confirmed by the quantitative risk assessment carried out in 2008. A conceptual site model illustrating the historic pollution is presented in **Figure 7.1**.

🟪 **Current Potential Sources**

🟫 **Historical Sources**

Scale:

1:250



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NOTES

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No.	Date	Drn. / Chk.	Amendment / Issue	App.

Client: **ENVA Ireland**

Project: **Groundwater Risk Assessment**

Title: **Figure 7.1**

Drawn by:	CMC	Job No: MDE0788	
Checked by:	YMcG	File No: R:/MDE0788\Gr	
Approved by:	YMcG	Drg. No: MDE0788Gr3	Rev: D01
Scale: NTS			
Date: 06/11/08			

8 STAGE 7: SITE INVESTIGATION

8.1 GUIDANCE REQUIREMENTS

The draft guidelines from the Commission require the following details for Stage 7:

If there is sufficient information to quantify the state of soil and groundwater pollution by relevant hazardous substances on the basis of Stages (1) to (6) then go directly to Stage 8. If insufficient information exists then intrusive investigation of the site will be required in order to gather such information. The details of such investigation should be clarified with the competent authority.

8.2 APPLICANT DETAILS

There is sufficient information to quantify the state of soil and groundwater pollution by relevant hazardous substances on the basis of Stages 1 to 6.

9 STAGE 9: BASELINE REPORT CONCLUSIONS

9.1 GUIDANCE DOCUMENTS

The draft guidelines from the Commission require the following details for Stage 8:

Produce a baseline report for the installation that quantifies the state of soil and groundwater pollution by relevant hazardous substances.

9.2 APPLICANT DETAILS

This document presents the baseline report which has been prepared in accordance with the "*European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions*" (reference 2014/C 136/03).

Assessment of the potential Source-Pathway-Receptor pollutant linkages described above concludes that as no source to receptor pathway is present at the Enva facility, there are no pollutant linkages to ground or groundwater associated with the site's current activities. While there is a pathway to receptor linkage, the nature of the strata underlying the facility is such that any contaminant plume would be short lived. The risk of current activities at the Enva facility causing pollution to ground or groundwater is low to medium.

There are two known sources of historic ground contamination on site, i.e. the thin LNAPL film within BH104B and the unidentified product within MW03. Both represent a source of dissolved phase concentrations within groundwater. However, the compounds that comprise the product are generally hydrophobic and will not preferentially partition to the dissolved phase and, as such, significant off-site migration is very unlikely and these contaminants are not considered to present a risk to the wider shallow or deeper groundwater. This has been confirmed by the quantitative risk assessment carried out in 2008.

Groundwater monitoring across the site illustrates that levels of aliphatic and aromatic hydrocarbons and PAHs are prevalent at varied concentrations across the site up to the latest data sets (Quarter 2 2016). These continued levels of contamination are a direct result of the historic ground contamination at the site. The Waste Oil and Reclaimed Fuel Oil are the two Relevant Hazardous Substances that are elevated in the groundwater.

The 2008 groundwater investigation concluded that the contamination not considered to be causing a risk to the wider hydrogeological environment, the film of free product within BH104 and MW03 does represent a residual source of contamination and as such should continue to be monitored. Monitoring top data shows that these pollutants are persisting in the groundwater underlying the site.

The 2008 report concluded that extraction of the product is not recommended due to the very small quantity and the complexity of trying to achieve this in fractured rock. Instead natural attenuation should be allowed to continue as the quantitative risk assessment demonstrated that the presence of contaminants within groundwater does not present a risk to receptors.

APPENDIX A

HAZARD CLASSES FOR HAZARDOUS SUBSTANCES

Article 3 of Regulation (EC) No 1272/2008 (Parts 2 to 5 of Annex I)

Part 2: Physical Hazards	
2.1 Explosives	H200: Unstable Explosive H201: Explosive; mass explosion hazard H202: Explosive; severe projection hazard H203: Explosive; fire, blast or projection hazard H204: Fire or projection hazard H205: May mass explode in fire
2.2. Flammable gases	H220: Extremely flammable gas H221: Flammable gas
2.3. Flammable aerosols	H222: Extremely flammable aerosol H223: Flammable aerosol
2.4. Oxidising gases	H270: May cause or intensify fire; oxidiser
2.5. Gases under pressure	H280: Contains gas under pressure; may explode if heated H280: Contains gas under pressure; may explode if heated H281: Contains refrigerated gas; may cause cryogenic burns or injury H280: Contains gas under pressure; may explode if heated
2.6. Flammable liquids	H224: Extremely flammable liquid and vapour H225: Highly flammable liquid and vapour H226: Flammable liquid and vapour
2.7. Flammable solids	H228: Flammable Solid
2.8. Self-reactive substances and mixtures	H240: Heating may cause an explosion H241: Heating may cause a fire or explosion H242: Heating may cause a fire
2.9. Pyrophoric liquids	H250: Catches fire spontaneously if exposed to air
2.10. Pyrophoric solids	H250: Catches fire spontaneously if exposed to air
2.11. Self-heating substances and mixtures	H251: Self-heating; may catch fire H252: Self-heating in large quantities; may catch fire
2.12. Substances and mixtures which in contact with water emit flammable gases	H260: In contact with water releases flammable gases which may ignite spontaneously H261: In contact with water releases flammable gases
2.13. Oxidising liquids	H271:May cause fire or explosion; strong oxidiser H272: May intensify fire; oxidiser
2.14. Oxidising solids	H271: May cause fire or explosion; strong oxidiser H272: May intensify fire; oxidiser
2.15. Organic peroxides	H240: Heating may cause an explosion H241: Heating may cause a fire or explosion H242: Heating may cause a fire
2.16. Corrosive to metals	H290: May be corrosive to metals
Part 3: Health Hazards	
3.1. Acute toxicity	H300: Fatal if swallowed H301: Toxic if swallowed H302: Harmful if swallowed H310:Fatal in contact with skin

	H311: Toxic in contact with skin H312: Harmful in contact with skin H330: Fatal if inhaled H331: Toxic if inhaled H332: Harmful if inhaled
3.2. Skin corrosion/irritation	H314: Causes severe skin burns and eye damage H315: Causes skin irritation
3.3. Serious eye damage/eye irritation	H318: Causes serious eye damage H319: Causes serious eye irritation
3.4. Respiratory or skin sensitisation	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled H317: May cause an allergic skin reaction
3.5. Germ cell mutagenicity	H340: May cause genetic defects (state route of exposure if it is conclusively proven that No other routes of exposure cause the hazard) H341: Suspected of causing genetic defects (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)
3.6. Carcinogenicity	H350: May cause cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H351: Suspected of causing cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)
3.7. Reproductive toxicity	H360: May damage fertility or the unborn child (state specific effect if known)(state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H361: Suspected of damaging fertility or the unborn child (state specific effect if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H362: May cause harm to breast-fed children.
3.8. Specific target organ toxicity — single exposure	H370: Causes damage to organs (or state all organs affected, if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H371: May cause damage to organs (or state all organs affected, if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H335: May cause respiratory irritation; H336: May cause drowsiness or dizziness
3.9. Specific target organ toxicity — repeated exposure	H372: Causes damage to organs (state all organs affected, if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) H373: May cause damage to organs (state all organs affected, if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)
3.10. Aspiration hazard	H304: May be fatal if swallowed and enters airways
Part 4: Environmental Hazards	
4.1. Hazardous to the aquatic environment	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects H411: Toxic to aquatic life with long lasting effects

	H412: Harmful to aquatic life with long lasting effects H413: May cause long lasting harmful effects to aquatic life
Part 5: Additional EU Hazard Class	
5.1. Hazardous to the ozone layer	EUH059: Hazardous to the Ozone Layer

APPENDIX B

BOREHOLE LOGS

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Ireland

BOREHOLE LOG

Page 1 of 1

BOREHOLE NO.: BH 101
TOTAL DEPTH: 6.8m bgl

PROJECT INFORMATION

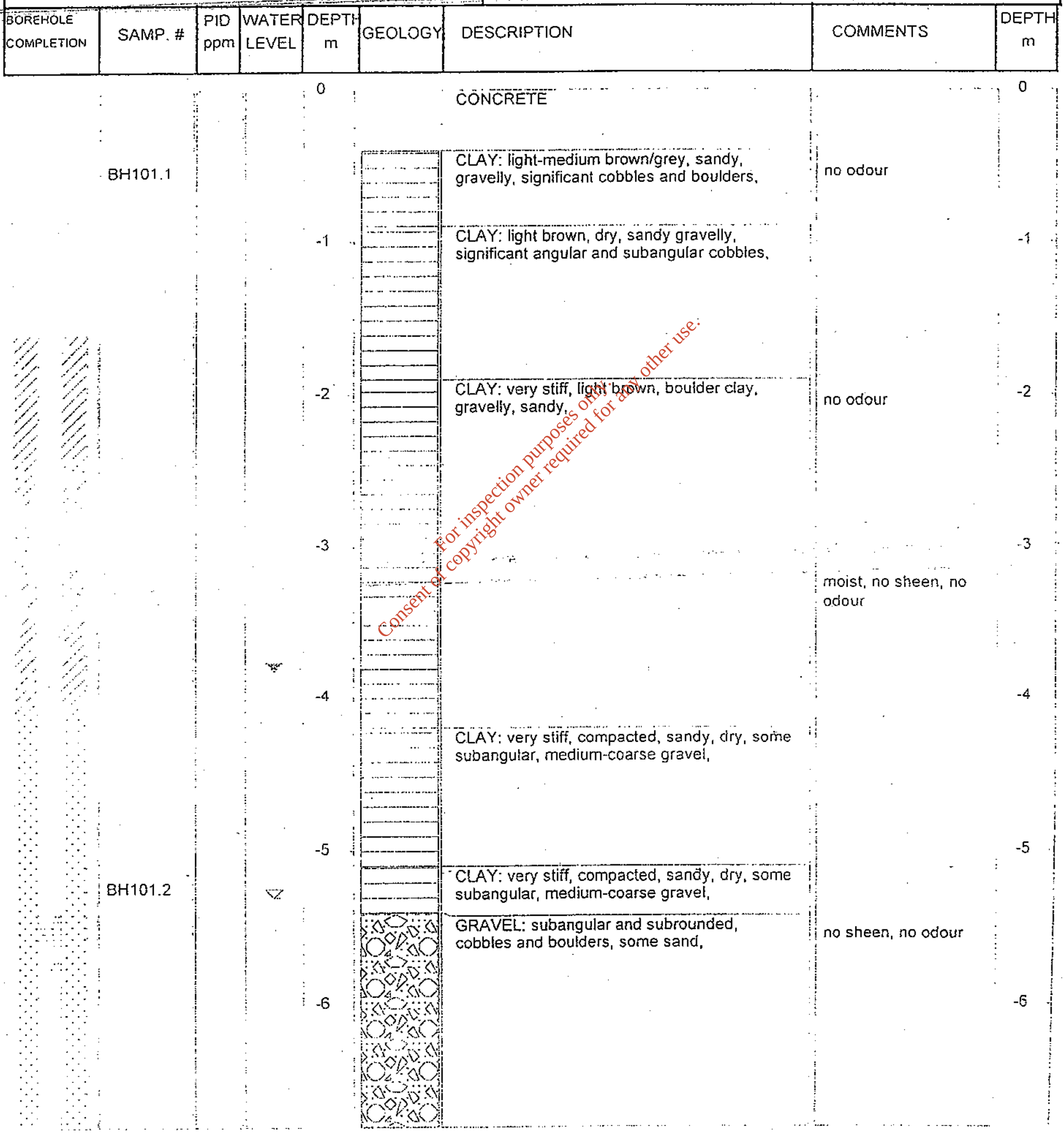
CLIENT:	Atlas Oil
SITE NAME:	Portlaois
SITE LOCATION:	Portlaois, Co Laois
JOB NO.:	46605-002
LOGGED BY:	Nicola O'Hara
CHECKED BY:	
DATES DRILLED:	05/03/01-08/03/01

DRILLING INFORMATION

DRILLING CO.:	Glovers
DRILLER:	John Sheppard
DRILLING METHOD/DIAMETER:	Shell and Auger
SCREEN TYPE/DIAMETER:	HDPE/ 50mm
SCREEN SLOT SIZE:	1mm
SAMPLING METHODS:	Grab

NOTES:

∇ Water level during drilling
▼ Water level in completed well



BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
				0		CONCRETE		0
	BH101.1					CLAY: light-medium brown/grey, sandy, gravelly, significant cobbles and boulders,	no odour	
				-1		CLAY: light brown, dry, sandy gravelly, significant angular and subangular cobbles,		-1
				-2		CLAY: very stiff, light brown, boulder clay, gravelly, sandy,	no odour	-2
				-3			moist, no sheen, no odour	-3
			▼	-4				-4
						CLAY: very stiff, compacted, sandy, dry, some subangular, medium-coarse gravel,		
				-5				-5
	BH101.2		∇			CLAY: very stiff, compacted, sandy, dry, some subangular, medium-coarse gravel,		
						GRAVEL: subangular and subrounded, cobbles and boulders, some sand,	no sheen, no odour	
				-6				-6

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Ireland

BOREHOLE LOG

Page 1 of 1

BOREHOLE NO.: BH 102
TOTAL DEPTH: 6.8m bgl

PROJECT INFORMATION

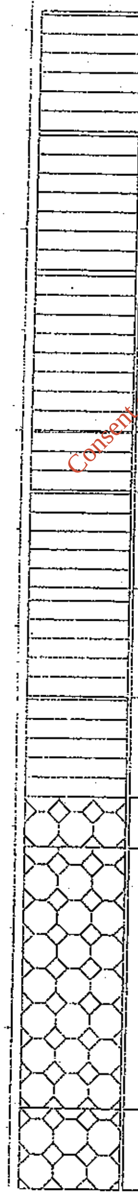
CLIENT: Atlas Oil
SITE NAME: Portlaois
SITE LOCATION: Portlaois, Co Laois
JOB NO.: 46605-002
LOGGED BY: Caroline Enright
CHECKED BY:
DATES DRILLED: 01/03/01-03/03/01

DRILLING INFORMATION

DRILLING CO.: Glovers
DRILLER: John Sheppard
DRILLING METHOD/DIAMETER: Shell and Auger
SCREEN TYPE/DIAMETER: HDPE/ 50mm
SCREEN SLOT SIZE: 1mm
SAMPLING METHODS: Grab

NOTES:

▽ Water level during drilling
▼ Water level in completed well



SAMP. #	PID ppm	WATER LEVEL	DEPTH m	DESCRIPTION	COMMENTS
			0	CONCRETE	
			-1	CLAY: soft-firm, mid-brown, friable, some peat, some small-medium subangular gravel,	slightly damp
BH102.1	1		-2	CLAY: soft-firm, mid-brown with grey/green mottling, friable, some peat, some small-medium subangular and subrounded gravel,	
		▽	-3	CLAY: soft, green grey, slightly plastic, some large cobbles,	slightly damp, no odour
				CLAY: firm to stiff, light grey with green mottling, plastic, large gravel and cobbles	slightly damp, no odour
				CLAY: soft, brown, plastic, marley, large gravel and cobbles	
			-4	CLAY: soft, light brown, plastic, marley, fine-coarse gravel, some cobbles	slightly damp, no odour
				CLAY: soft, light brown, plastic, marley, fine-coarse gravel, some cobbles	
BH102.2	1		-5	BOULDERS: very hard ground	
		▼	-6	BOULDERS: large cobles gravel and boulders, some clay	
				BOULDERS: some firm clay with fine-coarse gravel, large cobbles	

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BOREHOLE LOG

Page 1 of 1

BOREHOLE NO.: BH 103
TOTAL DEPTH: 5.7m bgl

PROJECT INFORMATION

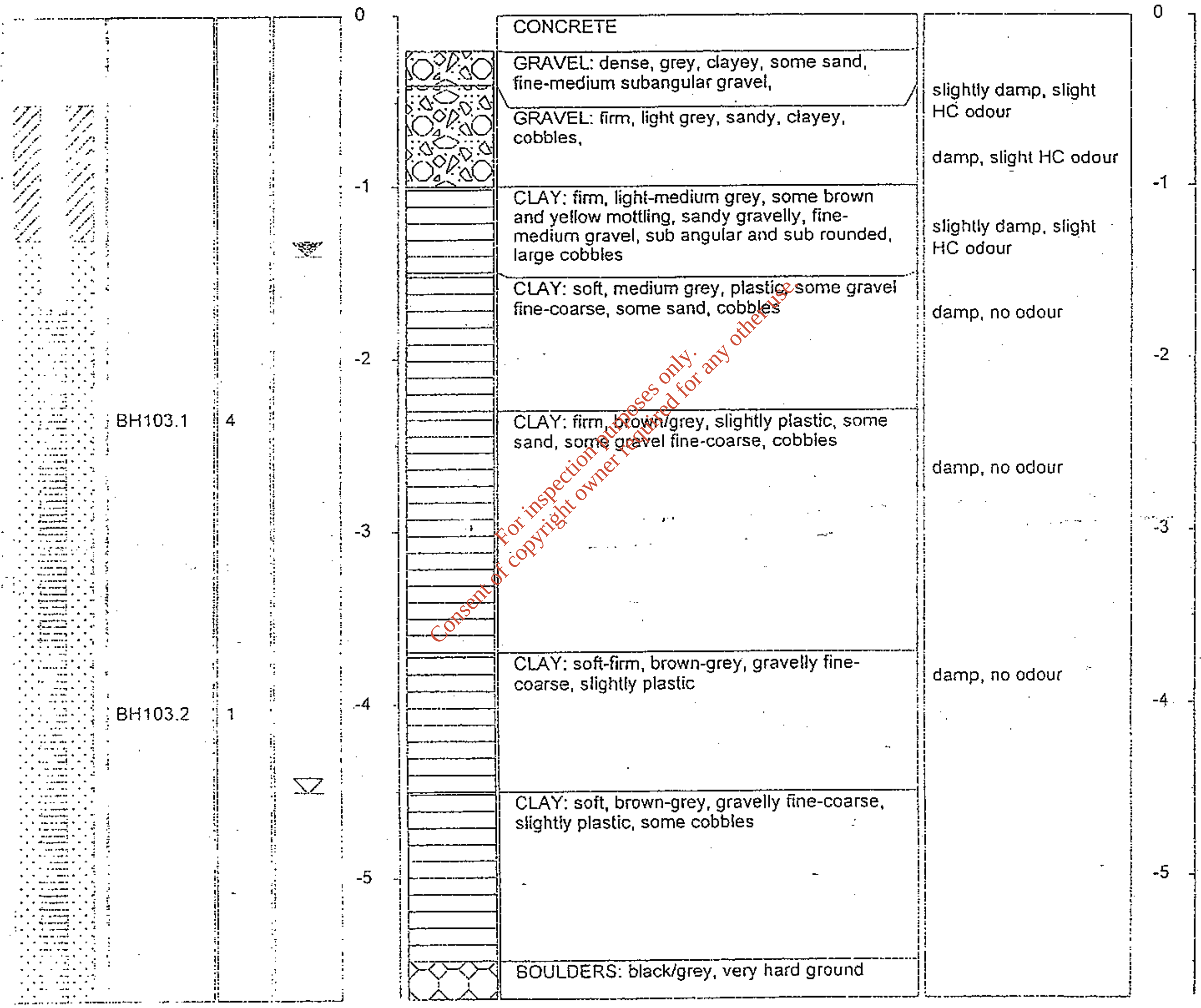
CLIENT:	Atlas Oil
SITE NAME:	Portlaois
SITE LOCATION:	Portlaois, Co Laois
JOB NO.:	46605-002
LOGGED BY:	Caroline Enright
CHECKED BY:	
DATES DRILLED:	01/03/01-03/03/01

NOTES:

DRILLING INFORMATION

DRILLING CO.:	Glovers
DRILLER:	John Sheppard
DRILLING METHOD/DIAMETER:	Shell and Auger
SCREEN TYPE/DIAMETER:	HDPE/ 50mm
SCREEN SLOT SIZE:	1mm
SAMPLING METHODS:	Grab

▽ Water level during drilling
⊻ Water level in completed well



BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
				0		CONCRETE		0
						GRAVEL: dense, grey, clayey, some sand, fine-medium subangular gravel,	slightly damp, slight HC odour	
						GRAVEL: firm, light grey, sandy, clayey, cobbles,	damp, slight HC odour	
				-1		CLAY: firm, light-medium grey, some brown and yellow mottling, sandy gravelly, fine-medium gravel, sub angular and sub rounded, large cobbles	slightly damp, slight HC odour	-1
						CLAY: soft, medium grey, plastic some gravel fine-coarse, some sand, cobbles	damp, no odour	
				-2				-2
	BH103.1	4				CLAY: firm, brown/grey, slightly plastic, some sand, some gravel fine-coarse, cobbles	damp, no odour	
				-3				-3
						CLAY: soft-firm, brown-grey, gravelly fine-coarse, slightly plastic	damp, no odour	
	BH103.2	1		-4				-4
						CLAY: soft, brown-grey, gravelly fine-coarse, slightly plastic, some cobbles		
				-5				-5
						BOULDERS: black/grey, very hard ground		

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Dublin 2
Ireland

BOREHOLE LOG

Page 1 of 1

BOREHOLE NO.: BH 104

TOTAL DEPTH: 6.8m bgl

PROJECT INFORMATION

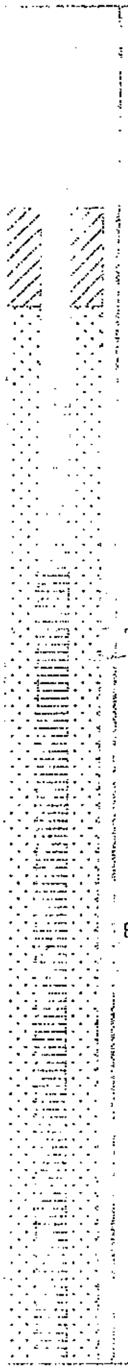
CLIENT: Atlas Oil
SITE NAME: Portlaois
SITE LOCATION: Portlaois, Co Laois
JOB NO.: 46605-002
LOGGED BY: Nicola O'Hara
CHECKED BY:
DATES DRILLED: 05/03/01-08/03/01

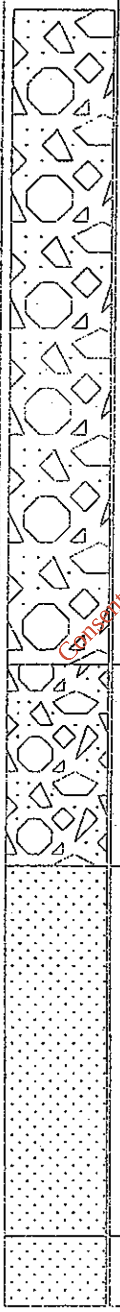
DRILLING INFORMATION

DRILLING CO.: Glovers
DRILLER: John Sheppard
DRILLING METHOD/DIAMETER: Shell and Auger
SCREEN TYPE/DIAMETER: HDPE/ 50mm
SCREEN SLOT SIZE: 1mm
SAMPLING METHODS: Grab

NOTES:

▽ Water level during drilling
▼ Water level in completed well





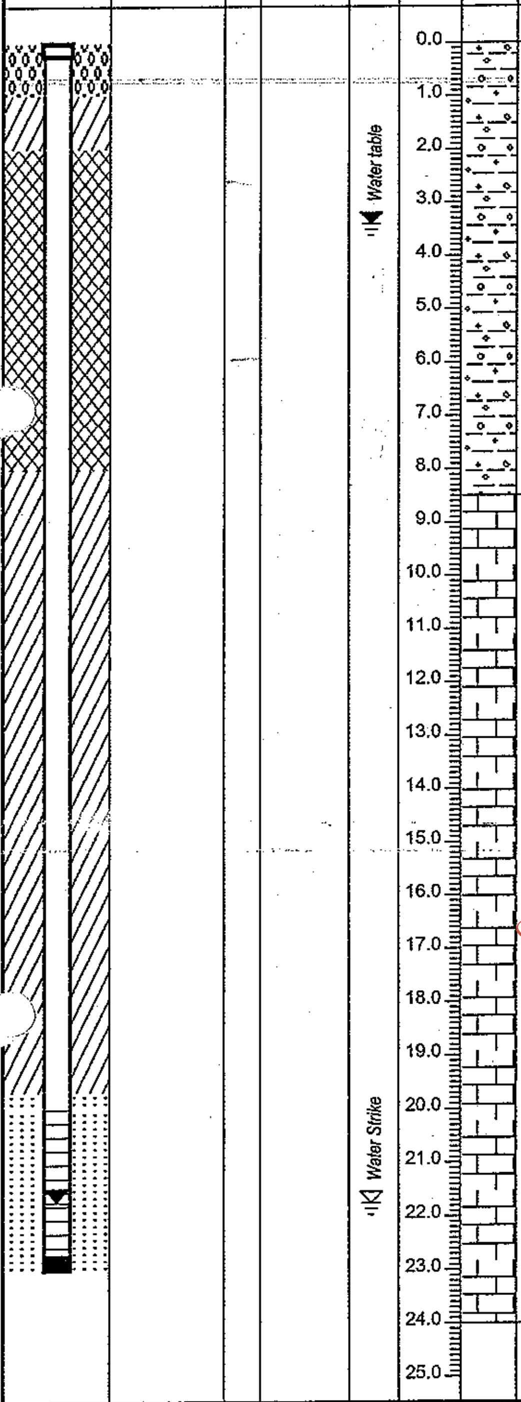
BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
				0		CONCRETE		0
	BH104.1					FILL: dense, hardcore some clay,	HC odour, sheen	
				-1				-1
			▼	-2				-2
			▽	-3				-3
							no odour, no sheen	
						GRAVEL & SAND: medium grained gravel,	no odour, wet	
				-4				-4
	BH104.2					SAND: medium-coarse grained, medium to coarse gravel angular and subangular, angular and subangular cobbles,	no odour	
				-5				-5
				-6				-6
						SAND: as above, except more gravel content		

BOREHOLE CONSTRUCTION	SAMPLE		PID READING (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY
	ANALYTES	TYPE				

BOREHOLE NUMBER: MW01

PAGE 1 of 1

DRILLING DATES: 14 April 2003	DRILLING METHODS : Air Rotary
DRILLER : Glover Site Investigations	BOREHOLE DIAMETER :
LOGGED BY : SES	SCREEN TYPE & DIAM:
CHECKED BY : CG	SCREEN SLOT SIZE:



DESCRIPTION	COMMENTS
Grey brown, **Sandy Boulder Clay** with abundant fine to medium rounded gravels. Moist.	NEC
Limestone, light grey, unweathered. Dry to 21m.	NEC
End of Borehole	

LOCATION / NOTES:
NEC= No Evidence of Contamination

LEGEND
- ⊠ Disturbed Sample
- ■ Undisturbed Sample
- ✱ PiD Headspace Analysis
- † Down Borehole Analysis
- ▼ Groundwater Table
- ▽ Perched Water Table

BOREHOLE LOG

Job Title: Groundwater Investigation

Location: Portlaoise, Co Laois

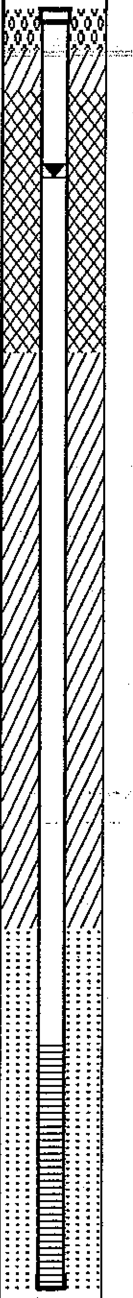
Client: Atlas Ireland Ltd

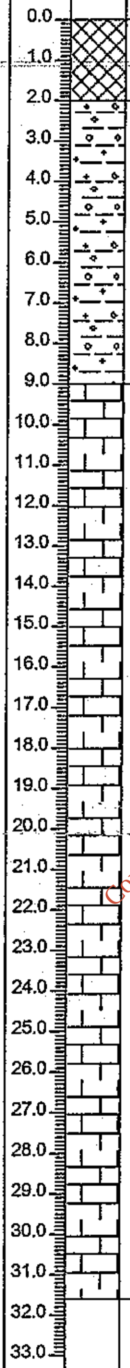
URS

App'd:	Date: 14-4-04
Drawn : SES	Ref: SS/CG/GW
Scale:	Job No: 46605-009-447
Drg. Size: A4	BOREHOLE LOG

BOREHOLE NUMBER: MW02	PAGE 1 of 1
DRILLING DATES: 14-15 April 2003	DRILLING METHODS : Air Rotary
DRILLER : Glover Site Investigations	BOREHOLE DIAMETER :
LOGGED BY : SES	SCREEN TYPE & DIAM:
CHECKED BY : CG	SCREEN SLOT SIZE:

BOREHOLE CONSTRUCTION	SAMPLE ANALYTES	SAMPLE TYPE	PID READING (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY





DESCRIPTION	COMMENTS
Made Ground: Loose **Sand and Gravel** hardcore with some silt. Dry.	NEC
Light brown, **Sandy Boulder Clay**, with abundant fine to medium rounded gravels. Dry.	NEC
Limestone, pale grey, fine grained, unweathered. Dry to 29m.	NEC
End of Borehole	

LOCATION / NOTES:
NEC= No Evidence of Contamination

LEGEND
- ☒ Disturbed Sample
- ■ Undisturbed Sample
- ✱ PID Headspace Analysis
- † Down Borehole Analysis
- ▼ Groundwater Table
- ▽ Perched Water Table

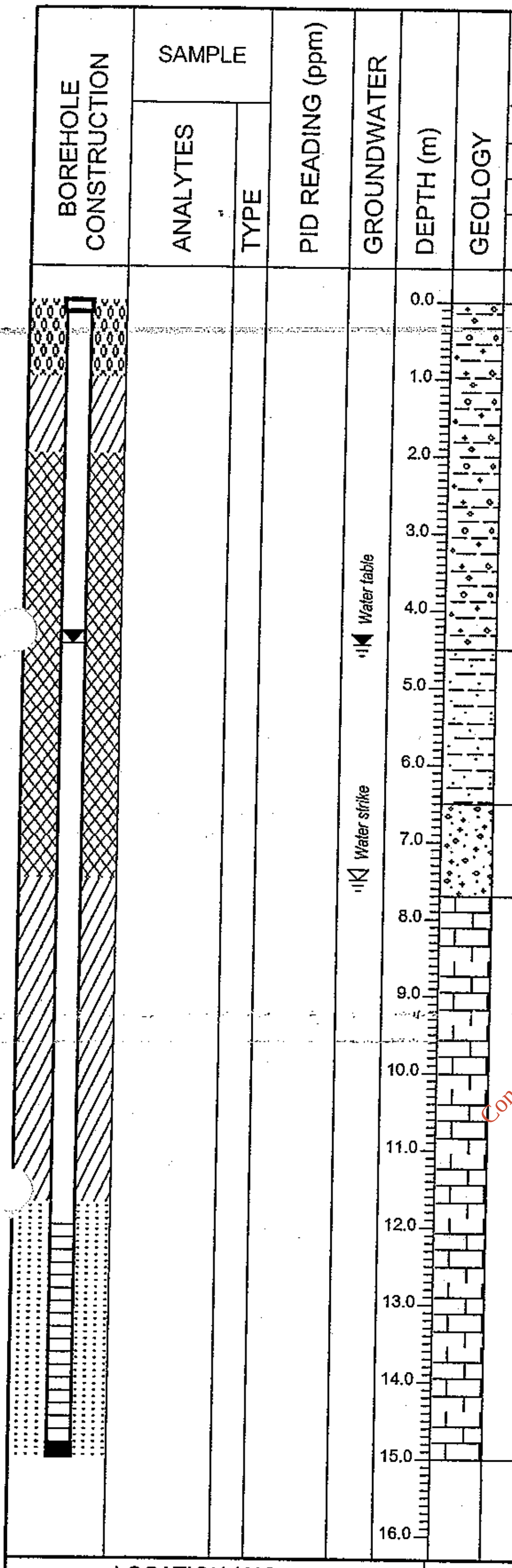
BOREHOLE LOG

Job Title: Groundwater Investigation
Location: Portlaoise, Co Laois
Client: Atlas Ireland Ltd

URS

App'd:	Date: 15-4-04
Drawn : SES	Ref: SS/CG/GW
Scale:	Job No: 46605-009-447
Drg. Size: A4	BOREHOLE LOG

BOREHOLE NUMBER: MW03	PAGE 1 of 1
DRILLING DATES: 14 April 2003	DRILLING METHODS : Air Rotary
DRILLER : Glover Site Investigations	BOREHOLE DIAMETER :
LOGGED BY : SES	SCREEN TYPE & DIAM:
CHECKED BY : CG	SCREEN SLOT SIZE:



DESCRIPTION	COMMENTS
Light brown, **Sandy Boulder Clay** with abundant fine to medium rounded gravels. Moist.	Slight Hydrocarbon Odour
Slightly loose, light brown **Clayey Sand**, with fine to medium grained gravel, slightly moist.	Slight Hydrocarbon Odour
Grey brown **Sand** with fine to medium subrounded to rounded gravels. Moist, becoming wet at 7.5m.	Slight Hydrocarbon Odour
Limestone pale grey, unweathered. Wet.	NEC
End of Borehole	

LOCATION / NOTES:
NEC= No Evidence of Contamination

LEGEND
- ⋈ Disturbed Sample
- ■ Undisturbed Sample
- ✱ PID Headspace Analysis
- † Down Borehole Analysis
- ▼ Groundwater Table
- ▽ Perched Water Table

BOREHOLE LOG

Job Title: Groundwater Investigation
Location: Portlaoise, Co Laois
Client: Atlas Ireland Ltd

URS

App'd:	Date: 14-4-04
Drawn : SES	Ref: SS/CG/GW
Scale:	Job No: 46605-009-447
Drg. Size: A4	BOREHOLE LOG

APPENDIX C

URS 2001 REPORT ON BOREHOLE INSTALLATION

ATTACHMENT J3

02 July 2001

46605\002\Report

RPS COPY.

URS

SHALLOW BOREHOLES 2001

FINAL REPORT

SOIL AND GROUNDWATER INVESTIGATION ATLAS IRELAND FACILITY, PORTLAOISE

PREPARED FOR ATLAS IRELAND LTD

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Final

nsai

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APPENDIX (4 Borehole Logs)

SOIL AND GROUNDWATER INVESTIGATION
ATLAS IRELAND FACILITY, PORTLAOISE

1.0 INTRODUCTION AND SCOPE OF WORK

1.1 INTRODUCTION

URS Dames & Moore are pleased to present this report, which summarises the findings of a soil and groundwater investigation at the Atlas Ireland facility in Portlaoise, Co. Laois. The field work was carried out between the 01st March 2001 and the 14th March 2001. All work completed was in accordance with our proposal of the 28th July 2000 (reference PRP672/09447/GHW) and as amended on the 11th September 2000.

1.2 PROJECT OBJECTIVES

Section 9.3 of the IPC licence for the facility (No. 472) requires Atlas Ireland to carry out a comprehensive soil and groundwater contamination investigation of the site. Details of the investigation were agreed with the EPA prior to implementation. The objectives of the investigation, in line with EPA requirements, were:

- To assess the extent and severity of shallow soil and groundwater contamination (if any) caused by historic and current use of the site for oil recovery and soil treatment.
- To gain an understanding of the shallow groundwater flow system beneath the site.
- To provide Atlas Ireland with a permanent monitoring network that can be used for on-going monitoring of shallow groundwater quality beneath the site.

1.3 SCOPE OF INVESTIGATIVE WORKS

The following scope of work was completed in order to meet the project objectives:

- Four shell and auger boreholes were drilled, at locations agreed in advance with the EPA (BH101-BH104; see attached figure). The boreholes were drilled to depths ranging between 5.7and 6.8 m.
- The vertical profile of contamination through the soil was assessed by detailed logging in the field of the soil returns from the borehole. This included field headspace tests on selected soil samples from the drilling returns. Laboratory analysis of selected soil samples was also undertaken. Two soil samples per borehole were taken for laboratory analysis for diesel range organics (DRO); one sample per borehole was analysed for gasoline range organics (GRO), BTEX compounds (benzene, toluene, ethylbenzene and xylene), polyaromatic hydrocarbons (PAH) and metals. The soil samples were taken where field evidence

(visual/olfactory/headspace results) of hydrocarbon contamination existed. In the absence of such evidence a shallow sample was taken and one near the water table.

- Monitoring wells, comprising 50mm diameter HDPE standpipe piezometers, were installed in each of the completed boreholes. The screened section of each well was placed across the zone of observed groundwater entry to allow ingress of groundwater for sampling, and was surrounded by a coarse silica sand filter pack. A bentonite seal was placed above each filter zone and at surface to isolate the screened section of each well, and to minimise the potential for surface and shallow groundwater entry into each well. Following completion, each of the monitoring wells was developed using the air-lifting technique to enhance the well's ability to exclude fine-grained material and prolong the productive lifespan of the monitoring well. The top of each of the well casings was subsequently surveyed relative to a local datum to allow assessment of groundwater flow direction and hydraulic gradient under the site.

- Groundwater samples were collected from the monitoring wells and analysed for the same parameters as the soil. Samples were collected via inertial-lift type polyethylene tubing, which was dedicated to each well to avoid cross contamination between samples. Before the samples were collected the monitoring wells were purged of at least three volumes of standing water to ensure a water sample representative of that in an aquifer was taken.

The drilling work and well installation was supervised on a full-time basis by a URS Dames & Moore field engineer, who also logged the drilling returns, and collected soil and groundwater samples for both field and laboratory testing. All soil and groundwater samples were taken using clean latex gloves, which were changed between sampling events to avoid cross contamination between samples. Samples were placed in laboratory supplied sample bottles and stored in a chilled cool box during the site investigation. Prior to shipment to the chosen laboratory of the Alcontrol Geochem Group in Chester, UK, the samples were stored in a fridge in URS Dames & Moore's offices. The samples were conveyed to the laboratory in a chilled cool box by overnight courier, together with chain-of-custody documentation.

2.0 SITE ENVIRONMENTAL SETTING

2.1 GEOLOGY

2.1.1 Regional Geology

The underlying bedrock in the region is dark grey argillaceous bioclastic limestone from the Lower Carboniferous. This type of limestone is usually thinly bedded.

The Geological Survey of Ireland's 1860's 6" to 1 mile drift geology sheet indicates that the overburden in this part of Portlaoise is limestone gravel. The map does not give any indication of the thickness of this overburden; however, within 1 km of the site is noted an area of bedrock outcrop, so the overburden cover is likely to be thin.

2.1.2 Site Geology

Detailed geological logs from each of the four boreholes are presented in Appendix A, complete with construction details of the monitoring wells installed at each location.

Below is a brief summary of the geological sequence encountered.

Concrete:	Concrete 0.2-0.9 m deep was encountered at each drilling location. In BH102 the concrete was present to a depth of 0.9 m and was reinforced with steel bars.
Fill:	Consisting of subangular, angular and subrounded gravel, sand, cobbles and boulders ('hardcore'). Hardcore was encountered in BH104 to a depth of 3.6 m; a water seepage was noted in this borehole at 0.9 m depth. Fill was also encountered in BH103 to a depth of 1.0 m.
Gravelly Clay:	Natural gravelly clay was encountered at locations BH101, BH102 and BH103, with a thickness ranging from 3.0 to 4.5 m. The clays were gravelly and varied in colour from brown to grey with an increasing sand content with depth. The gravelly clay was generally damp and soft to firm.
Sand:	In BH104, sand was encountered from the base of the fill layer to the base of the hole at 6.8m depth. The sand was gravelly in nature with some cobbles.
Cobbles/Boulders:	BH101, BH102 and BH103 were completed within dense cobbles or boulders with a clay matrix. Monitoring wells BH101 and BH 103 were completed on refusal indicating that bedrock may be present at 6.8m and 5.7 m below ground level respectively.

2.2 HYDROGEOLOGY

2.2.1 Regional Hydrogeology

Groundwater flow in both the fractured bedrock and overlying sediments is expected to mirror the topography and flow to the northeast towards Portlaoise. Groundwater flow in the bedrock is thought to be karstic and is believed to discharge to the Triogue River, which flows north through Portlaoise to the River Barrow.

The bedrock is considered to be a major aquifer in which the groundwater flow is via fractures, some of which may be solutionally enlarged ('karstified'). As the bedrock is overlain by coarse-grained subsoils it is considered to be extremely vulnerable. The subsoils themselves may also constitute a local aquifer and would also be classified as extremely vulnerable to pollution.

The public water supply for Portlaoise is derived from groundwater. The main groundwater source is at Ballydavis to the north-east of Porlaoise town; with an additional source, which is used occasionally, to the south-east of the town on the R426 road. Groundwater may be used for potable supply in the vicinity of the site, however no wells are noted within a 1 km radius of the site in the well record database of the Geological Survey of Ireland.

2.2.2 Site Hydrogeology

Groundwater was encountered in all four boreholes. Groundwater entry was first observed in each borehole at depths ranging from 2.0 to 5.2 m below ground level. A rapid inflow of water was observed in all boreholes implying relatively high permeability soils. Static water levels in the completed monitoring wells ranged between 1.4 m and 3.8 m below ground level, or between 7.8 and 8.3 m above site datum.

The topographic gradient at the site dips down slightly to the west, however the site has been built up particularly to the rear (east) where up to 1m of concrete and 3.5 m of fill were encountered. The general regional gradient is to the east-north-east. Based on water table elevations measured in the four monitoring wells the groundwater flow direction is to the east, towards a small tributary of the Triogue River.

3.0 FIELD EVIDENCE OF CONTAMINATION

During drilling no visual or olfactory evidence of contamination was observed at locations BH101 and BH102. Slight hydrocarbon odours were observed during the drilling of monitoring well BH103 to a depth of 1.0-1.5 m; below this no odours were detected and PID readings were below 10 ppm.

During the drilling of monitoring well BH104 a hydrocarbon odour and sheen were detected in the shallow fill material to a depth of 1.0 m, below which there was no evidence of contamination.

During groundwater sampling no hydrocarbon sheen or odour was detected from the groundwater recovered from any of the four monitoring wells.

4.0 ANALYTICAL RESULTS

The results of the soil and groundwater sampling are compared to Dutch Intervention values where relevant. The Dutch standards have no legal standing in Ireland but are a commonly used tool in the initial screening of analytical results.

4.1 SOIL RESULTS

A total of eight soil samples were analysed for diesel range organics (DRO) and four for gasoline range organics (GRO), the BTEX compounds (benzene, toluene, ethylbenzene and xylene), polyaromatic hydrocarbons (PAH) and the Dutch list of metals. Full details are given in the sample inventory (Table 1).

4.1.1 DRO in Soil

DRO was detected at low levels in all of the eight soil samples analysed, as shown in Table 3. However, it should be noted that the analytical technique for measuring DRO also picks up a range of natural organic compounds, and results of the order of 50 - 60 mg/kg for 'clean' soil are not uncommon. The levels of DRO detected in the soil samples ranged from 18 mg/kg to 69 mg/kg. The highest DRO result of 69 mg/kg was detected from BH101 at a depth of 0.5 m below ground level; this decreased to 21 mg/kg at 5.2 m.

4.1.2 GRO/BTEX in Soil

With regard to GRO and BTEX (both indicators of petrol contamination), trace levels were detected in two of the four soil samples. Full results are given in Table 4.

The highest level of GRO detected was 0.408 mg/kg from BH104 at a depth of 0.6m. Toluene levels from the same sample were 0.063 mg/kg, which is below the Dutch Intervention Value of 130 mg/kg. Toluene was also detected in BH102 at a depth of 1.5 m at a concentration of 0.022 mg/kg. No other BTEX compounds were detected from this sample. GRO and BTEX levels were below detection limits from those samples analysed from BH101 and BH103.

There is no Dutch Intervention Value for GRO, however, in our experience, concentrations in excess of 50 mg/kg could have significant migration potential, and the risk to sensitive environmental receptors should be assessed in such cases. The threshold of 50 mg/kg was not exceeded any of the four samples analysed.

4.1.3 PAH in Soil

Table 5 outlines PAH results for the soil samples. The Dutch Intervention Value for PAH's in soil is 40 mg/kg calculated as the sum of 10 individual PAH compounds. The respective total PAH concentrations for the four soil samples analysed from the subject site were all well below this. The highest sum of the ten PAH compounds was

6.16 mg/kg from BH102 at a depth of 1.5 m. This value can be mostly attributed to naphthalene, which was detected at 5.78 mg/kg. In the other three samples naphthalene concentrations ranged from 2.35 to 3.0 mg/kg.

4.1.4 Metals in Soil

The metal results are reported in Table 6. No results above typical background concentrations were reported. All the results from all four soil samples analysed were below the Dutch Intervention Values.

4.1.5 QA/QC - Soil Results

A laboratory duplicate of the soil sample from BH102 at a depth of 1.5m was analysed for all analytical suites. The primary sample results together with the lab duplicate and RPD values are given in Table 11.

For the DRO analysis the RPD values were consistently higher than the expected value of 30%. This may be due to the inherent heterogeneity of the soil.

With regard to volatile results, toluene was detected in the primary sample at 0.022 mg/kg and the total GRO was 0.023 mg/kg. No GRO or BTEX compounds were detected in the laboratory duplicate. This again may be due to sample heterogeneity.

With the exception of the anthracene result the RPD values for the PAH analyses were between 8 % and 25% and acceptable (i.e. below 30%). The RPD value for anthracene was 36%. However, both results for anthracene were low 0.036 and 0.015 mg/kg; the RPD value represents a large difference in two small numbers and is not of concern.

The metals results again had acceptable RPD values being less than 30% with the exception of the results for antimony. Antimony was detected in the primary sample at 3 mg/kg and was not detected above the method detection limit in the lab duplicate. As the level at which was detected is low it is not considered cause for concern. As above, the difference may be due to sample heterogeneity.

The sets of results for the primary sample were consistently above those of the laboratory duplicate and were therefore reported in the tables.

4.2 GROUNDWATER RESULTS

Water samples were taken from each of the four monitoring wells and were analysed for DRO, GRO, BTEX, PAH and Metals. Full details are given in the sample inventory (Table 1).

4.2.1 DRO in Water

DRO concentrations in the four water samples ranged from 0.23 mg/L in BH101 to 0.13 mg/L in BH104, (see Table 7). Mineral oil concentrations ranged from 0.047 mg/L to 0.081 mg/L. The mineral oil results were all below the Dutch Intervention Value for mineral oil of 0.6 mg/L.

4.2.2 GRO/BTEX in Water

The GRO and BTEX concentrations in the four water samples were all below the method detection limit of 0.01 mg/L.

4.2.3 PAH in Water

The PAH results are tabulated in Table 9. Total PAH concentrations (sum of 10 compounds on the Dutch list) ranged from 0.3 to 3.3 µg/L.

Four PAH compounds were detected in excess of their respective Dutch Intervention Values in some or all of the monitoring well samples. Specifically these compounds were:

- Benzo(k)fluoranthene was detected in all four monitoring wells above the Dutch Intervention Value of 0.05 µg/L, at a highest concentration of 0.084 µg/L in monitoring well BH101.
- Benzo(a)pyrene was detected in all four monitoring wells at, or in excess, of the Dutch Intervention Value of 0.05 µg/L; the highest concentration was 0.085 µg/L in monitoring well BH101.
- Indeno(1,2,3-cd)pyrene was detected in two samples above the Dutch Intervention Value of 0.05 µg/L, the highest value being 0.058 µg/L.
- Benzo(ghi)perylene was detected in all four monitoring wells above the Dutch Intervention Value of 0.05 µg/L. The highest concentration detected was 0.077 µg/L from monitoring well BH103.

The monitoring well with the highest total PAH concentration was BH103; this well is located up-gradient of the main areas of potential impact on site, namely the tank farm and soil treatment stockpile. The monitoring well with the lowest total PAH concentration was BH104, which is located in the south eastern corner of the site, across-gradient from the main potential source areas on site. This suggests that there may be an up-gradient source of PAH impact.

Monitoring well BH101 is located immediately down-gradient of the tank farm. Several PAH compounds were detected in this monitoring well at higher concentrations than in BH102 and BH103, specifically benzo(k)fluoranthene, benzo(a)pyrene and indeno(1,2,3-

cd)pyrene. This indicates that the site may be contributing to the observed groundwater impact by PAHs.

As there are no known potable supply wells down-gradient of the site this is not considered a major cause of concern. However, groundwater is a regional resource, and the possiblity of future potable supplies or unknown potable supplies being located down-gradient of the site can not be discounted.

4.2.4 Metals in Water

Of the eleven metals included in the analytical suite eight were not detected above the method detection limit in any of the four samples analysed.

Barium was detected in all four samples but was below the Dutch Intervention Value of 0.625 µg/L. The highest concentration of barium detected was 0.26 mg/L from monitoring well BH104.

Zinc was detected in monitoring well BH102 at a concentration of 0.12 mg/L, which is below the Dutch Intervention Value of 0.8 mg/L.

Nickel was detected in three of the four monitoring wells. Monitoring well BH103 yielded a result of 0.077 mg/L of nickel, which is marginally above the Dutch Intervention Level of 0.075 mg/L. In monitoring wells BH102 and BH104 the concentrations were below the Dutch Intervention value. Nickel was not detected in monitoring well BH101.

All the results of the metals analyses in groundwater are given in Table 10.

4.2.5 QA/QC - Water Results

A field duplicate from BH104 for GRO and BTEX was taken and sent for analysis with the other groundwater samples. No GRO or BTEX compounds were detected in either the primary or duplicate sample. The QA/QC data are given in Table 12.

5.0 SUMMARY AND CONCLUSIONS

A total of four groundwater monitoring wells were installed at the Atlas Ireland facility in Clonminam Industrial Estate, Portlaoise, Co. Laois. The monitoring wells were installed to enable the assessment of soil and groundwater quality beneath the site and to allow for continued groundwater monitoring at the site in line with the requirements of the site's IPC licence.

During drilling, evidence of minor hydrocarbon contamination in the shallow material was observed in the field. No PID reading was recorded above 10 ppm, indicating a general absence of volatile organic compounds. Laboratory analysis of the soil samples taken confirmed the field observations and did not highlight any zones of contamination with regard to volatile hydrocarbons, diesel range hydrocarbons, polyaromatic hydrocarbons or metals.

During groundwater sampling no field evidence of hydrocarbon contamination was observed. Laboratory analysis of the groundwater samples did not highlight any significant diesel range or volatile hydrocarbon contamination. The detected levels of four PAH compounds were above Dutch Intervention Values in some wells. The results indicated the possibility of an up-gradient source, however they also indicated that the site may be contributing to the observed impact of groundwater by PAHs. Most of the metal results were below the method reporting limit and all results were below the respective Dutch Intervention Values, except for nickel in one well which marginally exceeded the Dutch Intervention Value.

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URS Dames & Moore is pleased to have had the opportunity to prepare this proposal. Should you wish to discuss any aspect of the proposal please do not hesitate to contact the undersigned.

Yours sincerely
for URS DAMES & MOORE

Edel O'Hannelly

Edel O'Hannelly
Staff Hydrogeologist

Graham Webb
Senior Engineer

TABLE 1

Sample Inventory

Atlas Ireland, Portlaoise

Field I.D.	BH101.1	BH101.2	BH101	BH102.1	BH102.2	BH102	BH103.1	BH103.2	BH103	BH104.1	BH104.2	BH104
Depth (m bgl)	0.5	5.2		1.5	4.8		2.3	4		0.6	4.6	
Sample Type	Soil	Soil	Groundwater	Soil	Soil	Groundwater	Soil	Soil	Groundwater	Soil	Soil	Groundwater
Data Source	Atlas Oil Investigation											
Analysis	07/03/01	08/03/01	14/03/01	02/03/01	03/03/01	14/03/01	01/03/01	01/03/01	14/03/01	05/03/01	06/03/01	14/03/01
DRO and Mineral Oil	x	x	x	x	x	x	x	x	x	x	x	x
GRO & BTEX	x		x	x		x	x		x	x		x
PAH Compounds	x		x	x		x	x		x	x		x
Metals	x		x	x		x	x		x	x		x

TABLE 2

Groundwater Field Measurements

Atlas Ireland, Portlaoise

Field I.D.	BH101	BH102	BH103	BH104
Sample Type	Groundwater	Groundwater	Groundwater	Groundwater
Data Source	Atlas Oil Investigation			

Measurement				
SWL (m bct*)	3.83	3.02	1.4	2.23
SWL (m SD**)	7.8	8.13	8.3	7.77
Purged Volume (L)	30	30	75	75
pH	7.52	6.44	6.8	6.39
Temperature (°C)	10.9	11.6	9.5	9.2
Electrical Conductivity (µS/cm)	389	926	585	545
Observations	Brown very silty water, no sheen, no odour.	Brown, murky turbid water, very silty, no sheen, no odour.	Initially sandy in colour becoming clearer, some silt, no sheen, no odour.	Initially brown and silty, becoming clearer, no sheen, no odour.

m bct* Metres below casing top

m SD** Metres above site datum.

TABLE 3

Soil Analytical Results - Diesel Range Organics
Atlas Ireland, Portlaoise

Field I.D.				BH101.1	BH101.2	BH102.1	BH102.2	BH103.1	BH103.2	BH104.1	BH104.2
Depth (m bgl)				0.5	5.2	1.5	4.8	2.3	4	0.6	4.6
Sample Type				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Data Source				Atlas Oil Investigation							
Chemical	Dutch I Values	MRL^1	Units								
Hydrocarbon Compounds											
Diesel Range Hydrocarbons		1	mg/kg	69	21	68	29	40	25	28	18
Mineral Oil	5,000	1	mg/kg	45	9	31	13	18	11	13	8
C_{10} - C_{20} Compounds		1	mg/kg	34	13	34	18	24	15	17	11
C_{21} - C_{30} Compounds		1	mg/kg	27	6	27	9	12	7	8	6
C_{31} - C_{40} Compounds		1	mg/kg	7	2	7	3	4	2	3	2

MRL^1 Method Reporting Limit
Indicates result in excess of Dutch Intervention (I) Value

TABLE 4
Soil Analytical Results - Gasoline Range Organics
Atlas Ireland, Portlaoise

Field I.D.	BH101.1	BH102.1	BH103.1	BH104.1
Depth (m bgl)	0.5	1.5	2.3	0.6
Sample Type	Soil	Soil	Soil	Soil
Data Source	Atlas Oil Investigation			

Chemical	Dutch I Values	MRL[1]	Units				
Hydrocarbon Compounds							
GRO (C_4-C_{13})		0.01	mg/kg	-	0.023	-	0.408
Benzene	1	0.01	mg/kg	-	-	-	0.022
Toluene	130	0.01	mg/kg	-	0.022	-	0.063
Ethyl Benzene	50	0.01	mg/kg	-	-	-	-
Total Xylene	25	0.01	mg/kg	-	-	-	0.045

MRL[1] Method Reporting Limit

Indicates result in excess of Dutch Intervention (I) Value

- Indicates results below MRL

TABLE 5
Soil Analytical Results - PAH Compounds
Atlas Ireland, Portlaoise

Field I.D.				BH101.1	BH102.1	BH103.1	BH104.1
Depth (m bgl)				0.5	1.5	2.3	0.6
Sample Type				Soil	Soil	Soil	Soil
Data Source				Atlas Oil Investigation			
Chemical	Dutch I Values	MRL[1]	Units				
PAH Compounds							
Naphthalene		0.001	mg/kg	2.35	5.78	3.00	2.97
Acenaphthylene		0.001	mg/kg	0.034	0.15	0.061	0.036
Phenanthrene		0.001	mg/kg	0.35	0.12	0.12	0.066
Fluoranthene		0.001	mg/kg	0.23	0.038	0.05	0.031
Benz(a)anthracene		0.001	mg/kg	0.082	0.024	0.018	0.012
Chrysene		0.001	mg/kg	0.083	0.022	0.02	0.016
Benzo(a)pyrene		0.001	mg/kg	0.037	0.011	0.006	0.005
Benzo(g.h.i)perylene		0.001	mg/kg	0.022	0.007	0.003	0.003
Benzo(k)fluoranthene		0.001	mg/kg	0.044	0.009	0.006	0.006
Indeno(1.2.3-cd)pyrene		0.001	mg/kg	0.024	0.008	0.003	0.002
PAH's 10 (sum)	40		mg/kg	3.25	6.16	3.29	3.15
Acenaphthene		0.001	mg/kg	0.26	0.57	0.32	0.24
Fluorene		0.001	mg/kg	0.16	0.26	0.13	0.085
Anthracene		0.001	mg/kg	0.069	0.032	0.026	0.017
Pyrene		0.001	mg/kg	0.19	0.033	0.041	0.025
Benzo(b)fluoranthene		0.001	mg/kg	0.11	0.025	0.015	0.015
Dibenz(a.h)anthracene		0.001	mg/kg	0.005	0.005	0.001	0.001

MRL[1] Method Reporting Limit

Indicates result in excess of Dutch Intervention (I) Value

TABLE 6

Soil Analytical Results - Metals

Atlas Ireland, Portlaoise

Field I.D.	BH101.1	BH102.1	BH103.1	BH104.1
Depth (m bgl)	0.5	1.5	2.3	0.6
Sample Type	Soil	Soil	Soil	Soil
Data Source	Atlas Oil Investigation			

Chemical	Dutch I Values	MRL[1]	Units				
Metals							
Arsenic	55	1	mg/kg	2	4	1	-
Barium	625	1	mg/kg	69	117	113	18
Cobalt	240	1	mg/kg	3	4	3	3
Chromium	380	1	mg/kg	10	18	18	8
Copper	190	1	mg/kg	9	16	11	7
Molybdenum	200	1	mg/kg	-	2	2	-
Nickel	210	1	mg/kg	10	11	12	11
Lead	530	1	mg/kg	7	45	6	2
Antimony	15	1	mg/kg	3	3	2	1
Zinc	720	1	mg/kg	29	28	23	16
Cadmium	12	0.5	mg/kg	-	-	-	-
Mercury	10	0.3	mg/kg	-	-	-	-

MRL[1] Method Reporting Limit

Indicates result in excess of Dutch Intervention (I) Value

- Indicates result below MRL

TABLE 7
Groundwater Analytical Results - Diesel Range Organics
Atlas Ireland, Portlaoise

Field I.D.	BH101	BH102	BH103	BH104
Sample Type	Groundwater	Groundwater	Groundwater	Groundwater
Data Source	Atlas Oil Investigation			

Chemical	Dutch I Values	MRL[1]	Units				
Hydrocarbon Compounds							
Diesel Range Hydrocarbons		1	mg/L	0.23	0.17	0.15	0.13
Mineral Oil	0.6	1	mg/L	0.081	0.059	0.054	0.047
C_{10} - C_{20} Compounds		1	mg/L	0.093	0.067	0.061	0.053
C_{21} - C_{30} Compounds		1	mg/L	0.12	0.084	0.077	0.067
C_{31} - C_{40} Compounds		1	mg/L	0.023	0.017	0.015	0.013

MRL[1] Method Reporting Limit
Indicates result in excess of Dutch Intervention (I) Value

TABLE 8
Groundwater Analytical Results - Gasoline Range Organics
Atlas Ireland, Portlaoise

Field I.D.				BH101	BH102	BH103	BH104
Sample Type				Groundwater	Groundwater	Groundwater	Groundwater
Data Source				Atlas Oil Investigation			
Chemical	Dutch I Values	MRL[1]	Units				
Hydrocarbon Compounds							
GRO (C_4-C_{13})		0.01	mg/L	-	-	-	-
Benzene	0.03	0.01	mg/L	-	-	-	-
Toluene	1	0.01	mg/L	-	-	-	-
Ethyl Benzene	0.15	0.01	mg/L	-	-	-	-
Total Xylene	0.07	0.01	mg/L	-	-	-	-

MRL[1] Method Reporting Limit
Indicates result in excess of Dutch Intervention (I) Value
- Indicates result below MRL

TABLE 9

Groundwater Analytical Results - PAH Compounds

Atlas Ireland, Portlaoise

Field I.D.				BH101	BH102	BH103	BH104
Sample Type				Groundwater	Groundwater	Groundwater	Groundwater
Data source				Atlas Oil Investigation			
Chemical	Dutch I Values	MRL[1]	Units				
PAH Compounds							
Naphthalene	70	0.01	µg/L	0.13	0.16	2.69	0.11
Acenaphthylene	5	0.01	µg/L	0.011	-	0.09	-
Acenaphthene		0.01	µg/L	0.022	0.015	0.89	0.017
Fluorene		0.01	µg/L	0.022	0.01	0.38	0.011
Phenanthrene	5	0.01	µg/L	0.041	0.028	0.17	0.015
Anthracene		0.01	µg/L	0.015	0.012	0.035	-
Fluoranthene	1	0.01	µg/L	0.037	0.035	0.04	0.025
Pyrene		0.01	µg/L	0.038	0.035	0.041	0.024
Benzo(a)anthracene	0.5	0.01	µg/L	0.023	0.037	0.03	0.011
Chrysene	0.2	0.01	µg/L	0.06	0.05	0.049	0.033
Benzo(b)fluoranthene		0.01	µg/L	0.048	0.04	0.038	0.031
Benzo(k)fluoranthene	0.05	0.01	µg/L	0.084	0.074	0.069	0.051
Benzo(a)pyrene	0.05	0.01	µg/L	0.085	0.072	0.066	0.05
Indeno(1.2.3-cd)pyrene	0.05	0.01	µg/L	0.058	0.053	0.046	0.035
Dibenz(a.h)anthracene		0.01	µg/L	0.025	0.021	0.021	0.017
Benzo(g.h.i)perylene	0.05	0.01	µg/L	0.073	0.07	0.077	0.063

MRL[1] Method Reporting limit

Indicates result in excess of Dutch Intervention (I) Value

- Indicates result below MRL

TABLE 10
Groundwater Analytical Results - Metals
Atlas Ireland, Portlaoise

Field I.D.				BH101	BH102	BH103	BH104
Sample Type				Groundwater	Groundwater	Groundwater	Groundwater
Data Source				Atlas Oil Investigation			
Chemical	Dutch I Values	MRL[1]	Units				
Metals							
Barium	0.625	0.05	mg/L	0.06	0.11	0.11	0.26
Cobalt	0.1	0.05	mg/L	-	-	-	-
Molybdenum	0.3	0.05	mg/L	-	-	-	-
Zinc	0.8	0.05	mg/L	-	0.12	-	0.05
Mercury	0.0003	0.00005	mg/L	-	-	-	-
Arsenic	0.06	0.002	mg/L	-	-	-	-
Cadmium	0.006	0.0004	mg/L	-	-	-	-
Chromium	0.03	0.001	mg/L	-	-	-	-
Copper	0.075	0.005	mg/L	-	-	-	-
Nickel	0.075	0.01	mg/L	-	0.038	0.077	0.032
Lead	0.075	0.005	mg/L	-	-	-	-

MRL[1] Method Reporting Limit

Indicates result in excess of Dutch Intervention (I) Value

- Indicates result below MRL

TABLE 11
Soil QA/QC Data
Atlas Ireland, Portlaoise

Field ID	BH102.1	BH102 DUP	RPD %
Depth (m bgl)	1.5	1.5	
Sample Type	Soil	Soil	
Hydrocarbon Compound	mg/kg	mg/kg	%
Diesel Range Hydrocarbons	68	25	46
Mineral Oil	31	11	48
C_{10} - C_{20} Compounds	34	13	45
C_{21} - C_{30} Compounds	27	10	46
C_{31} - C_{40} Compounds	7	3	40
Hydrocarbon Compound	mg/kg	mg/kg	%
GRO C_4-C_{13}	0.023	-	100
Benzene	-	-	0
Toluene	0.022	-	100
Ethyl Benzene	-	-	0
Total Xylene	-	-	0
PAH Compound	mg/kg	mg/kg	%
Naphthalene	5.78	4.098	17
Acenaphthylene	0.15	0.1	18
Phenanthrene	0.12	0.084	16
Fluoranthene	0.038	0.025	21
Benz(a)anthracene	0.024	0.016	20
Chrysene	0.022	0.015	19
Benzo(a)pyrene	0.011	0.007	22
Benzo(g.h.i)perylene	0.007	0.006	8
Benzo(k)fluoranthene	0.009	0.007	12.5
Indeno(1.2.3-cd)pyrene	0.008	0.005	23
Acenaphthene	0.57	0.397	18
Fluorene	0.26	0.186	17
Anthracene	0.032	0.015	36
Pyrene	0.033	0.022	20
Benzo(b)fluoranthene	0.025	0.017	19
Dibenz(a.h)anthracene	0.005	0.003	25
Metal	mg/kg	mg/kg	%
Arsenic	4	4	0
Barium	117	113	2
Cobalt	4	4	0
Chromium	18	17	3
Copper	16	17	3
Molybdenum	2	1	33
Nickel	11	11	0
Lead	45	49	4
Antimony	3	-	100
Zinc	28	25	6
Cadmium	-	-	0
Mercury	-	-	0

TABLE 12

Groundwater QA/QC Data

Atlas Ireland, Fortlaoise

Field ID	BH104	QA/QC100	RPD %
Hydrocarbon Compound	mg/L	mg/L	
GRO C_4-C_{13}	-	-	0
Benzene	-	-	0
Toluene	-	-	0
Ethyl Benzene	-	-	0
Xylene	-	-	0

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BOREHOLE LOG

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BOREHOLE NO.: BH 101
TOTAL DEPTH: 6.8m bgl

PROJECT INFORMATION

CLIENT:	Atlas Oil
SITE NAME:	Portlaois
SITE LOCATION:	Portlaois, Co Laois
JOB NO.:	46605-002
LOGGED BY:	Nicola O'Hara
CHECKED BY:	
DATES DRILLED:	05/03/01-08/03/01

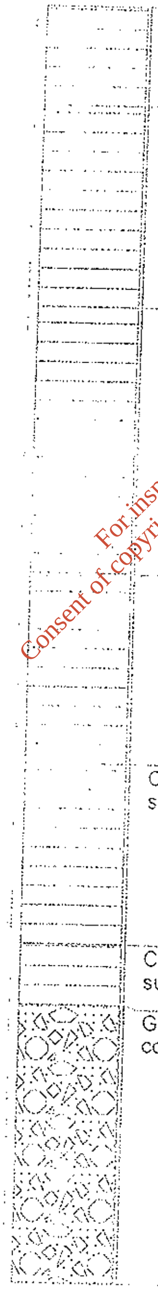
NOTES:

DRILLING INFORMATION

DRILLING CO.:	Glovers
DRILLER:	John Sheppard
DRILLING METHOD/DIAMETER:	Shell and Auger
SCREEN TYPE/DIAMETER:	HDPE/ 50mm
SCREEN SLOT SIZE:	1mm
SAMPLING METHODS:	Grab

▽ Water level during drilling
▼ Water level in completed well

BOREHOLE COMPLETION	SAMP #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
				0		CONCRETE		0
	BH101 1					CLAY: light-medium brown/grey, sandy, gravelly, significant cobbles and boulders,	no odour	
				-1		CLAY: light brown, dry, sandy gravelly, significant angular and subangular cobbles,		-1
				-2		CLAY: very stiff, light brown, boulder clay, gravelly, sandy,	no odour	-2
				-3			moist, no sheen, no odour	3
			▼					
				-4		CLAY: very stiff, compacted, sandy, dry, some subangular, medium-coarse gravel,		-4
	BH101.2		▽	-5		CLAY: very stiff, compacted, sandy, dry, some subangular, medium-coarse gravel,		-5
						GRAVEL: subangular and subrounded, cobbles and boulders, some sand,	no sheen, no odour	
				-6				-6



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BOREHOLE LOG

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BOREHOLE NO.: BH 102
TOTAL DEPTH: 6.8m bgl

PROJECT INFORMATION

CLIENT: Atlas Oil
SITE NAME: Portlaois
SITE LOCATION: Portlaois, Co Laois
JOB NO.: 46605-002
LOGGED BY: Caroline Enright
CHECKED BY:
DATES DRILLED: 01/03/01-03/03/01
NOTES:

DRILLING INFORMATION

DRILLING CO.: Glovers
DRILLER: John Sheppard
DRILLING METHOD/DIAMETER: Shell and Auger
SCREEN TYPE/DIAMETER: HDPE/ 50mm
SCREEN SLOT SIZE: 1mm
SAMPLING METHODS: Grab

▽ Water level during drilling
▼ Water level in completed well

BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
				0		CONCRETE		0
				-1		CLAY: soft-firm, mid-brown, friable, some peat, some small-medium subangular gravel,	slightly damp	-1
	BH102.1	1				CLAY: soft-firm, mid-brown with grey/green mottling, friable, some peat, some small-medium subangular and subrounded gravel,		
				-2		CLAY: soft, green grey, slightly plastic, some large cobbles,	slightly damp, no odour	-2
			▽	-3		CLAY: firm to stiff, light grey with green mottling, plastic, large gravel and cobbles	slightly damp, no odour	-3
						CLAY: soft, brown, plastic, marley, large gravel and cobbles		
				-4		CLAY: soft, light brown, plastic, marley, fine-coarse gravel, some cobbles	slightly damp, no odour	-4
						CLAY: soft, light brown, plastic, marley, fine-coarse gravel, some cobbles		
	BH102.2	1				BOULDERS: very hard ground		
			▽	-5		BOULDERS: large cobles gravel and boulders, some clay		-5
				-6		BOULDERS: some firm clay with fine-coarse gravel, large cobbles		-6

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BOREHOLE LOG

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BOREHOLE NO.: BH 103
TOTAL DEPTH: 5.7m bgl

PROJECT INFORMATION

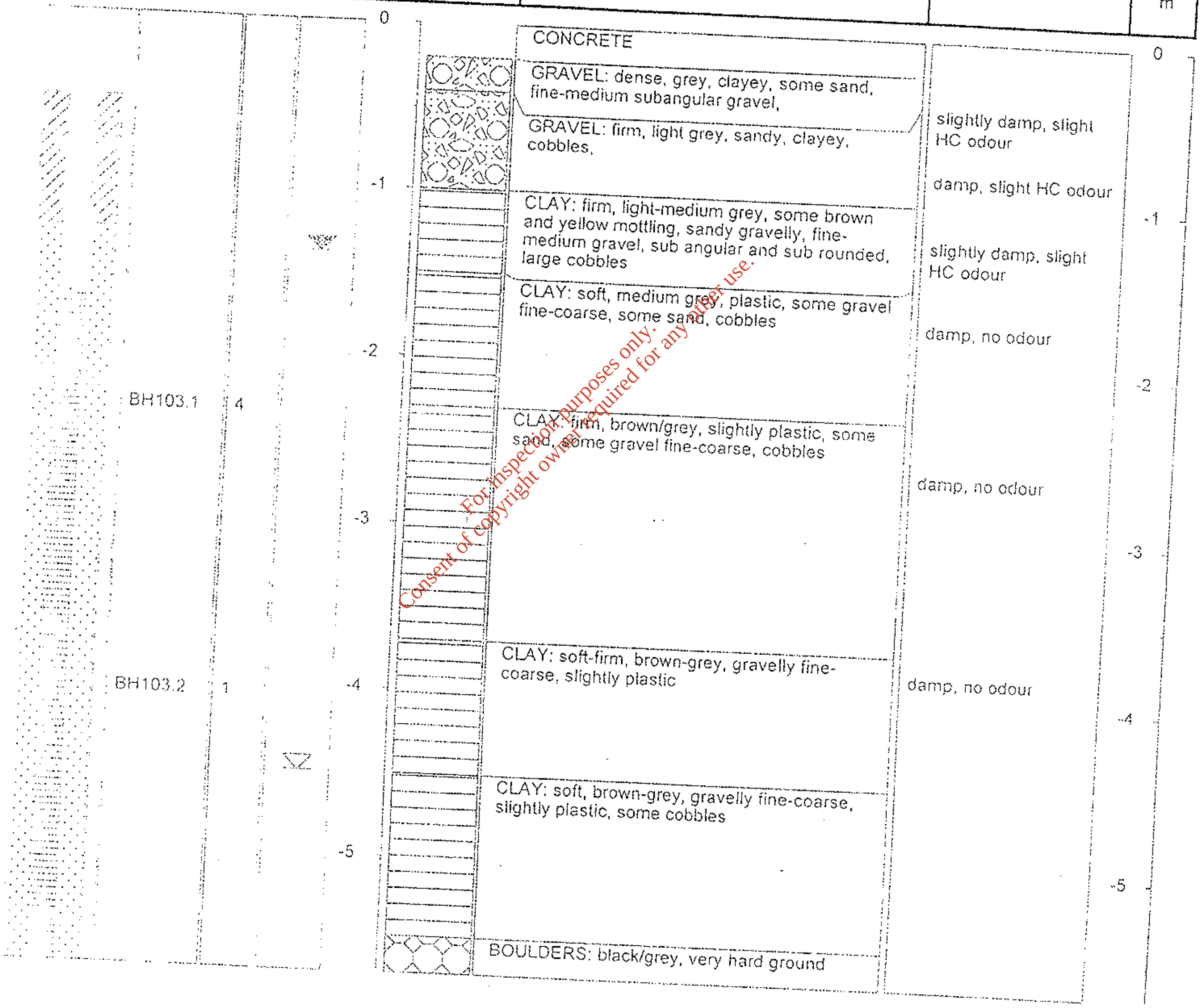
CLIENT: Atlas Oil
SITE NAME: Portlaois
SITE LOCATION: Portlaois, Co Laois
JOB NO.: 46605-002
LOGGED BY: Caroline Enright
CHECKED BY:
DATES DRILLED: 01/03/01-03/03/01

DRILLING INFORMATION

DRILLING CO.: Glovers
DRILLER: John Sheppard
DRILLING METHOD/DIAMETER: Shell and Auger
SCREEN TYPE/DIAMETER: HDPE/ 50mm
SCREEN SLOT SIZE: 1mm
SAMPLING METHODS: Grab

NOTES:

▽ Water level during drilling
▼ Water level in completed well



SAMP. #	PID ppm	DESCRIPTION	COMMENTS
		CONCRETE	
		GRAVEL: dense, grey, clayey, some sand, fine-medium subangular gravel,	
		GRAVEL: firm, light grey, sandy, clayey, cobbles,	slightly damp, slight HC odour damp, slight HC odour
		CLAY: firm, light-medium grey, some brown and yellow mottling, sandy gravelly, fine-medium gravel, sub angular and sub rounded, large cobbles	slightly damp, slight HC odour
BH103.1	4	CLAY: soft, medium grey, plastic, some gravel fine-coarse, some sand, cobbles	damp, no odour
		CLAY: firm, brown/grey, slightly plastic, some sand, some gravel fine-coarse, cobbles	damp, no odour
BH103.2	1	CLAY: soft-firm, brown-grey, gravelly fine-coarse, slightly plastic	damp, no odour
		CLAY: soft, brown-grey, gravelly fine-coarse, slightly plastic, some cobbles	
		BOULDERS: black/grey, very hard ground	

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BOREHOLE LOG

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BOREHOLE NO.: BH 104
TOTAL DEPTH: 6.8m bgl

PROJECT INFORMATION

CLIENT: Atlas Oil
SITE NAME: Portlaois
SITE LOCATION: Portlaois, Co Laois
JOB NO.: 46605-002
LOGGED BY: Nicola O'Hara
CHECKED BY:
DATES DRILLED: 05/03/01-08/03/01

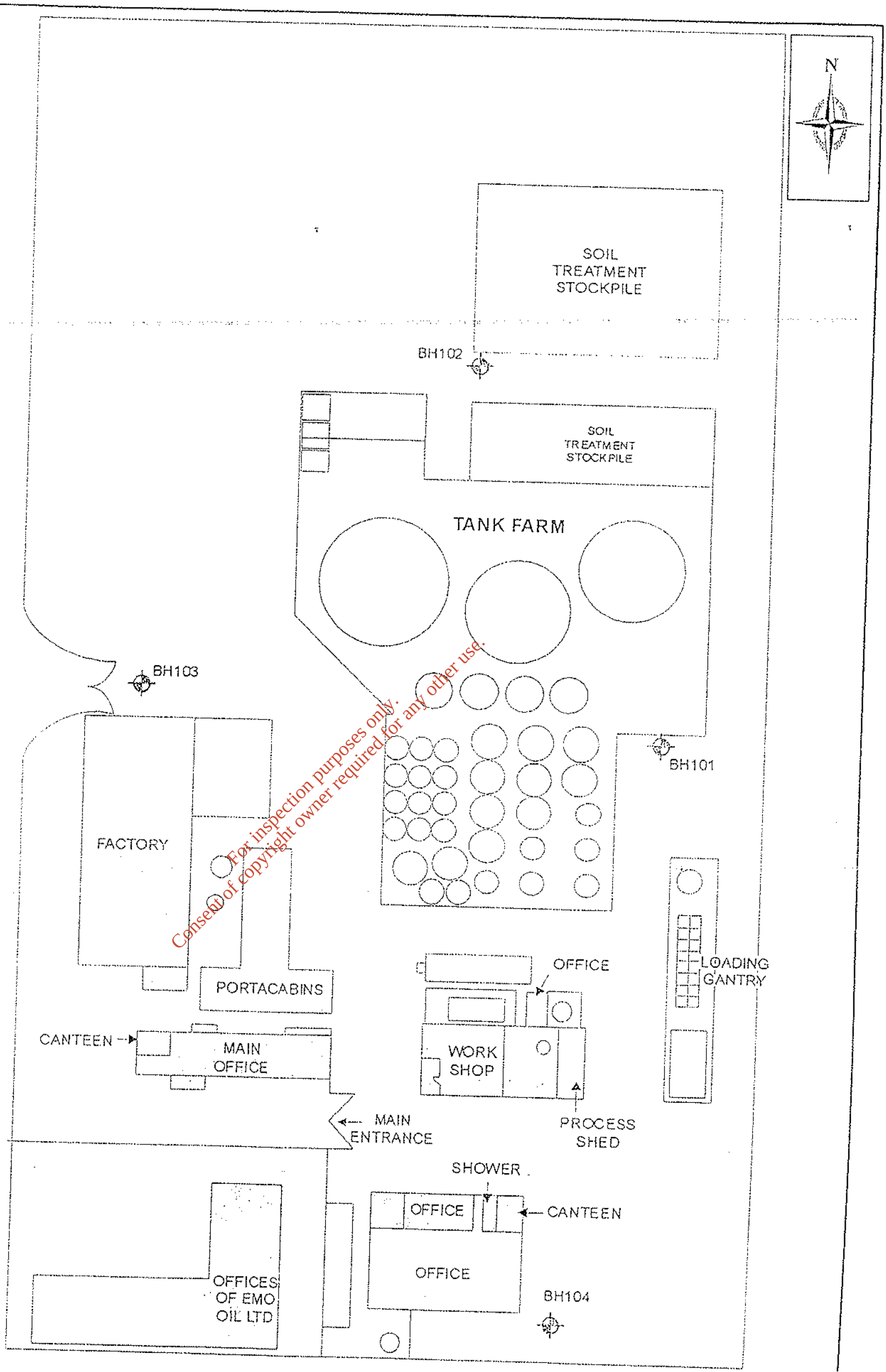
NOTES:

DRILLING INFORMATION

DRILLING CO.: Glovers
DRILLER: John Sheppard
DRILLING METHOD/DIAMETER: Shell and Auger
SCREEN TYPE/DIAMETER: HDPE/ 50mm
SCREEN SLOT SIZE: 1mm
SAMPLING METHODS: Grab

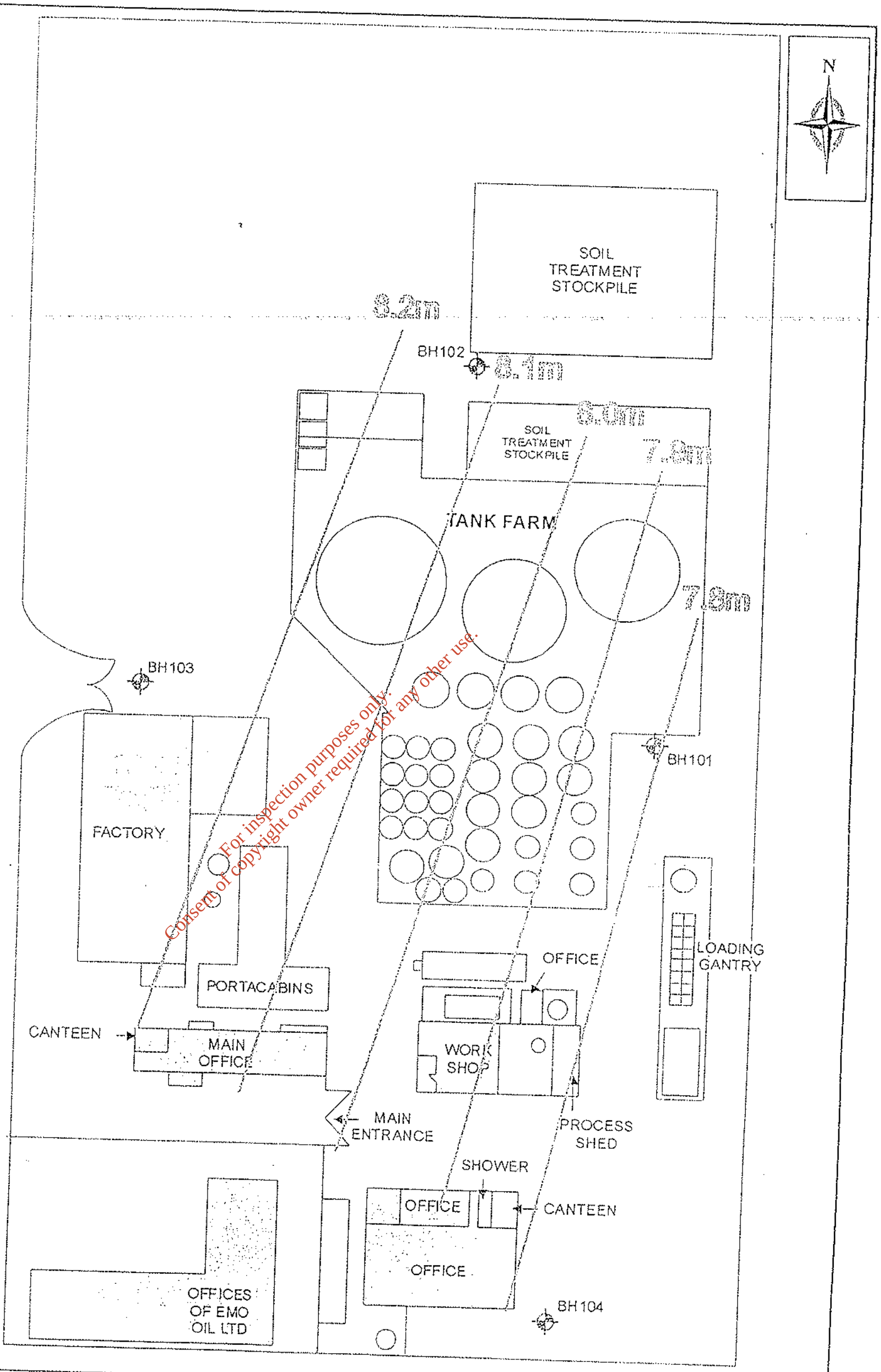
▽ Water level during drilling
▼ Water level in completed well

BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
				0		CONCRETE		0
	BH104.1					FILL: dense, hardcore some clay,	HC odour, sheen	
				-1				-1
			▼	-2				-2
			▽	-3			no odour, no sheen	-3
						GRAVEL & SAND: medium grained gravel,	no odour, wet	
				-4				-4
	BH104.2					SAND: medium-coarse grained, medium to coarse gravel angular and subangular, angular and subangular cobbles,	no odour	
				-5				-5
				-6				-6
						SAND: as above, except more gravel content		



Title	BOREHOLE LOCATION PLAN
Project	PHASE II SITE INVESTIGATION
Location	CLONMINAM INDUSTRIAL ESTATE
Client	ATLAS IRELAND

App'd	Reference EOH/DB/DUB	Date APRIL 2000
TI App'd DB	Job No. 46605-002-447	Scale NTS
URS Dames & Moore [illegible]	Dames & Moore Joseph Court, 4th Floor 5-6 Harcourt Road Dublin 2 Ireland Tel: +353 (0)1 475 4422 Fax: +353 (0)1 475 4578 www.urscorp.com	FIGURE 1



Title: INFERRED PIEZOMETRIC CONTOURS
Project: PHASE II SITE INVESTIGATION
Location: CLONMINAM INDUSTRIAL ESTATE
Client: ATLAS IRELAND

App'd
Reference: EOH/DB/DUB
Date: APRIL 2000
TI App'd: DB
Job No.: 46605-002-447
Scale: NTS

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FIGURE 2