Caulmert Limited

Engineering, Environmental & Planning
Consultancy Services

Daneshill Soils Treatment Facility

FCC Recycling (UK) Limited

Emissions Management Plan

Prepared by:

Caulmert Limited
14 Farrington Way, Eastwood Link Business Park, Eastwood, Notts, NG16 3BF
Tel: 01773 749132
Fax: 01773 746280
Email: andystocks@caulmert.com
Web: www.caulmert.com

Document Reference: 3982-CAU-XX-XX-RP-V-0307.A0-C1

January 2021

APPROVAL RECORD

Site:	Daneshill Soils Treatment Facility
Client:	FCC Recycling (UK) Limited
Project Title:	Environmental Permit Variation
Document Title:	Emissions Management Plan
Document Ref:	3982-CAU-XX-XX-RP-V-0307-A0.C1
Report Status:	**Final**
Project Manager:	Andy Stocks
Caulmert Limited:	14 Farrington Way, Eastwood Link Business Park, Eastwood, Notts, NG16 3BF
Telephone:	01773 749132

Author	Kellie-Marie P. Burston	**Date**	15/01/2021
Reviewer	Andy Stocks	**Date**	15/01/2021
Approved	Andy Stocks	**Date**	15/01/2021

DISCLAIMER

EMISSIONS MANAGEMENT PLAN

TABLE OF CONTENTS

DRAWINGS

3982-CAU-XX-XX-DR-V-1800	500m Receptors Plan
3982-CAU-XX-XX-DR-V-1801	Site Location Plan
3982-CAU-XX-XX-DR-V-1803	Dust and Asbestos Monitoring Plan
3982-CAU-XX-XX-DR-V-1804	Daneshill Landfill Site and Soil Treatment Facility
3982-CAU-XX-XX-DR-V-1805	Proposed Site Layout
3982-CAU-XX-XX-DR-V-1806	Cross Sections Drawing

APPENDICES

Appendix 1:	CRS Picking Station Specification
Appendix 2:	Soil Reception Procedure
Appendix 3:	Evergard Asbestos Surfactant MSDS Sheets
Appendix 4:	Air Quality Impact Assessment
Appendix 5:	Rowley Regis Biofilter Analysis

1. INTRODUCTION

1.1 Report Context

1.1.1 FCC Recycling (UK) Ltd (hereafter referred to as the 'Operator') operate Daneshill Landfill Site, which is located approximately 2km east of Lound Village, Nottinghamshire at National Grid Reference SK6755086750.

1.1.2 Caulmert Limited were appointed by the operator to prepare an application to vary the existing permit to include a Soil Treatment Facility (STF) which will operate on a constructed treatment pad within the landfill site boundary. As part of the application, an Emissions Management Plan (EMP) is required.

1.1.3 Preparation of this EMP has been in consultation with the following Environment Agency (EA) guidance documents:

1.1.4 Technical Guidance Notes (Monitoring) M8 – Ambient Air. Environment Agency, Version 2 (May 2011); and

1.1.5 Technical Guidance Note (Monitoring) M17 – Monitoring Particulate Matter in Ambient Air around Waste Facilities. Environment Agency, Version 2 (July 2013).

1.1.6 The Operator proposes to add the following listed activities to the current permit:

- Section 5.3A(1)(a)(ii) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment;
- Section 5.3A(1)(a)(i) - Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving biological treatment;
- Section 5.4A(1)(a)(i) - Disposal or recovery of non-hazardous waste with a capacity exceeding 10 tonnes per day involving biological treatment;
- Section 5.6 Part A (1) (a) – Temporary storage of hazardous waste with a total capacity exceeding 50 tonnes pending any of the activities listed in Sections 5.1, 5.2 and 5.3;

1.1.7 This EMP provides details of appropriate measures that are required for effective emissions management and control at the facility during construction and operational phases.

1.1.8 The Operator are required to submit a EMP to consider the impact of dust & particulate emissions on receptors as a result of the construction and operational activities of the STF. This EMP provides means of assessing the effectiveness of control measures. The proposed Emissions Action Plan should be implemented in cases of failure and emissions events.

1.2 Objectives

1.2.1 This EMP has the aim of ensuring that potential emission sources are identified and controlled at source where possible. The EMP aims to minimise the risk of emissions

impact at locations outside of the facility boundary. Potential emissions as a result of the soil treatment facility include:

1) Dust

2) PM10's

3) Asbestos fibres

4) Biofilter: VOC's (including BTEX), Speciated PAHs, TPH, PID

1.2.2 As a minimum this EMP will consider the following elements:

- An assessment of the risks of emissions at the Facility;
- Identify the appropriate controls to manage the identified risks;
- Prevent the emissions of dust, PM10 and asbestos fibres;
- Emissions monitoring;
- Identify actions, contingencies and responsibilities when emission problems arise; and
- Regular review of the effectiveness of the control and mitigation measures.

1.2.3 All internal and external storage and treatment areas will be designed so that they collect, extract and direct all process emissions to an appropriate abatement system for treatment before release.

1.2.4 The EMP is supported by the procedures and controls established within the following documents:

- The Site Management Plan;
- The Site Operational Procedures; and,
- The Site Environmental Risk Assessment.

2. SITE BACKGROUND

2.1 Site Setting

2.1.1 The proposed Soil Treatment Facility site is located within the footprint of Daneshill Landfill Site which is located approximately 2km east of Lound Village, 6km north-west of Retford and 11km north east from Worksop. The location of the proposed activity in relation to its surroundings is detailed in the Site Location Plan (3982-CAU-XX-XX-DR-V-1801).

2.1.2 The site is bordered to the north and east by agricultural land and mixed woodland and to the west. South-west are nature reserves and the Daneshill Lakes. The nearest residential dwelling to the site is Daneshill Cottages which lies approximately 75m to the south-west of the site and Loundfield Farm 200m east of the site.

2.1.3 The proposed location of the STF will fall within the current permit boundary of Daneshill Landfill Site; therefore, this application is not seeking to extend the permit boundary. The STF shall sit in the southern part of the site within the footprint of Daneshill Landfill Site as shown on drawing 3982-CAU-XX-XX-DR-V-1804.

2.1.4 The facility will be limited to accepting wastes that can be treated to a point where they can be used for restoration soils on the landfill.

2.2 Soil Treatment Operations

2.2.1 The STF is proposed to accept and process up to 29,999 tonnes per annum of hazardous containing visible bound pieces of asbestos and/or hydrocarbons and 20,001 tonnes of non-hazardous soils. The soils treated will be used for the restoration of the wider Daneshill Landfill site. The usual maximum biological treatment time for soils is 6 months in general with the majority being treated in periods of between 8-16 weeks.

2.2.2 The treatment areas consist of 2 treatment pads measuring at 3450m^2 and 3500m^2 for biotreatment/physical treatment and another 1 x 48800m^2 treatment pad solely for screening/processing. An indicative operational layout of the treatment and processing area and cross section is detailed in drawing refs: 3982-CAU-XX-XX-DR-V-1805 and 3982-CAU-XX-XX-DR-V-1806.

Asbestos Storage

Upon satisfactory pre-acceptance and waste acceptance checks, on arrival to site, the soils will be weighed and directed from the weighbridge to the soils reception area and undergo an inspection and sampling for analytical testing. Soils will be stored on impermeable surfacing provided with bunded edges and sealed drainage. After placement on the storage area, the soils will be sheeted to reduce the potential for air borne emissions. The pre-assessment testing is carried out to confirm the soil matrix and not containing any asbestos fibres above 0.1% for chrysotile asbestos and 0.01% for all other forms of asbestos. Until the testing has been completed, the soils will remain sheeted. Following satisfactory results from pre-assessment confirming that the soils are compliant with the acceptance criteria,

the soil can be stored externally, un-sheeted and will undergo pre-screening and handpicking for asbestos fragments. Asbestos containing soils with fibres concentrations that has to potential to become airborne at concentrations above the air monitoring detection limit will be rejected from site. Soils that meet all waste acceptance checks will be formally accepted for treatment.

Pre-screening and Handpicking of asbestos containing soils

2.2.3 Following formal acceptance, only hazardous soils containing asbestos will under-go pre-screening and handpicking, where pre-screening will be carried out prior to hand picking. Soils will be screened using a three-way screening (0-15mm, 15-50mm and 50mm+). This is to reduce the potential of damage to the picking station and make hand picking of asbestos debris more effective. All stockpiles generated from the screening/hand-picking will be visually inspected for the presence of residual asbestos prior to being samples for further biotreatment or reuse.

2.2.4 The picking station will provide an enclosed working area for hand-picking, details of the station specification is included in Appendix 1 . A conveyor belt will be used on the picking line providing a smoother running line which will aid the hand picking process. Treatment will only commence when waste acceptance testing has confirmed that the asbestos fibres content in soils is lower than 0.1% for chrysotile asbestos and 0.01% for all other forms of asbestos. Handpicking of small asbestos fractions will only be undertaken by suitably trained operatives, with asbestos fractions placed directly in polythene asbestos bags. The bags will be sealed and double bagged and will be placed in a designated sealed and locked asbestos bin.

2.2.5 Dust suppression will be provided for the screener as a preventative measure, in addition, air monitoring will be carried out hourly to assess if there is any detection of asbestos fibres above the method detection limit.

Screening of non-hazardous soils

2.2.6 Following acceptance and valid pre-acceptance testing results to confirm chemical validity, non-hazardous soils will be placed into their respective treatment batches and undergo physical treatment. Non-hazardous soils will be screened to remove oversize inclusions prior to reuse to ensure they are physically suitable.

2.2.7 Following screening, the soils will be stockpiled for use in recovery at Daneshill Landfill Site, this may also include soils that have undergone bioremediation process to remove oversized materials.

Bioremediation Process Description

2.2.8 The biological treatment process varies between 8 to 16 weeks, dependent on the contaminants present in the soil.

2.2.9 Bioremediation of soils will be undertaken on a newly constructed GCL lined pad comprising sand blinding, crushed concrete and sealed drainage to allow pumping to

holding tanks. The treatment pad has an appropriate fall to allow all process water to be collected in a precast concrete covered gully. As there is no drainage network on site, all process waters will be pumped to on-site holding tanks with any excess water tankered off to an appropriate disposal facility.

2.2.10 Soils accepted at the STF are deposited on the treatment area. The soils are arranged into biopiles using a system of batches which allows the waste to be trackable by age of waste and from the point of origin to its location on the treatment pad.

2.2.11 Bioremediation of soils refers to the biological treatment of contaminated soils by creating optimal conditions for biodegradation of contaminants. To enable biodegradation to occur the following parameters are monitored and manipulated:

- pH
- temperature,
- moisture content,
- oxygen level
- nutrient concentrations

2.2.12 Biodegradation of the organic contaminants is carried out by microorganisms in the soil. This is enhanced by addition of inorganic nutrients such as ammoniacal nitrate and organic material such as woodchip. Management of moisture content is also essential for microbial activity; low moisture content has the potential to inhibit microbial growth, but excessive moisture can restrict airflow. The perforated aeration pipes located beneath the waste will extract air from the biopile to effectively control waste oxygen levels and moisture content to maintain aerobic conditions.

2.2.13 Temperature in the biopiles is maintained between 30 and 40°C to ensure the mesophilic microflora are predominately stimulated, optimising biodegradation.

2.2.14 The stages of the bioremediation process are detailed below:

- Initial Placement: The soil is placed on the treatment pad by a tipper lorry/dump truck where an excavator will form the biopile.
- Addition of Nutrients: Based on the contaminants present within the soil, nutrients are added to facilitate the biological degradation of the hydrocarbon compounds.
- Chemical Analysis – Approximately every 4 weeks the soil is analysed for contaminant concentrations to determine whether the biological treatment of the soil is adequately reducing the hazardous contaminants to non-hazardous concentrations. Additional nutrients and/or organic inputs may be added to expedite the process
- Nutrients testing – Every 2-4 weeks the soil is analysed for nutrient levels within the soil to ensure that there is sufficient inorganic and organic material to facilitate the biodegradation process.
- De-compaction of the soil – Every 4-8 weeks the biopile will be turned to facilitate aeration of the soil. Reintroduction of treated water into the biopiles if emissions

(e.g. dust) is being generated or soils are outside of the optimal moisture content range

- Validation testing: Once the soil treatment is deemed complete it is sampled for laboratory testing to ensure that contaminants meet the landfill re-use criteria.

2.2.15 On receipt of validation testing that confirms the soil meets re-use criteria, it is transferred to the non-hazardous soils storage area, disposed in the adjacent landfill void or reused on site as restoration soils.

2.2.16 There are no direct releases off-site other than via the engineered surface water management system. The site will be engineered so that all collected surface waters and process waters from biopiles will pass into a drain at the lowest points of the treatment pad and transferred into holding tanks. The holding tanks will store all surface and process waters until emptied and disposed of at a suitable facility offsite.

3. POTENTIAL SENSITIVE RECEPTORS

3.1.1 The proposed STF site lies within a flat lying land resting on highly permeable sand/gravel and Sherwood Sandstone deposits. The site is in a predominantly agricultural setting of which Loundfield Farm is located 500m to the east. Other nearby residential and domestic dwellings include a few properties and a traveller's site located on Daneshill Road. Industrial/ commercial properties such as Retford Ready Mix Limited (concrete suppliers) and Retford Dismantlers (used trucks) are located 330m south and 440m south-south-east from the site. Recreational activities including the Daneshill Sailing Club is located 520m west from the site boundary which utilises the Daneshill Local Nature reserve and lakes as part of its activities.

3.1.2 The site is bound by a number of populated settlements; the village of Lound 1.5km south east, Torworth Village 1.8km west, Mattersey village 2.6km north-north-east and the largest of the four settlements, Ranskill located 1.9km north-west from the site boundary.

3.1.3 A review of the prevailing wind direction has identified that the most dominant wind is from the south-west/south-south-west towards north-east/north-north-east. The wind direction is likely to blow towards Mattersey Village, Loundfield Farm and agricultural fields. Given the distance from the site boundary and the transient nature of odours from site, it is considered that receptors are unlikely to be impacted as odours are likely to dissipate in this distance.

3.1.4 A search within 500m did not locate any Special Protection Areas (SPA's), Specials Areas of Conservation (SAC's), Areas of Outstanding Natural Beauty (AONB), National Nature Reserves (NNR's) RAMSAR Sites, Ancient Woodlands or World Heritage Sites.

3.1.5 There are no Air Quality Management Areas (AQMA's) in the vicinity of the site.

3.1.6 The site is located on river material classified by the Environment Agency as a secondary A aquifer of which is further underlain by the Chester Formation, part of the Sherwood Sandstone Group and which is classed as a principal aquifer.

3.1.7 The potential receptors within 500m of the site boundary are provided on Drawing 3982-CAU-XX-XX-DR-V-1800 and are summarised in Table 1.

Table 1: Potential Receptors identified within 500m of the site boundary

Receptor	Activity	Distance from site	Direction from site
Traveller's Site	Residential	155m	SWS
Daneshill Road	Public road	250-500m	S, W, SW
Retford Ready Mix Limited	Industrial premises (concrete plant)	330m	S
Daneshill Lakes Nature Reserve	Nature Conservation	400m	W
Retford Dismantlers	Industrial vehicles dismantling	440m	W
Loundfield Farm	Residential	495m	E
Mattersey Hill Marsh SSSI	Nature Conservation	500m	NW
Residential properties off Daneshill Road	Residential	500m	SW
Daneshill Sailing Club	Recreational	520m	W
Scrap Yard	Industrial	860m	NW

Surface Water

3.1.8 The closest surface water feature is a stream approximately 460m to the West of the site, which flows North into the River Idle. There are two fisheries in the surrounding area, Clearwater Lake fishery located 1.1km North of the site boundary and Lakeside fisheries located 1.1km north west.

3.1.9 Daneshill Lakes Nature Reserve is located 400m West of the site boundary, in which there are several small lakes where the area is used for recreational use and sailing.

3.1.10 The site is not located within a flood risk zone.

4. POTENTIAL EMISSION SOURCES

4.1 Construction Phase

4.1.1 Fugitive emissions during the construction of building and developing all infrastructure associated with the Soil Treatment Facility

4.1.2 Emissions can arise from:

- Construction of treatment pads;
- Drop height of materials e.g. aggregates,
- Handling of aggregates and crushed concrete for surface preparation;
- Screening of non-hazardous soils to remove oversized materials;
- Movement of site vehicles on dusty surfaces; and,
- Crushed concrete dust/asbestos fibres on site vehicles.

4.2 Operational Phase

4.2.1 Fugitive emissions can result from the receipt of contaminated soils if the waste acceptance procedure for soil inputs is not correctly implemented or if emissions mitigation measures are absent.

4.2.2 Potential emission sources have been identified from the proposed operational activities:

- Delivery of waste to site;
- Vehicle movements;
- Deposit of soils on the appropriate treatment area;
- Potential dust, particulates and asbestos fibres as a result of soil screening and hand picking;
- Bioremediation of hydrocarbon contaminated soils including initial placement, aeration and turning; and
- Storage and transfer of oversize materials (e.g. concrete debris etc) removed from soil screening.

5. POTENTIAL PATHWAYS

5.1 Airborne Pathways

5.1.1 It is considered the potential pathway for dust ,particulate and asbestos fibre emissions to sensitive receptors are via airborne transmission. Factors affecting emissions include:

- Quantity of wastes;
- Wind direction, exposure and speed; and,
- Exposure of sensitive receptor to site operations.

5.1.2 Meteorological data from Doncaster/Sheffield airport weather station (winderfinder.com) indicates that the prevailing wind is from the south-west, west-south-west and west towards the north-east, east, and east-north-east. These wind conditions are reflective of those likely to be experienced at Daneshill Soil Treatment Facility. A review of the sensitive receptors in Table 1 shows that the receptor likely to be impacted by emissions within 500m of the site boundary, is Loundfield farm which is located 495m east from the site boundary. However, given the transient nature of airborne emissions and the distance of this receptor from site, it is unlikely to be significantly impacted by emissions from site.

6. CONTROL MEASURES

6.1.1 The following control measures will be implemented to minimise the impact of emissions from Daneshill Soil Treatment Facility.

6.1.2 During the construction of the geo-composite clay lined crushed treatment pad, drop heights will be reduced to ensure there isn't any unnecessary or excessive dust & particulate plumes. Lorry drivers delivering hardcore and aggregates which will form the foundations of the impermeable base will be advised at the weighbridge to reduce drop heights to minimise the likelihood of dust & particulate emissions.

6.1.3 Haul and traffic movements roads can be dampened down as necessary, especially during dry and windy conditions by use of a site bowser. When leaving site, all vehicles will be required to pass through the wheel wash prior to exit.

6.1.4 All staff will be trained and aware of the effect of dust and particulate emissions and to carry out activities in a way that will minimise any plumes as a result of handling and developing the crushed treatment pad.

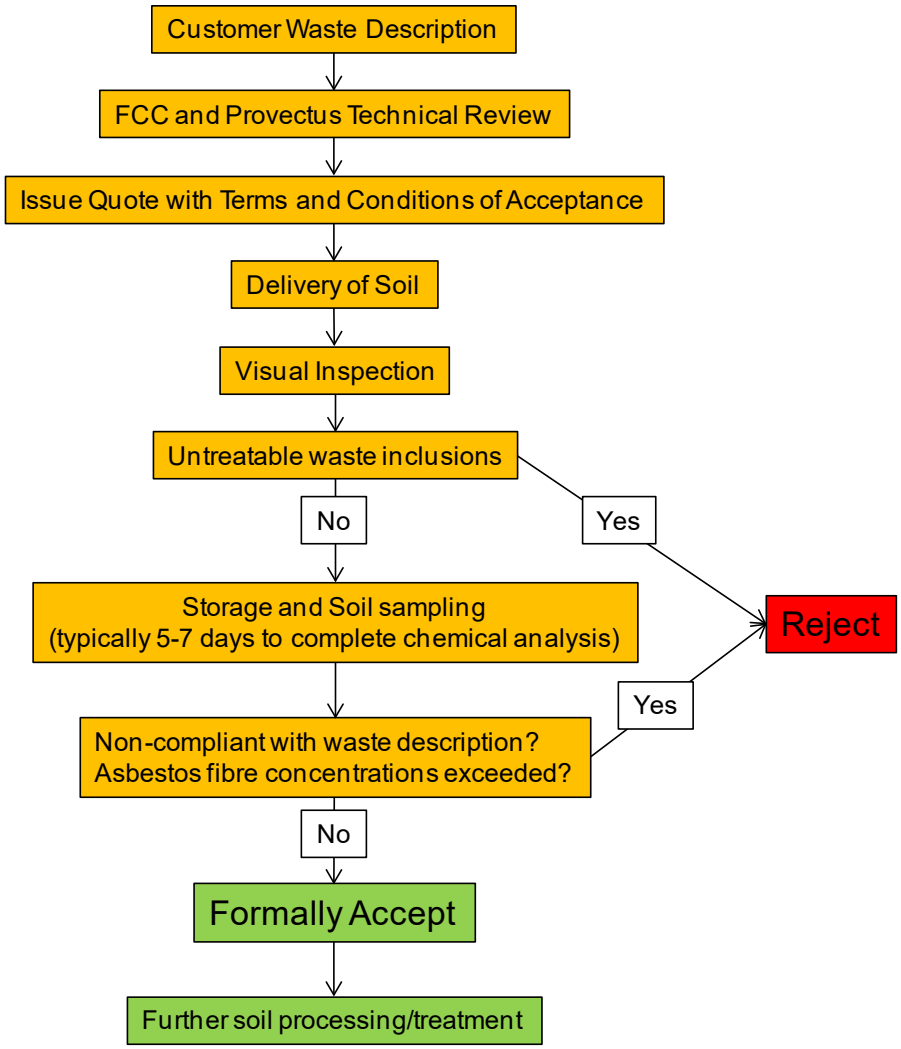
Pre-acceptance, Waste Acceptance and pre-assessment

6.1.5 In addition to FCC's Waste Acceptance Procedures, the site will operate in accordance to the Provectus 'STF – FO02- Soil Reception Procedure' (Appendix 2) which details specific procedures and measures for the pre-acceptance of hazardous soils, including rejection of non-conforming wastes. Form FO03 (Appendix 2) details the soil characterisation procedures and measure undertaken for sampling of soils received at the STF.

6.1.6 The weighbridge will conduct assessments of waste inputs and impose controls and restriction on potentially dusty waste (e.g. bagging, rapid cover following placement, refusal to tip).

6.1.7 Soil with asbestos will be consigned by contractors and haulier as 17 05 03* 'soils and stones containing hazardous substances' or 17 06 05* 'other construction materials containing asbestos'. All asbestos containing wastes will undergo visual inspection and chemical analysis to ensure that any soils that are formally accepted are suitable for further soil processing/treatment without the potential for any asbestos fibre emissions above the detection limit. A summary of waste acceptance is shown in Figure 1 below.

Figure 1: Summary of Waste Acceptance Procedures – Asbestos containing wastes



6.1.8 Unacceptable forms of asbestos containing wastes which will be rejected include:

- Asbestos pipe lagging;
- Loose asbestos fill;
- Asbestos insulation board; and,
- Soils with elevated asbestos fibres in any form that could result in airborne emissions above the detection limit (0.01f/ml) or reference background level (see Section 8 Monitoring).

6.1.9 Pre-assessment will be carried out to identify the asbestos fibre concentrations in soil, and to ensure that waste soils only containing identifiable pieces of bonded asbestos are subject to further treatment. This approach will eliminate the potential for airborne asbestos fibre emissions above the detection limit. Pre-assessment testing will confirm that asbestos fibre content is less than 0.01% for chrysotile asbestos and 0.01% for all other forms of asbestos. Any results above these levels will be rejected. During the storage time waiting for pre-assessment results, the soil will remain sheeted. Only on satisfactory laboratory results will the waste soils be un-sheeted. Air monitoring will be undertaken

during treatment of soils to provide reassurance that there are no airborne asbestos fibres present above the detection limit at all times.

Site Traffic and movement of vehicles

6.1.10 All site traffic will be kept to designated haul routes. The surface of internal haul routes will be inspected daily and swept when required with any defects made good.

6.1.11 Further standard good practices for haulage on site will include:

- Setting appropriate site speed limits and vehicle routes;
- Even loading of vehicles to avoid spillages;
- Ensuring even road surfacing and maintenance of potential potholes;
- Regular removal of spilled material from site haul routes; and,
- Dust suppression by regular spraying in dry conditions where there is the potential to generate dust and release of particulates and asbestos fibres.

6.1.12 A wheel wash is used to remove any debris or other deposits on internal roads to prevent drag out onto the public highway. In the event that drag-out is observed, then a road sweeper will be employed.

Waste Storage & Treatment

6.1.13 During particularly dry weather the storage areas will be dampened down as necessary. A tractor fitted with a bowser can be deployed during warm, dry and windy conditions to dampen down haul roads. The site will also be provided with dust & particulate suppression cannons which will spray a mist air to reduce the potential for airborne dust, particulates and asbestos fibres.

6.1.14 The soils will be stored on the impermeable pad that will be constructed with sealed drainage to onsite holding tanks.

6.1.15 The moisture content of the biopiles is maintained at a constant level to allow the bioremediation and subsequently minimise the dust, particulate and asbestos fibre potential. If soil is observed to be generating emissions on that biopile, it is an indicator that moisture content is too low. Irrigation of the biopile with treated water will then be implemented to rehydrate the soil to the correct moisture content levels thereby eliminating any potential emissions. Operational controls during the bioremediation process are in place to ensure no turning of the biopiles is undertaken during high winds.

6.1.16 On site vehicle speed limit enforced to ensure that vehicle movements do not generate excessive dust.

6.1.17 Drop heights will be minimised during the loading and unloading of materials to reduce the likelihood of dispersion and minimise the potential for dust and particulate release as a consequence of agitation.

6.1.18 All vehicles will use wheel wash to prevent mud / dust being trailed onto adjacent roads and creating a hazard / nuisance. A road sweeper will be regularly hired into clean site roads of any mud trailed on from site vehicles. Dampening of site roads/surfaces as necessary using a tanker/water bowser during dry periods will minimise dust.

Asbestos Screening and hand-picking

6.1.19 The control of asbestos emissions is predominantly based upon only receiving soils that are proven to pose no potential for airborne emissions of asbestos fibres above the detection limit. Asbestos fibres are not generated on site above the detection limit so no abatement system is required.

6.1.20 Soils with asbestos will be quarantined prior to formal acceptance even where in the majority of cases, soils have already been visually inspected and sampled prior to a formal offer for accepting the soils has been issued to the waste producer. The reception testing also includes for moisture content which will provide information on the dust potential in addition to the asbestos fibre quantification.

6.1.21 Reception testing will be undertaken at the receipt of soils and any soils that contain >0.1% chrysotile fibres, >0.01% other forms of asbestos fibres, or any form of unbound asbestos will be rejected from site. As an extra level of mitigation all externally stored asbestos contaminated soils will be covered prior to transfer to the internal building for screening and hand picking.

6.1.22 Within the asbestos soils storage and treatment areas, a dust suppression system is available to reduce dust and any particulate emissions. However, even without this operating and treatment activities operational there has never been an incidence of airborne asbestos being measured above the detection limit using Phase Contrast Microscopy (PCM) or if required to achieve a lower detection limit: Scanning Electron Microscopy (SEM) or Transmission Electron Microscopy (TEM).

6.1.23 Asbestos containing soils which has passed the pre-acceptance and waste acceptance will undergo a processing system comprising of a three-way soil screener according to the sizing fractions of; 0-15mm (fine fraction), 15-20mm (mid-range) and 50mm+ (oversized). Any soils with visible asbestos will go through further screening and hand picking to remove the asbestos element. All fractions will be visually checked for the presence of any residual asbestos debris before final resampling prior to biotreatment. Asbestos classified as 17 06 05 which has been removed from soils will be placed in a sealed, covered and lockable skip for onward disposal. Records of hazardous waste disposed from the site will be kept by the operator. The picking station will be an enclosed working area and dust suppression to reduce the potential for dust, particulate and asbestos fibre emissions. In addition, air monitoring will be carried during the pre-screening and hand-picking to confirm that asbestos levels are below the detection limit of 0.01f/ml. However, it is considered that due to pre-acceptance testing and previous experience, the risk of asbestos fibres being detected during air monitoring is extremely low. Monitoring in addition to the occupational

monitoring will be undertaken on a periodic basis to ensure compliance with the agreed background reference level for airborne asbestos.

Dust Suppression

6.1.24 During particularly dry weather the storage areas will be dampened down as necessary. A tractor fitted with a bowser can be deployed during warm, dry and windy conditions to dampen down haul roads. Misting suppression cannons will spray a mist air to reduce the potential for airborne dust and asbestos particulates. Misting cannons will be situated so that they concentrate spraying on storage, active and operational areas including the pre-screening and hand-picking for asbestos. The waters for dust suppression systems will be dosed with an asbestos surfactant additive which is a specially formulated solution which is capable of penetrating and "wetting out" amphibole (hydrophobic) forms of asbestos quickly and thoroughly. A copy of the MSDS sheets for the asbestos surfactant can be found in Appendix 3.

6.1.25 Dust generation is largely on haul roads and road sweeping/dust suppression is undertaken at source to prevent or minimise dust emissions occurring.

6.1.26 In addition, air monitoring testing will be carried out over an hour period to identify any elevated airborne asbestos fibres as a result of site activities to ensure compliance with occupational exposure reference standards. On a periodic basis this will be supplemented by background environmental monitoring that is undertaken for a longer period to achieve the lower background reference detection limit.

Bioremediation Process

6.1.27 The biopiles are operated using vacuum technology that means that >99% of volatile contaminants within soil pore spaces are collected and treated at the adjacent biofilter. Emissions from the biotreatment pad will be collected by undersoil pipework with liquids treated in the water treatment system and air treated by the biofilter. The conversion of hydrocarbons to carbon dioxide and water vapour means that the soil moisture concentration in soils is elevated during treatment and is rarely, if ever below 15-20%. Soil in treatment does not give rise to visible dust or elevated dust concentrations during treatment.

6.1.28 The bioremediation process in itself provides mitigation where the moisture content of the biopiles is maintained at a constant level either through the generation of water vapour within the pile or the reinstruction of treated water into soils to allow the bioremediation to continue optimally and subsequently minimising the risk for dust emissions. Operations controls are in place to ensure that no turning of biopiles in undertaken during high windy weather conditions.]

6.1.29 Air forced down through the biopiles via the extraction pipework system will pass through a biofilter before being discharged to air.

6.1.30 The blower connects to a manifold with several perforated pipes covered in stone above an impermeable surface. Overlying these pipes is oversize compost or woodchip mixture, nutrients and small amount of contaminated soil (<5%) to inoculate the biofilter placed to a height of approximately 1.5m. The compost/nutrient/soil mixture is overlain by an irrigation pipe network on top to maintain the moisture content and covered with a tarpaulin to ensure the biofilter does not dry out. It is then tested every month to ensure the process parameters remain within the optimal range. Olfactory odour checks are also undertaken daily. Biofilter emissions monitoring include monthly VOC's (including BTEX), Speciated PAHs, TPH, and bi-monthly photo-ionization detector (PID). Limits and thresholds of monitoring parameters are included in Table 2 'Emissions Monitoring'.

PM10 emissions from vehicles

6.1.31 The main sources of PM10 emissions on site are from:

- Excavators
- Dump trucks
- Tipper/articulated lorries

6.1.32 The additional storage areas will allow a one-way traffic system to be employed and avoid the vehicle restrictions and delays during delivery into the asbestos building. This will significantly decrease the time the lorry is present on site and result in a reduction in PM10 emissions.

6.1.33 PM10 emissions are largely from heavy plant and vehicle traffic. Emissions from vehicles delivering soils to site are to be reduced by having external reception areas rather than the existing system of delivering inside a building which often leads to queuing vehicles.

6.1.34 The use of a soil screener in the asbestos processing will result in a tenfold reduction in PM10 emissions compared to the existing emissions.

Off Site Emission sources

6.1.35 The Retford Ready Mix Limited Concrete Supplies are located 330m south from the site boundary across Daneshill Road. It is considered that given the wind direction, there is potential for the concrete supplies as a source of wind-blown dust and particulate matter. Dust and particulates emissions are most likely from accumulation on site roads and operating activities such as loading, unloading and bagging.

7. EMISSIONS RISK ASSESSMENT

7.1.1 A risk assessment for dust, particulate and asbestos fibre emissions and the possible hazards has been considered in an Amenity & Accidents Risk Assessment, document reference:3982-CAU-XX-XX-RP-V-0303 which has been included within the permit variation application.

7.1.2 The risk assessment details the control and mitigation measures to minimise emissions from operations at Daneshill Soil Treatment Facility.

7.1.3 It is considered that the majority of emissions are prevented from occurring and do not require further mitigation after the initial suppression. Monitoring will provide verification to the effectiveness of the suppression carried out on site.

8. MONITORING

8.1 Baseline Background Monitoring

8.1.1 It is an established procedure to attain pre-operational baseline monitoring to form the basis when determining the air quality prior to any treatment activities and the issue of the permit The operator will obtain baseline background monitoring prior to the commencement of operations where 3 rounds of monitoring will be taken at locations shown on drawing ref: 3982-CAU-XX-XX-DR-V-1803.

8.1.2 Following issue of the permit, the operator will be able to compare the monitoring results against reference background levels obtained from baseline monitoring. The background reference levels will be used as an action level should there be any soils with elevated asbestos fibres above the detection limit (0.01f/ml) or reference background level.

8.2 Schedule

8.2.1 Emissions monitoring will be undertaken in order to assess the effectiveness of the operational management and mitigating control measures at the STF. Monitoring will identify the potential for nuisance emissions to impact the nearby receptors, and the appropriate remediation measures required. Environmental monitoring locations are detailed in the Dust and Asbestos Monitoring Plan, drawing ref; 3982-CAU-XX-XX-DR-V-1803. PM10 will be undertaken around the working areas with a handheld decide.

8.2.2 Daily visual air monitoring during the soil processing works will be carried out to ensure that site activities do not increase emissions.

8.2.3 Monitoring will be undertaken by designated staff that will be fully trained by Site management. All site personnel will be responsible for reporting any problem emissions identified during their day to day operations.

8.2.4 Monitoring at the Facility will consist of the following detailed in Table 2 Below:

Table 2: Emissions monitoring

Parameter	Frequency	Thresholds	Comments
Asbestos (TCM)	Daily during initial soil screening	<0.01f/ml *Asbestos monitoring at locations around the STF during soil screening over 2 hour period *Pumped sampling >1m above ground level Flow rate = 4 litres/minute,	Method as described in M17 guidance and Table S3.3. This frequency is far in excess of other similarly permitted facilities. Monitoring undertaken around the treatment during soil screening process.

		minimum sample volume 480 litres, filter pore size = 1.2 µm asbestos fibre limit of detection = 0.001 fibres/ml	
Asbestos (SEM)	Quarterly	Supplementary asbestos monitoring at boundary locations (see drawing ref: 3982-CAU-XX-XX-DR-1803) to ensure compliance with an agreed background reference level.	Added reassurance to ensure baseline of asbestos emissions is not changing. Method is as described in M17 guidance. Detection limit anticipated to be <0.0005f/ml. This monitoring is far in excess of other similarly permitted facilities. Pre-operational background monitoring will be carried out at locations shown on 3982-CAU-XX-XX-DR-V-1803. 3 rounds of monitoring will be taken prior to the commencement of activities at site and prior to the issue of the permit.
Dust	Monthly	200mg/m2/day On Site checks and off site check in response to an issue being identified. Dust monitoring at locations onsite using Frisbee dust gauges,	Frisbee dust gauge method as described in M17 guidance. Daily on-site checks (or more frequently following dust complaints, or during prolonged dry or windy conditions)
Soil moisture content	Reception testing of soils as per	15% moisture content	To ensure soils received have low potential for dust release
Asbestos content in soils	Reception testing of soils	<0.1% chrysotile, <0.01% other types of asbestos fibres. No visible unbound asbestos or insulation	To ensure soils received cannot generate airborne emissions of asbestos above the method detection limit
PM_{10}	Weekly or as required if dust is suspected	250µg/m3/15 minute TWA*	Use of handheld nephelometer – not used for compliance against EU Directive Limit for PM_{10} as stated in EA Guidance M8, but provides real time results for implementing immediate mitigation if results are within 25% of threshold. A handheld mobile device for discrete monitoring around working areas. This method is preferred to support operational control of emissions rather than a fixed monitoring system for general air quality analysis at fixed locations (e.g. Filter

			Dynamics Measurement System/Beta Attenuation Monitor)
Biofilter Monitoring	6 monthly	Ammonia 20mg/m3 TVOCSs 40mg/,3 Hydrogen Sulphide (No Limit set)	Hourly mean Biofilter Monitoring taken at the treatment facility. Monitoring of moisture content, flow rate, nutrient levels and contaminant elimination (monitoring frequency as required).
VOCs	Weekly or as required	1mg/m^3 benzene	Use of calibrated PID around working areas on biotreatment pad. For ensuring RPE requirements are respected and biofilter is not overloaded with VOCs from incoming soils.
Odour	Daily	Absent	To ensure site activities do not cause nuisance

8.3 Air Quality - VOCs limits

8.3.1 Limits of VOC were derived from the applicant providing a full 20 months of monitoring data for the biofilter at their Rowley Regis site that will be replicated at Daneshill Soil Treatment Facility. The biofilter design and site operations will be the same and therefore emissions are predicted to be the same. Copies of analyses from the Rowley Regis site are included in Appendix 5 for information.

8.3.2 It can be seen that the average annual point source emissions at the biofilter are below public health protection benzene standard of 5 µg/m^{-3} as an annual mean. The average annual concentrations during 2018 were 2.81 µg/m^{-3} (conservative as assumes results shown as less than detection level were at detection level) and during the first 9 months of 2019 results were all below 5 µg/m^{-3} and mostly below detection level at the biofilter demonstrating protection to nearby receptors.

8.4 Photo-Ionisation Detector Measurements

8.4.1 A photo-ionisation detector (PID) shall be used on a bi-monthly basis at around the perimeter and near the biofilter (6) to quantify gaseous emissions. If PID readings for Benzene exceed 1ppm (based on EH40 guidance), then the source shall be identified and assessed by the operator. It will be dealt with, for example, increasing PPE levels on site, a cessation of soil movement or covering of odorous soils with a tarpaulin etc.

8.4.2 If site activity involves the movement of soil that has been identified as containing high concentrations of VOC which may be harmful to personnel working in the vicinity or other off-site receptors, then PID and benzene monitoring shall occur on a daily basis.

8.4.3 Results are recorded in the on-site database system. Detail of the frequency and thresholds of monitoring are included in the Emissions Management Plant, document ref: 3982-CAU-XX-XX-RP-V-0307.

8.5 Meteorological Monitoring

8.5.1 It is considered that the principle mechanism for the transit of emissions from site activities to nearby sensitive receptors is likely to be via airborne. Meteorological conditions will heavily impact and determine the level of risk and exposure to sensitive receptors. The following factors are likely to influence the risk:

Wind Direction & speed

8.5.2 The dominant wind direction determines which receptors are likely to be impacted and levels of exposure. Wind speed will affect the likely distances odours can be transported, however, in contracts increased wind speed is likely to dissipate odours.

Ambient air temperatures

8.5.3 Higher temperatures and warmer conditions can result in an increased risk of odour emissions from site. Staff will be trained to be vigilant of meteorological conditions and those likely to encourage odour emissions.

8.5.4 In the event of an emissions complaint, conditions will be assessed against the complaint and details of site activities/operations carried out during the time of that complaint. Meteorological information will be recorded on the Complaints Form.

8.6 Emissions Monitoring

8.6.1 Prior to the operation of the facility, asbestos monitoring will be undertaken at locations shown in drawing ref: 3982-CAU-XX-XX-DR-V-1803 to establish an agreed background reference level for asbestos in accordance with EA technical guidance document M8 and M17. The agreed reference level will be used for periodic monitoring on a quarterly basis to ensure no increase in asbestos concentration in air above the background reference concentration.

8.6.2 Dust and Asbestos monitoring during the operations on site will be undertaken at environmental monitoring points onsite using Frisbee dust gauges to measure for deposited dust, their locations are shown in the Dust and Asbestos Monitoring Plan;3982-CAU-XX-XX-DR-V-1803. Limits and frequency of monitoring will be as per the existing permit. The air extraction system will be regularly monitored and maintained. The biofilter will be monitored for the following parameters on a monthly basis for VOCs (including BTEX), Speciated PAHs and TPH. PID will be carried out bi-monthly.

8.6.3 The air sample analysis undertaken before and after the biofilter demonstrates that ~99% of monitored contaminants are continuously removed during the operation of the STF. The biofilter is operational 24 hours per day.

8.6.4 The biofilter will also be regularly checked and maintained to ensure appropriate media particle size, temperature and moisture content. Equipment will be calibrated in accordance with manufacturer's instructions or as agreed with the Environment Agency. These procedures will maintain and effective air extraction system, reducing odour

emissions and identifying any leaks or damage for repair. Compliance with this requirement will be demonstrated by the monthly biofilter monitoring and regular VOCs monitoring at the site.

8.6.5 As part of the daily inspections, appropriately trained and experienced site personnel will carry out an on-site inspection to monitor visual dust, particulates, and asbestos fibres emission generation, which will be recorded on the daily inspection form. The records of the site daily inspections will be made available to the EA on request.

8.6.6 Visual monitoring will include observing the movement of vehicles, stockpiling and movement of materials, to establish if such operations are giving rise to emissions and the size and frequency of these releases.

8.6.7 The frequency of site inspections will be increased when site activities with a high potential to produce emissions are being carried out and during prolonged dry or windy conditions.

8.6.8 In the event that visual emissions are observed to be crossing the site boundary or surfaces are becoming soiled, the site management will be informed immediately and the approximate location and extent of a dust/particulate plume, or deposition, assessed and site operations reviewed and remediated.

8.6.9 Asbestos monitoring will be carried out by placing air pumps around the perimeter of the working area whilst soil screening is being undertaken, locations of the pumps will be determined by wind direction on the day of sampling. Asbestos monitoring will only be undertaken during periods when asbestos contaminated wastes are being accepted and treated.

8.6.10 PM10 Monitoring will be carried out in working areas and carried out weekly (and or when dust is suspected). Equipment will consist of a handheld nephelometer mobile device for discrete monitoring.

9. ENGAGING WITH THE NEIGHBOURS

9.1 Complaints Procedure

9.1.1 As part of this EMP, engagement with the neighbours will be undertaken.

9.1.2 Typically, any complaints received at the site are likely to be through the Environment Agency or Local Authority although the operator is willing to deal directly with the complainants and where necessary the following can be implemented:

- Information can be provided to the local neighbours (via the Environment Agency) regarding the point and method of contact for the Facility in the event that fugitive emissions has been detected or they want to discuss any activities at the Facility.
- The neighbours can be advised that any complaints / concerns will be addressed immediately following identification / notification and contingency action implemented.
- The neighbours can be advised of any corrective action and a follow up call carried out if required.

9.1.3 The Operator will continue to maintain a routine liaison with the Environment Agency regarding nuisance emissions from site. In the event of an emissions complaint being received by the EA the complaint is passed to the Operator for the investigation. The primary point of contact at the site for complaints and liaison within the neighbours is the Site Manager who will ensure that the recording, investigation and close out of complaints is undertaken as described below and in accordance with company management procedures. Every complaint will be recorded on FCC Recycling internal system as below:

- All complaints are recorded by the site manager or site staff on the FCC 'Safeguard' online incident recording system, describing the complaint and severity;
- The complaint can be forwarded to the Regional Environment Manager to undertake further investigation;
- Depending on the severity, the complaint can be escalated to senior management for investigation if necessary; and,
- The system is a digitalised process and records a wide range of reporting.

9.2 Complaints Monitoring

9.2.1 Any complaints received directly by the Facility or via the Regulatory bodies, including the EA and Local Authority, will be recorded on the FCC 'Safeguard' online incident recording system. This will instigate emissions monitoring at the location of the complaint and on site to determine the source and extent of the plume.

9.2.2 If necessary, monitoring will also be carried out at the nearest sensitive receptors to the Facility and the monitoring results recorded.

10. REMEDIAL ACTION PLAN

10.1.1 Following receipt of a complaint or identification of visual emissions at the STF which may give rise to an offsite impact the following action plan will be undertaken, including:

- Additional monitoring as detailed above to identify the extent of the impact and potential cause and source;
- Examination of the operational activities at the Facility at the time of the complaint or identification of an impact;
- Examination of the meteorological conditions at the time of the complaint or identification of an impact;
- Carry out a review of the operational procedure and process controls as detailed in Section 4 and instigate any control measures immediately following identification of the problem;
- Further monitoring will be carried out to ensure the issue has been addressed and to monitor the effectiveness of any control measures undertaken.

10.2 Record Keeping and Reporting

10.2.1 The Complaints Form will be completed, and the forms will be maintained free from damage and kept within the Site office and will be made available to the regulating authorities on request. The record keeping will form part of the Facilities Management System.

10.3 EMP Review

10.3.1 This EMP will be reviewed by site management on a regular basis as a minimum to ensure that the controls described are effective and reflect best available techniques. The EMP will also be reviewed following a number of complaints at the Facility or relevant changes in the site operations or procedures.

DRAWINGS

LEGEND

- AREA OF PROPOSED ACTIVITY
- 1000m OFFSET BOUNDARY
- MAJOR ROAD
- MINOR ROAD
- RAIL
- SURFACE WATER
- PUBLIC AREAS
- AGRICULTURAL
- COMMERCIAL
- INDUSTRIAL
- RESIDENTIAL
- EDUCATION
- SSSI

REV	MODIFICATIONS	BY	RE	AP	DATE
P02	RECEPTOR BOUNDARY INCREASED	EJD	KB	AS	25.11.20
P01	ISSUED FOR INFORMATION	EJD	KB	AS	10.12.19

PURPOSE OF ISSUE: FOR INFORMATION
STATUS: S2

CLIENT: FCC Environment

PROJECT:
DANESHILL
SOILS TREATMENT
FACILITY

TITLE:
1000m SENSITIVE
RECEPTOR
PLAN

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
KB	EJD	KB	KB

DATE	SCALE @ A1	JOB REF:	REVISION
04.11.2019	1:2500	3982	P02

DRAWING NUMBER
3982-CAU-XX-XX-DR-1800

Caulmert
engineering environmental planning

WWW.CAULMERT.COM

Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG Company Registered No: 06716319

NOTE

AREA OF PROPOSED ACTIVITY

REV	MODIFICATIONS	BY	RE	AP	DATE
P2	ISSUED FOR INFORMATION	EJD	KB	AS	10.12.19
P1	ISSUED	KB	KB	KB	14.11.19

PURPOSE OF ISSUE: FOR INFORMATION

STATUS: S2

CLIENT: FCC Environment

PROJECT: DANESHILL SOILS TREATMENT FACILITY

TITLE: SITE LOCATION PLAN

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
KB	KB	KB	KB

DATE	SCALE @ A1	JOB REF:	REVISION
14.11.2019	1:10000	3982	P2

DRAWING NUMBER: 3982-CAU-XX-XX-DR-1801

Caulmert engineering environmental planning

Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG Company Registered No: 06716319

WWW.CAULMERT.COM

NOTES

1. DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN METRES AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.

LEGEND

- 1 — COMBINED DUST AND ASBESTOS MONITORING POSITIONS
- AREA OF PROPOSED ACTIVITY
- PERMIT BOUNDARY
- BIOTREATMENT SCREENING AND PROCESSING AREA
- SCREENING / PROCESSING AREA

P07	MONITORING POINTS AMENDED TO P04	EJD	KB	AS	18.01.21
P06	ENVIRONMENTAL MONITORING POINTS ADDED	EJD	KB	AS	15.01.21
P05	MONITORING POINTS UPDATED	EJD	KB	AS	26.11.20
P04	LEGEND UPDATED	EJD	KB	AS	24.03.20
P03	MONITORING POINTS UPDATED	EJD	KB	AS	03.02.20
P02	MONITORING POINTS UPDATED	EJD	KB	AS	09.12.19
P01	ISSUED FOR INFORMATION	EJD	KB	AS	05.12.19
REV	MODIFICATIONS	BY	RE	AP	DATE

PURPOSE OF ISSUE: FOR INFORMATION

STATUS: S2

CLIENT: FCC Environment

PROJECT:
DANESHILL
SOILS TREATMENT
FACILITY

TITLE:
DUST AND
ASBESTOS MONITORING
PLAN

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
KB	EJD	KB	KB

DATE	SCALE @ A3	JOB REF:	REVISION
04.12.2019	1:4000	3982	P07

DRAWING NUMBER: 3982-CAU-XX-XX-DR-1803

Caulmert
engineering environmental planning

Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG Company Registered No: 06716319

WWW.CAULMERT.COM

NOTE

1. DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN METRES AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.

LEGEND

PERMIT BOUNDARY

AREA OF PROPOSED ACTIVITY

S.W. Lagoon

Site Office

Garage

Wheelwash

Weighbridge

Site Entrance

Daneshill Lakes (Nature Reserve)

REV					
P1	ISSUED FOR INFORMATION	EJD	KB	AS	03.02.20
REV	MODIFICATIONS	BY	RE	AP	DATE

PURPOSE OF ISSUE: FOR INFORMATION

STATUS: S2

CLIENT: FCC Environment

PROJECT: DANESHILL SOILS TREATMENT FACILITY

TITLE: SITE BOUNDARY PLAN

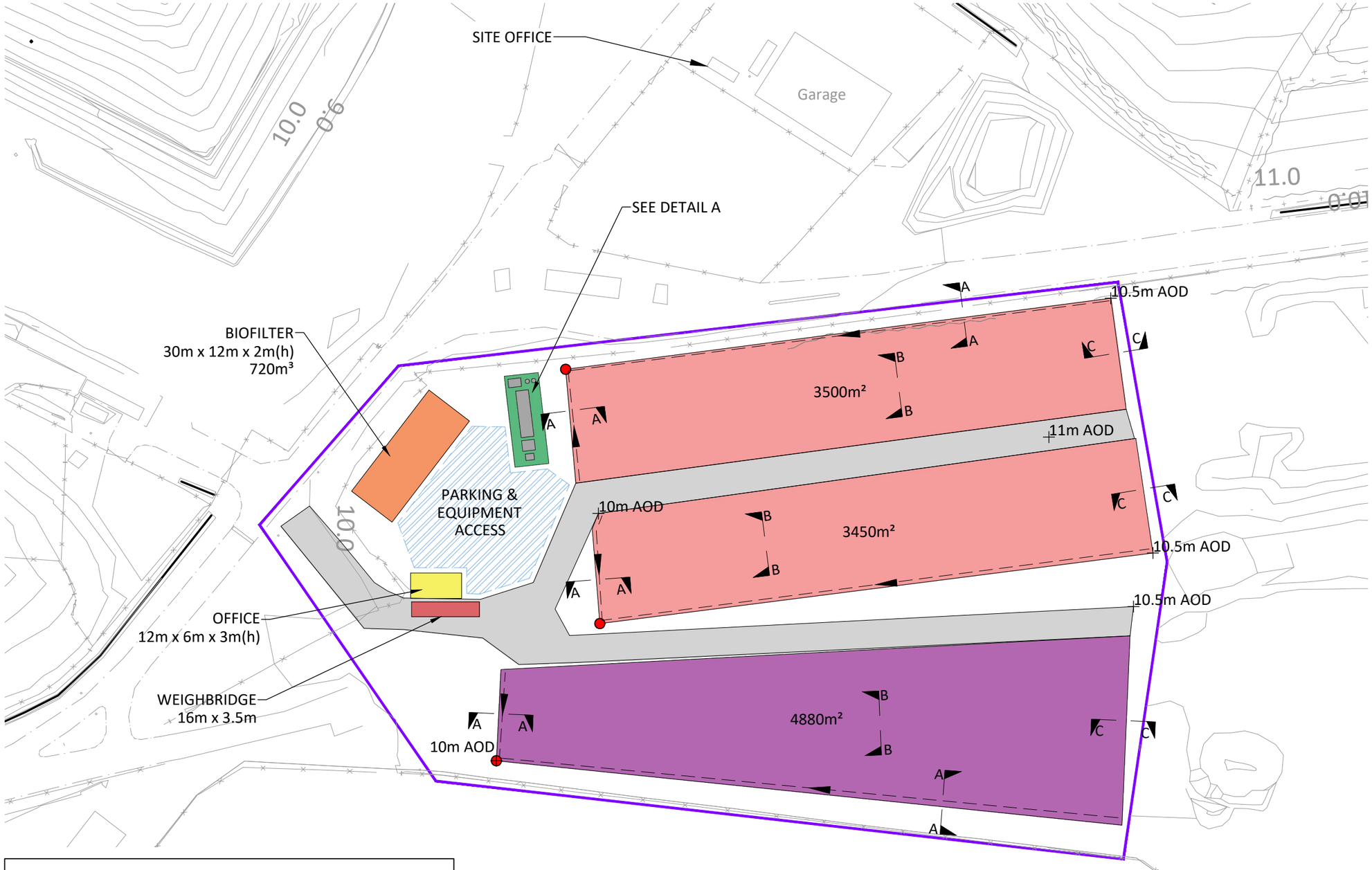
DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
KB	EJD	KB	KB
DATE	**SCALE @ A3**	**JOB REF:**	**REVISION**
17.12.2019	1:5000	3982	P1

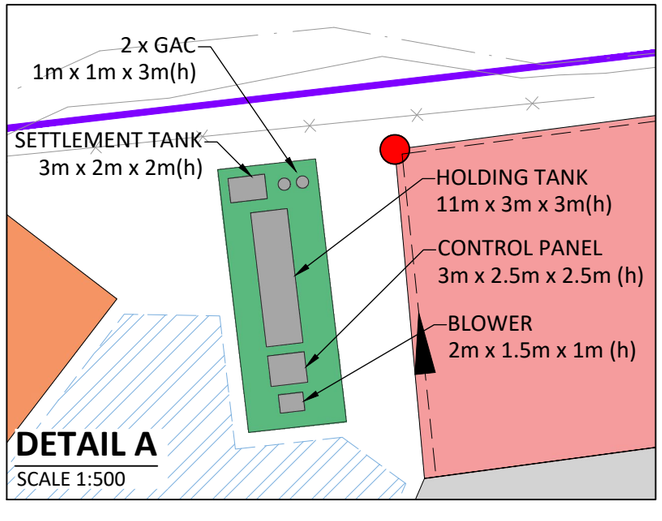
DRAWING NUMBER: 3982-CAU-XX-XX-DR-V-1804

Caulmert engineering environmental planning

WWW.CAULMERT.COM

Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG Company Registered No: 06716319





DETAIL A
SCALE 1:500

SITE LAYOUT
SCALE 1:1000

NOTES

1. DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN METRES AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.

3. DESIGN BASED ON PROVECTUS DRAWING - DANESHILL 1

4. SECTIONS SHOWN ON DRAWING 3982-CAU-XX-XX-DR-C-1806

LEGEND

- AREA OF PROPOSED ACTIVITY
- LEACHATE & DRAINAGE FLOW DIRECTION
- SECTION LINES
- BIOTREATMENT SCREENING AND PROCESSING AREA
- SCREENING / PROCESSING
- ACCESS ROAD
- WATER COLLECTION & PUMPING CHAMBER

REV					
P2	LEGEND UPDATED	EJD	KB	AS	24.03.20
P1	ISSUED FOR INFORMATION	EJD	AS	AS	06.02.20
REV	MODIFICATIONS	BY	RE	AP	DATE

PURPOSE OF ISSUE: FOR INFORMATION
STATUS: S2

CLIENT: FCC Environment

PROJECT:
DANESHILL
SOILS TREATMENT
FACILITY

TITLE:
PROPOSED
LAYOUT
PLAN

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
JC	EJD	JC	JC
DATE	SCALE @ A3	JOB REF:	REVISION
04.02.2020	AS SHOWN	3982	P2

DRAWING NUMBER
3982-CAU-XX-XX-DR-1805

Caulmert
engineering environmental planning

WWW.CAULMERT.COM

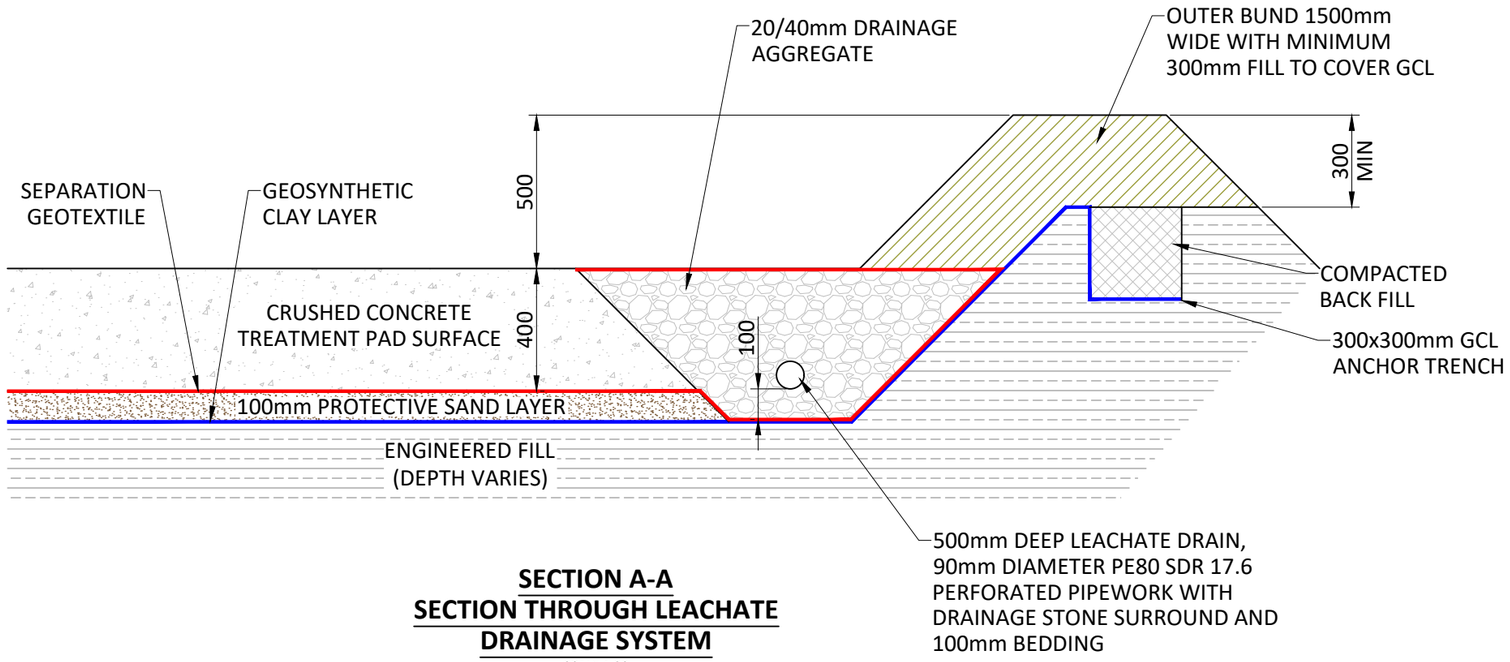
Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG Company Registered No: 06716319

NOTES

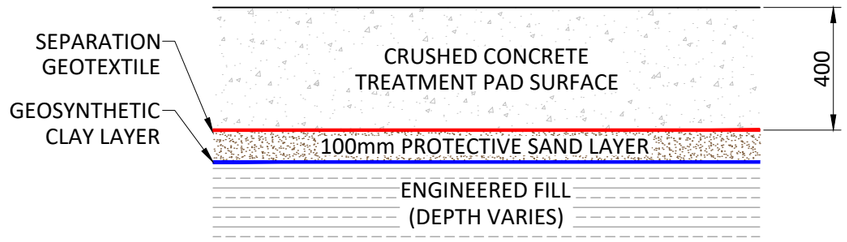
1. DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN METRES AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.

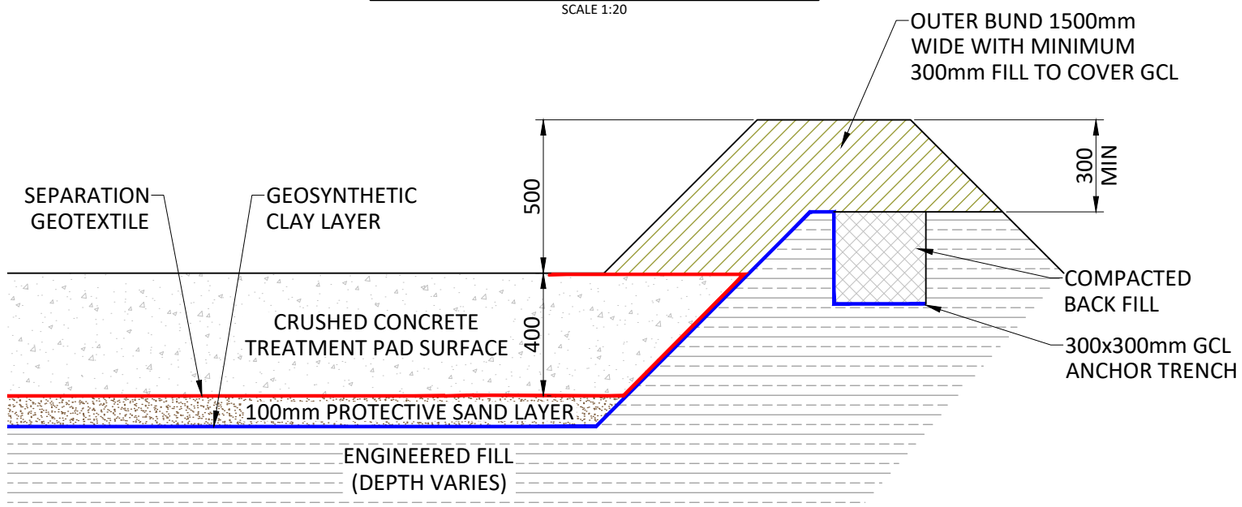
3. SECTIONS POSITIONS SHOWN ON DRAWING 3982-CAU-XX-XX-DR-C-1805



SECTION A-A
SECTION THROUGH LEACHATE DRAINAGE SYSTEM
SCALE 1:20



SECTION B-B
SECTION THROUGH TREATMENT PAD
SCALE 1:20



SECTION C-C
SECTION THROUGH TREATMENT PAD & EDGE BUND
SCALE 1:20

REV					
P1	ISSUED FOR INFORMATION	EJD	AS	AS	06.02.20
REV	MODIFICATIONS	BY	RE	AP	DATE

PURPOSE OF ISSUE: FOR INFORMATION
STATUS: S2

CLIENT: FCC Environment

PROJECT: DANESHILL SOILS TREATMENT FACILITY

TITLE: SECTIONS DRAWING

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
JC	EJD	JC	JC

DATE	SCALE @ A3	JOB REF:	REVISION
05.02.2020	AS SHOWN	3982	P1

DRAWING NUMBER: 3982-CAU-XX-XX-DR-C-1806

Caulmert
engineering environmental planning
WWW.CAULMERT.COM

Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG Company Registered No: 06716319

APPENDIX 1

Specification
Ref: CRS-045-SITE MASTER

COMPLETE RECYCLING SYSTEMS

T: +44 (0) 28 8076 0496
E: Marketing@crsni.com
W: www.crsni.com

Office Address: 136 Termon Road, Carrickmore, County Tyrone,
BT79 9HW, N.Ireland

CRS NI LTD

COMPLETE RECYCLING SYSTEMS

SALE OR HIRE

UNPARALLELED PERFORMANCE

NEW SITE MASTER

Designed For Building & Construction Sites To Retrieve Valuable Products From Waste Reducing What Goes Into Your Skip.

Features & Benefits

- Mobile 2 - 4 Man pick
- Designed for Building & Construction Sites
- Retrieve Valuable Products from waste
- Cut Down on what goes into your skip
- Adjustable Height
- Canopy for Weather Protection
- Economical Simple Design
- Electric Drive
- Robust & Heavy Duty Build

CRS NI LTD

COMPLETE RECYCLING SYSTEMS

SALE OR HIRE

UNPARALLELED PERFORMANCE

- Fully Mobile
- Easily Transported Around And Between Sites
- 2 to 4 Man Picking
- Low Cost To Run

- Low Maintenance
- Reduce Skip hire cost

OPTIONS

- Hydraulic Drive
- Air Brakes
- Hard Cover
- Chevron Belt
- Radial Stockpiler

CRS NI LTD

COMPLETE RECYCLING SYSTEMS

Sales: +44 (0) 28 80760 496

E: sales@crsni.com

www.crsni.com

1.0 Conveyor

Feature

- Heavy duty profile steel construction
- Specially designed 8mm and 5mm steel profile to produce high strength section
- Typically 3 times stronger than traditional 6mm channel designs

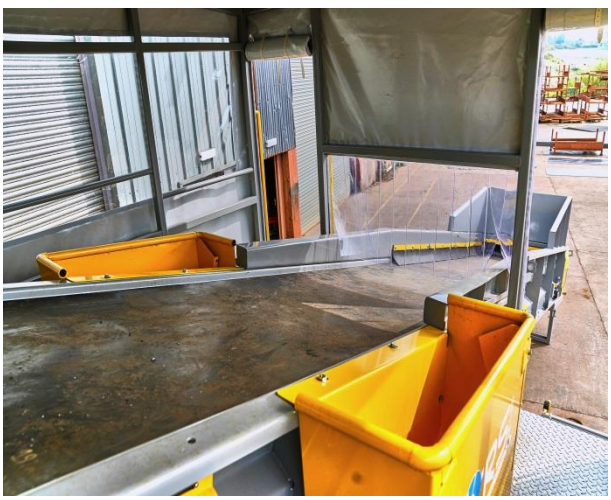
Technical Specification

- 1000mm wide heavy duty rubber belt
- EP500/3ply – 5mm top cover 1.5mm bottom cover
- 8.5m drum centres
- 3.0kW Hi Torque Motovario slip on gear motor drive
- 100mm dia carry rollers placed at 875mm centres
- 100mm dia disc return rollers placed at 2115mm centres
- Head and Tail are fully enclosed to reduce spillage
- High sides incorporated into conveyor with skirting rubber
- Impact bars at infeed boot
- Plough scraper at Tail to reduce material build up
- SKF 50mm bearings (Tail)
- SKF 60mm bearings (Head)
- 288mm dia crowned and lagged drum
- 220mm dia crowned tail drum
- Rosta belt scraper tensioner with polyurethane rubber
- Perspex window at each maintenance point along conveyor
- Dirt chute at tail under plough scraper
- Support legs
- Full guards with emergency stops

2.0 Picking Station

Feature

- 2-4 Man Picking
- 3.5mm Chequered Walkway
- 2 Dropboxes:
  - Width: 900mm
  - Depth: 452mm
  - Height: 989mm
- Access Step Ladders to Picking Station
- Canopy for Weather Protection
- Optional Hard Cover



3.0 Wheel Assembly

Feature

- Adjustable Ram
- Handbrake Lever
- 300x80mm Stud Axle
- Super Single Tyres - 385/65 R22.5

APPENDIX 2

SAFETY DATA SHEET

EVERGARD WETTING AGENT

Compilation date: 11/04/2017

Revision No: 1

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name: EVERGARD WETTING AGENT

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.3. Details of the supplier of the safety data sheet

Company name: SMH Products Ltd

SMH House

Maxwell Street

South Shields

Tyne & Wear

NE33 4PU

Tel: 0191 456 6000

Fax: 0191 456 7777

Email: enquiries@smhproducts.com

1.4. Emergency telephone number

Section 2: Hazards identification

2.1. Classification of the substance or mixture

Classification under CLP: Aquatic Chronic 3: H412

Most important adverse effects: Harmful to aquatic life with long lasting effects.

2.2. Label elements

Label elements:

Hazard statements: H412: Harmful to aquatic life with long lasting effects.

Precautionary statements: P273: Avoid release to the environment.

P501: Dispose of contents/container to hazardous or special waste collection point.

2.3. Other hazards

PBT: This product is not identified as a PBT/vPvB substance.

Section 3: Composition/information on ingredients

3.2. Mixtures

[cont...]

Hazardous ingredients:

STEOL CS-230

EINECS	CAS	PBT / WEL	CLP Classification	Percent
-	-	-	Eye Dam. 1: H318; Skin Irrit. 2: H315; Aquatic Chronic 3: H412	1-10%

PRIMARY ALCOHOL ETHOXYLATE

614-482-0	68439-46-3	-	Eye Dam. 1: H318; Acute Tox. 4: H302	<1%

Section 4: First aid measures

4.1. Description of first aid measures

Skin contact: Wash immediately with plenty of soap and water.

Eye contact: Bathe the eye with running water for 15 minutes.

Ingestion: Wash out mouth with water.

Inhalation: Remove casualty from exposure ensuring one's own safety whilst doing so.

4.2. Most important symptoms and effects, both acute and delayed

Skin contact: There may be mild irritation at the site of contact.

Eye contact: There may be irritation and redness.

Ingestion: There may be irritation of the throat.

Inhalation: No symptoms.

Delayed / immediate effects: Immediate effects can be expected after short-term exposure.

4.3. Indication of any immediate medical attention and special treatment needed

Immediate / special treatment: Not applicable.

Section 5: Fire-fighting measures

5.1. Extinguishing media

Extinguishing media: Suitable extinguishing media for the surrounding fire should be used. Use water spray to cool containers.

5.2. Special hazards arising from the substance or mixture

Exposure hazards: In combustion emits toxic fumes.

5.3. Advice for fire-fighters

Advice for fire-fighters: Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes.

Section 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Refer to section 8 of SDS for personal protection details. Turn leaking containers leak-side up to prevent the escape of liquid. Mark out the contaminated area with signs and prevent access to unauthorised personnel.

[cont...]

6.2. Environmental precautions

Environmental precautions: Do not discharge into drains or rivers. Contain the spillage using bunding.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Absorb into dry earth or sand. Transfer to a closable, labelled salvage container for disposal by an appropriate method.

6.4. Reference to other sections

Reference to other sections: Refer to section 8 of SDS.

Section 7: Handling and storage

7.1. Precautions for safe handling

Handling requirements: Avoid direct contact with the substance. Ensure there is sufficient ventilation of the area. Avoid the formation or spread of mists in the air.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in a cool, well ventilated area. Keep container tightly closed. The floor of the storage room must be impermeable to prevent the escape of liquids.

7.3. Specific end use(s)

Specific end use(s): No data available.

Section 8: Exposure controls/personal protection

8.1. Control parameters

Workplace exposure limits: No data available.

DNEL/PNEC Values

Hazardous ingredients:

STEOL CS-230

Type	Exposure	Value	Population	Effect
DNEL	Dermal	2750	Workers	Systemic
DNEL	Inhalation	175	Workers	Systemic
DNEL	Oral	15	General Population	Systemic
DNEL	Dermal	1650	General Population	Systemic
DNEL	Inhalation	52	General Population	Systemic
PNEC	Fresh water	0.24	-	-
PNEC	Marine water	0.024	-	-
PNEC	Fresh water sediments	0.9168	-	-
PNEC	Marine sediments	0.0917	-	-

[cont...]

PNEC	Soil (agricultural)	0.946	-	-
PNEC	Microorganisms in sewage treatment	10	-	-

8.2. Exposure controls

Engineering measures: The floor of the storage room must be impermeable to prevent the escape of liquids.

Respiratory protection: Respiratory protection not required.

Hand protection: Protective gloves.

Eye protection: Safety glasses.

Skin protection: Protective clothing.

Section 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

State: Liquid

Colour: Colourless

Odour: Characteristic odour

Viscosity: Non-viscous

pH: 3.00

9.2. Other information

Other information: No data available.

Section 10: Stability and reactivity

10.1. Reactivity

Reactivity: Stable under recommended transport or storage conditions.

10.2. Chemical stability

Chemical stability: Stable under normal conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions: Hazardous reactions will not occur under normal transport or storage conditions.

Decomposition may occur on exposure to conditions or materials listed below.

10.4. Conditions to avoid

Conditions to avoid: Heat.

10.5. Incompatible materials

Materials to avoid: Strong oxidising agents. Strong acids.

10.6. Hazardous decomposition products

Haz. decomp. products: In combustion emits toxic fumes.

Section 11: Toxicological information

[cont...]

11.1. Information on toxicological effects

Hazardous ingredients:

STEOL CS-230

DERMAL	RAT	LD50	>2000	mg/kg
ORAL	RAT	LD50	>2000	mg/kg

PRIMARY ALCOHOL ETHOXYLATE

ORL	RAT	LD50	>200<2000	mg/kg

Toxicity values: No data available.

Symptoms / routes of exposure

Skin contact: There may be mild irritation at the site of contact.

Eye contact: There may be irritation and redness.

Ingestion: There may be irritation of the throat.

Inhalation: No symptoms.

Delayed / immediate effects: Immediate effects can be expected after short-term exposure.

Section 12: Ecological information

12.1. Toxicity

Hazardous ingredients:

STEOL CS-230

ALGAE	48H EC50	27.7	mg/l
DAPHNIA	48H EC50	7.4	mg/l
FISH	96H LC50	7.1	mg/l

PRIMARY ALCOHOL ETHOXYLATE

FISH	96H LC50	1-10	mg/l

12.2. Persistence and degradability

Persistence and degradability: Not biodegradable.

12.3. Bioaccumulative potential

Bioaccumulative potential: Bioaccumulation potential.

12.4. Mobility in soil

Mobility: Readily absorbed into soil.

12.5. Results of PBT and vPvB assessment

PBT identification: This product is not identified as a PBT/vPvB substance.

[cont...]

12.6. Other adverse effects

Other adverse effects: Toxic to aquatic organisms. Toxic to soil organisms.

Section 13: Disposal considerations

13.1. Waste treatment methods

Disposal operations: Transfer to a suitable container and arrange for collection by specialised disposal company.

NB: The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

Section 14: Transport information

Transport class: This product does not require a classification for transport.

Section 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Specific regulations: Not applicable.

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has not been carried out for the substance or the mixture by the supplier.

Section 16: Other information

Other information

Other information: This safety data sheet is prepared in accordance with Commission Regulation (EU) No 2015/830.

* indicates text in the SDS which has changed since the last revision.

Phrases used in s.2 and s.3: H302: Harmful if swallowed.

H315: Causes skin irritation.

H318: Causes serious eye damage.

H412: Harmful to aquatic life with long lasting effects.

Legal disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any damage resulting from handling or from contact with the above product.

APPENDIX 3

STF – FO02 - SOIL RECEPTION PROCEDURE

Document No:	STF - RR - FO02	**Issue No:**	2
Author:	Jon Owens	**Approved By:**	Steve Langford
Issue Date:	19/01/18	**Approval Date:**	19/01/18

Introduction

This procedure relates to the measures to be undertaken for the assessment of data and inspection of waste received at the soil treatment facility. It allows rejection of non-conforming waste to ensure no contaminated soils are accepted which cannot be treated by the treatment facility to a standard suitable for reuse, or which breach the list of permitted wastes as shown in the site's Environmental permit.

Principle of Operation

The inspection will allow the following to be assessed prior to acceptance:

1. Presence of untreatable and hazardous materials (e.g. tars, clinker, asbestos insulation etc.) in the contaminated soil.
2. Presence of excessive litter/debris in the contaminated soil.
3. Compliance with the previously supplied chemical/physical analysis information (supplied by waste producer).
4. Potential for the waste to behave as a liquid or have free water/oil in the waste

If the waste material is not compliant with the agreed conditions of the Environmental Permit and pre-acceptance assessment then the waste will be declined/rejected. As a note, the forms of untreatable asbestos described in point 1 are predominantly insulation products as follows in Table 1.

Table 1. Unacceptable Forms of Asbestos Insulation Products

Form of asbestos	Example
Asbestos pipe lagging	
Loose asbestos fill	
Asbestos insulation board (AIB)	

Procedure

Pre-Acceptance Assessment

This is undertaken by Provectus to confirm treatability to meet the reuse criteria. A set of Terms and Conditions for acceptance are sent to the Waste Producer including a clear statememt of any waste characterisation samples that are deemed untreatable. These are agreed in writing between the Waste Producer and Provectus prior to an authorisation number (contract line) being issued by FCC at the weighbridge for deposit at the Soil Treatment Facility.

Where data gaps exist or queries remain about the suitability of material for treatment, Provectus or FCC will offer to attend the site of origin to undertake pre-acceptance analysis and visually inspect the material and obtain further information about the waste description.

In the event that the moisture content of the waste being in the range of 25-30% then the potential for free water or oil will be further reviewed. Where moisture contents are at this level or even higher and the material does not behave as a liquid, have the potential for releasing water/oil etc and is suitable for the site infrastructure then it would be accepted on a case by case basis.

Should either Provectus, or after consultation, FCC determine that there is the high potential for material to contain untreatable inclusions or to behave as a liquid or contain free water or oil then the waste will be declined for acceptance.

Duty of Care Documentation

Duty of Care Documentation and other legal procedures (registration of hazardous waste site *etc*.) are completed between the Waste Producer and forwarded to FCC. No tipping on the STF will be permitted without relevant documentation from the waste producer. This must be checked on-site at the STF to ensure that the load is indeed destined for the STF, and that the documents are correctly completed. In the case of hazardous waste, the consignment note shall be filled in by a member of Provectus staff; and in the case of non-hazardous waste, the waste transfer note shall be inspected at the STF site office, and the load checked by a Provectus staff member at the STF.

Health and Safety

The site technician or PM is to provide guidance to the location for soil to be tipped, and any relevant safety information prior to tipping of soil.

Technicians and site personnel are to stand well away from the lorry when tipping so as to avoid any crush injuries/incidents as a result of being in close proximity to the tipping lorry. Any drivers must be informed of the requirement to wear a hard hat and high visibility vest when outside of the lorry cabin.

Lorries shall be informed to check that any waste/debris is removed from their lorry prior to leaving the STF.

Visual Inspection: Waste Input

The following locations will be used for accepting wastes:

- Hydrocarbons only: biopile treatment area
- Asbestos only, or asbestos and hydrocarbons: asbestos processing shed

The following plant and personnel are required as part of this procedure:

- Provectus STF Technician
- Excavator / loading shovel (if available)

Each load of soil for inspection will be tipped onto the nominated quarantine area by the tipper lorry. The technician will inform the tipper lorry driver to remain at the stockpiling area until the inspection has been completed.

In the event of the material containing free water or oil, the load will be immediately rejected.

In the event of untreatable forms of asbestos being present, the load will be immediately rejected

The excavator will be used to expose any unsuitable materials and allow a comprehensive visual assessment. The technician will determine the next action when this has been completed, this will comprise of the following:

- Waste is accepted and tipper lorry is permitted to leave the STF with the accompanying paperwork, or;
- Waste is not accepted and the unsuitable element of waste load, either partial or complete load is removed by excavator and placed back into the tipper lorry. A rejection form is filled in on-site and both Landfill Manager (LM) and Sales Manager (SM) are informed. It is the duty of FCC to inform the Environment Agency of any rejected loads.

At the end of the formal waste acceptance procedure the soil will be prepared for processing or biotreatment. Coordination of further treatment/processing events is to be decided by the Site Manager/Site Operator.

Chemical Analysis: Waste Input

Based on visual inspection, sampling frequency will be considered; this is in relation to the volume from each hazardous waste production site. Sampling will be undertaken on soils using composite sampling methods described in BS812.

The chemical analysis of soils generally takes 5-7 days to complete, therefrore limited storage times are required. Materials will be placed into treatment as soon as practicable from the receipt of chemical analysis and formal acceptance of the waste.

The range of contaminants for analysis will be based upon the original contaminating substances. A copy of the analysis shall be checked by the PM for verification against the original client data. In the event of non-conformity, the PM shall liaise with the LM and SM, and a decision on the next course of action will be taken.

For avoidance of doubt, the limits for asbestos from laboratory testing will be as follows:

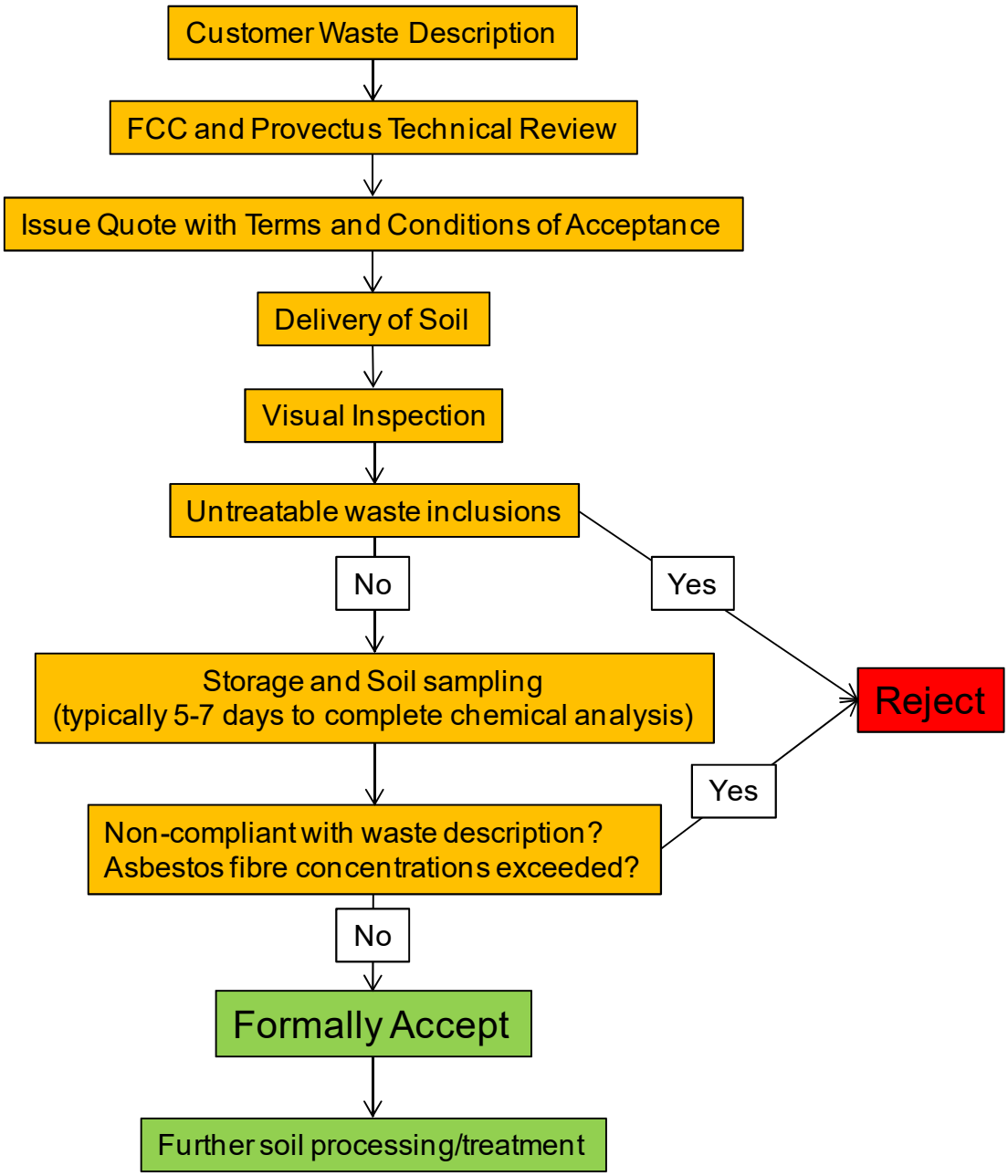
- Chrysotile only: 0.1%
- Other forms of asbestos (or chrysotile and others): 0.01%
- Asbestos debris limited to those which can be removed as Notifiable Non-Licensed Works (NNLW)

The waste will only be formally accepted once initial reception analyses is received in accordance with procedure STF PR02.

Summary of Waste Reception

Figure 1 is a flow diagram for the waste reception procedure. The procedure is implemented to ensure that the waste is only formally accepted once visual inspections and chemical analysis of received wastes has been successfully completed. This ensures that any soils that are formally accepted are suitable for further soil processing/treatment. All non-compliant wastes will be rejected.

Figure 1. Summary of Waste Acceptance Procedure



APPENDIX 4

The Airshed

Air Quality, Odour and Environmental Noise

Air Quality Impact Assessment
Proposed Soil Treatment Facility
at Daneshill Landfill
Lound Retford

Prepared by
The Airshed, 5 Lauder Place, East Linton
East Lothian EH40 3DB
Tel. 01620 860 529
mail@theairshed.com
www.theairshed.com
Registered in Scotland
Company No. SC309129

Record of changes

Version	Date	Change
1	18th December 2019	1st draft for internal review
2	8th January 2020	For client review
3	13th January 2020	Further and clarification of project description
4	2nd March 2020	Change to report title

Executive Summary

FCC Recycling (UK) propose to operate a new soil remediation facility on land at Daneshill Road, Lound, Retford DN22 8RB. The proposed facility is located in a rural area adjacent to a former landfill and current waste treatment facilities. The nearest established residential areas are Ranskill to the northwest, Torworth to the west and Lound to the east. There are isolated houses within 1km of the proposed facility, including the Travellers site at Daneshill Road.

The proposed bioremediation process will utilise industry standard bio-pile technology and will operate through the use of bio-piles and moisture control with extracted air treated in a bio-filter before being released to the atmosphere.

Caulmert Ltd, Environmental Consultants, has appointed The Airshed to conduct an air quality impact assessment (AQIA). The scope of this assessment is to consider the potential air quality impacts on human health from the emissions of VOCs. Dust impacts associated with the proposed facility are considered elsewhere.

The nearest sensitive receptors where long-term exposure is relevant is at the Travellers' site on Daneshill Road, ~280m to the south-east.

The airborne concentrations of pollutants have been predicted using ADMS 5.2, a widely used atmospheric dispersion model, using five years of hourly sequential meteorological data from RAF Scampton. The assessment considers the effects of these emissions on sensitive receptors in terms of Environmental Assessment Levels (EALs) for assessing human exposure. A single Scenario has been assessed:

- Scenario 1 considers emissions from the bio-filter assuming the maximum measured concentrations of VOCs reported at a similar site elsewhere.

The predicted concentrations of Benzene, Toluene, Ethylbenzene and Xylene are 0.0% of the relevant long-term and short-term EALs at the nearest sensitive receptors. The predicted air quality impacts from the proposed facility are insignificant.

Contents

TABLES

FIGURES

APPENDICES

Acronyms

AD	Anaerobic Digestion
ADMS 5	Air Dispersion Modelling System Version 5
AERMOD	Preferred dispersion model for USEPA
AOD	Above Ordnance Datum
AQIA	Air Quality Impact Assessment
AQMA	Air Quality Management Area
AQS	Air Quality Standards
As	Arsenic
BAT	Best Available Technique
C_6H_6	Benzene
$C_{20}H_{12}$	Benzo(a)pyrene
Cd	Cadmium
CERC	Cambridge Environmental Research Consultants
CLF	Critical Loads Function
CO	Carbon Monoxide
Co	Cobalt
CHP	Combined Heat and Power
Cr	Chromium
Cr_{VI}	hexavalent Chromium
Cu	Copper
^oC	Degrees Centigrade
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency for England
EAL	Environmental Assessment Level
EIA	Environmental Impact Assessment (a process)
EQS	Environmental Quality Standard
ES	Environmental Statement (a document or series of documents)
FGT	Flue Gas Treatment
g/s	grams per second
HCl	Hydrogen Chloride
HF	Hydrogen Fluoride
Hg	Mercury
HHRAP	Human Health Risk Assessment Protocol
IED	Industrial Emissions Directive
IPPC	Integrated Pollution Prevention & Control Directive
K	degrees Kelvin
kW	kiloWatt
LNR	Local Nature Reserve
m/s	metres per second
m^3/s	cubic metres per second
mg/m^3	milligrams per cubic metre(10^{-3})
Mn	Manganese
MSW	Municipal Solid Waste
ng/m^3	nanograms per cubic metre (10^{-9})
NH_3	Ammonia
Ni	Nickel
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
O_2	Oxygen
OS	Ordnance Survey
Pb	Lead
pg/m^3	pico gram per cubic metre (10^{-12})
PM_{10}	Particles with aerodynamic diameter less than 10 microns
$PM_{2.5}$	Particles with aerodynamic diameter less than 2.5 microns
PC	Process Contribution
PEC	Predicted Environmental Concentration
Sb	Antimony
Sn	Tin
SO_2	Sulphur Dioxide
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TEQ	Toxic Equivalent (usually for dioxins and furans)
TG(16)	Technical Guidance Note for Local Air Quality revised in 2018
Tl	Thallium
tpa	tonnes per annum
ug/m^3	micrograms per cubic metre (10^{-6})
U_{10}	wind speed at measurement height – usually 10m above local ground level
USEPA	Environment Protection Agency (for the United States of America)
V	Vanadium
VOCs	Volatile Organic Compounds
WwTP	Wastewater Treatment Plant
WID	Waste Incineration Directive
Zn	Zinc

Prediction is very difficult, especially about the future.
Niels Bohr, Danish physicist (1885 - 1962)

1.0 INTRODUCTION

Background to Report

1.1. FCC Recycling (UK) Ltd who are a wholly owned subsidiary of FCC Environment (UK) Ltd, propose to operate a new soil remediation facility on land at Daneshill Road, Lound, Retford DN22 8RB. The proposed facility is located in a rural area adjacent to a landfill and other waste treatment facilities. The proposed facility is located in a rural area where the nearest established residential areas are Ranskill to the northwest, Torworth to the west and Lound to the east. There are isolated houses within 1km of the proposed facility including the travellers site at Daneshill Road. The site location is shown in Figure 1.

1.2. The proposed bioremediation process will utilise industry standard bio-pile technology and will operate through the use of bio-piles and moisture control; addition of suitable nutrients to the soil and forced air extraction to encourage micro-organism growth leading to the breakdown of hydrocarbons into by products such as carbon dioxide and water vapour. Soils will typically be treated over an 8-16-week period, with the material being turned infrequently, typically once every 8 weeks. The bio-piles will be placed on water and air extraction pipes connected to a blower that will draw air through the soils. The extracted air is then passed through a bio-filter before being discharged to the atmosphere. Excess water draining through the soils will be collected and treated to remove any oils or suspended solids. Further details on the project description are presented in Appendix 1.

1.3. Caulmert Ltd, Environmental Consultants, has appointed The Airshed to conduct an air quality impact assessment (AQIA). The scope of this assessment is to consider the potential air quality impacts on human health from the emissions of VOCs. Dust impacts associated with the proposed facility are considered elsewhere.

Table 1.1 – Sensitive Receptors – Human Health (selected <2km)

No.	Location	OS x	OS y	Distance (m)
1	Travellers Site	467595	386491	279
2	Daneshill Cottage	467047	386590	474
3	House to east	468272	386638	788
4	Mattersey Road	468558	386067	1265
5	Lound	468895	386146	1528
6	Lound	469046	386531	1568
7	North View	469083	387159	1641
10	Mattersey Hill	468172	388578	1949
11	Lakeland House	467346	388611	1865
12	Mattersey Road	466777	388399	1797
14	Maltkiln Cottage	466239	387768	1614
15	Willow Avenue	466196	387589	1544
16	Lakeside Fishery	466351	387458	1344
17	Underwood Avenue	465818	387047	1701
18	Moat Farm	465851	386645	1645
19	Torworth Grange	465970	386001	1698
20	College Farm	466102	385473	1889

(N.B. distances are from the centre of the bio-filter)

1.4. The locations of the sensitive receptors considered in the study are shown in Figure 1 and receptor locations are presented in Table 1.1 above. The nearest receptor location is the Travellers' site 279m to the southeast of the proposed bio-filter.

Scope of Air Quality Impact Assessment

1.5. This assessment considers the potential adverse air quality impacts from the proposed facility on human receptors. The main pollutants of concern are Benzene, Toluene, Ethylbenzene and Xylene. This assessment is based on the assumption that the contaminants in the soils to be used at the facility will be similar in character to those tested at the Edwin Richards Quarry.

1.6. This study is intended to help determine the likely effects of the emissions on adjacent receptors. The dispersion model used in this study, ADMS 5.2, has been widely validated. Experience has shown that the model is conservative, so that it will tend to over-predict, provided the source estimates are accurate.

1.7. The assessment considers the effects of the emissions from the facility in terms of environmental assessment levels (EALs).

Report Structure

1.8. Section 2 discusses relevant air quality standards, and English and European Regulations and Guidance relating to air quality assessment criteria.

1.9. Section 3 describes the pollutant emission rates for the WwTP. The section also discusses the baseline air quality conditions around the installation, taking account of the character of the emissions.

1.10. Section 4 sets out the reasons for the approach to assessment and details the assumptions made in the dispersion model.

1.11. The results from the dispersion modelling are presented in Section 5.

1.12. Proposed mitigation measures are outlined in Section 6.

1.13. The significance of the residual emissions is presented in Section 7.

2.0 RELEVANT LEGISLATION AND STANDARDS

Introduction to Section 2

2.1. This section discusses relevant Guidance relating to the installation.

Environmental Assessment Levels

2.2. The Environment Agency (EA) has published Guidance[1] that proposes a simple screening approach where the predicted process contribution (PC) long-term concentrations of pollution may be regarded as insignificant where the PC <1% of the EAL. PC <10% of the EAL is insignificant for short-term concentrations. The relevant EALs for this assessment are set out in Table 2.1 below. Odour impacts are considered separately.

Table 2.1 – Environmental Assessment Levels (Human Exposure)

Pollutant	Long term	Short term
	ug/m³	ug/m³
Benzene	5	-
Toluene	1,910	8,000
Ethylbenzene	4,410	55,200
Xylene	4,410	66,200

N.B. columns are blank where there is no relevant EAL.

EA Guidance for Odour

2.3. The EA has issued Guidance on odour assessment[2] for processes that are subject to the Environmental Permitting Regulations (H4). The EA's odour criteria are based on the 98%ile of hourly averages in a typical year. This allows for atypical odour emissions or poor dispersion caused by unfavourable weather conditions around 175 hours over a year. According to this Guidance, odour from the most offensive odours, which is likely to include leachates, should be less than 1.5 OU_E/m^3 1 hour 98%ile at sensitive receptors. These criteria are quantified using dynamic olfactometry in accordance with British Standard, BS 13725:2003.

2.4. H4 advises that odours from different processes within the same installation are not necessarily equally offensive and that this should be taken into account. This assessment assumes that an odour benchmark of 1.5 OU_E/m^3 1 hour 98%ile will apply.

BS EN 13725 : 2003

2.5. The use of odour units, based on human response to odour rather than chemical speciation, presumes that human response to odour can be quantified scientifically. The European Standard for measurement of odour concentration, BS EN 13725 : 2003[3] specifies the sampling and analytical procedures for dynamic olfactometry and the quality assurance requirements for repeatability of results. Based on this type of sampling method, the limit of detection for 50% of the test panel is 1 OU_E/m^3. Odour units are not a measurement of concentration, but rather a ratio of

[1] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#environmental-standards-for-air-emissions
[2] Environment Agency March 2011. H4 Odour Management. How to comply with your permit.
[3] BS EN 13725 : 2003. Air quality. Determination of odour concentration by dynamic olfactometry.

the number of dilutions required to reduce an odour to where it cannot be detected by 50% of the odour test panel.

Where Should EALs and Odour Benchmarks Apply?

2.6. Air quality standards should apply to all locations where members of the public may be reasonably likely to be exposed to air pollution for the duration of the relevant objective. Thus short-term standards intended to prevent exposure to toxic air pollutants with acute effects should apply to footpaths at site boundaries and other areas which may be frequented by the public even for a short period of time.

2.7. Longer term exposure and odour benchmarks should only apply at houses and gardens or other locations which the public can be expected to occupy on a continuous basis.

2.8. The receptors used in the modelling assessment are shown in Figure 1. The predicted impacts at these receptor locations are concerned with air quality impacts on human health and amenity.

2.9. This assessment assumes that odour benchmarks around the proposed installation should only apply to residential areas, or other locations which members of the public are likely to occupy over an extended period of time; and that pedestrians on footpaths and people on roads adjacent to the site are not sensitive to odour. All dwellings are considered to be highly sensitive receptors as defined by the IAQM 2014 Odour Guidance[4].

Assessment Framework

2.6. The assessment framework used to assess the significance of air quality impacts is set out in Table 2.2 below. This is based on DEFRA/EA Guidance[5] and the EA's informal pragmatic risk assessment method. These assessment criteria only apply to EALs and do not apply to the assessment of odour.

Table 2.2 - Air Quality Impact Assessment Criteria (Annual Mean at Receptors)

Predicted Impact	Adverse Significance	Justification
Greater than air quality limit value or objective	Major	Exceeding any air quality limit value would be unacceptable in terms of human health, or where the impact would have significant adverse ecological impacts.
Process Contribution >30% of EAL	Moderate	Risk based approach advocated by Environment Agency taking account of model headroom and uncertainty.
Process Contribution <30% of EAL	Minor/Moderate	Risk based approach advocated by Environment Agency taking account of model headroom and uncertainty.
Process Contribution <10% of EAL	Minor	Based on rule of thumb (factor of 10)
Process Contribution <1% of EAL	Insignificant	This is the assessment criteria proposed by EA as a screening method which states that process contributions can be considered insignificant if the long-term process contribution is <1% of the long-term environmental standard.

[4] IAQM 2014. Guidance on the assessment of odour for planning.
[5] Air emissions risk assessment for your environmental permit https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#environmental-standards-for-air-emissions

3.0 BASELINE AIR QUALITY AND PROCESS EMISSION INVENTORY

Emission Inventory for the AQIA

3.1 The emission estimates for the soil treatment facility assumes that all emissions are released from the surface of the bio-filter and ignores any fugitive emissions from the stockpiles and screening and grading operations.

3.2 Details of the emission rate from the bio-filter are presented in Table 3.1 at the end of the text.

3.3 A single emission Scenario has been considered for the assessment:

- Scenario 1 is based on the maximum measured concentration from a similar installation elsewhere.

Baseline Air Quality

3.4 The only available baseline estimates for Benzene in the study area are from DEFRA modelled projections based on work conducted in 2001. This indicates that the annual mean exposure to Benzene in air within the study area was up to 0.275ug/m^3 for the year 2010.

4.0 DISPERSION MODELLING

Introduction to Section 4

4.1. This Section sets out the reasons for the approach to assessment and details the assumptions made in the dispersion modelling.

Justification for Approach

4.2. The likely impact from process emissions may be estimated using an appropriate atmospheric dispersion model and reliable emission estimates. The emissions from the process for Scenario 1 are based on worst-case emission concentrations measured at a similar facility elsewhere.

4.3. The objective of the dispersion modelling assessment is to predict the likely effect of the prevailing climate, local surface conditions and topography on plume behaviour; and to predict the likely worst case airborne concentrations at sensitive receptors around the facility.

4.4. The pattern of pollutant dispersion may be estimated using several years of historical meteorological data from a representative site. Air quality impacts are assessed against Environmental Assessment Levels.

4.5. The assessment ignores the impacts from fugitive emissions. This is contingent on appropriate measures being adopted at the site to prevent or minimise fugitive releases.

Approach to Modelling Uncertainty

4.6. Environment Agency policy statement[6] refers to the Royal Meteorological Society Guidelines on Dispersion Modelling. According to this Guidance, dispersion modelling studies should include a Sensitivity Analysis for model inputs to provide an estimate of the possible errors in the predictions. The Environment Agency has also published requirements for dispersion modelling.[7] This includes advice on the Agency's requirements for reporting. These Guidance documents have been taken into account in the assessment.

4.7. A widely recognised mathematical model (ADMS 5.2) has been used to predict how emissions will be dispersed taking account of: the source conditions (using emission factors and the flow rate and pollutant concentrations); release conditions (efflux velocity and temperature); meteorological conditions from a representative site (in this case near ground measurements at RAF Scmpton supplied by the Met Office); building effects and surface conditions (surface roughness).

4.8. ADMS 5.2 has been developed specifically for industrial point sources.[8] The model is widely used in the UK for environmental assessment and is

[6]Environment Agency, undated. Policy Statement EAS/2007/1/1
[7]Environment Agency, undated. Air Dispersion Modelling Report Requirements (for detailed dispersion modelling).
[8]CERC 2016. ADMS-5, The Multiple Source Air Dispersion Model. CERC, Cambridge.

generally considered by UK environmental agencies to be suitable for air quality impact assessment subject to its proper use.

4.9. Potential difficulties and limitations in this type of study when applied to air quality impact assessments include:

- Lack of good information about the risk to human health from process emissions. This assessment relies on the Environmental Assessment Levels (EALs) published by the Environment Agency;
- Uncertainties in baseline conditions. The baseline estimates used take account of available background estimates published by DEFRA;
- Errors in source terms used to estimate emissions. Emission rates are based on worst-case measured pollutant concentrations at a similar site elsewhere and air flow estimates provided by the operator;
- Errors inherent in the dispersion model used. The model is considered to be suitable for use in this application and has been validated for area sources; and
- Errors introduced by the model user due to the use of inappropriate or unrepresentative input values such as meteorological data or surface roughness values. A Sensitivity Analysis has been conducted to take these potential errors into account. The significance of these factors is discussed in Section 5. In general the approach used in this assessment has been to include worst case factors where these may otherwise lead to underestimates of worst case conditions.

4.10 This assessment presents a detailed account of the modelling process and considers the model sensitivity to the main user inputs. An inventory of the models run for this project is presented in Table 4.1 at the end of the text.

Dispersion Modelling

4.11 The transport and transformation of a pollutant in the boundary layer,[9] can be predicted with a reasonable degree of confidence using an appropriate mathematical model. The model used for this exercise is ADMS 5.2. This mathematical model enables the calculation of multiple sources and includes an algorithm for assessing flow around buildings that may cause entrainment. The principal factors affecting the concentration of a pollutant are:

- Source characteristics including source strength, height of discharge, density, and temperature of the release;
- Prevailing atmospheric conditions including wind speed, wind direction, cloud cover, precipitation, ambient temperature and the depth of the boundary layer; and

[9]The boundary layer is the layer of the atmosphere near the surface of the Earth that is affected by mechanical turbulence from surface friction and convective turbulence through local surface heating.

- Adjacent topography and local surface conditions.

These factors can be assigned numerical values and the resultant downwind concentrations of pollutants may be predicted.

4.12 The model description is published in the user guide for ADMS 5.2. The model was originally developed as a research project jointly funded by HSE, the Met Office and Her Majesty's Industrial Inspectorate of Pollution. The model is routinely used by UK environment agencies.[10]

Model Parameters

4.13 The temperature and efflux velocity of the stack gases are based on engineering estimates provided by the supplier. The emissions from the process are summarised in Table 4.2 in accordance with the requirements of H1[11] and Environment Agency Guidelines.

Source Condition, Location and Height

4.14 The emissions have been considered as continuous, steady state area source near ground level. The location of the proposed bio-filter is shown in Figure 2. The bio-filter release is assumed to be 1m above local ground level. The flow from the bio-filter has been modelled as a zero volume, zero velocity release.

4.15 The details of the proposed facility were obtained from the site planning drawings and the OS map base at 1:1250 and 1:10,000 scales.

Surface Roughness

4.16 The surface roughness conditions at the site have been assumed to have a surface roughness value of 0.5m as this is considered to represent worst case conditions for dispersion. This value has been used across the domain.

Meteorological Data

4.17 The selection of suitable meteorological data needs to be conducted with care. The main limiting factor for suitable meteorological data is continuous observations of cloud cover, used in the model to determine atmospheric stability.

4.18 Five years of hourly sequential meteorological data from RAF Scampton (2012 - 2016 inclusive) have been used to predict the dispersion around the site. Monks Wood is 34km to the south of the proposed installation and is likely to be reasonably representative of conditions at the study area. The worst case one year in five has been used in the assessment. A summary of the meteorological data is presented in Appendix 2. A model sensitivity analysis has also been conducted using 5 years of hourly sequential meteorological data for Wittering (2014 - 2018), which is

[10] Details of model validation studies are available at http://www.cerc.co.uk/software/publications.htm
[11] Environment Agency December 2011. H1 Risk Assessment Annex F v2.2

~29km to the south-east. Theses data has been used to assess worst case impacts for long-term exposure.

Building Effects

4.19 The release at near ground level so that building effects on dispersion have been discounted.

Terrain Effects

4.20 The land near the proposed installation is relatively level across the site, with only minor variations in ground level across the study area. The local topography is plotted in Figure 3. Terrain effects are unlikely to affect air flow and dispersion. Terrain effects have therefore been taken into account as a precaution.

Time Averaging and Percentiles

4.21 The averaging time for all pollutants is based on a 1 hour average. The 1 hour 100%ile has been calculated for pollutants where appropriate. Odour has been predicted using the 1 hour 98%ile and 100%ile.

Grid Resolution and Receptors

4.22 Predictions have been made at 20 fixed point receptor locations around the site to represent exposure at existing receptors and to assist with the model Sensitivity Analysis. These receptor locations are shown in Figure 1. The predictions have been modelled at a height of 1.5m above ground level.

4.23 Predictions have also been provided over the study area on a grid 43 by 36 at intervals of 100m where x1 = 465000; y1 = 385200; x2 – 469800; and y2 = 388700.

Removal Effects

4.24 Atmospheric chemistry and photo-lytic reactions have been ignored in the dispersion modelling.

Overview of the Modelling Process

4.25 Details of the ADMS dispersion model runs are presented in Table 4.1 at the end of the text.

Model Sensitivity Analysis

5.1. It is a requirement of the Royal Meteorological Society Guidelines on Dispersion Modelling[12&13] that studies should include a Sensitivity Analysis for model inputs, to provide an estimate of the possible errors in the predictions. The potential errors in predictions and limits to the dispersion model were outlined in Section 4. The Sensitivity Analysis conducted for this study is based on the findings of the model sensitivity analysis. The results for the model sensitivity analysis are presented in Appendix 3. The model predictions are based on the worst case one year in five, and allow for topography effects and worst case surface roughness conditions.

Results – Human Health

5.2. The predicted contours for airborne Benzene for Scenario 1, excluding background, are plotted in Figure 4. This indicates that the predicted annual mean concentration of Benzene is below the significance threshold of 1% of the EAL for human exposure. The predicted concentrations for all pollutants at sensitive receptors are included within Appendix 3 and summarised in Table 5.1 below.

Table 5.1 - Worst Case Predicted Levels at Sensitive Receptors (Scenario 1)

Pollutant	Long-term	Short-term
	ug/m^3	ug/m^3
Benzene	0.00031	0.0534
Toluene	0.00495	0.8545
Ethylbenzene	0.00046	0.0790
Xylene	0.00124	0.2136

5.3. These predictions are based on worst case dispersion conditions for meteorology and surface roughness. The criteria used to assess the significance of pollutants were presented in Table 2.2. The significance of these predicted concentrations may be determined from Table 5.2 below, where the predicted process contribution is expressed as a percentage of the Environmental Assessment Level. Impacts are insignificant where the process contribution is <1% of the long-term EAL.

Table 5.2 – Significance of Worst Case Predicted Levels at Sensitive Receptors

Pollutant	Long term	Short term
	ug/m^3	ug/m^3
Benzene	0%	-
Toluene	0%	0%
Ethylbenzene	0%	0%
Xylene	0%	0%

N.B. columns are blank where there is no relevant EAL. (Scenario 1)

[12]Royal Meteorological Society May 1995. Policy Statement Atmospheric Dispersion Modelling. Guidelines on the justification of choice and use of models and the communication and reporting of results

[13]ADMLC 2004. Guidelines for the Preparation of Dispersion Modelling Assessments for Compliance with Regulatory Requirements – an Update to the 1995 Royal Meteorological Society Guidance

5.4. This indicates that the process contributions are predicted to be well below the relevant EALs.

Model Headroom

5.5. The Environment Agency's method for assessing model uncertainty[14] indicates that confidence in the model is high for both short and long-term exposure based on Benzene (assuming Scenario 1 emissions).

Results - Odour

5.15. The predicted odour at the nearest sensitive receptors are well below the odour detection threshold for all pollutants.

[14] Ji Ping Shi and Betty Ng; 2004. Risk based pragmatic approach to address model uncertainty. Air Quality Modelling and Assessment Unit The Environment Agency 29 Newport Road Cardiff CF24 0TP. Paper Given At NSCA Seminar.

6.0 PROPOSED MITIGATION MEASURES

Operational Impacts

6.1 The following measures are proposed to prevent or minimise impacts on air pollution:

- The waste acceptance criteria for the proposed facility shall ensure that only suitable materials are deposited within the aerated static piles.
- The air stream into the bio-filter shall be cleaned to prevent dust loading into the filter media.
- The condition of the bio-filter bed shall be tested on a monthly basis to ensure satisfactory performance.
- Supervisory staff shall be trained to ensure that the facility is operated within specification.
- All process operations shall be subject to routine planned preventative maintenance.
- Environmental monitoring shall be conducted to confirm the pollutant concentrations are within the assumed levels and to ensure compliance with Environmental Assessment Levels.

7.0 EVALUATION OF IMPACTS

Human Exposure

7.1 The assessment takes account of the worst case model predictions, the relevant Environmental Assessment Levels (EAL) and the significance criteria set out in Tables 2.1 – 2.2.

7.2 The predicted impacts from the proposed facility are insignificant at all sensitive receptors in terms of the assessment framework set out in Table 2.2, where all pollutants are <1% of the EAL.

7.3 Odour impacts from the proposed facility are predicted to be negligible.

Tables

Item	Description	dimensions [1]	volume of air [2]	pollutant [3]	maximum reported concentration [4]	maximum emission rate [5]	maximum emission rate [5]
		m^2	m3/s		ug/m^3	g/s	$g/m^2/s$
1	bio-filter surface	475	2.778	Benzene	10	2.778E-05	5.848E-08
		475	2.778	Toluene	160	4.444E-04	9.357E-07
		475	2.778	Ethlbenzene	14.8	4.111E-05	8.655E-08
		475	2.778	m/p-Xylene	30	8.333E-05	1.754E-07
		475	2.778	o-Xylene	10	2.778E-05	5.848E-08

Notes

1. from drawing Daneshill No. 1. Provectus FCC Environment Provisional Layout September 2019
2. Email from Jon Owens Provectus to Andy Stocks Caulmert 28th November 2019
3. The species considered in this assessment are based on the available data from measurements at a similar facility elsewhere
4. Based on the maximum reported pollutant concentration at a similar site elsewhere.
5. No correction has been applied for STP or moisture

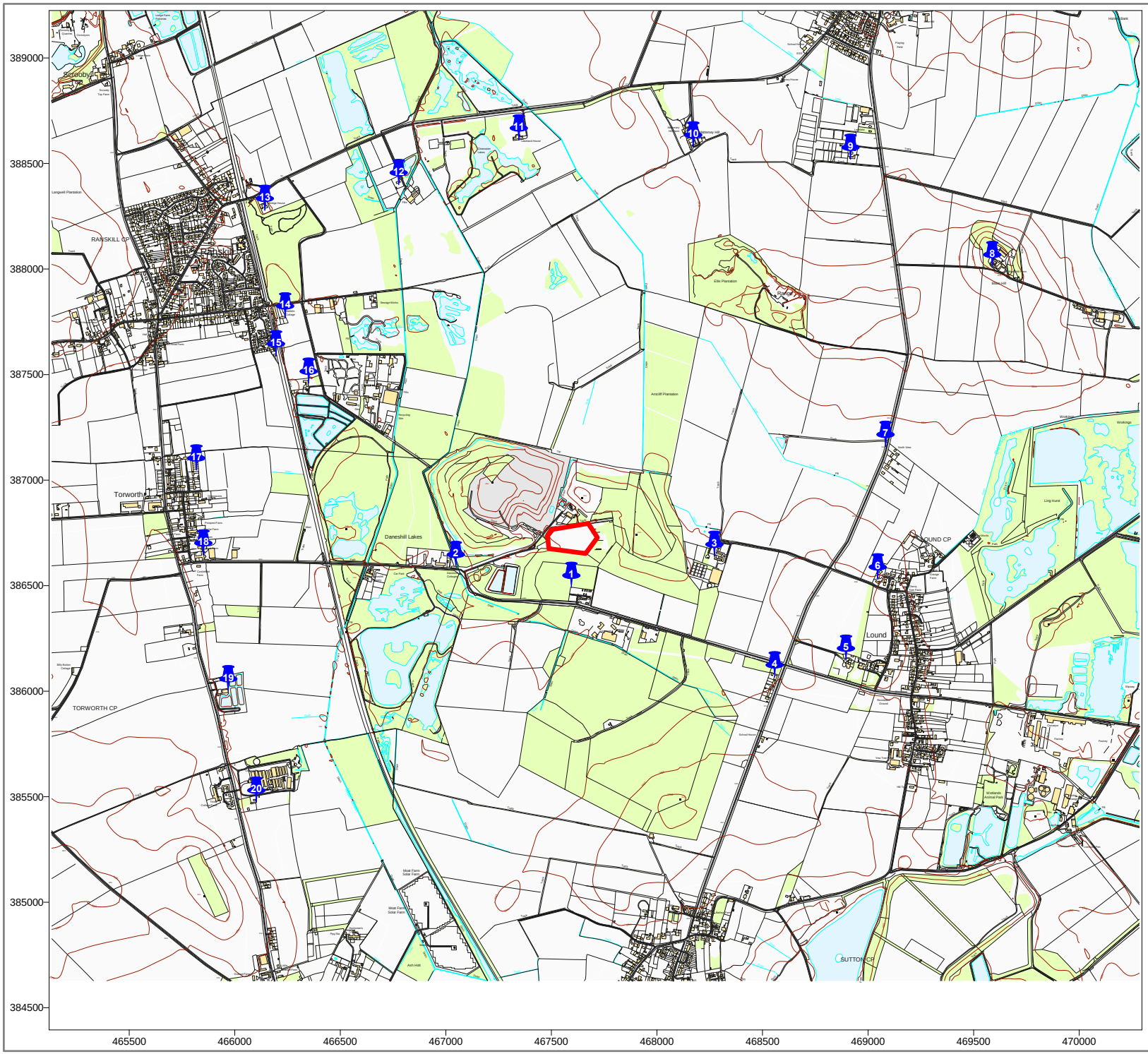
Results from sampling at bio-filter outlet Provectus Remediation Ltd Edwin Richards Quarry April 2018 - October 2019

BTEX	09-Apr-18	12-Mar-18	01-May-18	16-May-18	05-Jul-18	27-Jul-18	03-Sep-18	15-Oct-18	14-Nov-18	14-Nov-18	28-Dec-18	31-Jan-19	27-Feb-19	29-Mar-19	29-Apr-19	10-May-19	10-May-19	10-May-19	10-May-19	28-Jun-19	28-Jun-19	30-Jul-19	30-Aug-19	02-Oct-19	Max	average
Benzene	2.3	1.7	1.7	1.7	1.7	7.9	7.5	3.8	2.3	1.7	10	2	2	2	3	2	2	2	5	2	8	2	2	2	10	3
Toluene	5.3	2	1.7	2	1.7	11.1	9.2	4.9	2	1.7	10	10	20	10	20	3	20	20	30	20	40	30	160	53	160	20
Ethlbenzene	1.7	14.8	1.7	1.7	1.7	3.4	1.8	1.8	1.7	1.7	2	2	6	2	5	2	5	3	5	6	10	6	2	2	14.8	4
m/p-Xylene	1.9	10.9	1.7	1.7	1.7	15.1	8.4	6.7	1.7	1.7	3	6	20	7	10	3	10	6	9	20	30	20	4	4	30	8
o-Xylene	1.7	4	1.7	1.7	1.7	6.5	4.3	2.8	1.7	1.7	2	2	5	3	4	2	4	3	4	7	10	10	2	2	10	4

Model Inventory

Run	Name		Met Data	Surface roughness at site (m)	terrain	objective
1	Scampton 2014	.apl	Scampton 2014	0.3	off	
2	Scampton 2015	.apl	Scampton 2015	0.3	off	
3	Scampton 2016	.apl	Scampton 2016	0.3	off	
4	Scampton 2017	.apl	Scampton 2017	0.3	off	
5	Scampton 2018	.apl	Scampton 2018	0.3	off	to predict deposition for range of met. conditions
6	rough 0.3m	.apl	Scampton 2016	0.3	off	
7	rough 0.5m	.apl	Scampton 2016	0.5	off	
8	rough 1.0m	.apl	Scampton 2016	1.0	off	to assess significance of surface roughness on dispersion
9	terrain	.apl	Scampton 2016	0.3	on	to assess significance of terrain on dispersion
9	Scenario 1	.apl	Scampton 2016	0.3	off	to provide predictions for worst case dispersion conditions

Figures



Site Location

indicative site location

sensitive receptor considered in study

Figure 1

The Airshed

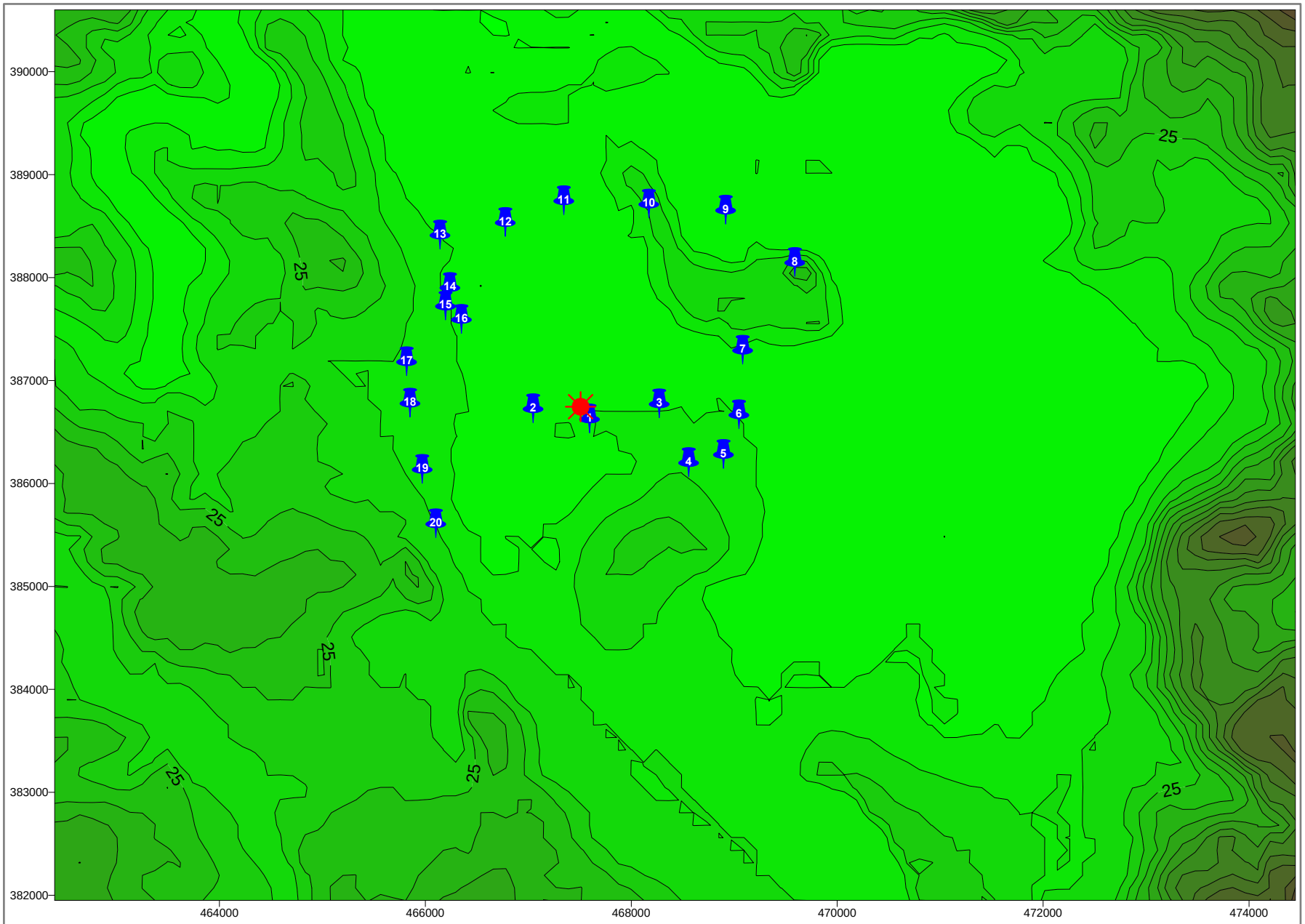
Model Layout

bio-filter

sensitive receptor considered in study

Figure 2

The Airshed



Topography

indicative location of bio-filter

sensitive receptor considered in study

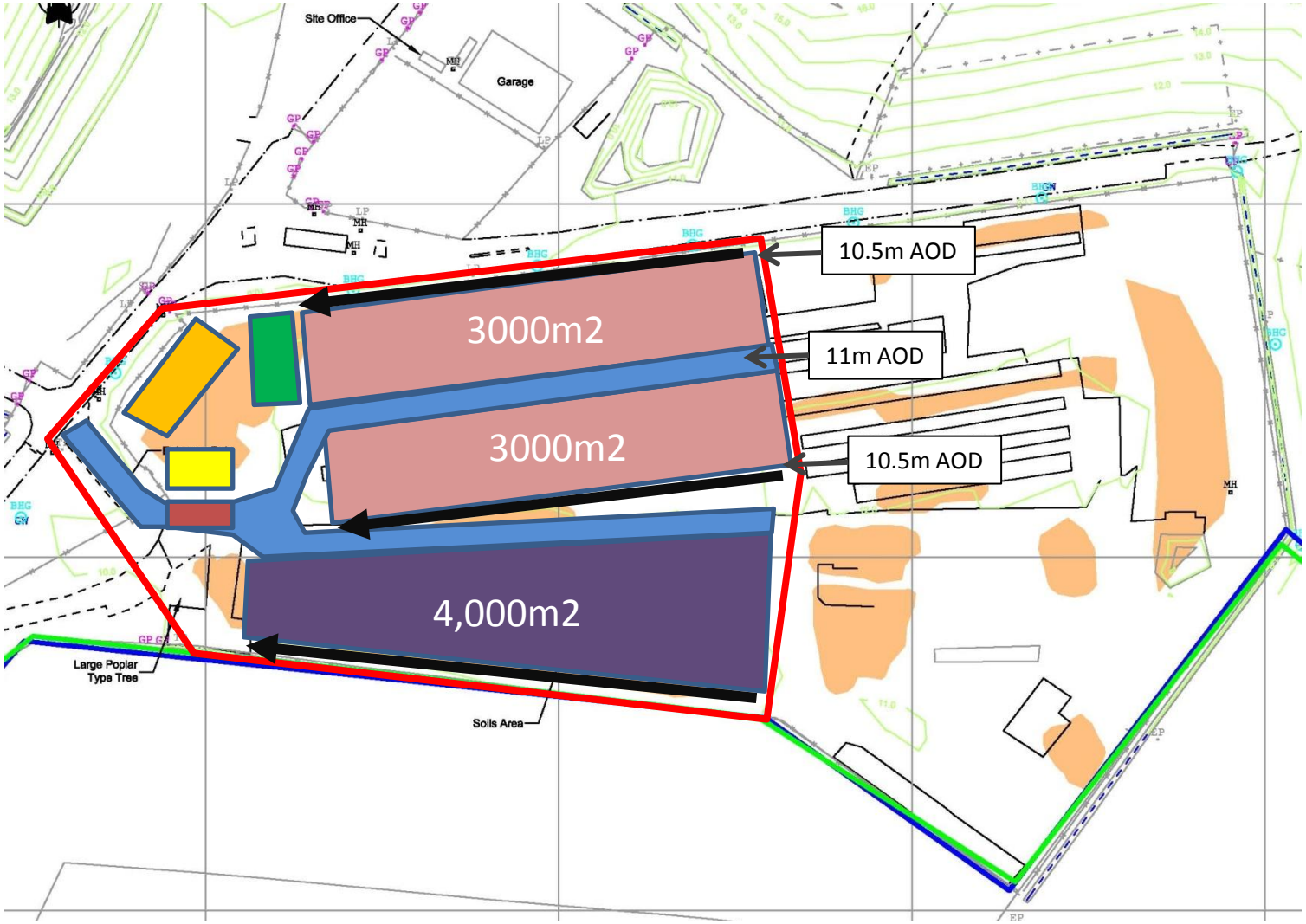
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0

OS Landform Panorama mAOD

Figure 3

The Airshed

Appendix 1 – Project Description



- Biofilter (475m2)
- Biotreatment Area
- Screening/Processing
- Soil and Water Treatment Equipment
- Site Office
- Relocated Weighbridge
- Access Roads
- Fall of Drainage

PROVECTUS

Provectus Remediation Ltd
Wyvols Court
Swallowfield
Reading
RG7 1WY

Tel. 0118 988 0218
www.provectusgroup.com

Client: FCC Environment

Project: Daneshill

Job No.: P268

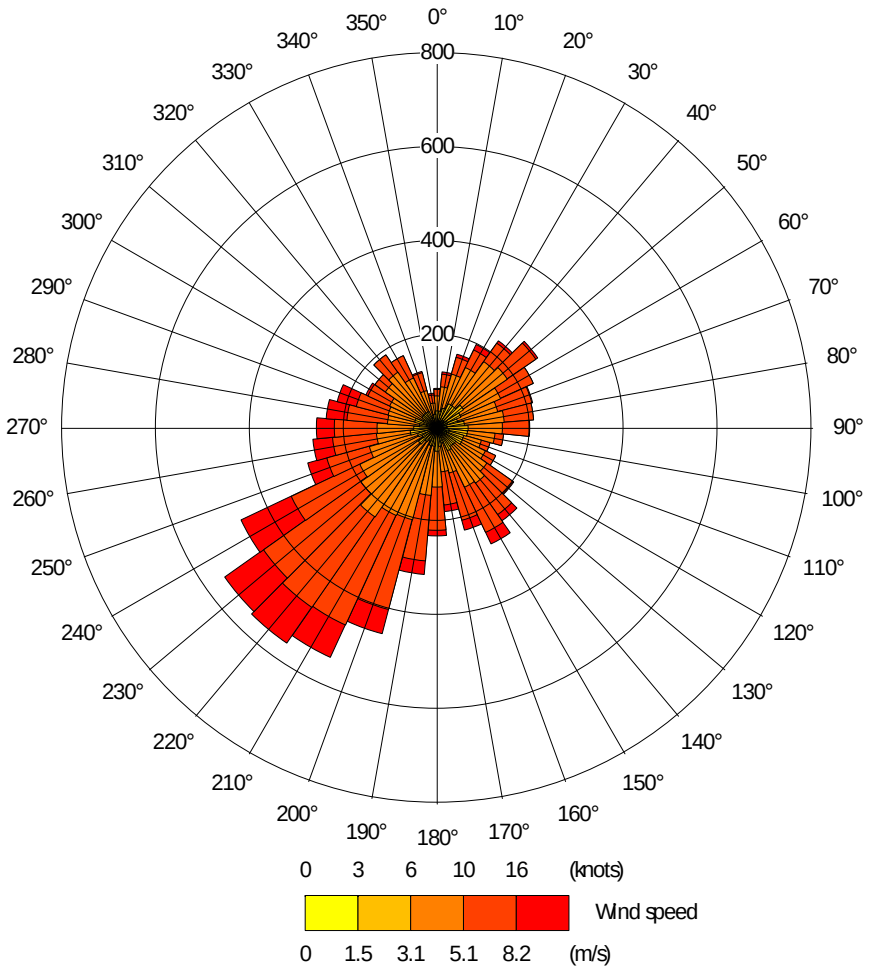
Title: Provisional Layout

Scale: NTS

Date Drawn: September 2019

Drawing No.: Daneshill 1

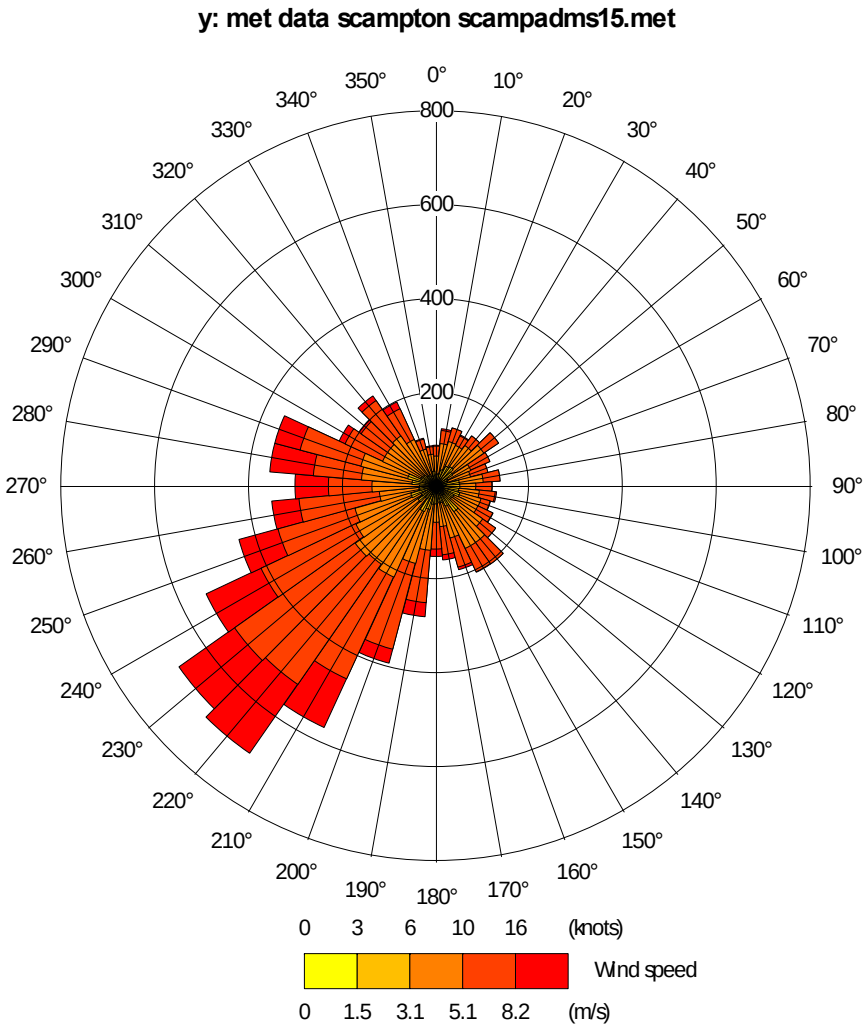
Appendix 2 – Model Inputs



Met Data

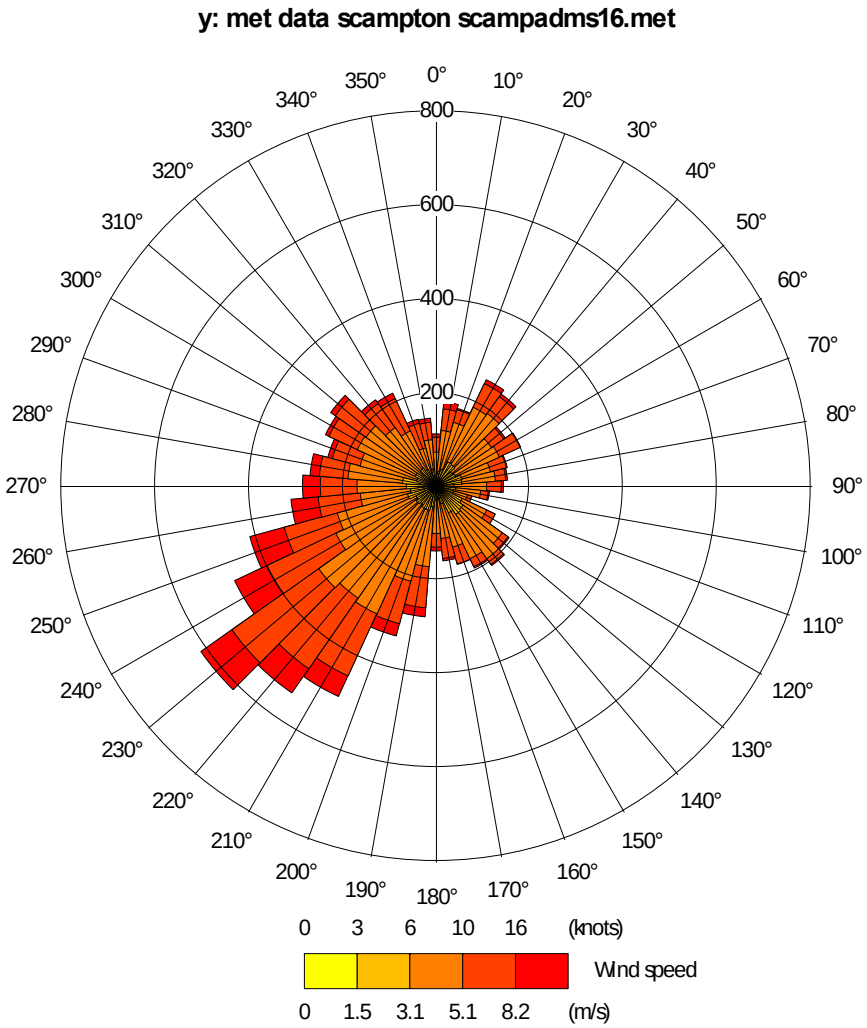
Appendix 2

Met Data



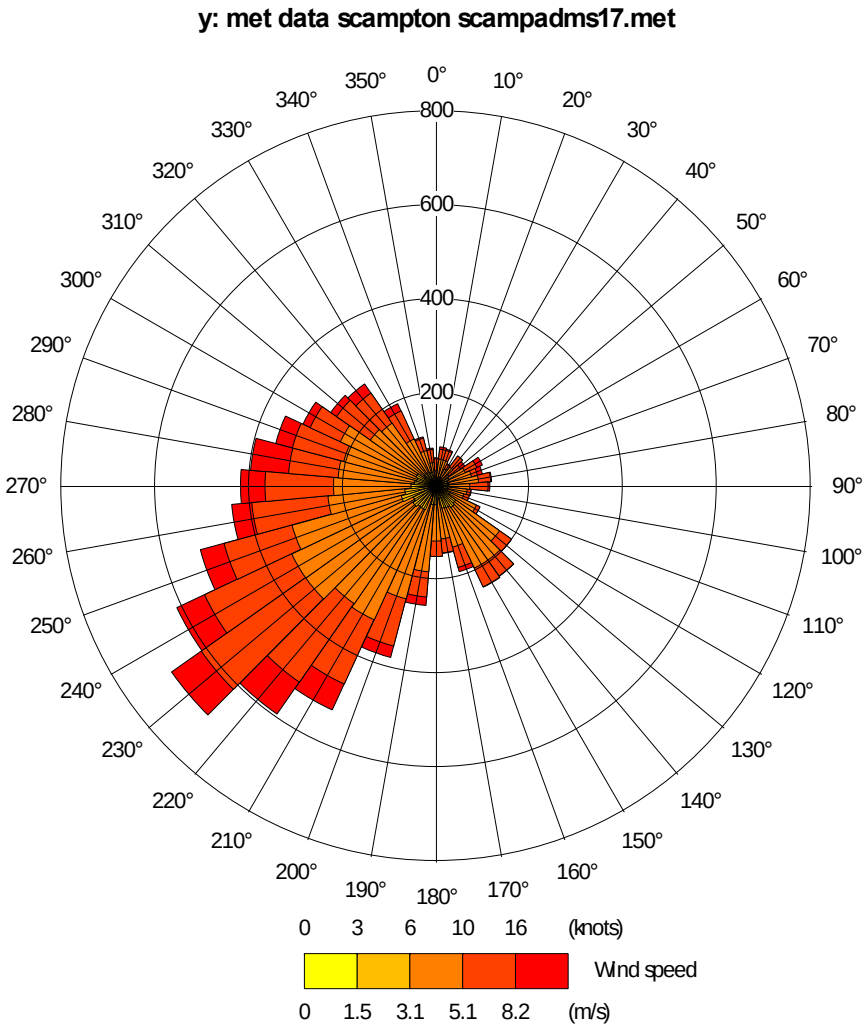
Appendix 2

Met Data



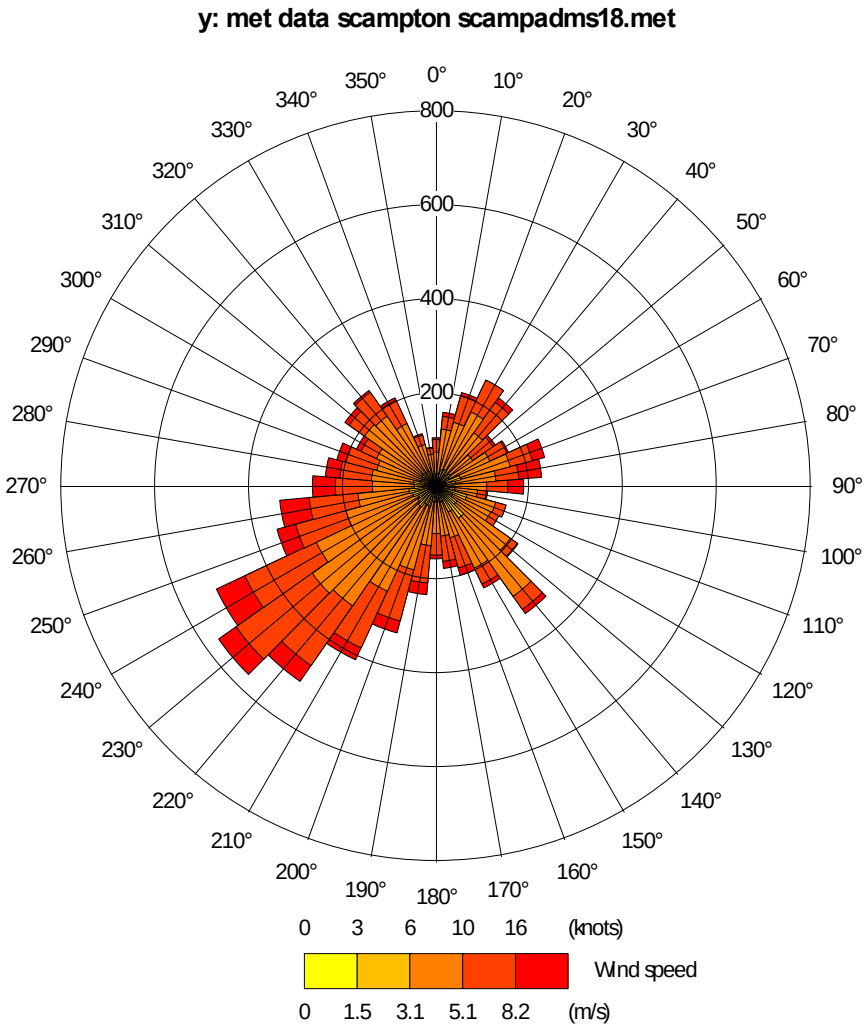
Appendix 2

Met Data



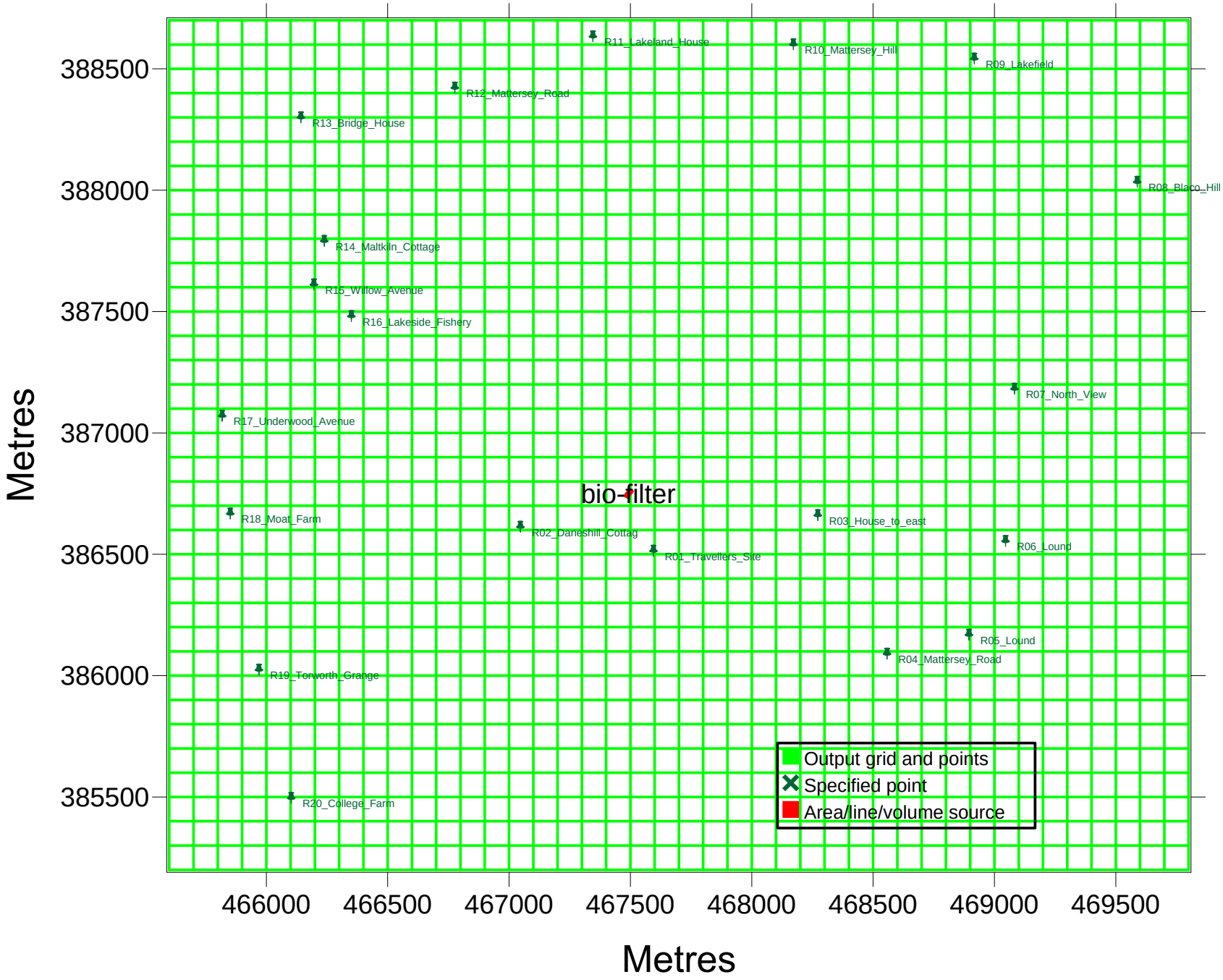
Appendix 2

Met Data



Appendix 2

Visualisation of ADMS input
P:\files\AS 0732 Daneshill Soil Vapour\model runs\Scenario 1.APL



Appendix 3 – Model Outputs

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00018	0.02964	0.00188
2	Daneshill Cottage	467047	386590	0.00014	0.01306	0.00168
3	House to east	468272	386638	0.00005	0.00556	0.00056
4	Mattersey Road	468558	386067	0.00002	0.00256	0.00023
5	Lound	468895	386146	0.00001	0.00193	0.00016
6	Lound	469046	386531	0.00001	0.00180	0.00017
7	North View	469083	387159	0.00002	0.00172	0.00020
8	Blaco Hill	469589	388011	0.00001	0.00090	0.00012
9	Lakefield	468917	388519	0.00001	0.00101	0.00013
10	Mattersey Hill	468172	388578	0.00002	0.00128	0.00017
11	Lakeland House	467346	388611	0.00001	0.00140	0.00014
12	Mattersey Road	466777	388399	0.00001	0.00148	0.00014
13	Bridge House	466143	388277	0.00001	0.00121	0.00015
14	Maltkiln Cottage	466239	387768	0.00002	0.00170	0.00023
15	Willow Avenue	466196	387589	0.00002	0.00190	0.00024
16	Lakeside Fishery	466351	387458	0.00002	0.00240	0.00031
17	Underwood Avenue	465818	387047	0.00002	0.00161	0.00024
18	Moat Farm	465851	386645	0.00002	0.00171	0.00024
19	Torworth Grange	465970	386001	0.00001	0.00161	0.00018
20	College Farm	466102	385473	0.00001	0.00136	0.00017
Max				0.00018	0.02964	0.00188

model sensitivity analysis
met data variability
Scampton 2014
surface roughness 0.5m
terrain effects off

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00020	0.03068	0.00202
2	Daneshill Cottage	467047	386590	0.00010	0.01306	0.00090
3	House to east	468272	386638	0.00007	0.00575	0.00078
4	Mattersey Road	468558	386067	0.00002	0.00264	0.00025
5	Lound	468895	386146	0.00002	0.00193	0.00021
6	Lound	469046	386531	0.00002	0.00186	0.00024
7	North View	469083	387159	0.00002	0.00172	0.00020
8	Blaco Hill	469589	388011	0.00001	0.00090	0.00012
9	Lakefield	468917	388519	0.00001	0.00101	0.00013
10	Mattersey Hill	468172	388578	0.00002	0.00128	0.00018
11	Lakeland House	467346	388611	0.00001	0.00140	0.00010
12	Mattersey Road	466777	388399	0.00001	0.00148	0.00013
13	Bridge House	466143	388277	0.00001	0.00121	0.00014
14	Maltkiln Cottage	466239	387768	0.00002	0.00177	0.00021
15	Willow Avenue	466196	387589	0.00002	0.00190	0.00022
16	Lakeside Fishery	466351	387458	0.00002	0.00240	0.00029
17	Underwood Avenue	465818	387047	0.00002	0.00161	0.00015
18	Moat Farm	465851	386645	0.00001	0.00171	0.00012
19	Torworth Grange	465970	386001	0.00001	0.00161	0.00010
20	College Farm	466102	385473	0.00001	0.00136	0.00010
Max				0.00020	0.03068	0.00202

model sensitivity analysis
met data variability
Scampton 2015
surface roughness 0.5m
terrain effects off

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00025	0.03068	0.00240
2	Daneshill Cottage	467047	386590	0.00014	0.01306	0.00166
3	House to east	468272	386638	0.00007	0.00575	0.00093
4	Mattersey Road	468558	386067	0.00003	0.00264	0.00029
5	Lound	468895	386146	0.00002	0.00193	0.00023
6	Lound	469046	386531	0.00002	0.00186	0.00030
7	North View	469083	387159	0.00002	0.00172	0.00030
8	Blaco Hill	469589	388011	0.00001	0.00086	0.00015
9	Lakefield	468917	388519	0.00002	0.00101	0.00016
10	Mattersey Hill	468172	388578	0.00002	0.00128	0.00022
11	Lakeland House	467346	388611	0.00001	0.00140	0.00010
12	Mattersey Road	466777	388399	0.00001	0.00148	0.00014
13	Bridge House	466143	388277	0.00001	0.00121	0.00019
14	Maltkiln Cottage	466239	387768	0.00002	0.00177	0.00032
15	Willow Avenue	466196	387589	0.00002	0.00190	0.00030
16	Lakeside Fishery	466351	387458	0.00003	0.00240	0.00035
17	Underwood Avenue	465818	387047	0.00001	0.00161	0.00009
18	Moat Farm	465851	386645	0.00001	0.00171	0.00014
19	Torworth Grange	465970	386001	0.00002	0.00161	0.00017
20	College Farm	466102	385473	0.00001	0.00136	0.00015
Max				0.00025	0.03068	0.00240

model sensitivity analysis
met data variability
Scampton 2016
surface roughness 0.5m
terrain effects off

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00016	0.03068	0.00150
2	Daneshill Cottage	467047	386590	0.00008	0.01198	0.00083
3	House to east	468272	386638	0.00007	0.00575	0.00084
4	Mattersey Road	468558	386067	0.00002	0.00256	0.00024
5	Lound	468895	386146	0.00002	0.00193	0.00021
6	Lound	469046	386531	0.00002	0.00186	0.00026
7	North View	469083	387159	0.00003	0.00172	0.00033
8	Blaco Hill	469589	388011	0.00002	0.00090	0.00018
9	Lakefield	468917	388519	0.00002	0.00101	0.00016
10	Mattersey Hill	468172	388578	0.00002	0.00128	0.00019
11	Lakeland House	467346	388611	0.00001	0.00140	0.00013
12	Mattersey Road	466777	388399	0.00001	0.00148	0.00013
13	Bridge House	466143	388277	0.00001	0.00121	0.00016
14	Maltkiln Cottage	466239	387768	0.00002	0.00177	0.00025
15	Willow Avenue	466196	387589	0.00002	0.00176	0.00024
16	Lakeside Fishery	466351	387458	0.00002	0.00229	0.00029
17	Underwood Avenue	465818	387047	0.00001	0.00161	0.00008
18	Moat Farm	465851	386645	0.00001	0.00171	0.00008
19	Torworth Grange	465970	386001	0.00001	0.00161	0.00008
20	College Farm	466102	385473	0.00001	0.00136	0.00004
Max				0.00016	0.03068	0.00150

model sensitivity analysis
met data variability
Scampton 2017
surface roughness 0.5m
terrain effects off

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00021	0.03068	0.00218
2	Daneshill Cottage	467047	386590	0.00013	0.01306	0.00128
3	House to east	468272	386638	0.00006	0.00575	0.00062
4	Mattersey Road	468558	386067	0.00002	0.00264	0.00028
5	Lound	468895	386146	0.00002	0.00190	0.00017
6	Lound	469046	386531	0.00002	0.00186	0.00019
7	North View	469083	387159	0.00002	0.00172	0.00022
8	Blaco Hill	469589	388011	0.00001	0.00090	0.00012
9	Lakefield	468917	388519	0.00001	0.00101	0.00016
10	Mattersey Hill	468172	388578	0.00002	0.00128	0.00016
11	Lakeland House	467346	388611	0.00001	0.00133	0.00010
12	Mattersey Road	466777	388399	0.00001	0.00148	0.00012
13	Bridge House	466143	388277	0.00002	0.00121	0.00024
14	Maltkiln Cottage	466239	387768	0.00002	0.00177	0.00036
15	Willow Avenue	466196	387589	0.00002	0.00190	0.00030
16	Lakeside Fishery	466351	387458	0.00003	0.00240	0.00037
17	Underwood Avenue	465818	387047	0.00001	0.00161	0.00017
18	Moat Farm	465851	386645	0.00001	0.00171	0.00014
19	Torworth Grange	465970	386001	0.00001	0.00161	0.00016
20	College Farm	466102	385473	0.00001	0.00136	0.00010
Max				0.00021	0.03068	0.00218

model sensitivity analysis
met data variability
Scampton 2018
surface roughness 0.5m
terrain effects off

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00031	0.05341	0.00269
2	Daneshill Cottage	467047	386590	0.00020	0.02288	0.00217
3	House to east	468272	386638	0.00009	0.00928	0.00111
4	Mattersey Road	468558	386067	0.00003	0.00446	0.00032
5	Lound	468895	386146	0.00002	0.00320	0.00026
6	Lound	469046	386531	0.00003	0.00296	0.00034
7	North View	469083	387159	0.00003	0.00234	0.00035
8	Blaco Hill	469589	388011	0.00001	0.00149	0.00017
9	Lakefield	468917	388519	0.00002	0.00168	0.00018
10	Mattersey Hill	468172	388578	0.00002	0.00208	0.00025
11	Lakeland House	467346	388611	0.00002	0.00233	0.00012
12	Mattersey Road	466777	388399	0.00002	0.00250	0.00018
13	Bridge House	466143	388277	0.00002	0.00202	0.00023
14	Maltkiln Cottage	466239	387768	0.00003	0.00296	0.00038
15	Willow Avenue	466196	387589	0.00003	0.00317	0.00037
16	Lakeside Fishery	466351	387458	0.00004	0.00404	0.00044
17	Underwood Avenue	465818	387047	0.00002	0.00274	0.00012
18	Moat Farm	465851	386645	0.00002	0.00289	0.00017
19	Torworth Grange	465970	386001	0.00002	0.00275	0.00021
20	College Farm	466102	385473	0.00002	0.00222	0.00018
Max				0.00031	0.05341	0.00269

model sensitivity analysis
surface roughness
Scampton 2016
surface roughness 0.3m
terrain effects off

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00025	0.03068	0.00240
2	Daneshill Cottage	467047	386590	0.00014	0.01306	0.00166
3	House to east	468272	386638	0.00007	0.00575	0.00093
4	Mattersey Road	468558	386067	0.00003	0.00264	0.00029
5	Lound	468895	386146	0.00002	0.00193	0.00023
6	Lound	469046	386531	0.00002	0.00186	0.00030
7	North View	469083	387159	0.00002	0.00172	0.00030
8	Blaco Hill	469589	388011	0.00001	0.00086	0.00015
9	Lakefield	468917	388519	0.00002	0.00101	0.00016
10	Mattersey Hill	468172	388578	0.00002	0.00128	0.00022
11	Lakeland House	467346	388611	0.00001	0.00140	0.00010
12	Mattersey Road	466777	388399	0.00001	0.00148	0.00014
13	Bridge House	466143	388277	0.00001	0.00121	0.00019
14	Maltkiln Cottage	466239	387768	0.00002	0.00177	0.00032
15	Willow Avenue	466196	387589	0.00002	0.00190	0.00030
16	Lakeside Fishery	466351	387458	0.00003	0.00240	0.00035
17	Underwood Avenue	465818	387047	0.00001	0.00161	0.00009
18	Moat Farm	465851	386645	0.00001	0.00171	0.00014
19	Torworth Grange	465970	386001	0.00002	0.00161	0.00017
20	College Farm	466102	385473	0.00001	0.00136	0.00015
Max				0.00025	0.03068	0.00240

model sensitivity analysis
surface roughness
Scampton 2016
surface roughness 0.5m
terrain effects off

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00022	0.01970	0.00226
2	Daneshill Cottage	467047	386590	0.00012	0.00852	0.00158
3	House to east	468272	386638	0.00006	0.00371	0.00087
4	Mattersey Road	468558	386067	0.00002	0.00171	0.00026
5	Lound	468895	386146	0.00002	0.00126	0.00022
6	Lound	469046	386531	0.00002	0.00121	0.00027
7	North View	469083	387159	0.00002	0.00112	0.00028
8	Blaco Hill	469589	388011	0.00001	0.00054	0.00014
9	Lakefield	468917	388519	0.00001	0.00066	0.00015
10	Mattersey Hill	468172	388578	0.00002	0.00085	0.00022
11	Lakeland House	467346	388611	0.00001	0.00091	0.00010
12	Mattersey Road	466777	388399	0.00001	0.00097	0.00013
13	Bridge House	466143	388277	0.00001	0.00078	0.00017
14	Maltkiln Cottage	466239	387768	0.00002	0.00115	0.00028
15	Willow Avenue	466196	387589	0.00002	0.00124	0.00028
16	Lakeside Fishery	466351	387458	0.00002	0.00155	0.00034
17	Underwood Avenue	465818	387047	0.00001	0.00106	0.00010
18	Moat Farm	465851	386645	0.00001	0.00112	0.00014
19	Torworth Grange	465970	386001	0.00001	0.00107	0.00018
20	College Farm	466102	385473	0.00001	0.00089	0.00014
Max				0.00022	0.01970	0.00226

model sensitivity analysis
surface roughness
Scampton 2016
surface roughness 1.0m
terrain effects off

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00023	0.01934	0.00258
2	Daneshill Cottage	467047	386590	0.00012	0.00944	0.00188
3	House to east	468272	386638	0.00007	0.00399	0.00103
4	Mattersey Road	468558	386067	0.00002	0.00171	0.00027
5	Lound	468895	386146	0.00002	0.00125	0.00022
6	Lound	469046	386531	0.00002	0.00122	0.00035
7	North View	469083	387159	0.00002	0.00115	0.00030
8	Blaco Hill	469589	388011	0.00001	0.00056	0.00010
9	Lakefield	468917	388519	0.00001	0.00060	0.00017
10	Mattersey Hill	468172	388578	0.00002	0.00083	0.00023
11	Lakeland House	467346	388611	0.00001	0.00090	0.00012
12	Mattersey Road	466777	388399	0.00001	0.00092	0.00016
13	Bridge House	466143	388277	0.00001	0.00077	0.00022
14	Maltkiln Cottage	466239	387768	0.00002	0.00122	0.00036
15	Willow Avenue	466196	387589	0.00002	0.00127	0.00034
16	Lakeside Fishery	466351	387458	0.00002	0.00163	0.00041
17	Underwood Avenue	465818	387047	0.00001	0.00108	0.00009
18	Moat Farm	465851	386645	0.00001	0.00115	0.00021
19	Torworth Grange	465970	386001	0.00001	0.00106	0.00014
20	College Farm	466102	385473	0.00001	0.00091	0.00014
Max				0.00023	0.01934	0.00258

model sensitivity analysis
terrain effects
Scampton 2016
surface roughness 0.3m
terrain effects on

No	Receptor name	X(m)	Y(m)	LTConc|ug/m3|BENZENE|<All sources>|-| 1hr	P100.00|ug/m3|BENZENE|<All sources>|-| 1hr	P 98.00|ug/m3|BENZENE|<All sources>|-| 1hr
1	Travellers Site	467595	386491	0.00031	0.05341	0.00269
2	Daneshill Cottage	467047	386590	0.00020	0.02288	0.00217
3	House to east	468272	386638	0.00009	0.00928	0.00111
4	Mattersey Road	468558	386067	0.00003	0.00446	0.00032
5	Lound	468895	386146	0.00002	0.00320	0.00026
6	Lound	469046	386531	0.00003	0.00296	0.00034
7	North View	469083	387159	0.00003	0.00234	0.00035
8	Blaco Hill	469589	388011	0.00001	0.00149	0.00017
9	Lakefield	468917	388519	0.00002	0.00168	0.00018
10	Mattersey Hill	468172	388578	0.00002	0.00208	0.00025
11	Lakeland House	467346	388611	0.00002	0.00233	0.00012
12	Mattersey Road	466777	388399	0.00002	0.00250	0.00018
13	Bridge House	466143	388277	0.00002	0.00202	0.00023
14	Maltkiln Cottage	466239	387768	0.00003	0.00296	0.00038
15	Willow Avenue	466196	387589	0.00003	0.00317	0.00037
16	Lakeside Fishery	466351	387458	0.00004	0.00404	0.00044
17	Underwood Avenue	465818	387047	0.00002	0.00274	0.00012
18	Moat Farm	465851	386645	0.00002	0.00289	0.00017
19	Torworth Grange	465970	386001	0.00002	0.00275	0.00021
20	College Farm	466102	385473	0.00002	0.00222	0.00018
Max				0.00031	0.05341	0.00269

Scenario 1
worst-case dispersopm conditons
Scampton 2016
surface roughness 0.3m
terrain effects off

No	Receptor name	X(m)	Y(m)	Benzene	Toluene	Ethylbenzene	Xylene
1	Travellers Site	467595	386491	0.00031	0.00495	0.00046	0.00124
2	Daneshill Cottage	467047	386590	0.00020	0.00322	0.00030	0.00080
3	House to east	468272	386638	0.00009	0.00146	0.00013	0.00036
4	Mattersey Road	468558	386067	0.00003	0.00051	0.00005	0.00013
5	Lound	468895	386146	0.00002	0.00037	0.00003	0.00009
6	Lound	469046	386531	0.00003	0.00045	0.00004	0.00011
7	North View	469083	387159	0.00003	0.00044	0.00004	0.00011
8	Blaco Hill	469589	388011	0.00001	0.00024	0.00002	0.00006
9	Lakefield	468917	388519	0.00002	0.00031	0.00003	0.00008
10	Mattersey Hill	468172	388578	0.00002	0.00040	0.00004	0.00010
11	Lakeland House	467346	388611	0.00002	0.00025	0.00002	0.00006
12	Mattersey Road	466777	388399	0.00002	0.00027	0.00003	0.00007
13	Bridge House	466143	388277	0.00002	0.00030	0.00003	0.00008
14	Maltkiln Cottage	466239	387768	0.00003	0.00048	0.00004	0.00012
15	Willow Avenue	466196	387589	0.00003	0.00050	0.00005	0.00013
16	Lakeside Fishery	466351	387458	0.00004	0.00062	0.00006	0.00016
17	Underwood Avenue	465818	387047	0.00002	0.00027	0.00003	0.00007
18	Moat Farm	465851	386645	0.00002	0.00031	0.00003	0.00008
19	Torworth Grange	465970	386001	0.00002	0.00035	0.00003	0.00009
20	College Farm	466102	385473	0.00002	0.00028	0.00003	0.00007
Max				0.00031	0.00495	0.00046	0.00124

Scenario 1
units = ug/m3

No	Receptor name	X(m)	Y(m)	Benzene	Toluene	Ethylbenzene	Xylene
1	Travellers Site	467595	386491	0.05341	0.85453	0.07904	0.21363
2	Daneshill Cottage	467047	386590	0.02288	0.36608	0.03386	0.09152
3	House to east	468272	386638	0.00928	0.14847	0.01373	0.03712
4	Mattersey Road	468558	386067	0.00446	0.07136	0.00660	0.01784
5	Lound	468895	386146	0.00320	0.05117	0.00473	0.01279
6	Lound	469046	386531	0.00296	0.04734	0.00438	0.01183
7	North View	469083	387159	0.00234	0.03742	0.00346	0.00936
8	Blaco Hill	469589	388011	0.00149	0.02377	0.00220	0.00594
9	Lakefield	468917	388519	0.00168	0.02692	0.00249	0.00673
10	Mattersey Hill	468172	388578	0.00208	0.03332	0.00308	0.00833
11	Lakeland House	467346	388611	0.00233	0.03735	0.00345	0.00934
12	Mattersey Road	466777	388399	0.00250	0.03996	0.00370	0.00999
13	Bridge House	466143	388277	0.00202	0.03234	0.00299	0.00809
14	Maltkiln Cottage	466239	387768	0.00296	0.04741	0.00439	0.01185
15	Willow Avenue	466196	387589	0.00317	0.05066	0.00469	0.01266
16	Lakeside Fishery	466351	387458	0.00404	0.06470	0.00598	0.01617
17	Underwood Avenue	465818	387047	0.00274	0.04385	0.00406	0.01096
18	Moat Farm	465851	386645	0.00289	0.04624	0.00428	0.01156
19	Torworth Grange	465970	386001	0.00275	0.04407	0.00408	0.01102
20	College Farm	466102	385473	0.00222	0.03547	0.00328	0.00887
Max				0.05341	0.85453	0.07904	0.21363

Scenario 1
units = ug/m3

APPENDIX 5

TEST REPORT ASC/39489

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	31526
Date Samples Received:	12 June 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	13 June 2019

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
4	ATD Tube - Tenax	ASC/SOP/211*	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

*Sample ASC/39489.001, 164501, is classed as deviating due to the internal standard not meeting our criteria. These results therefore have a higher level of uncertainty.

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
164501* BF1 MAY 19	ASC/39489.001*	08:57 10/05/19	10:05 10/05/19	Mi159027	<5	<10	<5	<10	<5	200
164503 BF2 MAY 19	ASC/39489.002	09:14 24/05/19	10:14 24/05/19	H0207919	<5	70	20	30	10	1700
164505 BF3 MAY 19	ASC/39489.003	12:38 31/05/19	13:01 31/05/19	Mi114677	<5	60	10	20	10	1100
164507 BF Manifold May 2019	ASC/39489.004	10:40 31/05/19	11:42 31/05/19	Mi002623	20	110	20	30	20	7100

1. *Sample ASC/39489.001, 164501, is classed as deviating due to the internal standard not meeting our criteria. These results therefore have a higher level of uncertainty.

Results

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
164501 BF1 MAY 19	ASC/39489.001	08:57 10/05/19	10:05 10/05/19	Mi159027	3.4	<2	<3	<2	<3	<2	60
164503 BF2 MAY 19	ASC/39489.002	09:14 24/05/19	10:14 24/05/19	H0207919	3.0	<2	20	5	10	4	510
164505 BF3 MAY 19	ASC/39489.003	12:38 31/05/19	14:01 31/05/19	Mi114677	3.7	<2	20	3	6	3	340
164507 BF Manifold MAY 2019	ASC/39489.004	10:40 31/05/19	11:42 31/05/19	Mi002623	3.2	5	30	5	9	4	2200

END OF TEST REPORT

TEST REPORT ASC/39919

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	31704
Date Samples Received:	10 July 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	18 July 2019

1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
2	**ATD Tube - Tenax**	ASC/SOP/211	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
165688 BF JUN 19	ASC/39919.001	11:05 28/06/19	12:05 28/06/19	Mi064791	<5	70	20	60	30	2200
165690 BF Manifold JUN 19	ASC/39919.002	10:00 28/06/19	11:00 28/06/19	Mi107378	30	140	40	100	40	23000

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
165688 BF JUN 19	ASC/39919.001	11:05 28/06/19	12:05 28/06/19	Mi064791	3.7	<2	20	6	20	7	970
165690 BF Manifold JUN 19	ASC/39919.002	10:00 28/06/19	11:00 28/06/19	Mi107378	2.3	8	40	10	30	10	10000

END OF TEST REPORT

1252

TEST REPORT ASC/40426

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	31887
Date Samples Received:	06 August 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	16 August 2019

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
1	ATD Tube - Tenax	ASC/SOP/211	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
BF JUL 19 166815	ASC/40426.001	11:45 30/07/19	12:45 30/07/19	Mi144436	<5	90	20	60	30	1100

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
BF JUL 19 166815	ASC/40426.001	11:45 30/07/19	12:45 30/07/19	Mi144436	3.0	<2	30	6	20	10	350

END OF TEST REPORT

UKAS TESTING
1252

TEST REPORT ASC/40948

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	32164
Date Samples Received:	11 September 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	02 October 2019

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
1	ATD Tube - Tenax	ASC/SOP/211*	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

*The internal standard level for sample ASC/40948.001 falls outside of our criteria; therefore the results are not UKAS Accredited.

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Start**	**End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
BF AUG 19 168575	ASC/40948.001	10:00 30/08/19	11:03 30/08/19	Mi002533	6*	510*	6*	10*	<5*	1100*

*The internal standard level for sample ASC/40948.001 falls outside of our criteria; therefore the results are not UKAS Accredited.

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Start**	**End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
BF AUG 19 168575	ASC/40948.001	10:00 30/08/19	11:03 30/08/19	Mi002533	3.2	2	160	2	4	<2	360

END OF TEST REPORT

TEST REPORT ASC/41464

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	32436
Date Samples Received:	11 October 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	22 October 2019

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

UKAS TESTING
1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
1	ATD Tube - Tenax	ASC/SOP/211	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Start**	**End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
BF SEP 2019 170105	ASC/41464.001	10:55 02/10/19	11:58 02/10/19	Mi131798	<5	180	5	10	6	1400

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Start**	**End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
BF SEP 2019 170105	ASC/41464.001	10:55 02/10/19	11:58 02/10/19	Mi131798	3.3	<2	53	2	4	2	420

END OF TEST REPORT

UKAS TESTING
1252

TEST REPORT ASC/37520

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	30639
Date Samples Received:	08 February 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	18 February 2019

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
1	ATD Tube - Tenax	ASC/SOP/211	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
158915 BF JAN 19	ASC/37520.001	08:23 31/01/19	09:27 31/01/19	Mi114876	<5	40	6	20	6	700

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
158915 BF JAN 19	ASC/37520.001	08:23 31/01/19	09:27 31/01/19	Mi114876	2.9	<2	10	<2	6	2	300

END OF TEST REPORT

1252

TEST REPORT ASC/37932

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	30832
Date Samples Received:	06 March 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	11 March 2019

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

UKAS TESTING
1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
1	ATD Tube - Tenax	ASC/SOP/211	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
160147 BF FEB 19	ASC/37932.001	08:00 27/02/19	09:03 27/02/19	A25914	<5	60	20	60	20	1000

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
160147 BF FEB 19	ASC/37932.001	08:00 27/02/19	09:03 27/02/19	A25914	3.3	<2	20	6	20	5	300

END OF TEST REPORT

1252

TEST REPORT ASC/38478

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	31096
Date Samples Received:	09 April 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	17 April 2019

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
1	ATD Tube - Tenax	ASC/SOP/211	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
161646 BF MAR 19	ASC/38478.001	08:55 29/03/19	10:01 29/03/19	A16674	7	30	7	20	9	2100

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
161646 BF MAR 19	ASC/38478.001	08:55 29/03/19	10:01 29/03/19	A16674	3.3	2	10	2	7	3	640

END OF TEST REPORT

1252

TEST REPORT ASC/39029

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	31320
Date Samples Received:	14 May 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	21 May 2019

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
1	ATD Tube - Tenax	ASC/SOP/211	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

Results

Table 1: Amount of BTEX Components and TPHs (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
163215 BF APR 19	ASC/39029.001	09:32 29/04/19	10:35 29/04/19	Mi107378	8	50	20	40	10	2000

Table 2: Concentration of BTEX Components and TPHs (µg/m^3)

					Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
					UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
163215 BF APR 19	ASC/39029.001	09:32 29/04/19	10:35 29/04/19	Mi107378	3.2	3	20	5	10	4	620

END OF TEST REPORT

1252

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M01545R**
Customer	**Provectus Remediation** **Edwin Richards Quarry** **Rowleg Regis** **Birmingham** **B65 9DS**
Booking In Reference	**V0237**
Despatch Note Number	**39939**
Date Samples Received	**21/02/2018**
Diffusion Tube Type	**TXTA**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**GRA10771**
Gradko Lab Reference	**04M0181**
Volume (Litres)	**3**
Sample ID	**BF JAN 18**

BTEX	**Accreditation Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	<5	<1.7
Toluene	U	<5	<1.7
Ethylbenzene	U	<5	<1.7
m/p-Xylene	U	<5	<1.7
o-Xylene	U	<5	<1.7

	Estimated ng on tube	**µgm^{-3}***
Total TPH	21	6.9

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

ilac-MRA UKAS TESTING 2187

LABORATORY ANALYSIS REPORT

Tube Number	**000569**
Gradko Lab Reference	**180227_TXTABLANK_27R**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

	Estimated ng on tube
Total TPH	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU 17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.

Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limits for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**27/02/2018**
Report Checked By	**Mariella Angelova**	**Date of Report**	**08/03/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M05300R**
Customer	**Provectus Remediation Ltd**
	Edwin Richard Quarry
	Rowley Regis
	Birmingham
	B65 9DS
Booking In Reference	**V0843**
Despatch Note Number	**43011**
Date Samples Received	**27/07/2018**
Diffusion Tube Type	**Tenax**
ob Reference	**Quote-34277**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**001639**
Gradko Lab Reference	**02M0831**
Sample Volume (L)	**3**
Sample ID	**BF uly 18**

BTEX	**Accreditation Status**	**ng on tube**	**µgm^{-3*}**
Benzene	U	23.7	7.9
Toluene	U	33.3	11.1
Ethylbenzene	U	10.1	3.4
m/p-Xylene	U	45.4	15.1
o-Xylene	U	19.5	6.5

	Estimated ng on tube	**µgm^{-3*}**
Total TPHs	714	238

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Tube Number	**GRA 03916**
Gradko Lab Reference	**23_BLANKTXTA180809_27**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5.0
Toluene	U	<5.0
Ethylbenzene	U	<5.0
m/p-Xylene	U	<5.0
o-Xylene	U	<5.0

	Estimated ng on tube
Total TPHs	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU 17.5% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.
Reporting Limits:
Benzene 5.0ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limit for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**M.Angelova**	**Date of Analysis**	**08/08/2018**
Report Checked By	**G.Aikman**	**Date of Report**	**10/08/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M06151R**
Customer	**Provectus Remediation** **Edwin Richards Quarry** **Rowleg Regis** **Birmingham** **B65 9DS**
Booking In Reference	**V0980**
Despatch Note Number	**43012**
Date Samples Received	**03/09/2018**
Diffusion Tube Type	**TXTA**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**GRA08815**		
Gradko Lab Reference	**04M1074**		
Volume (Litres)	**3**		
Sample ID	**BF AUG 18**		
	Accreditation		
BTEX	**Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	22.4	7.5
Toluene	U	27.5	9.2
Ethylbenzene	U	5.5	1.8
m/p-Xylene	U	25.2	8.4
o-Xylene	U	13.0	4.3

	Estimated ng on tube	**µgm^{-3}***
Total TPH	1933	644

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

ilac-MRA UKAS TESTING 2187

LABORATORY ANALYSIS REPORT

Tube Number	**GRA10597**
Gradko Lab Reference	**180907_TXTABLANK_26**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

	Estimated ng on tube
Total TPH	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU ±17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.
Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limit for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**07/09/2018**
Report Checked By	**Len Gates**	**Date of Report**	**11/09/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M07243R**
Customer	**Provectus Remediation** **Edwin Richards Quarry** **Rowleg Regis** **Birmingham** **B65 9DS**
Booking In Reference	**V1171**
Despatch Note Number	**43013**
Date Samples Received	**15/10/2018**
Diffusion Tube Type	**TXTA**
Job Reference	**Quote - 34277**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**001639**		
Gradko Lab Reference	**04M1176**		
Volume (Litres)	**3**		
Sample ID	**BF SEP 18**		
BTEX	**Accreditation Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	11.5	3.8
Toluene	U	14.8	4.9
Ethylbenzene	U	5.3	1.8
m/p-Xylene	U	20.1	6.7
o-Xylene	U	8.4	2.8
		Estimated ng on tube	**µgm^{-3}***
Total TPH		397	132

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Tube Number		
Gradko Lab Reference		
Sample ID	**Laboratory Blank**	
	Accreditation	
BTEX	**Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

	Estimated ng on tube
Total TPH	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU ±17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.
Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limit for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**22/10/2018**
Report Checked By	**Len Gates**	**Date of Report**	**24/10/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M07993R**
Customer	**Provectus Remediation** **Edwin Richards Quarry** **Rowley Regis** **Birmingham, B65 9DS**
Booking In Reference	**V1298**
Despatch Note Number	**43015**
Date Samples Received	**14/11/2018**
Diffusion Tube Type	**TXTA**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**GRA11937**
Gradko Lab Reference	**04M1245**
Volume (Litres)	**3**
Sample ID	**BF NOV/2**

BTEX	**Accreditation Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	6.8	2.3
Toluene	U	5.9	2.0
Ethylbenzene	U	<5.0	<1.7
m/p-Xylene	U	5.2	1.7
o-Xylene	U	<5.0	<1.7

	Estimated ng on tube	**µgm^{-3}***
Total TPH	67	22

Tube Number	**GRA10561**
Gradko Lab Reference	**181120_TXTABLANK_1**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

	Estimated ng on tube
Total TPH	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU ±17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.
Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limit for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**21/11/2018**
Report Checked By	**Mariella Angelova**	**Date of Report**	**22/11/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M07994R**
Customer	**Provectus Remediation** **Edwin Richards Quarry** **Rowley Regis** **Birmingham, B65 9DS**
Booking In Reference	**V1296**
Despatch Note Number	**43014**
Date Samples Received	**14/11/2018**
Diffusion Tube Type	**TXTA**
Job Number	**Quote 34277**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**GRA10609**		
Gradko Lab Reference	**04M1246**		
Volume (Litres)	**3**		
Sample ID	**BF OCT 18**		
	Accreditation		
BTEX	**Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	<5.0	<1.7
Toluene	U	<5.0	<1.7
Ethylbenzene	U	<5.0	<1.7
m/p-Xylene	U	<5.0	<1.7
o-Xylene	U	<5.0	<1.7
		Estimated ng on tube	**µgm^{-3}***
Total TPH		29	9.6

Tube Number	**GRA10561**	
Gradko Lab Reference	**181120_TXTABLANK_1**	
Sample ID	**Laboratory Blank**	
	Accreditation	
BTEX	**Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

	Estimated ng on tube
Total TPH	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU ±17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.
Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limit for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**21/11/2018**
Report Checked By	**Mariella Angelova**	**Date of Report**	**22/11/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

TEST REPORT ASC/37207

Customer:	Mr C Gould STC Operator Provectus Remediation Limited Edwin Richards Quarry Portway Road Rowley Regis B65 9DN
Testing Facility:	Specialist Chemistry SOCOTEC Etwall Building Bretby Business Park Ashby Road Burton Upon Trent DE15 0YZ
Purchase Order Number:	30523
Date Samples Received:	22 January 2019
Condition of Samples:	Ambient and Satisfactory
Approved by:	
Approver's name:	Nicola Baker
Job Title:	Analyst
Test Report Date:	30 January 2019

Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation

UKAS TESTING
1252

Sample and Method Descriptions

Number of Samples Received	Matrix / Sample Description	Method ID	Description
1	ATD Tube - Tenax	ASC/SOP/211	**ANALYSIS OF BTEX IN AMBIENT AIR BY THERMAL DESORPTION GAS CHROMATOGRAPHY / MASS SPECTROMETRY** – Samples were analysed for benzene, toluene, ethyl benzene and xylenes by ATD-GC-MS.
		IHM	**TPH -** The tubes were analysed by ATD-GC/MS operating in scan mode. The TPH were tentatively identified by mass spectral data and semi-quantified against the response of a calibration of Toluene.

Results

Table 1: Amount of BTEX Components and TPH (ng)

				Units	ng	ng	ng	ng	ng	ng
				Method ID (ASC/SOP/xxx)	211	211	211	211	211	IHM
				Method Limit of Detection	5	10	5	10	5	100
				UKAS	YES	YES	YES	YES	YES	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
158193 BF DEC 18	ASC/37207.001	10:00 28/12/18	11:00 28/12/18	GRA 06998	40	30	<5	10	<5	800

Table 2: Concentration of BTEX Components and TPH (µg/m^3)

						Units	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
						UKAS	NO	NO	NO	NO	NO	NO
Customer Sample Reference	**Laboratory Sample Reference**	**Sampling Start**	**Sampling End**	**Tube ID**	**Sampling Volume (L)**	Benzene	Toluene	Ethyl-Benzene	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbons
158193 BF DEC 18	ASC/37207.001	10:00 28/12/18	11:00 28/12/18	GRA 06998	3	10	10	<2	4	<2	300

END OF TEST REPORT

UKAS TESTING
1252

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M01964R**
Customer	**Provectus Remediation**
	Edwin Richards Quarry
	Rowleg Regis
	Birmingham
	B65 9DS
Booking In Reference	**V0317**
Despatch Note Number	**42506**
Date Samples Received	**12/03/2018**
Diffusion Tube Type	**TXTA**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**GRA08329**		
Gradko Lab Reference	**04M0316**		
Volume (Litres)	**3**		
Sample ID	**BF FEB 18**		
	Accreditation		
BTEX	**Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	<5.0	<1.7
Toluene	U	6.0	2.0
Ethylbenzene	U	44.5	14.8
m/p-Xylene	U	32.7	10.9
o-Xylene	U	12.1	4.0
		Estimated ng on tube	**µgm^{-3}***
Total TPH		187	62.4

The Diffusion Tubes have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures calculations and assessments involving the exposure procedures and periods provided by the client are not within the scope of our UKAS accreditation. Those results obtained using exposure data shall be indicated by an asterisk (*). Any queries concerning the data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Tube Number	**GRA06174**
Gradko Lab Reference	**BLANKTXTA180327_22**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

	Estimated ng on tube
Total TPH	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU 17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.

Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limits for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**26/03/2018**
Report Checked By	**Mariella Angelova**	**Date of Report**	**05/04/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M02682R**
Customer	**Provectus Remediation Ltd**
	Edwin Richard Quarry
	Rowley Regis
	Birmingham
	B65 9DS
Booking In Reference	**V0423**
Despatch Note Number	**43007**
Date Samples Received	**09/04/2018**
Diffusion Tube Type	**Tenax**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**GRA 09210**
Gradko Lab Reference	**02M0533**
Sample Volume (L)	**3**
Sample ID	**BF MAR 18**

BTEX	**Accreditation Status**	**ng on tube**	**µgm^{-3*}**
Benzene	U	6.9	2.3
Toluene	U	15.9	5.3
Ethylbenzene	U	<5.0	<1.7
m/p-Xylene	U	5.7	1.9
o-Xylene	U	<5.0	<1.7

	Estimated ng on tube	**µgm^{-3*}**
Total TPHs	200	67

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Tube Number	**GRA 10349**
Gradko Lab Reference	**BLANKTXTA180416_2**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5.2
Toluene	U	<5.0
Ethylbenzene	U	<5.0
m/p-Xylene	U	<5.0
o-Xylene	U	<5.0

	Estimated ng on tube
Total TPHs	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU 17.5% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.
Reporting Limits:
Benzene 5.2ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limit for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**M.Angelova**	**Date of Analysis**	**16/04/2018**
Report Checked By	**Len Gates**	**Date of Report**	**23/04/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

ilac-MRA UKAS TESTING 2187

LABORATORY ANALYSIS REPORT

Report Number	**M03166R**
Customer	**Provectus Remediation**
	Edwin Richards Quarry
	Rowleg Regis
	Birmingham
	B65 9DS
Booking In Reference	**V0492**
Despatch Note Number	**43008**
Date Samples Received	**01/05/2018**
Diffusion Tube Type	**TXTA**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**GRA06929**		
Gradko Lab Reference	**04M0484**		
Volume (Litres)	**3**		
Sample ID	**BF APR 18**		
	Accreditation		
BTEX	**Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	<5.0	<1.7
Toluene	U	<5.0	<1.7
Ethylbenzene	U	<5.0	<1.7
m/p-Xylene	U	<5.0	<1.7
o-Xylene	U	<5.0	<1.7

	Estimated ng on tube	**µgm^{-3}***
Total TPH	20	6.8

The Diffusion Tubes have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures calculations and assessments involving the exposure procedures and periods provided by the client are not within the scope of our UKAS accreditation. Those results obtained using exposure data shall be indicated by an asterisk (*). Any queries concerning the data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

ilac-MRA UKAS TESTING 2187

LABORATORY ANALYSIS REPORT

Tube Number	**GRA10349**
Gradko Lab Reference	**180508_TXTABLANK_2**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

	Estimated ng on tube
Total TPH	5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU 17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.

Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**08/05/2018**
Report Checked By	**Mariella Angelova**	**Date of Report**	**09/05/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

ilac-MRA UKAS TESTING 2187

LABORATORY ANALYSIS REPORT

Report Number	**M03605R**
Customer	**Provectus Remediation** **Edwin Richards Quarry** **Rowleg Regis** **Birmingham** **B65 9DS**
Booking In Reference	**V0556**
Despatch Note Number	**43009**
Date Samples Received	**16/05/2018**
Diffusion Tube Type	**TXTA**
Job Reference	**Quote-34277**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**GRA11318**
Gradko Lab Reference	**04M0562**
Volume (Litres)	**3**
Sample ID	**BF MAY 18**

BTEX	**Accreditation Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	<5.0	<1.7
Toluene	U	6.0	2.0
Ethylbenzene	U	<5.0	<1.7
m/p-Xylene	U	<5.0	<1.7
o-Xylene	U	<5.0	<1.7

	Estimated ng on tube	**µgm^{-3}***
Total TPH	20	6.6

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Tube Number	**001763**
Gradko Lab Reference	**180521_TXTABLANK_2**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

	Estimated ng on tube
Total TPH	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU 17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.
Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limit for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**21/05/2018**
Report Checked By	**Mariella Angelova**	**Date of Report**	**25/05/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Report Number	**M04764R**
Customer	**Provectus Remediation** **Edwin Richards Quarry** **Rowleg Regis** **Birmingham** **B65 9DS**
Booking In Reference	**V0742**
Despatch Note Number	**43010**
Date Samples Received	**05/07/2018**
Diffusion Tube Type	**TXTA**
Job Reference	**7032/100993/CGO**

Quantitative Analysis of BTEX
Identification and estimation of ng on tube in accordance with ISO16000-6

Index to UKAS Accreditation Status	
U	Analysis is UKAS accredited under our Fixed Scope
F	Analysis is UKAS accredited under our Flexible Scope
N	Analysis is not UKAS accredited

Tube Number	**001783**		
Gradko Lab Reference	**04M0874**		
Volume (Litres)	**3**		
Sample ID	**BF JUN 18**		
	Accreditation		
BTEX	**Status**	**ng on tube**	**µgm^{-3}***
Benzene	U	<5.0	<1.7
Toluene	U	<5.0	<1.7
Ethylbenzene	U	<5.0	<1.7
m/p-Xylene	U	<5.0	<1.7
o-Xylene	U	<5.0	<1.7
		Estimated ng on tube	**µgm^{-3}***
Total TPH		85	28

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

ilac-MRA UKAS TESTING 2187

LABORATORY ANALYSIS REPORT

Tube Number	**GRA02968**
Gradko Lab Reference	**180718_TXTABLANK_1**
Sample ID	**Laboratory Blank**

BTEX	**Accreditation Status**	**ng on tube**
Benzene	U	<5
Toluene	U	<5
Ethylbenzene	U	<5
m/p-Xylene	U	<5
o-Xylene	U	<5

	Estimated ng on tube
Total TPH	<5

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Overall MU 17.8% for quantitative analysis of BTEX compounds.

Results are not Blank corrected.

Results reported as <5ng on tube are below the reporting limit.
Reporting Limits:
Benzene 5ng
Toluene 5ng
Ethylbenzene 5ng
m/p-Xylene 5ng
o-Xylene 5ng
Reporting limit for non BTEX compounds are derived from the non-specific standard Toluene.

Analysts Name	**Katya Paldamova**	**Date of Analysis**	**17/07/2018**
Report Checked By	**Mariella Angelova**	**Date of Report**	**20/07/2018**

Analysis has been carried out in accordance with in-house method GLM 13

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

Caulmert
engineering environmental planning

Registered Office: Intec, Parc Menai, Bangor, Gwynedd, LL57 4FG
Tel: 01248 672666
Fax: 01248 672601
Email: contact@caulmert.com
Web: www.caulmert.com