Caulmert Limited

Engineering, Environmental & Planning
Consultancy Services

Maw Green Soils Treatment Facility

3C Waste Limited

Environmental Permit Variation Application

Treatment Process Description & Indicative BAT Review: Establishing BAT Conclusions for waste treatment

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1. INTRODUCTION

1.1 Permit Context

1.1.1 Caulmert Limited have been appointed by 3C Waste limited to apply for an environmental permit variation application of permit ref. EPR/BS7722ID at Maw Green Soils Treatment Facility, located at Maw Green Landfill Site. The operator and permit holder; 3C Waste Limited (hereafter referred to as 'the Operator', are a wholly owned subsidiary of FCC Environment Limited).

1.1.2 The operator proposes to vary their existing permit in relation to the Soils Treatment Facility (STF) that forms part of the Maw Green Landfill Installation Permit to remove the 30,000 tonnes per annum restriction for hazardous waste and increase the capacity to 50,000 tonnes per annum (tpa). The STF currently undertakes the biological treatment of hazardous and non-hazardous wastes, with an overall tonnage limited of 50,000 tonnes per annum (tpa).

1.2 Background

1.2.1 This report is an assessment of compliance of the soils treatment facility at Maw Green Landfill Site which has been brought (See Section 1.3 below) in line with 'best available techniques (BAT) conclusions for waste treatment industries (BREF), under Directive 20/10/75/EU, from the Official Journal of the EU [1] and Environment Agency Guidance Sector Guidance Note S5.06[2].

1.2.2 A general process description for the treatment activities is provided in section 2 of this report.

1.2.3 Indicative BAT standards are laid out in the BAT Conclusions (updated August 2018) for setting permit conditions for installations covered by Chapter II of Directive 2010/75/EU and their set emissions limit values to ensure that under normal operation conditions, emissions do not exceed emissions levels associated the with best available techniques as laid down by the BAT conclusions. The technical standards for Maw Green STF against BAT Conclusions are detailed within Section 9 'Review against BAT standards' with reference to the BAT conclusions for waste treatment industries (BREF), under Directive 20/10/75/EU, from the Official Journal of the EU.

[1] Commission implementing decision (EU) 2018/1147 of 10 August 2018. Establishing best available techniques (BAT) conclusions for waste treatment, under Direction 2010/75/EU of the European Parliament and of the Council. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2018.208.01.0038.01.ENG&toc=OJ%3AL%3A2018%3A208%3ATOC

[2] Environment Agency Guidance: Sector Guidance Note S5.06: recovery and disposal of hazardous and non-hazardous waste. (published may 2013, updated October 2018). https://www.gov.uk/government/publications/sector-guidance-note-s506-recovery-and-disposal-of-hazardous-and-non-hazardous-waste

1.3 Requirements to demonstrate compliance with BAT Conclusions techniques

1.3.1 The Environment Agency are now implementing a revised set of BAT conditions where all new and existing installations are required to meet by the 17th August 2022. Therefore as part of this Application a revised BAT assessment has been produced which details all relevant BAT conclusions as described in the Commission Implementing Decision. The BAT Reference Document for Waste Treatment (the BREF) was published in August 2018 following a European Union Wide review of BAT.

1.4 Principle of Operation

1.4.1 The facility will be limited to accepting wastes that can be treated so that they are suitable for landfill restoration in accordance with the approved restoration plan.

1.4.2 The proposed bioremediation process will utilise industry standard biopile technology and will operate through the use of biopiles 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 4-8 weeks. The bioremediation plant will operate continuously.

1.4.3 The biopiles will be placed on water and air extraction pipes connected to a blower that will draw air through the soils where it is then passed through a biofilter before being discharged to air. Excess water draining through the soils will be collected and treated to remove any oils or suspended solids.

1.4.4 Standard NPK fertiliser 25:05:05 ratio, typically added at 1kg/tonne of soil per application. Occasionally, an organic additive such as woodchip is added at ~1-3% to clayey soils to break up the cohesive nature of the soils and aid aeration.

2. PROCESS DESCRIPTION

2.1.1 The Soil Treatment Facility is proposed to accept and process up to 50,000 tonnes per annum of hazardous soils and non-hazardous soils. The soils treated will be used for the restoration of the wider Maw Green Landfill site. The total storage capacity of the site is 38,000 tonnes. The treatment areas consist of a treatment/quarantine areas as shown in drawing ref: 5193-CAU-XX-XX-DR-V-1801, the exact layout will vary over time dependent upon inputs and treatment timescales. The STF Effluent Pipeline route is shown under drawing ref: 5193-CAU-XX-XX-DR-V-1803. Demarcation of the areas will be managed via suitable signage. All soils received to Site are subject to reception testing irrespective of the amount of prior testing received, soils are effectively held in quarantine prior to being formally accepted. Soils are only formally accepted upon the receipt of the soil analytical results to confirm compliance with the original waste description and treatability to meet the restoration/non-hazardous re-use criteria.

2.1.1 The bioremediation process will utilise industry standard biopile technology as shown in Figure 1. The process will operate through the use of biopiles 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.

2.1.2 The following procedures will be applied at Maw Green STC and are referenced throughout this BAT Review document, included under Appendix 1:

- STC WI 004 Soil Treatment and Process Monitoring Procedure
- STC WI 005 Soil Turnover
- STC WI 006 Soil Analysis
- STC WI 007 Environmental Monitoring
- STC WI 008 Biofilter and Monitoring
- STC WI 010 Pad Maintenance
- Waste Acceptance Procedures

2.2 Treatment Pad

2.2.1 The STF is situated on the former compost pad at Maw Green STF constructed of an impermeable pavement to prevent run-off, the pad measures at 6,800m^2. The entire site is kerbed with a sealed drainage system to the north-eastern corner of the site.

2.2.2 The site layout and drainage detail of the treatment pad is included is shown in drawing ref 5193-CAU-XX-XX-DR-V-1801. The drainage systems at site lead to sealed sumps and a treatment plant, there is no surface water run-off to the environment. The STF Effluent Pipeline Route is shown in drawing ref:5193-CAU-XX-XX-DR-V-1803.

2.2.3 The treatment pad undergoes maintenance as part of the remit of Provectus quality control system as detailed in the operating procedures contained in Appendix 1 under 'STC WI 010 Pad Maintenance'.

2.3 Pre-Assessment

2.3.1 Pre-acceptance procedures are undertaken to confirm the suitability of materials for treatment to subsequently achieve the reuse criteria. Pre-acceptance procedures are undertaken by Provectus Limited. A set of Terms and Conditions for acceptance are sent to the Waste Producer including a clear statement of any waste characterisation samples that are deemed unsuitable for treatment. These are agreed in writing between the Waste Producer and FCC prior to an authorisation number (contract line) being issued by FCC at the weighbridge for deposit at the Soil Treatment Facility. The set of terms and conditions will include the following:

- Maximum soil contaminant concentrations for reuse of material in the restoration area or disposal within the landfill (re-use criteria);
- Limitations on physical and chemical characteristics of the soils (e.g. particle size, pH, moisture content); and,
- Statement from the waste producer confirming that soils containing tars, free oils, invasive species (e.g. Japanese Knotweed) and high moisture content will not be accepted to site.

2.3.2 If any variations or discrepancies should be found regarding the suitability of source origin materials, Provectus or FCC can attend the site of origin to undertaken pre-acceptance checks and visual inspections. This will enable the operator to identify any issues which could be affecting the conformity of the source materials and rectify any issues.

2.3.3 In the event that moisture content of the waste is within 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 higher) and the material does not behave as a liquid however considered suitable for site infrastructure, then it will be accepted on a case by case basis.

2.3.4 If insufficient information is provided to adequately characterise the waste or determine its suitability for treatment, the Operator will undertake a pre-acceptance testing at the source site to establish an initial waste description. This pre-acceptance will include a visual inspection. Waste soils will be tested in accordance with a general suite of analysis for soils based on the potential substances present from the site history and any existing chemical data. Sampling of waste soils will be undertaken by a technically competent person, using the sampling frequency utilised at the STF site for soil reception as a minimum. Samples will be clearly identified using labels and recorded on chain of custody forms for transfer to a soils laboratory. All testing and analysis will be undertaken using an UKAS/MCERT accredited laboratory and accredited methods. Measures to be undertaken for the testing of soils treated are detailed in Appendix 1 STC WI 006 Soil Analysis, STCFO03 Soil Characterisation Procedure and STC WI 004 Soil Treatment and Process Monitoring Procedure.

2.3.5 Should FCC determine that there is the high potential for material to contain untreatable materials or properties where the waste materials behave as a liquid or containing free water or oil then, the waste will not be quoted for acceptance and/or will be rejected.

2.4 Waste Acceptance

2.4.1 There are no changes to the waste list, the full waste list is contained in the permit, all wastes received to site will be subject to the Waste Acceptance Procedures as detailed in the operating procedures in Appendix 1.

2.4.2 On arrival to site, lorries entering will be weighed at the weighbridge and all appropriate documentation checked and referenced by the weighbridge clerk. The weighbridge clerk will direct the lorries to the designated soil reception area.

2.4.3 As the waste material is tipped, it will be visually inspected for its conformity, samples of that load will also be taken and sent off for laboratory analysis. On receipt of satisfactory lab results (issue typically between 3-5 days), the soil waste materials will be formally accepted into the treatment process (i.e. undergo nutrient addition and placed on extraction pipework).

2.4.4 If in the circumstance that a load is tipped and upon inspection is identified as non-conforming, (for example deleterious inclusions) the waste materials will be reloaded immediately and rejected. A record of the waste material rejection will be reported to the manager on duty who will record the event.

2.4.5 Following reception testing and acceptance on site, soils are then placed into their respective treatment batches and soil treatment will then commence. Batches comprise of soils with similar hydrocarbons and are combined to make the most effective use of the treatment pad space.

2.4.6 If in the circumstance that a load is tipped and upon inspection is identified as non-conforming, (for example deleterious inclusions) the waste materials will be reloaded immediately and rejected. A record of the waste material rejection will be reported to the manager on duty who will record the event. If in the event of a non-conformity that takes place later e.g. chemical data shows inconsistencies against the data originally provided as a waste description by the producer. In this scenario, the waste producer will be contacted, and the waste rejection procedure implemented where required.

2.4.7 All wastes received to Maw Green Soils Treatment Facility will be in accordance with general BAT requirements as detailed in BAT 1-2 which at pre-acceptance stage ensures that:

- All assessment of waste is undertaken by a suitability competent person;
- Testing is undertaken at a laboratory with UKAS/MCERTS accreditation All wastes on site is validated through chemical analysis; and visual inspection.

- Checks are undertaken to ensure that the method of treatment will allow reuse on site prior to any acceptance on site.

2.5 Waste Rejection

2.5.1 In the event of any non-conforming wastes, a waste rejection notification will be issued informing that the waste is not suitable for treatment. Waste not deemed acceptable will be rejected as per the written procedures (Appendix 1). Written records will be maintained which will include information on the waste type, quantity, how the materials were stored and how they were disposed off. Rejected waste will be stored within the designated quarantine area pending removal from site and a note will be made of the waste type, quantity, hazardous properties and storage requirements. The quarantine area is segregated from the storage areas for other permitted wastes to reduce the risk of cross contamination.

2.6 On Site Verification

2.6.1 On-site verification procedures will be carried out to ensure soils received at the Soils Treatment Facility (STF) are visually, structurally and chemically similar to those described during the pre-acceptance procedures and confirm compliance with the Environmental Permit and suitability for treatment.

2.6.2 Soil sampling will be performed by the STF technician or project manager in line with composite sampling methods as detailed in the British Standards BS812. Measures to be undertaken for the testing of soils treated are detailed in the operating procedures contained in Appendix 1 'STC WI 006 Soil Analysis' and' STC WI FO03 Soil Characterisation Procedure'.

2.6.3 A minimum of at least one composite sample must be taken from each job (unique authorisation code) and in accordance with the sampling frequency highlighted in Table 1 below. The Project Manager shall assess based on; visual, high risk job, knowledge of the client, materials variation etc. to determine which sample will be sent to the laboratory for reception compliance testing. Chemical testing is undertaken to ensure that the materials being tipped are consistent with the analysis and description provided by the client at the waste description stage.

2.6.4 Sampling requirements for soil samples are detailed within Table 1 below

Table1: Sampling requirements for Soil Samples

Volume of soil (t)	No. of samples needed (before or during acceptance at STF)
< 100	1
100 - 500	2
500 +	2 + 1 for every 500t

2.6.5 The general suite of analysis for soils shall include:

- pH
- CLEA Metals
- Total TPH
- Total PAHs
- Total Cyanide (where required)
- Phenols (where required)
- SVOCs and VOCs (where required)
- PCBs (where required)
- Moisture content
- Asbestos ID/quantification as appropriate

2.6.6 Soils deemed unsuitable for treatment will be removed from site and either returned to the waste producer or taken to a suitable permitted facility for final treatment/disposal

2.7 Waste Storage

2.7.1 Wastes are stored as per the Site Layout Plan, drawing ref: 5193-CAU-XX-XX-DR-V-1801.

2.7.2 Segregation of the accepted waste types is not necessary as they are not considered to be reactive. In the event of any non-conforming wastes a waste rejection notification will be issued informing that the waste is not suitable for treatment

2.7.3 Waste deemed not acceptable will be rejected as per written procedures (see Appendix 1).

2.7.4 Rejected wastes will be stored within a designated quarantine area pending removal from site and a note will be made of the waste type, quantity, hazardous properties and storage requirements. The quarantine area is segregated from the storage areas for other permitted wastes to reduce the risk of cross contamination.

2.8 Screening/Processing Treatment of Soils

Screening of non-hazardous soils

2.8.1 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.

2.8.2 Soil turnover during treatment process improves air flow through the soil by decompacting it, soils are inspected as part of the overall treatment programme. Details of Soil Turnover is included in the operating procedures contained in Appendix 1 under 'STC WI 005 Soil Turnover'.

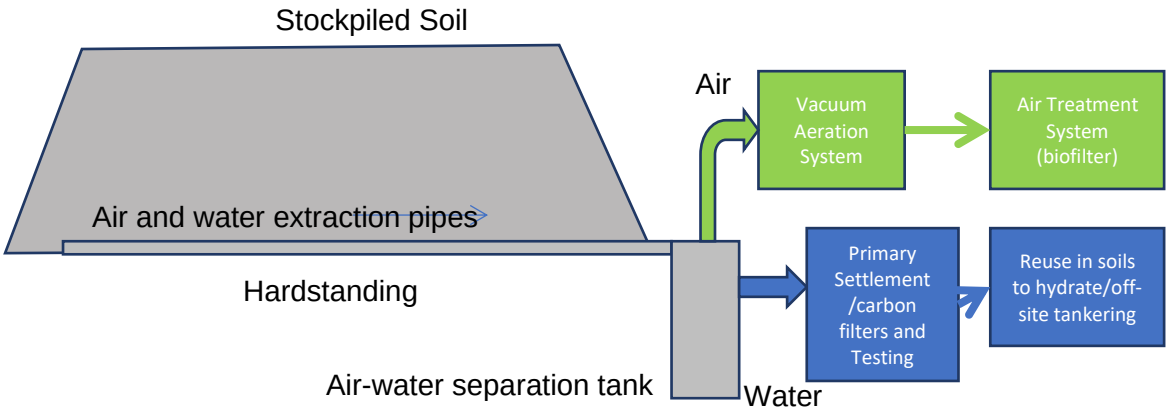
2.9 Bioremediation of Soils

2.9.1 The biopile treatment process in the STF will use biological remediation over a period of time to reduce organic contaminating components within the soils to concentrations where the materials can be reused.

2.9.2 Only wastes which have been chemically and physically assessed to ensure that they are capable of treatment will be accepted at the facility. Most incoming wastes will be classified as hazardous wastes; however, a proportion of incoming wastes will be similar wastes but at levels slightly below the hazardous waste thresholds.

2.9.3 Following screening and hand-picking, soils undergoing biotreatment activities will remove contaminants such as hydrocarbon utilising industry standard biopile technology as shown in Figure 1 below. The process will operate through the use of biopiles 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.

Figure 1: Bioremediation Process



2.9.1 The facility will be limited to accepting wastes that can be treated so that they are suitable for landfill restoration in accordance with the approved restoration plan.

2.9.2 The proposed bioremediation process will utilise industry standard biopile technology and will operate through the use of biopiles 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 bioremediation plant will operate continuously. Please refer to Operating Procedures in Appendix 1.

2.9.3 The biopiles will be placed on water and air extraction pipes connected to a blower that will draw air through the soils where it is then passed through a biofilter before being

discharged to air. Excess water draining through the soils will be collected and treated to remove any oils or suspended solids.

2.9.4 Standard NPK fertiliser 25:05:05 ratio, typically added at 1kg/tonne of soil per application Occasionally, an organic additive such as woodchip is added at ~1-3% to clayey soils to break up the cohesive nature of the soils and aid aeration.

2.9.5 Bioremediation of soils will be undertaken on the existing treatment pad. Details of the drainage from the treatment pad is included further in Section 4.2 'Surface Wate drainage from treatment pad' of this report.

2.9.6 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.

2.9.7 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

2.9.8 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.

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

2.9.10 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.

2.9.11 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.

2.10 Post Treatment Verification Sampling

2.10.1 This is to ensure soils treated at the Soil Treatment Facility (STF) meet the waste acceptance criteria to enable their use for the restoration of the landfill.

2.10.2 The sampling of soils will be performed by the STF technician or project manager. The procedure uses composite sampling methods as provided in BS812. For batches where treatment has been completed the sampling frequency will be 1/500t of treated soil.

2.10.3 Soils that do not meet the acceptance criteria will be treated further (if deemed viable) or removed from site for treatment/disposal at a suitable permitted facility.

2.11 Transfer – Landfill Restoration

2.11.1 Treated soils will be transferred onto the landfill for storage prior to spreading in accordance with the approved restoration plan for Maw Green Landfill Site.

3. PLANT & EQUIPMENT

3.1 Mobile Plant

3.1.1 Soils will be handled using tracked 360° excavators from reception through the treatment process. Treated soils will be moved onto the landfill restoration area using dump trucks.

3.1.2 A mechanical screener will be brought in as required to remove oversize material from soils after treatment to ensure suitability with the physical requirements of soils in the restoration area

3.2 Fixed Plant

3.2.1 Fixed plant includes the following items

- Weighbridge
- Office
- Bunded process/surface water storage tank
- Air Blower and containerised control panel/transfer pumps
- Biofilter
- Process water treatment vessels
- Storage Container

4. CONTROL OF EMISSIONS

4.1 Biofilter

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

4.1.2 The biofilter treats effluent air from the vacuum blower in the soil treatment area. The blower connects to a manifold with several perforated pipes covered in stone sitting on an impermeable surface. Overlying these pipes is an oversize compost and woodchip mixture, nutrients and small amount of contaminated soil (<5%) to inoculate the biofilter placed to an average height of 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 are within the optimal range. Olfactory odour checks are also undertaken daily.

4.2 Surface Water drainage from treatment pad

4.2.1 Currently surface water drains to a sump which drains to a tank which is pumped out when required. Details of the site drainage system for leachate in the treatment pad and site design is shown in drawing ref: 5193-CAU-XX-XX-DR-V-1801. The STF Pipeline Route from the treatment facility is shown in drawing ref: 5193-CAU-XX-XX-DR-V-1803.

4.2.2 Surface water is collected within the process pipework from where it is pumped into the small treatment plant prior to discharge to sewer or redirected via a pipeline to humidify the biofilter. Valves can be switched to use treated water to irrigate the biofilter and then reverse back to discharge the water to sewer. There is the option to irrigate the biopile if required however this not usually required for the typical British climate.

4.2.3 The treatment plant comprises:

- 50m^3 settlement tank with transfer pump and level detectors
- Oil Water separator with transfer pump and level detectors
- 10m^3/hr sand filter
- 10m^3/hr granular activated carbon filter

4.2.4 The capacity of the treatment plant is **<50tonnes/day**.

4.3 Discharge Consent

4.3.1 Effluent from the treatment plant will be discharged to sewer under the current trade effluent consent for Maw Greens Soil Treatment Facility. A copy of the United Utilities TEC is included in Appendix 3. A summary of the discharge limits are included in Table 2 below:

Table 2: Summary of Maw Green STF Trade effluent discharge limits:

Parameter	**Limit (and unit)**
Maximum volume of discharge	$20m^3$
Maximum rate of discharge	2 litres/sec
Ammonia and its compounds as N	250 mg/l
Cyanides and cyanogen compounds which produce hydrogen cyanide on acidification	1 mg/l
Separable grease and oil	100 mg/l
Sulphates as SO_4	1,000 mg/l
Sulphides, hydrosulphides, polysulphides and substances producing hydrogen sulphide on acidification	1 mg/l
Total suspended solids	1000 mg/l
Toxic Metals	10,000 µg/l
Temperature	43°C
pH	6-10

4.3.2 A separate H1 Surface Waste Assessment has also been submitted as part of an improvement condition relating to the soil treatment facility. A review of the chemical analysis monitoring data from the point of discharge at the soil treatment facility has been undertaken alongside the H1 assessment using the Environment Agency's Surface Water Pollution Risk Assessment.

4.3.3 The results of the monitoring data for the discharge point at the Soil Treatment Facility indicated concentrations released are significantly lower than the existing trad effluent consent limit provided by United Utilities.

4.3.4 H1 calculations have been undertaken using the maximum allowed concentration on the trade effluent consent. The conditions do not contain any specific limits on individual metal ions in favour of a combined limit of 10 mg/l. The model indicates that if each metal ion was present at this level, then there would be an unacceptable discharge both in terms of impact on the river and breach of trade effluent condition. Therefore, the permissible concentrations of each metal ion have been back calculated and compared against observed concentration in discharged effluent. A number of parameters failed stage 4 of testing due to the comparison of background total dissolved metal concentrations against the current bioavailable standard.

4.3.5 The assessment has demonstrated that concentrations recorded within the STF discharge are significantly lower than the maximum concentrations modelled and therefore the discharge is acceptable with respect to the Surface Water Pollution Assessment methodology.

4.4 STF Dust Control

4.4.1 Dust suppression is to be undertaken when soil movement is generating excessive dust, this includes traffic movements and soil turnover. The source of dust will be identified and the operation creating a dust presence ceased. Mitigation measures will include the use of the on-site water bowser with spray rail or equivalent, rain guns and or misting systems will be employed if required.

4.4.2 For further information, please see the Maw Green Emissions (Dust) Management Plan under document ref 5193-CAU-XX-XX-RP-V-0303.

5. MONITORING

5.1.1 Monitoring will be undertaken in accordance with STC WI 007 Environmental Monitoring (detailed within the operating procedures in Appendix 1) to ensure that all emission points are regularly monitored to ensure that the operation is in compliance with the conditions of the permit. Visual monitoring of equipment, including plant, and soil biopiles shall be undertaken on a daily basis. Equipment modules will be inspected every morning and evening upon module opening and closing respectively. Noise, vibration and heat observations of equipment shall also be executed at these times. Monitoring of emissions/nuisance is included in the following management plans:

5.1.2 Emissions Management Plan, under document ref: 5193-CAU-XX-XX-RP-V-0303; and,

5.1.3 Odour Management Plan, under document ref: 5193-CAU-XX-XX-RP-V-0304

5.1.4 The Activities and Operating Techniques report details the monitoring parameters and requirements for the following:

- Air emissions from the biofilter.
- Material testing of the biofilter matrix.
- Water emissions from the water discharge point at the STF.
- Dust concentrations in air at the STF.
- PID measurements for VOCs at the STF.
- Noise assessment
- Odour assessment

5.2 Process Emissions

5.2.1 The point emissions from the STF include process water, surface water collection and air emissions from the biofilter as well as dust and odour from general site works. The monitoring for these processes includes:

- Biofilter sampling (from exhaust vents)
- Process water sampling
- Visual and olfactive daily assessment for dust and odour on site.
- Dust monitoring

5.2.2 See the Activities and Operating Techniques Report (document ref: 5193-CAU-XX-XX-RP-V-0306) for details of monitoring parameters and requirements.

5.3 Biofilter Monitoring

5.3.1 The biofilter will be regularly checked and maintained to ensure appropriate media particle size, nutrient levels, 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 an effective air extraction system,

reducing odour emissions and identifying any leaks or damage for repair. Compliance with this requirement will be demonstrated by monthly biofilter monitoring and regular VOC's at the site. Monitoring is scheduled through a nominated UKAS accredited laboratory. The schedule of analysis for the air biofilter is as follows:

- TPH
- Benzene
- Toluene,
- Ethylbenzene
- Xylenes (BTEX)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Ammonia
- TVOCS
- Hydrogen Sulphide

5.3.2 The principals of 'Biofilter Maintenance and Monitoring' are included in STC WI 008 under the operating procedures in Appendix 1. Detail of the frequency and thresholds of biofilter monitoring are included in the Activity and Operating Techniques Report, document ref: 5193-CAU-XX-XX-RP-V-0306.

5.3.3 The use of a nominated laboratory will permit independent testing of the biofilter air quality for reporting and recording to allow compliance with the permit conditions. The procedure for biofilter monitoring is STF – WI 008. 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.

5.3.4 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 the manufacturer's instructions or as agreed with the Environment Agency. These procedures will maintain an affective 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 VOC's monitoring at the site.

5.4 Process Water Monitoring

5.4.1 The water quality in the water collection tank will be monitored on a monthly basis. A sample will be obtained from the point of discharge and analysed for parameters stated in the discharge consent. Regular checks will be made to ensure no visible oil or grease is present in the tanks.

5.4.2 See the Activities and Operating Techniques Report (document ref: 5193-CAU-XX-XX-RP-V-0306) for details of monitoring parameters and requirements.

5.5 STF Dust Monitoring

5.5.1 Visual dust monitoring shall be undertaken on a daily visual basis during periods of dry weather or following a complaint. Monthly onsite monitoring will be carried out using a hand-held dust detector (Dustmate http://dustmonitor.co.uk/ or similar) as well as fixed Frisbee gauges. Details of dust monitoring in included within the Emissions (Dust) Management Plan, document ref: 5193-CAU-XX-XX-RP-V-0303 and the Activities and Operating Techniques Report (document ref: 5193-CAU-XX-XX-RP-V-0306) for further details of monitoring parameters and requirements.

5.6 Photo-Ionisation Detector Measurements

5.6.1 A photo-ionisation detector (PID) is on a bi-monthly basis at locations 1 to 5 and near the biofilter (6) to quantify gaseous emissions (see monitoring locations on drawing 1 attached). 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.

5.6.2 If site activity involves the movement of soil that has been identified with high level 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.

5.6.3 Results are recorded in the on-site database system. Detail of the frequency and thresholds of monitoring are included in the Activities and Operating Techniques Report (document ref: 5193-CAU-XX-XX-RP-V-0306) for further details of monitoring parameters and requirements. .

5.7 Noise Measurements

5.7.1 Observations relating to excessive noise incidents shall be recorded in the database system.

5.8 STF Odour Control

5.8.1 Regular daily checks will take place for odours on and around the treatment area. If excessive odours are identified, the source of odour will be assessed by the operator. It will be dealt with, for example, by a cessation of soil movement if required or covering of odorous soils with a tarpaulin etc. Observations shall be logged in the database system. Details of odour monitoring and procedures are detailed within the Odour Management Plan, document ref: 5193-CAU-XX-XX-RP-V-0309.

5.9 Recording of Results

5.9.1 All analytical results and monitoring results shall be stored onto the STF database under the relevant environmental batches location. Any changes made to the type of monitoring or adjustment to the biofilter shall also be recorded on the STF database.

6. ENERGY REQUIREMENTS

6.1.1 The energy requirements of the facility are low with the main energy consumption associated with the treatment processes with the majority of energy use from the air extraction blower.

6.1.2 As the energy requirements of the facility in general are low and no alternatives are available with lower energy use, no improvements are considered necessary. Basic energy saving measures will be adopted and continually reviewed. This includes measures such as: -

- Efficient use of plant and machinery to avoid unnecessary ignition;
- Plant and machinery to be switched off when not in use; and
- Regular maintenance of all plant and machinery.
- Use of HVO fuel as an alternative to diesel to reduce the carbon footprint of the operations

7. RESOURCE USE - RAW MATERIALS

7.1.1 The activities on site require amounts of resources and raw materials as part of the treatment process.

7.1.2 A water bowser may be used at the site during dry conditions to control the generation of dust. The water will be used only when necessary, and the minimum amount will be used. Water collected in the sealed drainage system from the non-hazardous storage/treatment areas can be used in place of freshwater.

7.1.3 Fuels and chemicals associated with on-site plant will be appropriately stored and bunded in the location as detailed on Drawing 5193-CAU-XX-XX-DR-V-1801; use of diesel will be undertaken in accordance with the site's EMS.

7.1.4 A Standard NPK fertiliser 25:05:05 ratio is used to encourage micro-organism growth. Typical application rates are 1kg/tonne of soil per application equating to a usage of up to 240 tonnes per year if the maximum of 3 applications per batch are used. Bags of the fertilizer will be stored with a waterproof cover.

7.1.5 Organic additive such as woodchip maybe added at ~5% to clayey soils to break up the cohesive nature of the soils and aid aeration, however usage us not expected to be significant. The biodegradation of the organic contaminants can be enhanced by addition of very low concentrations of organic material such as woodchip. Use of these raw materials replaces virgin materials such as manufactured fertiliser or virgin woodchip and using 'waste raw materials' which would otherwise be landfilled.

8. EMERGENCY PROCEDURES

8.1.1 FCC operates a Near Miss, Incident and Emergency management systems, specific Emergency procedures for this facility will cover:

- Spillages of waste and/or reagents.
- Fire
- Injury to staff or visitor
- Incident

8.1.2 FCC has ISO14001, 18001 and 45001 accreditation and this will be extended to this facility.

9. REVIEW AGAINST INDICATIVE BAT STANDARD

	Overall Environmental Performance
BAT 1	*In order to improve the overall environmental performance, BAT is to implement and adhere to an environment management system (EMS) that incorporates all of the following features:* *I) Commitment of the management, including senior management;* *II) Definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation;* *III) Planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;* *IV) The implementation of procedures;* *V) Checking performative and taking corrective action;* *VI) Review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;* *VII) Following the development of cleaner technologies;* *VIII) Consideration for the environmental impacts from the eventual decommission of the plant at the stage of designing a new plant, and throughout its operating life;* *IX) Application of sectoral benchmarking on a regular basis;* *X) Waste stream management;* *XI) An inventory of waste water and waste gas streams;* *XII) Residues management plan;* *XIII) Accident management plan;* *XIV) Odour management plan;* *XV) Noise and vibration management plan.*
	The company operates under an ISO14001 accredited environmental management system, audits of the performance of key plant, and all maintenance that has been undertaken will be undertaken and reviewed as part of the company's management system. The company management system is audited externally as part of the ISO 9001 and 14001 accreditation. Further information is provided within the management plan summary contained in this application under document ref: 5193-CAU-XX-XX-RP-V-0309, however in summary the site will have: - • A full maintenance schedule for all machinery and equipment on site;

	• Documented procedures to control all aspects of the operation that may have an impact on the environment, including contingency and operational methods which are to be undertaken in the event that there is a plant breakdown, or activities could lead to an unacceptable emission; • Well documented procedures for monitoring emissions and impacts including the use of a daily site log. All monitoring will occur in accordance with the Environmental Management plans The site will undertake a preventative maintenance programme where site plant, and infrastructure will be inspected on a daily, weekly and monthly basis in accordance with written procedures. Training systems are in place and all employees which will include: - • Relevant treatment activities undertaken on site; • Management techniques to be employed for all aspects of waste treatment which are relevant to their position • Reporting any abnormal events; • Contingency measures in place to prevent breaches of the Environmental Permit in the event of abnormal weather conditions; and ccontingency measures to be taken in the event that accidental emissions are released to the environment. The operator will only appoint suitably qualified contractors, and all purchasing of equipment and materials will be undertaken in accordance with the management system.
BAT 2	*In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques detailed in 'BAT 2 Table 'best available techniques (BAT) conclusions for waste treatment industries (BREF), under Directive 20/10/75/EU, from the Official Journal of the EU' summarised below:* *Pre-acceptance procedures* *Waste Acceptance procedures* *Waste tracking and inventory* *Output quality management system* *Ensure waste segregation* *Waste compatibility prior to mixing or blending of waste* *Sorting of incoming solid waste*

	Pre-acceptance and Waste Acceptance procedures Waste pre-acceptance and Waste acceptance procedures will be in place to ensure that only waste types permitted are accepted for treatment, procedures are outlined in Section 2.3-2.5 and contained within Appendix 1 of this document. No liquid wastes, drummed wastes or laboratory smalls will be accepted. The Operator has in place 'Waste Acceptance Procedures' and STF FO03 'Soil Characterisation Procedure' which includes an assessment of waste prior to their acceptance to site and the sampling to ensure their suitability. During pre-acceptance checks, the type of contamination of each waste load will be established as will the end use of the waste (after it has been treated. The waste will only be accepted if it is compliant with the permitted waste types and if the site is able to treat the waste. The treatment method is determined prior to the waste being delivered to the facility. In the event of any non-conforming wastes a waste rejection notification will be issued informing that the waste is not suitable for treatment Waste deemed not acceptable will be rejected as per written procedures (see Appendix 1). Rejected wastes will be stored within a designated quarantine area pending removal from site and a note will be made of the waste type, quantity, hazardous properties and storage requirements. The quarantine area is segregated from the storage areas for other permitted wastes to reduce the risk of cross contamination. Waste tracking and inventory Waste tracking system will be used as detailed in written procedures contained in Appendix 1. Written records will be maintained which will include information on the waste type, quantity, how the materials were stored and how they were subsequently disposed of. A daily assessment of the current capacity of the site is undertaken and waste is only accepted if there is sufficient capacity. A spreadsheet calculating how much waste is on site will be updated daily to account for waste received on site where waste tonnages have been dedicated (e.g. pre-storage, bioremediation treatment, wastes treated, and wastes removed from site). Written records will be maintained which will include information on the waste type, quantity, how the materials were stored and how they were subsequently disposed of. Output Quality Management System

	The Operator has a technically competent manager who is qualified to 'Level 4 in Waste Management Operations – Managing', and 'Treatment of Hazardous Waste (Remediation HROC6 or equivalent)'. The roles of sales and technical staff are clearly defined within the procedures and staff will only undertake activities for which they have received suitable training. All staff undertaking waste acceptance procedures will receive suitable training in the waste acceptance procedures, as well as in waste handling and the relevant health and safety and environmental procedures in place. The site will be manned by a minimum of two staff under normal circumstances, during waste reception periods, the operations manager to be qualified to at least HNC Chemistry or equivalent. <u>Ensure waste segregation</u> Segregation of the accepted waste types is not necessary as they are not considered to be reactive In the event of any non-conforming wastes a waste rejection notification will be issued informing that the waste is not suitable for treatment Waste deemed not acceptable will be rejected as per written procedures (see Appendix 1). Rejected wastes will be stored within a designated quarantine area pending removal from site and a note will be made of the waste type, quantity, hazardous properties and storage requirements. The quarantine area is segregated from the storage areas for other permitted wastes to reduce the risk of cross contamination. See the Site Layout Plan, drawing ref. 5193-CAU-XX-XX-DR-V-1801 for further detail on waste stockpile location. <u>Waste Compatibility</u> Waste pre-acceptance and Waste acceptance procedures, soil testing and analysis will be in place to ensure that only waste types permitted are accepted for treatment, procedures are outlined in Section 2.2-2.6and contained within Appendix 1 of this document. Section 2.6 details on-site verification, Reception and Compliance testing will be undertaken in accordance with written procedures (see Appendix 1) Testing will be performed to ensure that the materials accepted are consistent with the analysis and description supplied at the pre-characterisation stage. All external lab analysis will be carried out by MCerts and UKAS-accredited laboratories as detailed within the procedures. Samples shall be retained on site for a minimum of two days following sampling, the accredited laboratory will retain samples for 30 days.

<table>
<tr><td></td><td><u>Sorting of Incoming waste</u>
As per Sections 2.3-2.6, following acceptance and valid-pre-acceptance testing result (dependant on the waste stream) wastes will undergo the following acceptance, sorting screening and storage. The treatment pads are used as reception/quarantine areas as shown in drawing ref: 5193-CAU-XX-XX-DR-V-1801, however the exact layout will vary over time, dependent upon inputs and treatment timescales. The STF pipeline route from the treatment facility is shown in drawing ref: 5193-CAU-XX-XX-DR-V-1803. Demarcation of the areas will be managed via suitable signage. The waste storage area is impermeable concrete pavement with sealed drainage system any runoff will be treated and then either stored for reuse or discharged to sewer. All vehicles delivering waste travel over a calibrated weighbridge and a ticket is printed for a record. The driver is then directed to the designated unloading area by the site operation staff. The site is always manned during operational hours.</td></tr>
<tr><td>BAT 3</td><td>In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams as part of the environmental management system.</td></tr>
<tr><td></td><td>Water usage is minimal. Rainfall derived drainage water will be used for moisture control where required. Use of mains water restricted to washing plant etc.
The wastewater discharge areas comprise of an impermeable concrete slab which drains to a collection pipework so that any runoff will be contained. The water will either be used within the process to maintain optimum moisture levels or discharged to sewer. Basic treatment of this potentially contaminated surface/process water will be undertaken prior to discharge to sewer. The discharge of effluent to sewer is already regulated by the existing permit for the soil treatment facility. Emissions to sewer have been assessed as part of the trade effluent/discharge consent and emission limit values have been set. The parameters detailed in the discharge consent are listed below, a copy of the discharge consent is contained in Appendix 3:

<table>
<tr><th>Parameter</th><th>Limit (and unit)</th></tr>
<tr><td>Maximum volume of discharge</td><td>20m^3</td></tr>
<tr><td>Maximum rate of discharge</td><td>2 litres/sec</td></tr>
<tr><td>Ammonia and its compounds as N</td><td>250 mg/l</td></tr>
<tr><td>Cyanides and cyanogen compounds which produce hydrogen cyanide on acidification</td><td>1 mg/l</td></tr>
<tr><td>Separable grease and oil</td><td>100 mg/l</td></tr>
</table></td></tr>
</table>

Sulphates as SO_4	1,000 mg/l
Sulphides, hydrosulphides, polysulphides and substances producing hydrogen suphide on acidification	1 mg/l
Total suspended solids	1000 mg/l
Toxic Metals	10,000 µg/l
Temperature	43°C
pH	6-10

See Section 5.6 'Photo-ionisation Detector' on quantifying gaseous emissions.

A photo-ionisation detector (PID) is used on a bi-monthly basis at locations near the biofilter 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 the use of Personal Protective Equipment (PPE) on site, a cessation of soil movement or covering of odorous soils with a tarpaulin etc.

If site activity involves the movement of soil that has been identified with high level 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.

Results are recorded in the on-site database system.
A separate H1 Surface Waste Assessment has also been submitted as part of an improvement condition relating to the soil treatment facility. A review of the chemical analysis monitoring data from the point of discharge at the soil treatment facility has been undertaken alongside the H1 assessment using the Environment Agency's Surface Water Pollution Risk Assessment.

The results of the monitoring data for the discharge point at the Soil Treatment Facility indicated concentrations released are significantly lower than the existing trad effluent consent limit provided by United Utilities.

H1 calculations have been undertaken using the maximum allowed concentration on the trade effluent consent. The conditions do not contain any specific limits on individual metal ions in favour of a combined limit of 10 mg/l. The model indicates that if each metal ion was present at this level,

	then there would be an unacceptable discharge both in terms of impact on the river and breach of trade effluent condition. Therefore, the permissible concentrations of each metal ion have been back calculated and compared against observed concentration in discharged effluent. A number of parameters failed stage 4 of testing due to the comparison of background total dissolved metal concentrations against the current bioavailable standard. The assessment has demonstrated that concentrations recorded within the STF discharge are significantly lower than the maximum concentrations modelled and therefore the discharge is acceptable with respect to the Surface Water Pollution Assessment methodology.
BAT 4	*In order to reduce the environmental risk associated the with storage of waste, BAT is to use all of the techniques given below* *Optimised storage location* *Adequate storage capacity* *Safe storage operations* *Separate area for storage and handling of packaged hazardous waste*
	See BAT 2 'Ensure waste segregation' Waste Acceptance procedures, Waste Rejection Procedures outlined in Section 2.3-2.6of this document and contained within Appendix 1. Waste storage is outlined in Section 2.1 of this report. A daily assessment of the current capacity of the site is undertaken and waste is only accepted if there is sufficient capacity. The waste storage area is impermeable concrete pavement with sealed drainage system any runoff will be treated and then either stored for reuse or discharged to sewer. All vehicles delivering waste travel over a calibrated weighbridge and a ticket is printed for a record. The driver is then directed to the designated unloading area by the site operation staff. The site is always manned during operational hours. See the Site Layout Plan, drawing ref. 5193-CAU-XX-XX-DR-V-1801 for further detail on waste stockpile location. The STF effluent pipeline route is shown in drawing ref:5193-CAU-XX-XX-DR-V-1803. The site layout has been designed to ensure that treatment and storage areas are separate from the rest of the site so as to ensure segregation of activities.

	The facility is located within a predominantly rural setting, the closest residential receptors are located some 210m east of the site, with local highways or minor roads located within 150 m of the site Materials are stored in in such a way as to avoid double handling i.e. wastes are received, stored, treated and moved to the post treatment area. Wastes will only be removed from the storage area if sufficient capacity is available for them to be treated. All areas will be clearly marked using signage. Storage vessels and containment systems will be in line with the CIRIA 'Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises (C736;2014). Bunding will be provided to a minimum of 110% capacity. Treatment of wastes will normally occur within 10 working days of the material being accepted on site. once treated, the material is stored on the and used to restore the landfill in accordance with the approved restoration plan. A spreadsheet calculating how much waste is on site will be updated daily to account for waste received on site where waste tonnages have been dedicated (e.g. pre-storage, bioremediation treatment, wastes treated, and wastes removed from site).
BAT 5	*In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.* *Handling and transfer procedures aim to ensure that wastes are safely handled and transferred to the respective storage or treatment. Including the following elements:* *A) Handling and transfer of waste are carried out by competent staff;* *B) Handling and transfer of waste are duly documented;* *C) Measures are taken to prevent, detect and mitigate spills;* *D) Operation and design precautions are taken when mixing or blending wastes;*
	The Operator will have a technically competent manager who is qualified to 'Level 4 in Waste Management Operations – Managing', and 'Treatment of Hazardous Waste (Remediation HROC6 or equivalent)'. The roles of sales and technical staff are clearly defined within the procedures and staff will only undertake activities for which they have received suitable training. All staff undertaking waste acceptance procedures will receive suitable training in the waste acceptance procedures, as well as in waste handling and the relevant health and safety and environmental procedures in place.

	The site will be manned by a minimum of two staff under normal circumstances, during waste reception periods, the operations manager to be qualified to at least HNC Chemistry or equivalent. The following procedures are in place (See Appendix 1) to reduce the environmental risk associated with the handling and transfer of waste: Waste Acceptance Procedures STC WI 004 Soil Treatment and Process Monitoring STC WI 005 Soil Turnover STC WI 006 Soil Analysis STC WI 007 Environmental Monitoring STC WI 008 Biofilter Maintenance and Monitoring STC WI 010 Paid Maintenance STC FO03 Soil Characterisation In addition, environmental risks are assessed in detail in the Amenity and Accidents Risk Assessment, document ref: 5193-CAU-XX-XX-RP-V-0301 which includes risk management, control and mitigation for site activities and potential accidents i.e. leaks and spills. Storage vessels and containment systems will be in line with the CIRIA 'Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises (C736;2014). Bunding will be provided to a minimum of 110% capacity.
	Monitoring
BAT 6	*For relevant emissions to water as identified by the inventory of waste water stream, BAT is to monitor key process parameters at key locations (e.g. at inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation)*
	Monitoring and reporting of emissions currently undertaken as a requirement of the permit. See the Activities and Operating Techniques report, document ref: 5193-CAU-XX-XX-RP-V-0306 for monitoring requirements and parameters and Section 5 of this document.
BAT 7	*BAT is to monitor emissions to water with at least the frequency detailed in BAT 7 'best available techniques (BAT) conclusions for waste treatment industries (BREF), under Directive 20/10/75/EU, from the Official Journal of the EU'*
	See response to BAT 6 and Section 5.5 of this document.

	Monitoring and reporting of emissions is currently undertaken as a requirement of the permit. There will be no groundwater monitoring required as part of the proposed operations. The waste discharge areas comprise of impermeable pads which drains to a collection pipework so that any runoff will be contained. The water is either be used within the process to maintain optimum moisture levels or discharged to sewer. Basic treatment of this potentially contaminated surface/process water will be undertaken prior to discharge to sewer. The discharge of effluent to sewer is already regulated by the existing permit with regards to the treatment of leachate. Emissions to sewer have been assessed as part of the trade effluent/discharge consent and emission limit values have been agreed in the discharge consent.
BAT 8	*BAT is to monitor channelled emissions to air with at least the frequency detailed in BAT 8 'best available techniques (BAT) conclusions for waste treatment industries (BREF), under Directive 20/10/75/EU, from the Official Journal of the EU' and in accordance with EN Standards. If EN standard are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.*
	See Section 5 of this document for Monitoring for: • Air emissions from the biofilter. • Material testing of the biofilter matrix. • Water emissions from the water discharge point at the STF. • Dust concentrations in air at the STF. • PID measurements for VOCs at the STF. • Noise assessment • Odour assessment Daily visual monitoring to air for dust, litter and olfactory odour monitoring will be carried out on site. Monitoring is undertaken as per the Operating Techniques and requirements of the management system and operational procedures. Given the rural nature of this activity and the existing similar operations on site that have not given rise to complaints, noise modelling is not considered to be required. Noise management has been addressed within the Amenity and Accidents Report, document ref: 5193-CAU-XX-XX-RP-V-0301. Air forced down through the biopiles via the extraction pipework system will pass through a biofilter (to remove odorous contaminants) before being discharged to air. This filter operates continuously and removes approximately 99% of the monitored volatile organic contaminants that have the potential to cause odour. Emissions to be tested every month to ensure the process parameters are within the optimal range. Olfactory odour checks are also undertaken daily. During soil screening activities. Management plans are in place for odour, dust and emissions.

BAT 9	*BAT is to monitor diffuse emission or organic compounds to air from the regeneration of spent solvents, the decontamination of equipment containing POPS with solvents, and the physico-chemical treatment of solvents for the recovery of their calorific value, at least once per year using one or a combination of the techniques given below.*
	N/A
BAT 10	*BAT is to periodically monitor odour emissions*
	Monitoring is undertaken as per the Operating Techniques Report (document ref. 5193-CAU-XX-XX-RP-V-0306) and requirements of the management system and operational procedures. The wastes to be accepted are not inherently malodorous although hydrocarbons may produce slight odour - see Amenity and Accidents Risk Assessment (document ref. 5193-CAU-XX-XX-RP-V-0301). Additional control measures include the biofilter (to remove odorous contaminants) before being discharged to air. This filter operates continuously and removes approximately 99% of the monitored volatile organic contaminants that have the potential to cause odour. As none of the waste is putrescible, odour modelling is not deemed to be required for this installation. The waste types and treatment is not expected to cause odour at levels that will cause a nuisance outside of the permit boundary. An existing Air Quality Assessment (Appendix 2) is in place and an updated Amenity and Accidents Risk Assessment (included with the permit variation application under document ref: 5193-CAU-XX-XX-RP-V-0301) outline the techniques that will be employed to control odour. Given the nature of the activity and the odour control techniques that will be in place, the installation is not expected to generate high levels of odour. A suitability qualified person will do a perimeter walk on a daily basis, if the daily walk identifies high levels of odour at the site boundary, the operator will investigate what activities were occurring on site at the time. If the odour proves to be coming from the site, the operator may investigate further operating techniques to control/diminish the odour levels. See Air Quality Assessment (Appendix 2) & Amenity and Accident Risk Assessment (document ref. 5193-CAU-XX-XX-RP-V-0301). The facility will operate in accordance with the odour management techniques in this document and in the existing odour management plan already in place at Maw Green STF. All abatement equipment will be in place prior to operations commencing. The operator will operate the facility in accordance with BAT for the sector and will review the operating techniques on an annual basis, upon changes to regulations/guidance or after a substantiated complaint as verified by the Environment Agency.

	All waste will be thoroughly screened through pre-acceptance checks. Any waste which is likely to cause unacceptable odour will be rejected at this stage. If, upon arrival of waste at the site, the visual checks identify the odour content of waste may cause problems at the site, the waste will either be rejected, or if there is sufficient capacity to immediately treat or safely store the waste, the waste may be accepted. There will be no scrubber liquors associated with the site operations, therefore odours and their controls is not applicable. Regular daily checks will take place for odours on and around the treatment area. If excessive odours are identified, the source of odour will be assessed by the operator. It will be dealt with, for example, by a cessation of soil movement if required or covering of odorous soils with a tarpaulin etc. Observations shall be logged in the database system. Details of odour monitoring parameters are detailed within the existing Odour Management Plan already in place at Maw Green STF and referenced in the Activities and Operating Techniques Report, document ref: 5193-CAU-XX-XX-RP-V-0306. Biofilter Monitoring The biofilter will be regularly checked and maintained to ensure appropriate media particle size, nutrient levels, 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 an effective air extraction system, reducing odour emissions and identifying any leaks or damage for repair. Compliance with this requirement will be demonstrated by monthly biofilter monitoring and regular VOC's at the site. Monitoring is scheduled through a nominated UKAS accredited laboratory for the parameters specified within Table S3.2 of the permit. The schedule of analysis for the air biofilter will also include as follows: • TPH • Benzene • Toluene, • Ethylbenzene • Xylenes (BTEX) • Polycyclic Aromatic Hydrocarbons (PAHs)

	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 the manufacturer's instructions or as agreed with the Environment Agency. These procedures will maintain an affective 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 VOC's monitoring at the site.
BAT 11	*BAT is to monitor the annual consumption of waste, energy and raw materials as well as the annual generation of residue and wastewater, with a frequency of at least once per year.*
	Monitoring is undertaken as per the Activities and Operating Techniques Report (document ref.5193-CAU-XX-XX-RP-V-0306) and requirements of the management system and operational procedures. The annual consumption of waste, energy, raw materials and the generation of waste water will be reported on an annual basis. It is considered however that the energy requirements of the operation are not considered to be significant, Specific Energy Consumption (SEC) information is not applicable to the site operations. FCC Environment shows its commitment to energy management through BSI certification to ISO50001. ISO 50001 enables FCC Environment to meet statutory energy efficiency requirements including cutting carbon emissions, lowering energy costs and demonstrating best practice in energy management to customers, employees and other stakeholders. A copy of the Energy Management System ISO50001 certificate is included in the Environmental Management System document, ref: 5193-CAU-XX-XX-RP-V-0309. The use of Raw Materials is detailed further in Section 7 of this document and specific details are provided in the Operating Techniques. The site will utilise the following raw materials: • Oil and fuels • Standard NPK fertilizer (25:05:05 ratio, typically added at 1kg/tonne of soil per application) • Organic additive such as woodchip (occasionally added at ~1-3% to clayey soils to break up cohesive nature of the soils and aid aeration) • Flocculants may be used to removed suspended solids from surface water runoff • Sand and activated carbon used as part of the water treatment process. Datasheets for the raw materials will be kept on site. A regular review of raw materials will be carried out as per requirements of ISO14001 environmental management system, this will include quality-assurance procedures, waste minimisation and substitutions for less polluting options.

	Water requirement for the proposed operation are minimal, rainfall derived drainage water will be used for moisture control where required. Use of mains water restricted to washing plant etc. Usage will be reported on a yearly basis within the annual report submitted to the Environment Agency. Water efficiency objectives will be identified and reported on in an annual basis with an annual report including investigations into water saving technologies. Techniques to minimise water usage will be employed as per requirements of ISO14001 environmental management system.
	Emissions to air
Bat 12	*In order to prevent, or where that is not practicable, to reduce odour emissions, BAT is set up, implement and regularly review an odour management plan, as part of the environmental management system, that includes all of the following elements:* *Protocol for containing actions and timelines;* *Protocol for conducting odour monitoring as set out in BAT 10;* *Protocol for response to identified odour incidents, e.g. complaints* *An odour prevention and reduction programme designed to identify the source(s); to characterise the contributions of the sources; and to implement prevention and/or reduction measures.*
	See response to BAT 10
BAT 13	*In order to prevent or, where that it not practicable, to reduce odour emissions, BAT is to use one of more a combination of the following techniques:* *a) minimise residence time* *of potentially odorous waste in storage on in handling systems (e.g., pipe, tank containers) in particular in anaerobic conditions* *b) Using chemical treatment* *c) Optimising aerobic treatment*
	See response to BAT 10
BAT 14	*In order to prevent or, where that is not practicable, to reduce emissions to air, in particular of dust, organic compounds and odour. BAT is to use an appropriate combination of the techniques given below:* *a) Minimizing the number of potential diffuse emissions sources* *b) Selection and use of high integrity equipment*

	c) Corrosion prevention *d) Containment, collection and treatment of diffuse emissions* *e) Dampening* *f) Maintenance* *g) Cleaning of waste treatment and storage areas* *h) Leaks detection and repair (LDAR) programme*
	Dust management will contain the following measures: - • Daily visual monitoring to air and litter • Olfactory odour checks undertaken daily; • Air forced down through the biopiles via the extraction pipework system will pass through a biofilter before being discharged to air; • Emissions to be tested monthly to ensure process parameter are within optimal range; • provision on site of a water bowser equipped with rain gun, misting and adequate year-round water supply and dust suppression by regular spraying in dry conditions; • use of uncontaminated water for dust suppression, to avoid re-circulating fine material; • high standards of housekeeping to minimise track-out and windblown dust; • a preventative maintenance programme, including readily available spares, to ensure the efficient operation of plant and equipment; • minimisation of drop heights during tipping; • clear delineation of stockpiles to deter vehicles from running over edges; and • effective staff training in respect of the causes and prevention of dust. • inspection and maintenance of all trafficked surfaces; • regular compaction, grading and maintenance of haul routes and unsurfaced routes; • setting an appropriate speed limit; • fitting all site vehicles and plant with upswept exhausts and radiator fan shields where practical; • even loading of vehicles to avoid spillages; • sheeting of haulage loads;

	• regular removal of spilled material from site routes. For VOCs, see the Air Quality Impact Assessment (Appendix 2) For fugitive, dust and odour emissions, see the Air Quality Impact Assessment (Appendix 2) and existing Odour Management Plan already in place at Maw Green STF. In addition, an Amenity & Accidents Risk Assessment (document ref: 5193-CAU-XX-XX-RP-V-0301 is in place which assess the risk and mitigation measures in place to reduce emissions to air. As per the company EMS and detailed in the Amenity & Accidents Risk Assessment, maintenance of mobile plant/equipment will be in line with manufacturers specification. Plant and machinery will be selected to meet all legislation and statutory guidance on dust/fugitive emission levels and to minimise these from selected equipment and maintained to reduce dust/fugitive emissions where possible. If an equipment is found to generate unacceptable dust/fugitive emission levels, consideration will be given to modifying equipment to incorporate additional dust/fugitive suppression. A LDAR programme is not applicable to the proposed operations at Maw Green STF.
BAT 15	*BAT is to use flaring only for safety reasons or for non-routine operation conditions (e.g. start-ups, shut downs) by using techniques below* *a) correct plant design* *b) Plant management*
	N/A to the proposed operations.
BAT 16	*In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use the techniques detailed below:* *a) Correct design of flaring devices* *b) Monitoring and recording as part of flare management*
	N/A to the proposed operations.
	Noise and Vibrations
BAT 17	*In order to prevent, or where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan as part of the environmental management system.*
	Given the rural nature of this activity and the existing similar operations on site that have not given rise to complaints, noise modelling is not considered to be required.

	Noise management has been addressed within the Amenity and Accident Assessment, document ref: 5193-CAU-XX-XX-RP-V-0301 of this application. • Noise management techniques are employed at the facility as set out in the Environmental Risk Assessment. • In summary the site will employ the following BAT recognized techniques: - • Ensuring site roads and surfaces are kept in good working order; • Acoustic dampening of noise generating equipment; • Low level reversing alarms; • Plant and machinery will be selected to meet all legislation and statutory guidance on noise levels and to minimise noise levels from selected equipment and maintained to reduce noise emissions where possible; • If an item of plant is found to generate unacceptable noise levels, consideration will be given to modifying the equipment to incorporate noise suppression; • All plant and equipment in use will be regularly maintained to minimise noise resulting from their operation; • Deliveries and pickups from the site will only take place within the stipulated operational hours; and, • Minimizing drop heights when handling material.
BAT 18	*In order to prevent or where that is not practicable, to reduce noise and vibration emissions, BAT is to use of or a combination of the techniques given below.* *a) Appropriate location of equipment and buildings* *b) Operational measures* *c) Low-noise equipment* *d) Noise and vibration control equipment* *e) Noise Attenuation*
	See Response to BAT 17
	Emissions to Water
BAT 19	*In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that it not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given below.*

	There are no emissions to groundwater. The operation will not have a dedicated water supply. The waste water discharge area comprise of an impermeable concrete slab which drains to a collection pipework so that any run off will be contained. This water will either be used within the process to maintain optimum moisture levels or discharged to sewer. Basic treatment of this potentially contaminated surface/ process water will be undertaken prior to discharge to sewer. The discharge of effluent to sewer is regulated by a discharge consent for the Maw Green Soil Treatment Facility, a copy is contained in Appendix 3. Emissions to sewer have been assessed as part of the trade effluent/discharge consent and emission limit values have been set. The existing surface water storage tank (installed for composting operation) is used when required for storage prior to treatment plant. All site holding tanks are bunded to 110% and its condition monitored regularly. Further details of water treatment and discharge monitoring are outlined in Sections 5.4 of this document and in the Activities and Operating Techniques Report, 5193-CAU-XX-XX-RP-V-0306.
BAT 20	*In order to reduce emissions to water, BAT is to treat waste water using an appropriate combination of techniques.*
	See response to BAT 19
	Emissions from accidents and incidents
BAT 21	*In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all for the techniques given below, as part of the accident management plan (See BAT 1)* *a) Protection measures* *b) Management of incidental/accidental emissions* *c) Incident/accident registration and assessment system*
	An existing Accident Management Plan is already in place at Maw Green STF. See Section 8 of this document, 'Emergency Procedures' that identifies: - • The likely causes of accidents; • The consequences of such accidents; • Prevention measures in place to reduce the likelihood of accidents; and • How any accidents that do occur will be managed.

	The potential for accidents and incidents hazards have been assessed and management techniques put in place as per: • The Activities & Operating Techniques (document ref.5193-CAU-XX-XX-RP-V-0306); • BAT assessment (this document); and, • Amenity and Accident Risk Assessment (document ref.5193-CAU-XX-XX-RP-V-0301). These documents have been prepared in support of this application, to ensure that in the unlikeliness of the any accidents or incidents occurring, the operator has sufficient contingency plans and management techniques to ensure they will not lead to an impact on the environment. The company Management system includes written procedures dealing with noncompliance. Any non-compliance will be reported to the site manager or foreman immediately. The site manager or their deputy will determine the course of action to be taken in accordance with the procedure. The company Management system includes written procedures for handling, investigating, communicating and reporting environmental complaints and implementation of appropriate actions. These are included in the BSI certification for 'Occupational Health & Safety Management System' (ISO45001) and 'Occupational Health and Safety certificate' (OHSAS 18001) See the Environmental Management System summary, document ref: 5193-CAU-XX-XX-RP-V-0309.
	Material Efficiency
BAT 22	*In order to use materials efficiently, BAT is to substitute materials with waste*
	The activities on site requires of resources and raw materials as part of the treatment process, See Section 7 'Resources Use – Raw Materials'. Organic additive. Specific details regarding raw materials are provided in the Operating Techniques. The site will utilise the following raw materials: • Oil and fuels, and use of HVO fuel if possible • Standard NPK fertilizer • Woodchip, Use of the raw materials replaces virgin materials such as manufactured fertiliser or virgin woodchip and using waste raw materials which would otherwise be landfilled. The operator has in place as per requirement of the ISO140001 Environmental Management system:

	a) Procedures for the regular review of new developments in raw materials and any suitable replacements with an improved profile; b) Quality assurance procedures for controlling the impurity content; and, c) Waste minimization and less polluting options favored.
	Energy Efficiency
BAT 23	*In order to use energy efficiently, BAT is to use both of the techniques given below:* *a) Energy Efficiency plan* *b) Energy balance record*
	See BAT 11. Energy requirements of the operation are not considered to be significant and there are no buildings proposed that would require energy-efficient services. FCC Environment shows its commitment to energy management through BSI certification to ISO50001. ISO 50001 enables FCC Environment to meet statutory energy efficiency requirements including cutting carbon emissions, lowering energy costs and demonstrating best practice in energy management to customers, employees and other stakeholders. A copy of the Energy Management System ISO50001 certificate is included in the Environmental Management System document, ref: 5193-CAU-XX-XX-RP-V-0309. The energy efficiency plan relating to techniques relevant to the installation including operating, maintenance and housekeeping measure are in place and covered under an Environmental Management System. Housekeeping measures including maintenance and operational procedures are in place for all areas of the site where the breakdown of machinery could lead to an impact upon the environment or compromise the operator's ability to undertake normal site activities. These measures will be reviewed every year to determine if additional energy savings could be made and will include: - • Switching off equipment when not in use; • Careful operation and maintenance of plant & equipment; • Regular cleaning of plant & equipment.

	General BAT Conclusion for the mechanical treatment of wastes **Emissions to air**
BAT 25	*In order to reduce emissions to air of dust, and of particulate-bound metals*
	See BAT 14
	BAT Conclusions for the mechanical treatment in shredders of metal waste
	BAT Conclusions 26-28
	N/A
	BAT Conclusions for the treatment of WEE containing VFCs and/or VHCs
	BAT Conclusions 29-30
	N/A
	BAT Conclusions for the mechanical treatment of waste with calorific value
	BAT Conclusions 31
	N/A
	BAT Conclusions for the mechanical treatment of WEEE containing mercury
	BAT Conclusions 32
	N/A
	BAT Conclusions for the biological treatment of waste
BAT 33	*In order to reduce odour emissions and to improve the overall performance, NAT is to select the waste input.*
	See BAT 2 regarding the pre-acceptance, acceptance and sorting of waste. The existing Odour Management Plan provides detail on odour source inventory – these remain unchanged as part of the variation proposals.
BAT 34	*Emissions to air* *In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H2S and NH3, BAT is to use one or a combination of the techniques given below:* *a) Adsorption*

	b) Biofilter *c) Fabric filter* *d) Thermal oxidation* *e) Wet scrubbing*
	See Section 4.1 'Control of emissions- biofilter' and BAT 8 regarding the use of biofilter to reduce emissions to air.
BAT 35	*Emissions to water and water usage* *In order to reduce the generation of waste water and reduce water usage, BAT is required to use all of the techniques given below:* *a) Segregation of water streams* *b) Water circulation* *c) Minimisation of the generation of leachate*
	See BAT 3 and BAT 19 Water usage is minimal. Rainfall derived drainage water will be used for moisture control where required. Use of mains water restricted to washing plant etc. The waste water discharge areas comprise of impermeable concrete slabs which drains to a collection pipework so that any run off will be contained. This water will either be used within the process to maintain optimum moisture levels or discharged to sewer. Basic treatment of this potentially contaminated surface/ process water will be undertaken prior to discharge to sewer- a discharge consent is in place for the Soil Treatment Facility, a copy is contained in Appendix 3.
	BAT Conclusions for the aerobic treatment of waste
BAT 36	*In order to reduce emission to air and to improve the overall performance, BAT is to monitor and/or control the key waste and process parameters.*
	For emissions to air see Section 2.3 'Bio-remediation of soil', Section 4 'Control of Emissions'. For detail on monitoring, see Section 5 'Monitoring' and BAT: 6,7,8 and 10.
BAT 37	*Odour and diffuse emission to air* *In order to reduce the diffuse emissions to air of dust, odour and bioaerosols from open-air treatment steps, BAT is to use one or both of the techniques given below:* *a) Use of semipermeable membrane covers*

	b) Adaption of operations to the meteorological conditions.
	See BAT 10 and BAT 15 See Activities and Operating Techniques Report, document ref: 5193-CAU-XX-XX-RP-V-0306. For VOCs, see the Air Quality Impact Assessment (Appendix 2) For fugitive, dust and odour emissions, see the Air Quality Impact Assessment (Appendix 2) and Amenity & Accidents Risk Assessment (document ref: 3982-CAU-XX-XX-RP-V-0303. An existing Odour Management Plan is already in place at Maw Green STF. Meteorological conditions will be considered before site activities are carried out, where relevant, operational activities should be minimised during unfavourable wind conditions i.e. wind blowing towards sensitive receptors.
	BAT Conclusions for the anaerobic treatment of waste
	BAT 38
	N/A
	BAT Conclusions for the mechanical biological treatment (BMT) of waste
	BAT 39
	N/A
	BAT Conclusions for the physico-chemical treatment of solid and/or pasty waste
	BAT 40-41
	See BAT 1 and BAT 2. For emissions to air see Section 2.3 'Bio-remediation of soil', Section 4 'Control of Emissions', Section 5 'Monitoring' and responses detailed in BAT 6,7,8 and 10.
	BAT Conclusions for the re-refining of waste oil
	BAT 42-44
	N/A
	BAT Conclusions for the physico-chemical treatment of waste with a calorific value

	BAT 45-47
	N/A
	BAT Conclusions for the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil
	BAT 48-49
	N/A
	BAT Conclusions for the water washing of excavated contaminated soil
	BAT 50
	N/A
	BAT Conclusions for the decontamination of equipment containing PCB's
	BAT 51
	N/A
	BAT Conclusions for the treatment of waste-based liquid waste
	BAT 52-53
	N/A

Drawings

LEGEND

- PERMIT BOUNDARY
- EFFLUENT PIPELINE ROUTE - OVER GROUND
- EFFLUENT PIPELINE ROUTE - BELOW GROUND
- PUBLIC SEWER BH3201

PROVECTUS CONNECTION POINT TO DISCHARGE LINE

LEACHATE PIPIELINE BELOW GROUND

LEACHATE PIPIELINE OVER GROUND

PUBLIC SEWER BH3201

SOILS TREATMENT FACILITY

PROVECTUS SAMPLING POINT
PROVECTUS WATER METER

Works
Pond
Shandon Barn
Shandon House Farm
Drain
Gravy Road
MAW GREEN
The Barn House
Maw Green Farm
El Sub Sta
Windy Nook
Meadow Cottage
Meadow Croft Cottage
MAW GREEN ROAD
FOXES HOLLOW
52.4m
53.0m
54.6m
44.5m
43.9m
46.0m
MP .75

P01	ISSUED FOR INFORMATION	EJD	KB	KB	22.11.21
REV	MODIFICATIONS	BY	RE	AP	DATE

PURPOSE OF ISSUE: FOR INFORMATION
STATUS: S2

CLIENT: FCC Environment

PROJECT: MAW GREEN LANDFILL

TITLE: STF EFFLUENT PIPELINE ROUTE

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
AS	EJD	KB	KB
DATE	SCALE @ A1	JOB REF:	REVISION
03.11.2021	1:1000	5193	P01

DRAWING NUMBER: 5193-CAU-XX-XX-DR-V-1803

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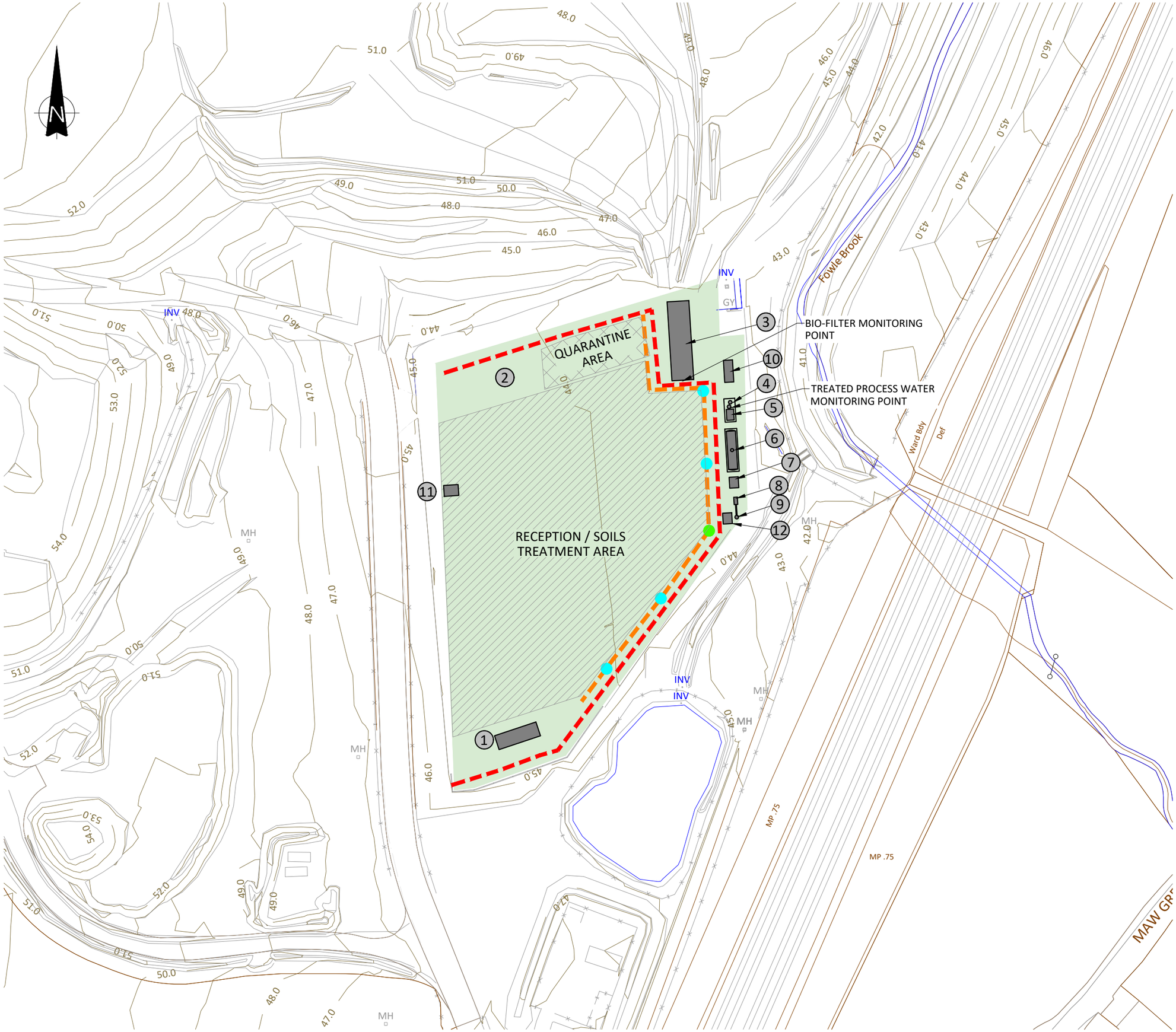

LEGEND

- CONCRETE IMPERMEABLE PAVING
- BOUNDARY KERB LINE
- WATER DRAINAGE PIPE
- DRAINAGE GULLY
- PUMPING CHAMBER
- 1 SITE OFFICE
- 2 NUTRIENT STORAGE
- 3 BIOFILTER
- 4 GRANULAR ACTIVATED CARBON FILTERS
- 5 TRANSFER TANK
- 6 PROCESS WATER SETTLEMENT TANK
- 7 10ft CONTAINER WITH CONTROL PANEL
- 8 BLOWER
- 9 AIR WATER SEPERATOR
- 10 20ft TOOL STORE
- 11 FUEL STORAGE
- 12 3WV

REV					
P02	LAYOUT UPDATED TO CLIENTS DESIGN	EJD	KB	KB	14.12.21
P01	ISSUED FOR INFORMATION	EJD	KB	KB	27.10.21
REV	MODIFICATIONS	BY	RE	AP	DATE

PURPOSE OF ISSUE: FOR INFORMATION

STATUS: S2

CLIENT: 3C WASTE LIMITED

PROJECT: MAW GREEN SOILS TREATMENT FACILITY PERMIT VARIATION

TITLE: SITE LAYOUT PLAN

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

DATE	SCALE @ A3	JOB REF:	REVISION
28.10.2021	1:1000	5193	P02

DRAWING NUMBER: 5193-CAU-XX-XX-DR-V-1801

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Appendix 1

Management Procedures

STC – FO03 - SOIL CHARACTERISATION PROCEDURE

Document No:	STC - ERQ - FO03	**Issue No:**	2
Author:	Jon Owens	**Approved By:**	Steve Langford
Issue Date:	11/11/16	**Approval Date:**	11/11/16

Introduction

This procedure relates to the measures to be undertaken for the sampling of soils received at the STC. See procedure STC - F002 for background information.

Objectives

The main objective of the operation is to ensure soils received at the Soil Treatment Centre (STC) are visually, structurally and chemically similar to those described during the pre-acceptance procedure, and therefore compliant with the Environmental permit and suitable for treatment. This will allow any non-conforming waste to be rejected. The equipment required will be:

- Gloves
- Clean stainless steel trowel
- Mixing tray
- Soil-sampling plastic pots

Procedure

The sampling of soils will be performed by the STC technician or project manager. The procedure uses composite sampling methods as provided in BS812.

A minimum of at least one composite sample must be taken from each job (unique authorisation code). The PM shall assess which sample will sent to the laboratory for reception compliance testing, based on visual assessment, high risk job, knowledge of the client, material variation etc... Chemical testing is undertaken to ensure that the materials being tipped are consistent with the analysis and description provided by the client at the pre-characterisation stage.

Not all samples may require analysis; these samples shall be stored in an appropriate storage place until the job/batch is disposed of.

Table 1: Requirements for sampling:

Volume of soil (t)	No. of samples needed (before or during acceptance at STC)
< 100	1
100 - 500	2
500 +	2 + 1 for every 500t

The general suite of analysis for soils shall include:

- pH
- CLEA Metals
- Total TPH
- Total PAHs
- Total Cyanide (where required)
- Phenols (where required)
- SVOCs and VOCs (where required)
- PCBs (where required)
- Asbestos (screen) and quantification
- Moisture content

However, these parameters may be adapted by the project manager due to prior knowledge of contaminants derived from client waste description, history and data.

All analysis will be undertaken by a UKAS/MCERTS accredited laboratory using accredited methods.

Once the analysis results are received, they will be assessed by a suitably qualified and experienced STC manager to confirm they meet the requirements for treatment. These results are to be stored electronically onto the CRM database under the specific job number (reception samples) or the specific batch (amendment / in-process / final samples).

Should the results not conform to the requirements for treatment the waste will be rejected following the formal rejection procedure.

STC – WI 004 - SOIL TREATMENT AND MONITROING PROCEDURE

Author:	Jon Owens - STCM	**Approved By:**	Steve Langford - MD
Distribution:	Z/QMS/Work Instructions - STC		

Document Changes

Revision No:	Summary of Changes	Date
2	Document format and location change to integrate STC documents into QMS.	05.03.18

Introduction

This procedure relates to the monitoring of the soil treatment process undertaken and executed by Provectus. The purpose of the treatment is to reduce concentrations of certain contaminants within a soil, prior to reuse within the FCC landfill. This shall form, in conjunction with other routine observations, the monitoring programme for the soil treatment process.

Principle of Operation

Certain process parameters are vital for Provectus' soil treatment system to operate successfully; hence regular and frequent inspection and assessments must be made of these process parameters, in order to monitor the performance efficiency of the soil treatment process, and allow for alterations to be made as required.

Procedure

A weekly equipment follow-up sheet shall be filled in by the Site Manager. This performance record shall be entered in the STC database and compared to previous follow-up sheets, by the site manager, in order to highlight any significant short-term changes in the operational parameters. Additionally, the long-term performance efficiency shall then be monitored. Any necessary advice for re-adjustments can be given by PM, while STC site manager shall act upon this advice/instruction at the earliest possible time.

Soil sampling procedures, in accordance to STC procedure STC WI 003 shall also be undertaken. Soil sampling shall elicit information relating to concentrations of relevant pollutants and amendments made to the soil. From this information, the degradation of contaminants over time may be observed, and any follow up actions decided for the following week *via* a treatment calendar, containing information relating to the history of a 'lot' of soil.

Analysis results shall be entered on to the STC database and thus electronically recorded as part of the quality control procedure.

On a daily basis, visual monitoring of equipment, including plant, and soil biopiles shall be undertaken. Equipment modules will be inspected every morning and evening upon module opening and closing respectively. Noise, vibration and heat observations of equipment shall also be executed at these times.

Daily site walk-overs shall be conducted by the SM in order to monitor leaks in pipe working and water conduits. Regular manual checks of air-flow in secondary pipes for humidity, flow-rates and temperature shall be undertaken by the head technician. Water filters shall be cleaned once weekly, at the time of undertaking the follow-up.

STC – WI 005 - SOIL TURNOVER

Author:	Jon Owens - STCM	**Approved By:**	Steve Langford - MD
Distribution:	Z/QMS/Work Instructions - STC		

Document Changes

Revision No:	Summary of Changes	Date
2	Document format and location change to integrate STC documents into QMS.	05.03.18

Introduction

This procedure relates to the periodic process referred to as 'turnover', which is an important and necessary undertaking for the treatment of soils at the STC. The process improves air flow through the soil by decompacting it, and soils to be inspected as part of the overall treatment programme. It consists of moving soil sections in a biopile, using an excavator, to an adjacent piping section of the biopile. Occasionally a turnover is conducted *in-situ*, *i.e.* - the soil is moved around within the section it already occupies. This is typically done when there is no spare room on the biopile to relocate the soil. The biopile is also effectively inverted in order to effect a more homogeneous treatment.

Principle of Operation

There is no set pattern of frequency for a turnover, since it is usually dependent upon soil-specific characteristics, and will often follow the receipt of 'in-process' chemical analysis undertaken on soil sampled from the biopile. The programme for the soil turnover events shall be determined by the PM, in conjunction with the SM. A turnover may involve the addition of one or more types of amendments into the soil, and will usually entail movement along the treatment pad to form a new similarly shaped and dimensioned biopile.

Procedure

The operation is carried out by trained excavator drivers, under the supervision of Provectus personnel. Before any soil is moved on to a new secondary pipe, the pipe must be covered with gravel, typically, though not exclusively 20-40mm clean gravel; formed into an apex above the centre line of the secondary pipe, giving a triangular facial profile, and triangular prism shape.

Trenches created during the turnover shall be made safe with a 1 in 1 batter (45^{o} slope) at all times and regular checks will be undertaken by the technician to ensure this is occurring.

During the turnover, underlying secondary pipes may be damaged, when this occurs the area around the damage will be made safe to allow access by Provectus technicians. The damaged section of pipe shall be removed and disposed of, it must NEVER be left in the biopile. Each end of a new pipe section will be secured with the use of a flexible coupler. Gravel will be reinstated on the new pipe section prior to continuing with the soil turnover.

During any pipe repairs the excavator driver shall act as a top man on top of the biopile to ensure no access is permitted to the pipe repair area by unauthorised personnel.

Any operation, turnover or amendment added to the batch shall be recorded electronically onto the STC database, in compliance with Provectus' quality control system.

STC – WI 006 - SOIL ANALYSIS

Author:	Jon Owens - STCM	**Approved By:**	Steve Langford - MD
Distribution:	Z/QMS/Work Instructions - STC		

Document Changes

Revision No:	Summary of Changes	Date
2	Document format and location change to integrate STC documents into QMS.	05.03.18

Introduction

This procedure relates to the measures to be undertaken for the testing of soils treated at the STF. This ensures that soils are suitable when received, are maintained in optimal treatment ranges and are validated in accordance with the permit. Once treatment is complete soils treated at the STC may be reused in two possible ways. Namely, as soil for the quarry access road or as restoration soils for the quarry backfill works.

Principle of Operation

The main objective of the reuse of soils is to ensure, in accordance with the PPC permit, that any material treated by Provectus is reused in a safe and environmentally acceptable manner. Quality control measures are implemented in order to prevent the reuse of soils to destinations either unintended, or unsuitable for the receipt of such soils. This operation is performed in conjunction with FCC, who operate the quarry where the soils shall be reused.

In-treatment batches of soil are monitored periodically, testing for the contaminants of concern and nutrient availability. The location and frequency of this 'in-process' sampling is decided at the discretion of the PM. When a batch of treated soil displays strong chemical evidence of meeting a non-hazardous reuse standard, a 'validation' sample must be taken to generate a data report, this can be sent to FCC for disposal to be formally approved.

Validation sampling should be carried out by the site operator or site manager, using a random stratified sampling plan. As a general rule one composite sample should be taken for every 500t.

The reception and validation samples should be submitted for the following analytical tests –

- Metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se & Zn)
- pH
- Speciated TPH (including BTEX)
- Speciated PAHs
- Phenols
- Total Sulphate
- Elemental sulphur
- Free Cyanide
- Total Cyanide
- Asbestos screen

In process samples should be submitted for the following analytical tests:

- Moisture content
- pH
- Ammoniacal nitrogen
- Nitrate

Contaminants of concern will be added at the request of the PM to supplement the in-process analysis.

Dependent on the contaminants of concern it may be necessary to request further parameters for testing on validation. Leachate analyses are required for reuse of soils in the restoration part of the landfill in accordance with the agreed risk assessment.

Procedure

Once the soil lot has been analysed by an accredited laboratory, and deemed to be suitable for removal from the biopile, the Site Manager shall arrange with FCC, for soil to be removed from the biopiles, and taken to a suitable reuse destination on the landfill.

All information regarding soil volumes, final analysis results, soil origin and ultimate destination shall be recorded on STC database and communicated to both the FCC Waste Assessment team and to FCC Site Manager for approval and arrange plant and personnel required for the transfer of soils.

STC – WI 007 – ENVIRONMENTAL MONITORING

Author:	Jon Owens - STCM	**Approved By:**	Steve Langford - MD
Distribution:	Z/QMS/Work Instructions - STC		

Document Changes

Revision No:	Summary of Changes	Date
2	Document format and location change to integrate STC documents into QMS.	05.03.18

Introduction

This procedure relates to the measures to be undertaken for environmental monitoring at the STC, in order that all emission points are regularly monitored to ensure that the operation is compliant with the conditions of the permit. This procedure does not replace any general monitoring of the site undertaken by FCC.

Principle of Operations

The main objective of the operation is to monitor and record the emission points on the STC. These are limited to the following:

- Air emissions from the biofilter.
- Material measurements from the biofilter.
- Water emissions from the water discharge point at the STC.
- Dust concentrations in air at the STC.
- PID measurements for VOCs at the STC.
- Noise assessment
- Odour assessment

Procedure

Site environmental monitoring aims to ensure compliance with the Environmental Permit as well as our internal procedures for PPE and RPE.

Process Emissions

The point emissions from the STC include process water, surface water collection and air emissions from the biofilter as well as dust and odour from general site works. The monitoring for these processes include:

- Biofilter sampling (from exhaust vents only)
- Process water sampling
- Visual and olfactive daily assessment for dust and odour on site.
- Dust monitoring

Biofilter Monitoring

The frequency for the biofilter sampling is monthly and is scheduled through a nominated laboratory. The schedule of analysis for the biofilter is as follows:

- VOCs (including BTEX)
- Speciated PAHs
- TPH

The use of a nominated laboratory will permit independent testing of the biofilter air quality for reporting and recording to allow compliance with the permit conditions. The procedure for biofilter monitoring is STC – WI 008.

Process Water Monitoring

The water quality in the water collection tanks will be monitored on a monthly basis. A sample will be obtained from the point of discharge, and analysed for parameters stated in the discharge consent. Regular checks will be made to ensure no visible oil or grease is present in the tanks, or at the discharge point.

STC Dust Control

Monitoring shall be done on a daily visual basis in addition to independent dust measurement carried out by nominated laboratory/subcontractor. Sampling locations are shown on attached drawing no2.

Dust suppression is to be undertaken when soil movement is generating excessive dust, this includes traffic movements and soil turnover. Measures for this are included within the Site-Specific Working Plan submitted to the Environment Agency. The source of dust will be identified and the operation creating a dust presence ceased. Mitigation measures will include the use of the on-site water bowser with spray rail or equivalent.

PID Measurements

A photo-ionisation detector (PID) shall be used on a bimonthly basis on locations 1 to 5 and near the biofilter (6) to quantify gaseous emissions (see monitoring locations on drawing 1 attached). If PID readings for Benzene exceed 1ppm (based on EH40 guidance), then the source shall be identified and assessed by Provectus. 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.

If site activity involves the movement of soil that has been identified with high level 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.

Results are recorded in the on-site database system.

Noise Measurements

Observations relating to excessive noise incidents shall be recorded in the database system.

STC Odour Control

Regular daily checks will take place for odours on and around the treatment area. If excessive odours are identified, the source of odour will be assessed by Provectus. It will be dealt with, for example, a cessation of soil movement if required or covering of odorous soils with a tarpaulin etc. Observations shall be logged in the database system.

Recording of Results

All analytical results and monitoring results shall be stored onto the STC database under the relevant environmental batches location. Any changes made to the type of monitoring or adjustment to the biofilter shall also be recorded on the STC database.

STC – WI 008 – BIOFILTER OPERATION AND MONITORING

Author:	Jon Owens - STCM	**Approved By:**	Steve Langford - MD
Distribution:	Z/QMS/Work Instructions - STC		

Document Changes

Revision No:	Summary of Changes	Date
2	Document format and location change to integrate STC documents into QMS.	05.03.18

Definitions and Abbreviations

VOC – Volatile Organic Compound
TPH – Total Petroleum Hydrocarbon
PAH – Polycyclic Aromatic Hydrocarbon
BTEX – Benzene, Toluene, Ethyl Benzene, Xylene

Introduction

This procedure relates to the measures to be undertaken for the regular monitoring of the quality and performance of the biofilter located on the STC. The biofilter is a compost mixture, acting as a natural filter medium for exhaust gases from the treatment pads. Its function is to treat exhaust gases, removing VOCs, TPHs, PAHs, and BTEX. To maintain moisture and temperature levels and to maximise process efficiency, the biofilter is normally kept under a tarpaulin cover. Both visual inspections and chemical analyses will constitute the quality control procedure relating to biofilter performance, with electronic data recording and a system for modifications and alterations of the process incorporated into Provectus' quality control system.

Principle of Operation

Air and process water are pumped from the treatment pads, *via* secondary pipes, into a primary pipe. This mixture then enters an air-water separator, where water is separated from the air fraction by gravity. This air fraction is then pumped through a treatment module, and eventually exhausted to the biofilter.

In order to maintain a moisture film on the matrix of the biofilter, re-circulating process water may be pumped periodically (this is controlled and may be altered by the PM in accordance with needs) onto the surface of the biofilter. Used in conjunction with periodic visual inspections, decompaction, re-fertilisation and replacement techniques; this ensures the continuing maintenance of a high-performance biofilter at the STC. The moisture film must be maintained in order to facilitate desorption of organic gases onto the biofilter matrix.

Procedure

As part of the quality control system for the STC, Provectus will replace the biofilter on at least an annual basis. This will involve the removal of an existing biofilter and replacement with a similar material. The biofilter shall be turned, in a similar way to that described for the biopiles on a recommended quarterly period. At this point, if necessary, manual spraying of the biofilter *via* a normal transfer hose assembly from the water collection tank shall be undertaken. Any

such additions of water, turnovers and replacements shall be electronically recorded as part of the quality control system on the STC database. Periodic manual and visual assessments of the moisture content and structure of the biofilter will also be conducted.

On a monthly basis, sampling of the gases directly exhausted from the biofilter will be undertaken by an independent laboratory. The process-specifics are appended and it has been agreed when using Gradko to use a 10 minute exposure period.

Moisture content from the biofilter material will also be tested for monthly, along with quarterly testing of pH, exchangeable ammoniacal nitrogen and phosphorus. Result will be stored onto the STC database.

STC – WI 010 – PAD MAINTENANCE

Author:	Jon Owens - STCM	**Approved By:**	Steve Langford - MD
Distribution:	Z/QMS/Work Instructions - STC		

Document Changes

Revision No:	Summary of Changes	Date
2	Document format and location change to integrate STC documents into QMS.	05.03.18

Introduction

This procedure relates to the daily operations required to keep the STC fully functional, including maintaining a tidy and safe method of working. This maintenance comes under the remit of Provectus' quality control system. It is also seen as a desirable health and safety practice, since it incorporates measures which control the possibility of equipment, plant and permanent installations presenting dangers to operatives by entering into a state of disrepair and untidiness.

Principle of Operation

The main aim is to ensure that the process performed at the STC is operating at a high level of efficiency; including the reduction of potential infringements. It is undertaken to keep the STC in a clean state of appearance, and to provide a safe working environment for all employees and other operatives in the vicinity of, and within the boundaries of, the treatment pads.

Procedure

There is no specific, set procedure that can be listed to cover general pad maintenance. It comprises of constant visual monitoring of the state of the biopiles, soil treatment pad, and any such areas of operation on the STC. Such things included in this operation are:

- tidy deployment of tools and equipment
- keeping any tarpaulins neatly stored when not in use
- tarpaulins shall not be kept in an untidy manner on the biopile surfaces (tarp use is kept to a minimum)
- any stockpiles of soils, gravels, amendments and materials shall be kept in a safe and organised form
- the on-site office shall be cleaned as required
- the edges of the biopiles shall be kept clean and tidy
- the drains along the edges of the biopiles shall be regularly purged of any debris
- use of a road sweeper and water bowser with spray rail as required

The use of earthworks plant shall often be employed in order to keep the treatment pads and associated areas clean. All of the procedures listed above shall be particularly observed during any operations on the STC, namely soil deliveries and shaping into biopiles, soil removal for subsequent disposal, and turnovers.

As part of a good traffic management system, the regular maintenance of signs shall also be undertaken. The levels on the pad shall be regularly surveyed and visually monitored for differential settlement. Any potholes or deformation of the pad or associated roads will be reported to the PM and the matter resolved within an appropriate timescale.

Waste Acceptance Procedure Soil Treatment Centre (STC).

FCC soil treatment centres are limited to accepting wastes which can be treated to a standard that is acceptable beneficial reuse in the adjoining quarry void as general fill. Potential wastes for treatment must be assessed prior to their acceptance to ensure their suitability.

Prior to acceptance at a non-hazardous landfill site the treatment outputs must be assessed and pre-characterised so that its acceptance will not:

- Result in unacceptable emissions to groundwater, surface water or the surrounding environment;
- Jeopardise environment protection systems (such as liners, leachate and gas collection and treatment systems) at the landfill adjacent to the quarry void; or
- Endanger human health

Definitions & Abbreviations

- TM – Technical Manager
- STC – Soil Treatment Centre

Waste Acceptance Procedure STC

1.0	**Waste enquiry receipt, data collection and classification.**	
TM/Site Management	Upon receipt of a new permit or permit variation, all existing wastes should be evaluated in line with the procedures below.	
Sales Team	The initial stage of the STC waste acceptance procedure commences via an enquiry from a potential customer.	
Sales/TM	The Technical Manager (TM) is informed of the nature of the waste and shall carry out a full technical assessment. As a first step toward this aim, the following details shall be gathered: • Source and origin of the waste; • Discussion to be held between the Sales team and treatment subcontractor to establish suitability on the proposed material prior to undertaking the full technical assessment. • Information on the process producing the waste • Appearance of the waste e.g. smell, colour and physical form; • Code in accordance with the European Waste Catalogue or List of Wastes Regulations; • Data on the composition of the waste and the levels of contamination; • Any additional information that may require special precautions to be taken at the STC.	

TM	Waste types acceptable at the STC are limited to those detailed in Appendix C3_1 of the environmental permit variation application, DATED. If the candidate waste is not classified in one of the categories above, it shall be rejected.	
TM	As part of the classification process described above, the waste will be assessed to determine whether it is hazardous or non-hazardous in accordance with Environment Agency guidance WM3, May 2015.	
TM	The TM will gather all of the above information and pass to the site staff at the treatment centre.	

2.0	**Assessment of Treatment Suitability**	
Treatment Subcontractor	The waste shall be assessed to ensure that it comprises biologically treatable substances. Such substances predominantly comprise of the following, but are not limited to: • A range of petroleum hydrocarbons (petrol, heating fuel, diesel, used oils, crude oil etc) • Polycyclic Aromatic Hydrocarbons (PAHs) • Pentochlorophenols (PCP) • Creosote • Phenols • Volatile Organic Compounds (VOCs) and Solvents • Asbestos screen Unsuitable physical inclusions in the waste that can be treated by physico-chemical treatment processes would be accepted. These inclusions after segregation would either be further treated to allow reuse within the quarry or disposed off-site as appropriate. If the waste contains materials which are untreatable and likely to render the waste unacceptable at the quarry post-treatment, the waste will be rejected.	
Treatment subcontractor	The treatment subcontractor will forward confirmation to the TM that the waste is suitable for treatment together with a statement of any limitations on physical and chemical characteristics (particle size, pH, moisture content etc) which they wish to impose. The treatment subcontractor will at this point advise of the acceptable frequency of incoming loads for treatment. They will also advise with regard to any relevant, additional parameters to be tested for compliance testing and output testing.	

3.0	**Waste stream Approval / Rejection**	
Sales/TM	A Customer Enquiry Form is generated on the computer network at this stage.	
Sales/TM/ Site Manager	All details gathered above will be entered into the waste assessment screens associated with the enquiry. Including the frequency of sampling. Once the assessment is completed and the waste approved for acceptance at the STC, the enquiry is allocated a specific Approval Number and the Customer Enquiry form becomes the Technical Approval. If the waste is rejected the reasons for rejection are keyed onto the Customer Enquiry Form so that a letter of rejection may be generated informing the customer of our decision.	
TM	Following the allocation of an Approval Number to a specific waste all the technical data obtained during and following the appraisal, will be forwarded to the Site Manager and a copy forwarded to the STC Manager.	
Sales / Site Manager	A tipping reference for the waste will created on the Central System and a quotation created and sent to the customer. The tipping reference will require all vehicles to "tare off" following delivery of the waste.	

4.0	**Waste acceptance and booking in.**	
STC Manager	No waste will be accepted unless it has been pre-booked for disposal with the STC manager. Upon booking in, the following information will be required: • Date of proposed deliveries to site • Confirmation of source and approval number (provided on the quotation paperwork) The Sales Team will confer with the Site Manager in relation to the number of the expected loads to the site weighbridge prior to the site opening each day.	
Weighbridge Operator	The weighbridge operator will weigh all incoming loads and assign them to the appropriate tipping reference. If the waste is hazardous the system will demand the entry of the consignment note details. These details should be entered at this point but the paperwork should remain with the driver for completion & signing by the treatment subcontractor staff. The driver should be directed to the STC making them aware of the need to tare off after deposit of the waste.	
Treatment Subcontractor	The treatment subcontractor will inspect any associated hazardous waste consignment notes and sign them prior to deposit of any load. The paperwork will be returned to the delivery driver with an explanation that it must be handed in at the weighbridge. They will direct the deposit of the waste into the suitable treatment lot. During unloading, a visual inspection will be carried out. If the waste appears to be different to that specified in the approval, the material will be quarantined or rejected as appropriate.	

Weighbridge Operator	When the driver returns to tare off the weighbridge operator will collect the signed hazardous waste consignment note (where relevant) and file it securely. The weighbridge ticket will be completed and appropriately signed.	

5.0	**STC Reception - Compliance sampling and testing**	
	All incoming wastes for treatment at the biopile process will be subjected to thorough pre characterisation as described above.	
Treatment Subcontractor	In addition to this, further testing will be performed to ensure that the materials accepted are consistent with the analysis and description supplied at the pre-characterisation stage. This is known as Reception and Compliance testing.	
Treatment Subcontractor	**STC Reception and Compliance Sampling methodology:** As the soil volume and number of lorry movements associated with each clients contract can vary the sampling of incoming soils is adjusted to ensure that representative data is obtained. The table below shows how the number of recovered samples relates to the volume of soil delivered under each contract. **Table 1 – Reception – Sampling Frequency** Volume of soil (m^3) / No. of samples recovered for analysis < 50 / 1 50 - 100 / 2 100 - 200 / 3 200 - 500 / 4 500 – 1,000 / 4 + 1 for every 250m^3 after 1,000m^3 1,000 - 2,000 / 8 + 1 for every 250m^3 after 2000m^3 **Sampling Population:** The sampling exercise is intended to represent the volume of material accepted from each contaminated land site. Its purpose is merely to ensure that the material accepted is that which was described during the pre-characterisation stage and that the material being accepted does not significantly differ either qualitatively or quantitatively in terms of its chemical composition. **Specify detailed sampling location:** Samples to be collected immediately from the discharged waste upon reception at the STC as per the treatment subcontractor Sampling Matrix. **Specify date and time(s) of sampling;** Each consignment of soil delivered to the STC will be sampled once it has been deposited in the STC & prior to being mixed with any existing material. The number of samples taken is dependent on the scale of the delivery (see Table 1 above). **Specify persons to be present:** The sampling of soils during the reception	

process is conducted by the STC Manager or Technician.

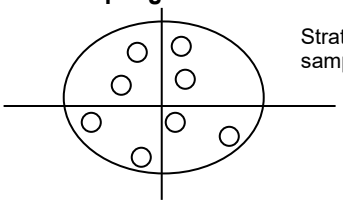
Identify equipment: Stainless Steel trowel, Sample containers (with air tight lids) and a permanent marker pen.

Specify no. of samples to be collected: See Table 1 and associated notes above.

Specify number of increments per sample: 8 (eight)

Specify increment size/sample size: Approximately 200g removed with a trowel.

Description of Sampling event:



The pile of discharged soil is split into quarters (visually) and 2 (two) incremental samples are taken from random locations within each quarter. These incremental samples are placed in plastic containers with air tight lids for subsequent mixing and sub-sampling.

Detail Requirements for on site determinations: No onsite testing is undertaken on these samples

Identify sample-coding methodology: Each sample should be labeled (written in indelible ink) twice. One label on the lid of the container and once on the outer body of the container both should contain identical information including: Contract and Line Number, Approval Number, Time of sample collection, date, signature of sampler.

SUB-SAMPLING

No sub sampling is undertaken with soils recovered at the point of reception. Each sample is considered to fairly represent the quality of the material delivered by the client. The number of samples submitted for external analysis (by an accredited laboratory) from each running contract is outlined in Table 1 and the associated notes above.

PACKAGING, PRESERVATION, STORAGE AND TRANSPORT REQUIREMENTS

Packaging: Samples are packaged into (1 litre) plastic containers, with airtight lids, as supplied by the laboratory. Each container is labelled using the sample coding specified above. These are packed into plastic cool boxes supplied by the laboratory along with a copy of the Chain of Custody documentation, specifying the analysis to be competed.

Preservation: The addition of preservatives is not required.

Storage: All soils awaiting analysis are stored at <4^{o}C in a fridge up to the point of transport to the laboratory

Transport: The samples should be collected and delivered to the laboratory using a propriety courier with proof of collection and delivery confirmed by time, signed and dated receipts.

STC Input Compliance Testing:

The samples collected above should be submitted for the following analytical testing:

- Metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se and Zn)
- pH
- Benzene, Toluene, Ethyl benzene and Xylene
- Volatile Petroleum Hydrocarbons (C5-C10, C10-C12)
- Extractable Petroleum Hydrocarbons (speciated)*
- USEPA priority 16 PAHs+
- Asbestos screen

Any additional parameters suggested by the treatment subcontractor at stage 2.0.

Any material found to be inconsistent with the pre-characterisation description will be quarantined at the waste producers cost, and disposed if untreatable to an appropriately licensed disposal point.

STC Output Sampling methodology:

Scale: A sample is to be collected from each batch of processed soils following treatment to confirm the level of decontamination.
Sampling Population: The sampling exercise is intended to represent the volume of material arising from each batch of soil that has been through the process. **Note -** The size of a typical process batch can vary from as little as 800 tonnes to over 4000 tonnes. Soils that are formed into treatment batches at the start of the treatment contain soils with similar, or compatible, chemical and physical properties. Once treatment begins sampling is based on stratified random sampling at a frequency of one composite sample for every 500 m^3 in process.
Specify detailed sampling location: Samples to be collected from Lots on the basis of a stratified random sampling plan.
Specify date and time(s) of sampling: Each batch will be sampled once it is considered to have completed the treatment process to the required standard. The end point of each treatment is tracked through the collection and analysis of "in-process" soil samples over a period of typically 8 to 16 weeks. This work is conducted by the treatment subcontractor in conjunction with an accredited analytical laboratory.
Specify persons to be present: The sampling of soils during the reception process is conducted by the STC Manager or a technician.

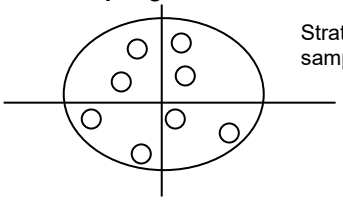
Identify equipment: Stainless Steel trowel, Sample containers (with air tight lids) and a permanent marker pen.

Specify no. of samples to be collected: 1 (one) composite sample from each 500m^3 of soil within the batch (Biopile).

Specify number of increments per sample: 8 (eight)

Specify increment size/sample size: Approx 200g removed with a hand held auger at depths of between 0.5m and 1.5m below the surface.

Description of Sampling event:



The upper surface of the biopile is visually divided into 3 (three) metre wide strips. This equates to the area influenced by a single aeration pipe and contains approximately 400 tonnes of soil. This area is then visually divided once more into 4 (four) equal zones and 2 (two) incremental samples are taken from random locations within each quarter. These incremental samples are placed in a clean 25 litre plastic tub for mixing and sub-sampling.

Detail Requirements for on site determinations: No onsite testing is undertaken on these samples

SUB-SAMPLING

Detailed procedure: Recovered soils from a single batch sampling process are placed in a clean 25 litre plastic container and mixed using a stainless steel hand trowel, for a minimum of two minutes, to generate a uniform sample. Each mixing operation is limited to a maximum of 2kg of soil at any one time. A 1 (one) kg sub sample from each mixing operation is transferred as a the sub-sample to a sample container (1 litre plastic container with air tight lid)

One sub sample is submitted for chemical analysis for every 500m^3 of soil held within the treated batch (Biopile)

PACKAGING, PRESERVATION, STORAGE AND TRANSPORT REQUIREMENTS

Identify sample-coding methodology: Each sample should be labelled (written in indelible ink) twice. Once on the lid of the container and once on the outer body of the container. Both should contain identical information including: Batch identification Number, Time of sample collection, date, signature of sampler.

Sample numbers have the following structure:
STC -1-X-Y
Where X corresponds to batch number and Y corresponds to the nth sample number taken e.g. – if batch 14 underwent three separate sampling events, the samples would be numbered:

	STC -1-14-1 STC -1-14-2, and STC -1-14-3	
	Packaging: Samples are packaged into (1 litre) plastic containers, with air tight lids, as supplied by the laboratory. Each container is labelled using the sample coding specified below. These are packed into plastic cool boxes supplied by the laboratory along with a copy of the Chain of Custody documentation, specifying the analysis to be competed.	
	Preservation: The addition of preservatives is not required. All soils awaiting analysis are stored at <4^{o}C in a fridge up to the point of transport to the laboratory.	
	Storage: Store sample containers in a cool darkened environment (preferably a cold store) until collected.	
	Transport: The samples should be collected and delivered to the laboratory using a propriety courier with proof of collection and delivery confirmed by time, signed and dated receipts.	
	STC Output Testing: The samples collected above should be submitted for the analytical testing as detailed in STC Input Compliance Testing.	

6.0	**Acceptance of treated material at the quarry.**	
TM	Results of STC output testing will be forwarded to the landfill site manager and TM for review. All materials accepted from the STC into the landfill must be subjected to a full technical assessment and approval.	
TM	Material leaving the STC following treatment will be coded under the list of Wastes as either: 19 13 02 An assessment will therefore be required to determine whether the material is hazardous or non-hazardous in accordance with Environment Agency guidance "WM3" using the Approved Supply List (ASL) as the reference source for substance classification, or 19 13 01* Any materials found to be hazardous will not be accepted at the quarry and will remain at the STC to undergo further treatment or off site disposal to a suitably permitted facility.	
TM	Materials which are shown to be non-hazardous and which are shown to display levels of contamination below the soil reuse targets agreed through the completion of a detailed quantitative risk assessment (DQRA) will be permitted for reuse in the quarry as general fill	

Appendix 2

Air Quality Risk Assessment

Contaminated Land
Air Quality
Environmental Audit

SMITH GRANT Environmental Consultancy LLP

Partnership No: OC 300776

PROPOSED SOIL TREATMENT FACILITY, MAW GREEN LANDFILL, CREWE

AIR QUALITY ASSESSMENT

For: FCC Environment / Axis

February 2019

R2598-R01-v3

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DOCUMENT CONTROL SHEET

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Client:	FCC Environment
Report Reference Number:	R2598-R01
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for: Smith Grant LLP

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v1	draft	18.01.19	draft, issued for client comments
v2	revised draft	18.01.19	revised draft
v3	revised draft	26.02.19	revised draft incorporating additional information on air treatment system

PROPOSED SOIL TREATMENT FACILITY, MAW GREEN LANDFILL, CREWE AIR QUALITY ASSESSMENT

For: FCC Environment / Axis

Contents

Figures

Appendices

1 Introduction

1.1 FCC Environment (FCC) proposes to submit a planning application to Cheshire East Council (CEC) for a bioremediation Soil Treatment Facility (STF) at Maw Green Landfill near Crewe. The Proposed Development would be in addition to the existing activities already undertaken at the landfill. Axis, acting on behalf of FCC, instructed Smith Grant LLP (SGP) to undertake an air quality assessment of the proposed development and to provide a report to support the planning application.

1.2 The application Site to be used for the STF is located within the boundary of the wider landfill area, to the southeast of the existing landfill cells; however, the landfill area itself does not form part of the Site. The area is used currently informally for storing small stockpiles and accommodating vehicle movements.

1.3 Site details are:

Table 1.1: Site Details

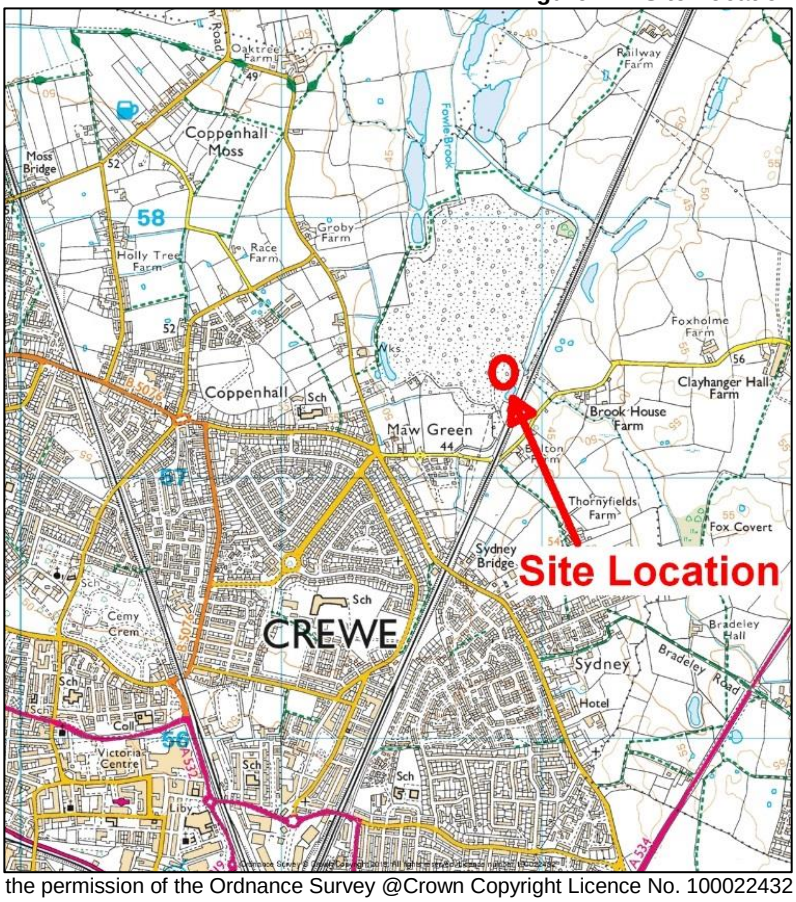
Address	Maw Green Landfill Site, Maw Green Road, Crewe, CW1 5NG
National Grid Reference	371822, 357334
Local Authority	Cheshire East Council (CEC)
Site Area	0.5ha
Nature of Current Site	Informal usage associated with adjacent landfill cell operations
Proposed Development	Soil Treatment Facility (STF) processing up to 50,000t soils per annum.

1.4 This report describes the Air Quality Assessment (AQA) undertaken by SGP with regards to potential airborne emissions from the proposed development. The assessment considers the potential impacts and resulting effects associated with fugitive dust (disamenity dust and fine particulate matter), road transport emissions (nitrogen dioxide and fine particulates) on local receptors, and odours and aerial emissions that may arise from the soils. The study comprises a review of readily available information on the environmental setting of the Site; baseline air quality data; assessment of air quality impacts; identification of mitigation measures and a description of residual impacts.

1.5 SGP is an environmental consultancy specialising in air quality assessments. The report author, Katrina Hawkins, Partner, is a Member of the Institute of Air Quality Management (IAQM) with over 20 years of experience in environmental assessment.

1.6 The Site location is provided below in Figure 1.1 and in Drawing D01a.

Figure 1.1: Site Location



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2 Technical, Policy and Legislative Context

2.1 Technical Context

2.1.1 The airborne pollutants of principal concern in connection with the proposals and which are considered in the following assessment are particulate matter (arising from site operations and vehicle exhaust emissions), VOCs and odours (site operations and transported materials) and nitrogen oxides (arising from vehicle exhaust emissions).

2.1.2 Airborne particulate matter (PM) is made up of condensed phase (solid or liquid) particles suspended in the atmosphere and ranges in size from a few nanometres to around 100µm. The term 'dust' typically refers to all airborne particulate matter. Particulate matter comes from both man-made and natural sources. It can give rise to both soiling effects through dust deposition (often referred to as 'disamenity' or 'nuisance' dust) and human health effects through suspended particles, particularly among those susceptible groups with pre-existing lung disease or heart disease and the elderly or children. Dust accumulation may also affect sensitive habitats through impacts on vegetation and aquatic ecosystems.

2.1.3 Dust soiling will arise from the deposition of particulate matter in all size fractions but will mostly be associated with particulate matter of diameter greater than 30 µm. Particles below 10µm (referred to as PM_{10}) correspond to the inhalable fraction of particulate matter and have been related to various adverse health effects[1]. PM_{10} includes both fine (those particles of diameter below 2.5 µm; referred to as $PM_{2.5}$) and coarse (diameter between 2.5-10µm; $PM_{2.5-10}$) fractions of airborne particulate matter which normally arise from different sources. $PM_{2.5}$ has been shown to give a stronger association with the observed ill-effects.

2.1.4 Soil handling operations give rise to releases of airborne particulate matter. The nature and quantity of airborne PM released at any one time will depend on a wide variety of factors including, but not limited to, the nature of the material being handled, the quantity of materials being handled, the handling processes and the weather conditions at the time of handling.

2.1.5 The soils to be treated at the site may contain a range of VOCs (Volatile Organic Compounds) where VOCs are organic compounds that have a high vapour pressure at ordinary room temperature, and hence are emitted as gases / vapours from solids and liquids. They comprise an extremely wide range of chemicals that are emitted from both biogenic and anthropogenic sources. The presence of VOCs may also give rise to odours which may be generated by the tipped and stored soils, and by the subsequent treatment of the soils. An odour is the organoleptic attribute perceptible by the olfactory organ on sniffing certain volatile substances. Odours may be perceived as pleasant or unpleasant, and the key concern with odour is its ability to cause a

[1] Air Quality Expert Group (2012), Fine Particulate Matter ($PM_{2.5}$) in the United Kingdom.

response in an individual that is considered to be objectionable or offensive. There is a wide variation between individuals as to what is deemed unacceptable and as to what can affect an individual's quality of life. As it may cause offence to human senses odour is defined as a pollutant.

2.1.6 Haulage and road transport will result in emissions of, primarily, oxides of nitrogen (NO_x; comprises nitrogen dioxide (NO_2) and nitric oxide (NO)) and PM_{10}. NO itself is not considered harmful to human health. However, on release to the atmosphere it usually oxidises rapidly to NO_2 which is associated with adverse effects on human health, causing inflammation of the lungs at high concentrations. Long term exposure to NO_2 can affect lung function and respiratory symptoms.

2.1.7 Road transport is also a source of primary PM_{10} both as direct emissions through vehicle exhausts and as indirect emissions through tyre and brake wear, re-suspension of particulate matter on the road and road wear (mechanical abrasion and corrosion). Road transport may also be responsible for secondary PM formed via gas-to-particle conversion.

2.2 Legislation and Guidance

European Legislation

2.2.1 Action to manage and improve ambient air quality within the UK is driven largely by European (EU) legislation. The majority of European air quality legislation is consolidated under Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which came into force on 11th June 2008 consolidating an earlier Directive and three daughter directives. The legislation sets legally binding European-wide air quality limit and interim target values (Ambient Air Directive (AAD) Limit and Target Values) for concentrations in outdoor air of major air pollutants for the protection of human health and ecosystems and prescribes how air quality should be assessed and managed by Member States.

UK Legislation

2.2.2 The **Air Quality (Standards) Regulations 2010** implement EU Directives 2008/50/EC and 2004/107/EC, a fourth daughter directive, transposing the AAD values into UK legislation. In the UK responsibility for meeting the AAD Limit and Target Values is devolved to the national administrations; the Department for Environment, Food and Rural Affairs (Defra) co-ordinates assessment and air quality plans for the UK as a whole.

2.2.3 Under the Environment Act 1995 the UK Government and the devolved administrations are required to produce a national Air Quality Strategy (AQS). This was last reviewed and published

in 2007[2]. The UK AQS sets out air quality objectives (AQOs) and policy options to improve air quality within the UK. The strategy sets AQOs for specific pollutants deemed to pose a risk for human health or other receptors, a number of which are derived from the EU limit and target values, although requirements for compliance vary. The UK AQS includes more exacting AQOs for some pollutants than those required by EU legislation.

2.2.4 Existing UK policy and legislation relating to $PM_{2.5}$ acknowledges the fact that there are no clear concentrations of particulate matter below which health effects do not occur. However, the approach is to reduce the overall exposure of the population to $PM_{2.5}$ rather than aiming at reducing concentrations at 'hot-spots'. The expectation is that the objectives and limit values for PM_{10} that drive policies to reduce PM concentrations in hot-spots will also help to reduce $PM_{2.5}$ in these locations.

2.2.5 Part IV of the Environment Act 1995 imposes a duty on local authorities in the UK to review existing and projected air quality in their area. Any location likely to exceed the UK AQOs must be declared an Air Quality Management Area (AQMA) and an Action Plan prepared and implemented, with the aim of achieving the objectives. This process is referred to as **Local Air Quality Management** (LAQM). The LAQM process is supported by national statutory policy[3] and technical guidance[4] provided by Defra.

2.2.6 The standards and objectives relevant to the LAQM framework are prescribed through the Air Quality (England) Regulations (2000) and Air Quality (England)(Amendments) Regulations 2002.

2.2.7 The air quality objectives and limit values currently applicable to the UK can therefore be split into two groups. Each has a different legal status and is therefore handled differently within the framework of UK air quality policy. These are:

- UK AQOs set down in regulations for the purposes of local air quality management; and,
- European Union (EU) AAD limit values transposed into UK legislation for which compliance is mandatory.

2.2.8 The applicable EU limits and target values and UK AQOs relevant to the Site and Proposed Development with regards to the protection of human health, referred to in this report as Air Quality Assessment levels (AQALs), are summarised in Table 2.1 below:

[2] Defra (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007
[3] Defra, Local Air Quality Management, Policy Guidance (PG16), April 2016
[4] Defra, Local Air Quality Management, Technical Guidance (TG16), February 2018

Table 2.1: Air Quality Objectives, Standards and Target Values

pollutant	AQAL	Averaging period	Source
NO_2	40 µg/m^3	annual mean	AAD Limit Value / AQO
	200 µg/m^3	hourly mean, not to be exceeded more than 18 times per annum	AAD Limit Value / AQO
PM_{10}	40 µg/m^3	annual mean	AAD Limit Value / AQO
	50 µg/m^3	24-hour mean, not to be exceeded more than 35 times per annum	AAD Limit Value / AQO
$PM_{2.5}$	25 µg/m^3	annual mean	AAD Limit Value / AQO[1]
	% reduction relative to average exposure indicator (AEI), dependant on initial concentration; to at least 10 µg/m^3	annual mean	AAD Limit Value / AQO[1]

1: standards not included within LAQM system

2.2.9 Statutory objectives, limit and / or target values for NO_2, PM_{10} and $PM_{2.5}$ are provided in the Air Quality Standards Regulations 2010 and Air Quality Strategy 2007, the 2010 Regulations imposing stricter standards on $PM_{2.5}$ than the Strategy. However, there are no regulatory standards for $PM_{2.5}$ within the LAQM system, and $PM_{2.5}$ is currently regulated at a national, rather than local, level. Local Authorities do not presently have an obligation to review and monitor $PM_{2.5}$ but are expected to work towards reducing $PM_{2.5}$ emissions and concentrations in their area as far as practicable.

2.2.10 For the purposes of the AQALs ambient air refers to the outdoor air and excludes workplaces where members of the pubic do not have regular access. Advice is given in Defra guidance4 as to where the UK AQOs should apply as summarised below; slightly different compliance requirements are provided for EU limit and target values:

Table 2.2: Summary of where the AQOs should apply

Averaging period	Locations where the objective should apply
Annual mean	All locations where members of the public might be regularly exposed; including facades of residential properties, schools, hospitals, care homes etc
24-hour mean and 8-hr mean	All locations where the annual mean objectives apply together with hotels and gardens of residential properties
1-hour mean	All locations where the annual mean, 24-hour and 8-hour means apply; also kerbside Sites, parts of car parks, bus stations and railway stations which are not fully enclosed and any outdoor locations where members of the public might reasonably be expected to spend 1 hour or longer
15-min mean	All locations where members of the public may be reasonably exposed for a period of 15 minutes

Note: the AQOs do not apply at building facades or other places of work where members of the public do not have regular access

Dust Standards and Control

2.2.11 Dust deposition may give rise to annoyance, disamenity or an acknowledged nuisance, through the unacceptable effects of emissions. Deposited dust as such is not regulated under the above requirements and there are no European or UK statutory standards or recommended levels in relation to dust deposition.

2.2.12 Public concerns relating to dust accumulation and soiling may be related to a range of factors including the nature of a site and locality and baseline levels. Nuisance may be alleged when the dust coverage on surfaces is visible in contrast with other cleaner areas, especially if it occurs regularly. Severe nuisance is likely to be alleged when dust is perceptible without reference to a clean surface.

2.2.13 Controls of soiling and annoyance impacts are typically achieved through conditions within planning permissions and / or Environmental Permits requiring the implementation of a dust management plan to prevent amenity impacts. In addition, deposited dust may also give rise to a 'nuisance', where statutory nuisance is defined and controlled in accordance with Part 3 of the Environmental Protection Act 1990 (EPA 1990) as amended. It is recognised however that a significant loss of amenity may occur at lower levels than would constitute a statutory nuisance.

Odour Standards and Control

2.2.14 The concentration at which an odour is just detectable to a typical human nose is referred to as the 'threshold concentration'. An odour concentration of 1 odour unit (ou_E/m^3) equates to the level at which 50% of a trained olfactometry panel can detect a faint odour, and is the point of detection. Typical odour concentrations can be described as:

1 ou_E/m^3: odour threshold,

3 ou_E/m^3: the point at which a smell is recognisable,

5 ou_E/m^3: noticeable, but faint, and

10 ou_E/m^3: a distinct smell.

2.2.15 The odour quality, hedonic tone (pleasantness or unpleasantness) and concentration can influence the potential for annoyance and perception leading to complaint. Hedonic tones may vary from +4 for very pleasant odours (e.g. bakeries) to -4 for foul ones (e.g. rotting flesh). However, even relatively pleasant odours may become objectionable, if not offensive, by virtue of persistence and intensity.

2.2.16 Once exposure to odour has occurred, it may lead to adverse effects such as disamenity, annoyance, nuisance and possibly complaints, where annoyance is an adverse effect arising from an immediate exposure and nuisance is caused cumulatively by repeated events of annoyance. Nuisance is also a term in law such as Statutory Nuisance as defined in the Environmental Protection Act 1990. Loss of amenity, or disamenity, does not equate to nuisance and it is accepted that significant loss of amenity can occur at lower levels of emission that would constitute a statutory nuisance.

2.2.17 There are no mandatory numerical standards in the UK for assessing odour levels, although some guideline values can be used for assessing potential odour impacts. Although odours can be due to a single chemical, they are typically due to a complex mixture of compounds making reliable 'chemical' analysis or measurement at source difficult. As such, there is no single method for reliably measuring or assessing odour pollution, and the potential for an odour disamenity or nuisance, and any conclusion, is best based on a number of pieces of evidence.

2.2.18 The potential for an odour impact, and magnitude of resulting effect, will be dependent on a number of factors including:

- Likely magnitude of odour emissions (source strength);
- Likely meteorological conditions at a site;
- Sensitivity of the receptors;
- Frequency: how often a receptor / individual is exposed to odour; and
- Offensiveness: type of odour, as some odours are generally regarded as more unpleasant than others.

2.3 Pollution Control – Environmental Permits

2.3.1 A wide range of industrial, waste and agricultural installations require an Environment Permit to operate under the Environmental Permitting (England and Wales) Regulations 2010 (EPR), and subsequent amendments. The aim of the permitting system is to prevent, and where that is not practicable reduce, emissions to air, water and land by potentially polluting and other installations. Permits are issued by either the Environment Agency or the Local Authority dependant on the nature and size of the facility.

2.3.2 Premises that are controlled under a Permit are required to operate in such a way that a) all the appropriate preventative measures are taken against pollution, in particular through the application of the best available technique; and b) no significant pollution is caused.

2.3.3 EA guidance[5] regarding developments requiring both a planning permission application and environmental permit application clarifies that when deciding on a planning application the authorities should a) be confident that the development will not result in unacceptable risks from pollution when considering if the development is an appropriate use of the land and b) not focus on controlling pollution where it can be controlled by other pollution regulations, such as EPR.

2.3.4 The Proposed Development will be subject to controls under an Environmental Permit, and any variation as required. Guidance is provided by the EA in controlling and monitoring emissions from permitted activities in relation to odour and dust[6].

2.4 Planning Policy

National Planning Policy and Guidance

2.4.1 The **National Planning Policy Framework (NPPF)[7]** sets out the Government's planning policies for England and how these are expected to be applied. The Framework provides some guidance to local authorities on taking air pollution into account in planning policies and decisions. Paragraph 170 of the Framework states: *"Planning policies and decisions should contribute to and enhance the natural and local environment by […] preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality."*

2.4.2 The Framework further states in paragraph 180 that: *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects*

[5] Environment Agency (EA), Guidelines for developments requiring planning permission and environmental permits (England), 9th October 2013
[6] https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit
[7] Ministry of Housing, Communities and Local Government (2018). National Planning Policy Framework

(including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."

2.4.3 More specific guidance regarding air quality is provided in paragraph 181, which states: *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

2.4.4 Of note the different roles of a planning authority and a pollution control authority are addressed by the NPPF in paragraph 183: *"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."*

2.4.5 Further guidance is provided in the national **Planning Practice Guidance regarding Air Quality (nPPG-AQ)**[8] which provides guiding principles on how planning can take account of the impact of new development on air quality. The guidance states that: *"the level of air quality assessment should be proportionate to the nature and scale of the development and level of concern about air quality and that each assessment is locationally specific."*

2.4.6 No further specific guidance is currently provided in the NPPF or the supporting technical guidance. In assessing the risks posed to, or by, new development, reference is therefore also made to non-statutory guidance issued by IAQM, as detailed below.

2.5 Local Planning Policy

2.5.1 CEC adopted the **Local Plan Strategy 2010-2030**[9] on 27th July 2017. The document forms the basis for planning strategy and development in the borough. Policy SE 12 'Pollution, Land Contamination and Land Instability' specifically mentions air quality. The policy states:

[8] Ministry of Housing, Communities and Local Government (2014). Planning Practice Guidance: Air Quality.
[9] Cheshire East Council, Local Plan Strategy 2010 – 2030, Adopted 27 July 2017

*'1. The council will seek to ensure all development is located and designed so as not to result in a harmful or cumulative impact upon **air quality**, surface water and groundwater, noise, smell, **dust**, vibration, soil contamination, light pollution or any other pollution which would unacceptably affect the natural and built environment, or detrimentally affect amenity or cause harm. Developers will be expected to minimise and mitigate the effects of possible pollution arising from the development itself, or as a result of the development (including additional traffic) during both the construction and the life of the development. Where adequate mitigation cannot be provided, development will not normally be permitted.*

*2. Development for new housing or other environmentally sensitive development will not normally be permitted where existing **air pollution**, soil contamination, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against.*

3. Development should support improvements to air quality, not contradict the Air Quality Strategy or Air Quality Action Plan and seek to promote sustainable transport policies.'

2.5.2 CEC issued an Air Quality Action Plan (AQAP)[10] in 2011 following Local Government reorganisation within Cheshire. The purpose of the AQAP is to replace the previous Congleton, Crewe and Nantwich AQAPs and to incorporate new actions as a result of new AQMA declarations. The action plan outlines a range of potential initiatives to help reduce, in particular, nitrogen dioxide levels within the declared AQMAs across the Borough. In relation to new development, AQAP planned action DC5 is to:

'Seek to enable appropriate new development supporting appropriate sustainable transport initiatives mitigating potential impact of development proposals'.

2.5.3 The 2011 AQAP was to be reviewed in 2018 to take into account changes in local air quality and AQMAs within the Borough[11]. At the time of the preparation of this report, this review had not yet been completed by CEC.

2.5.4 CEC is understood to have adopted a Low Emissions Strategy (LES) which is in the process of being adopted[11]. The LES aims to reduce emissions from new developments by clearly identifying measures which can be implemented to minimise additional burden from transport.

[10] Cheshire East Council (CEC), Air Quality Action Plan (AQAP), Appendix July 2011
[11] Cheshire East Council (CEC), 2017 *Air Quality Annual Status Report (ASR),* July 2017 (dated December 2017)

2.5.5 CEC also provides Air Quality and Planning Guidance[12] on its website regarding air quality as a material planning consideration taken into account as part of the planning decision process. The guidance includes an indication of when an Air Quality Assessment may be required, types of modelling, and assessment content. The guidance recommends that developers follow the methodology laid out in IAQM guidance[13].

2.6 National Best Practice and Guidance

2.6.1 The IAQM **Planning for Air Quality**[13] document provides specific non-statutory guidance on air quality and the planning system for new development. The guidance primarily focuses on vehicle exhaust emissions and provides indicative criteria in relation to changes in vehicle movements that would indicate the need for detailed assessment with regards to exhaust emissions.

2.6.2 The IAQM **Guidance on the Assessment of Odour for Planning**[14] provides non-statutory guidance applicable to the assessment of odours specifically for planning purposes. The guidance outlines approaches for carrying out odour assessments and details information that should contained in such an assessment report.

2.6.3 Further guidance is provided on the government website[15] on assessment of nuisance odour. Previously guidance was provided to Local Authorities through Defra's **Odour Guidance for Local Authorities**[16]. Although withdrawn on 15th September 2017 the guidance was primarily aimed at supporting local authorities in their regulatory duties in preventing, regulating and controlling odours, and still contains relevant information. Separate guidance is also provided by the Environment Agency to holders / potential holders of Environmental Permits on assessing, measuring and monitoring odours and recommended control measures[17] (referred to as the **EA H4 guidance**).

2.6.4 The IAQM **Guidance on the Assessment of Mineral Dust Impacts for Planning**[18] document provides specific non-statutory guidance on dust assessments on mineral sites. Although not specifically provided for waste management sites the guidance contains elements of relevance with regards to a recommended methodology for carrying out dust impact assessments and determining the significance of impacts and effects and the provision of mitigation measures.

[12] Cheshire East Council, *Air Quality and Planning*. Accessed 31.01.19, http://www.cheshireeast.gov.uk/environment/environmental_health/local_air_quality/air_quality_and_planning
[13] Moorcroft and Barrowcliffe et al (2017), *Land-use Planning & Development Control: Planning for Air Quality.* v1.2. Institute of Air Quality Management, London
[14] Bull et al (2014), *Guidance on the assessment of odour for planning.* Institute of Air Quality Management, London
[15] Defra (2015), *Guidance: Nuisance smells: how councils deal with complaints*. Available at: https://www.gov.uk/guidance/nuisance-smells-how-councils-deal-with-complaints. Accessed 31.01.19
[16] Defra (2010). *Odour Guidance for Local Authorities*. Viewed at: https://www.gov.uk/government/publications/odour-guidance-for-local-authorities Accessed 31.01.19
[17] Environment Agency (EA), How to Comply with your Environmental Permit, Additional Guidance for H4 Odour Management, March 2011
[18] IAQM (2016). *Guidance on the Assessment of Mineral Dust Impacts for Planning.* v1.1. Institute of Air Quality Management, London

2.6.5 The IAQM **Guidance on the Assessment of Dust from Demolition and Construction**[19] has produced supplementary planning guidance on the control of dust and emissions from construction and demolition. Parts of this guidance may also be applied to waste management sites, where these present similar risks.

[19] Holman et al (2014). *Guidance on the assessment of dust from demolition and construction*. Institute of Air Quality Management, London

3 Assessment Methodology

3.1 Scope of the Assessment

3.1.1 The principal aspects identified as requiring consideration during the assessment are:

- **dust emissions**: disamenity dust and fine particulate matter (PM_{10}) arising from site activities during site preparation and the processing, handling and transportation of soils;
- **vehicle exhaust emissions**: nitrogen oxides (NO_x) and particulate matter (PM_{10} / $PM_{2.5}$) arising from vehicles travelling to and from the Site and from on-site non-road mobile machinery (NRMM);
- **aerial emissions**: emissions of VOCs from the operational processing and treatment of soils;
- **odour**: emissions of odour arising from the operational processing and treatment of soils.

3.1.2 In undertaking the air quality assessment the following has been undertaken:

- site visit to view the Site, current landfill operations and surrounding environs;
- review of Proposed Development information including layout, proposed activities and operational traffic movements;
- review of baseline air quality and local weather conditions;
- review of information for the existing landfill operations including landfill dust monitoring data, complaints log and other relevant information;
- review of existing and future expected vehicle movements and routing options and screening assessment of vehicle emissions;
- qualitative assessment of dust, particulate matter (PM_{10}) and potential odour arising from soil handling and treatment and the air treatment process;
- provision of recommendations for additional mitigation measures if necessary and assessment of residual effects.

3.1.3 A site visit was undertaken by F Hartley, SGP Consultant, accompanied by C Shaw, Site Business Manager, on 5th February 2019. The weather conditions were 8/8 cloud cover, a moderate southerly breeze and a recorded temperature of 5˚C. A photographic record is provided in Appendix A.

3.2 Surveys and Information Sources

3.2.1 The baseline data has been gathered through a desk top study and the site visit. Adequate background information is considered available to inform the assessment and additional survey and monitoring work has not been undertaken. In undertaking the assessment reference has been made to the following sources of information:

Table 3.1: Information Sources

Date and Reference	Author and Source	Purpose and Content
Background and Topographical Information		
Promap	Ordnance Survey	general mapping information including topographic data, ground features, rights of ways, communications etc
Aerial satellite imagery	Aerial photography (various)	site setting
www.magic.gov.uk	Multi-agency	web-based interactive map containing information on nature conservation areas
Air Quality Information		
2013–2017 bias adjusted monitoring data	CEC	update of local authority air quality monitoring and assessment
2017 Air Quality Annual Status Report for Cheshire East Council, July 2017	CEC	update of local authority air quality monitoring and assessment
www.uk-air.defra.gov.uk/aqma	Defra	details and maps of AQMAs throughout UK
www.laqm.defra.gov.uk	Defra	Local Authority air quality management support; background pollutant maps
http://uk-air.defra.gov.uk/data/gis-mapping	Defra	Defra PCM (Pollution Climate Mapping Model) data including background and roadside pollutant concentrations

3.3 In addition, the existing Environmental Permit, complaints log, compliance reports and dust monitoring data have been reviewed.

3.4 Assessment Methodologies

3.4.1 The assessment of potential pollutant impacts uses the source-pathway-receptor concepts and considers the potential magnitude of a release (the source potential), the effectiveness of the pathway (i.e. dispersion of a pollutant towards a receptor), and the sensitivity of the receptor.

3.4.2 The assessment therefore considers the location of the Site, associated activities and haulage routes in relation to sensitive receptors and the control measures to be implemented, to assess the probability of significant adverse air quality impacts occurring during normal operations. Consideration is made of the orientation and distance of receptors to the Site and the prevailing weather conditions.

3.4.3 The odour and dust assessments have been undertaken with reference to the IAQM guidance on planning and odours[14], mineral extraction[18] and construction dust[19].

3.4.4 The requirement for detailed assessment of impacts associated with vehicle exhaust emissions has been considered through reference to the IAQM guidance on air quality and planning[13]. The screening assessment determined that further detailed assessment with respect to the impacts of vehicle movements was not necessary as detailed below in Section 8.

3.4.5 Receptors considered in this assessment comprise human receptors, that is locations where a person or property may experience adverse impacts of odours, airborne dust or exposure to ambient pollutions (i.e. residential, leisure, amenity and sensitive commercial use), and ecological receptors where this refers to any sensitive habitat that may be affected by dust soiling or increased ambient pollution (e.g. locations with an international, national or local designation and sensitive habitat features). The sensitivity of the receptors to potential impacts from aerial emissions, whether changes in pollutant concentrations, odours or dust soiling, has been determined as detailed in the relevant guidance as described.

3.4.6 Further details on the selection of receptors and the methodology of each aspect of the assessment as detailed in the relevant guidance is described in Appendix B.

3.5 Scoped Out Matters

3.5.1 The operation of on-site plant and machinery (non-road mobile machinery (NRMM)) during the operations will give rise to vehicle exhaust and combustion plant emissions. However, given the these are typically considered unlikely to give rise to significant impacts on local air quality and given the small number of operational plant proposed further consideration has been scoped out of this assessment.

4 Current and Proposed Development

4.1 Current Landfill Conditions

4.1.1 Maw Green Landfill is currently accepting waste and filling a final landfill cell located to the north of the application Site. The operational life of the landfill was extended to 31st December 2027 under planning permission 14/5489W (granted on 1st September 2016), with restoration to be complete by 31st December 2028.

4.1.2 The landfill currently has consent for 400 2-way vehicle trips (200 in / 200 out) per day until 2028. It is estimated that the landfill is currently only operating at about 40 2-way vehicle trips per day.

4.1.3 Access and egress to the landfill is via the access road off Maw Green to the south/southwest. The current access road to the site office and weighbridge is tarmacked, as is the road to the Site for the proposed operations. Loaded haulage HGVs enter via the site office and weighbridge and then proceed to the tipping area of the landfill. The HGVs return to the weighbridge before leaving the site.

4.1.4 All movements associated with the landfill and associated activities are routed to turn left into and right out of the Landfill site along Maw Green Road, to/from the junction with Sydney Road. Vehicles do not travel along Maw Green Road to the east of the access road turning.

4.1.5 Information is not available on the wider routing but it is presumed vehicles are distributed via either Sydney Road to the A534 or Remer Street / North Street / Bradfield Road to the A530, depending on the ultimate origin / destination of travel.

4.2 Proposed Operations

4.2.1 Proposals are for the installation of a bioremediation Soil Treatment Facility (STF) and associated activities. The STF is to operate continuously. It will be capable of treating up to a maximum of 50,000 tonnes per annum of hazardous and non-hazardous soils.

4.2.2 It is assumed the site will operate for 305 working days a year, with 3 staff members. On the basis of a maximum of 50,000 tonnes per annum of soil being processed at the STF, it is expected that soils will be delivered in 20t loads and therefore that there will be an average of 8 HGV deliveries each working day.

4.2.3 The soils to be accepted are to be used in the restoration scheme for the Maw Green Landfill (expected to be primarily soils, stones, dredging materials, and waste materials from non-metal mineral excavation and processing).

4.2.4 It is expected that there will be some residual waste not suitable for use on site in the restoration scheme resulting from the waste treatment processes, estimated at 1,500 tonnes per annum, which will require removal off site for disposal.

4.2.5 The main aspects of the proposed development therefore are:

- installation of bioremediation soil treatment facility, including soil screener, picking station, piling pad, transfer pumps, air-water separator, water settlement tank and biofilter;
- stockpiling of untreated and treated soils;
- erection of site offices and welfare facilities, and tool and equipment stores.

Treatment Process Description

4.2.6 Hazardous and non-hazardous soils would be received / stockpiled in a reception area at the Site and subject to compliance testing prior to formal acceptance. The facility would be limited to only accepting wastes capable of being treated to a point where they can be used in the restoration scheme for the landfill.

4.2.7 Accepted soils would be physically screened in a mechanical screener and via a manual picking station to remove oversize fractions or hazardous constituents.

4.2.8 Soils to be treated would be piled on a treatment pad. Typically soils would be treated over an 8-16 week period, with material being turned typically once every 4-8 weeks. Excavators would be used for loading/unloading and turning activities.

4.2.9 The soils would be subject to moisture controls and the addition of suitable materials (such as soil nutrients) and forced aeration and extraction to encourage micro-organism growth and thus breakdown of any contaminating components (e.g. hydrocarbons, organics etc).

4.2.10 Water and air used in and resulting from the treatment process would enter extraction pipes and pass through an air-water separation tank. Waste water is then passed through a settlement tank and removed via the foul sewer. The air is passed through a vacuum aeration system and an air treatment system, in the form of a biofilter, before being discharged to air.

4.2.11 The biofilter would be in the order of 30m x 2m x 1.5m and would utilise shredded greenwaste or compost with a small amount of contaminated soil as the media. All extracted air from the biopiles would be passed through the biofilter. Treated air would be vented direct to the atmosphere via a perforated cover.

4.2.12 The treated soils would primarily be used in the restoration of the landfill; any residual wastes not suitable for use on site would be transported offsite for disposal.

4.2.13 The bioremediation process will be subject to an Environmental Permit. This would either be through a variation to the existing Permit for the landfill or stand-alone separate Permit. A full list of the waste types to be accepted and the relevant EWC codes will be provided in the Environmental Permit. The Permit would also include requirements for management of the operations, acceptance of the soils, and the monitoring of emissions from the biofilter.

Proposed Equipment

4.2.14 The equipment and facilities to be used for the proposed operations are:

- Electric blower in acoustically insulated container;
- Air water separator installed below ground;
- Main collection pipework and secondary undersoil extraction pipework;
- Electrical control panels and transfer pumps in 10ft shipping container;
- Primary water settlement tank (approximately 60m^3) located in bund;
- Transfer tank and associated pumps located in bund;
- Sand filter located in bund;
- Granular activated carbon filter located in bund;
- Drainage gully and associated transfer pump;
- Biofilter;
- 360 excavators;
- 25t and 10t dump trucks;
- Picking station;
- Soil screener.

5 Site Setting and Baseline Conditions

5.1 General Site Setting

5.1.1 The Site is an irregularly shaped area located on the northern outskirts of Crewe north of Maw Green. The Site is located to the immediate south/southeast of the existing operational Maw Green Landfill Site. The Site is accessed via the road for the Landfill site, which connects to Maw Green Road to the southwest.

5.1.2 Site boundaries and immediate environs are:

Table 5.1: Site Boundaries and Immediate Environs

direction	boundary	neighbouring land
North	edge of hardstanding	Maw Green Landfill
East	edge of hardstanding / embankment	raised railway line
South	trees	undeveloped / Landfill operation buildings
West	trees / fencing / access road	Maw Green Landfill

5.1.3 The nearest residential receptors are at Brook House Farm 240m to the east and Meadow Cottage / Meadow Croft Cottage 210m to the southeast. There are also residential frontages along Maw Green Road to the southwest, including Cattle Arch Farm, along which operational traffic would travel to/from the Site.

5.1.4 There are no schools, hospitals or other such highly sensitive receptors within 500m of the Site boundary. The nearest school is Monks Coppenhall Primary school 630m to the west.

5.2 Nature Conservation Sites

5.2.1 The following designated nature conservation sites have been identified within a 2km radius of the Site.

Table 5.2: Nearby Nature Conservation Sites

Name	Designation	Distance and Orientation
Sandbach Flashes	SSSI	645m northeast

5.3 Air Quality Review

5.3.1 Reference has been made to the reports prepared by CEC in fulfilment under the LAQM reporting requirements, including CEC's 2017 Annual Status Report (ASR), which summarises air quality monitoring undertaken by CEC up to the end of 2016. Reference has also been made to the most recent data provided by CEC on their website summarising monitoring results from 2013 to

the end of 2017[20] and summarising ongoing monitoring throughout 2018 and 2019 as detailed in Section 5.5.5 below.

5.3.2 As part of the LAQM process CEC has declared 17 AQMAs throughout the Borough; these have all been declared due to traffic related NO_2 emissions. Of these, details of those declared within Crewe are provided below.

Table 5.3: Nearby AQMAs

Name	Distance and Orientation from Site	Comment
Earle Street, Crewe	1.8km southwest	
Wistaston Road, Crewe	2.6km southwest	
Nantwich Road, Crewe	2.8km southwest	

5.4 Background Air Quality Data

5.4.1 The Defra website provides predicted background air quality data for certain pollutants for 1km x 1km grid squares across the UK. The predicted data is based on 2015 ambient monitoring and meteorological data and incorporate revised information on the age and distribution of vehicles and emission factors. Predicted data is provided by Defra for each year from 2015 to 2030.

5.4.2 Predicted background concentrations of particulate matter and nitrogen oxides for the grid squares in which the Site, the Landfill, the nearest receptors and the immediate key associated transport routes are located for the current year (2019) are summarised in the following table.

Table 5.4: Predicted Background Air Quality Data - 2019

Grid Square	Location	Annual Mean Pollutant Concentration (µg/m^3)			
		PM_{10}	$PM_{2.5}$	NO_x	NO_2
371500, 357500	Site, landfill, nearest receptors	12.01	7.92	17.04	12.43
371500, 356500	Crewe	11.52	7.66	14.93	11.08

Note 1: Data downloaded on 30 January 2019, data released on 13 November 2017

5.4.3 The average background PM_{10} concentration for the grid square in which the Site and nearest receptors is located is predicted to be substantially below the AQO at 30% of the objective in 2019. Background NO_2 concentrations are also lower than the AQO at 43%.

5.4.4 It should be noted that the data are effectively an average concentration across each 1 km square. The pollutant concentrations will therefore be higher close to any significant source, such as main roads, junctions and concentrated habitation. In this case the landfill may contribute emissions of dust to the local ambient air.

[20] CEC (2019) Air Pollution Monitoring. Available at: https://www.cheshireeast.gov.uk/environment/environmental_health/local_air_quality/what_is_pollution_like_near_me/air-pollution-monitoring.aspx

5.5 PCM (Pollution Climate Model) Data

5.5.1 Reference was made to the PCM data provided by Defra for UK background and roadside NO_2 and PM_{10} concentrations for 2017. The data is derived from the modelled air quality data derived to inform the UK's annual assessment of compliance with the EU air quality directives.

5.5.2 Background NO_2 concentrations in the area encompassing the Site and wider area were predicted to be in the 10–20 µg/m^3 band. Roadside concentrations along the main roads in the centre of Crewe to the south and southwest were variably predicted to be in the 10–20 µg/m^3 and 20–30 µg/m^3 range. These roads are the closest to the Site to be included in the mapping.

5.5.3 Background PM_{10} concentrations in the area encompassing the Site and Crewe were predicted to be in the <13 µg/m^3 band. Roadside concentrations along the main roads in the centre of Crewe were variably predicted to be in the <13 µg/m^3 and 13–17 µg/m^3 bands.

5.6 Monitored Air Quality

Continuous Monitoring

5.6.1 There are two real-time continuous NO_2 monitoring stations within the CEC administrative area, one in Mere and one in Disley. These are both distant from the Site and immediate associated road network and are not considered to provide information applicable to the Site and assessment.

Diffusion Tube Monitoring

5.6.2 CEC operates a network of diffusion tubes for monitoring NO_2 concentrations across the Borough, which includes several tubes within each Crewe AQMA. No tubes are located within a 1km radius of the Site, however details of the closest tube at North Street that may have relevance to this assessment are provided below. The historical location of diffusion tube monitoring on North Street is also included.

Table 5.5: Details of Diffusion Tubes

Site ID	Location	Grid Ref.	Distance to Site	Type[1]	Within AQMA?
CE307	8 North Street	370568 357254	1.2km	Roadside	No
CE238	33/35 North Street	370485 357285	1.3km	Roadside	No

1: as defined in Defra LAQM guidance

5.6.3 Monitoring ceased at location CE238 at the end of 2017 as the location was consistently below the AQO. The monitoring location was moved to CE307 for 2018. Annual NO_2 concentrations for 2013-2017 at the historical monitoring location CE238 on North Street are as detailed below:

Table 5.6: Diffusion Tube Monitoring – Annual Mean NO_2 Concentrations

Monitor	Annual Mean (µg/m^3) *(bias adjusted) (distance corrected)*				
	2013	**2014**	**2015**	**2016**	**2017**
CE238	27.93	26.33	24.09	26.65	22.23

1: Data provided by CEC on website; updated November 2018

5.6.4 Bias adjustment has been applied by CEC to all measured results. Distance correction calculations were also undertaken by CEC to estimate concentrations at relevant receptors.

5.6.5 Raw monthly monitoring data for CE307 throughout 2018 is available on the CEC website[21]. As of the time of the preparation of this report, an annual average for 2018 was not available, however the raw results over January–November reported an exceedance of the annual objective in January 2018 at CE307. Raw concentrations were also close to the objective in February 2018 and November 2018.

5.7 Industrial Emissions and Other Emission Sources

5.7.1 Only the landfill has been identified as a permitted activity within a 1km vicinity of the Site. Details are provided below:

Table 5.7: Permitted Sites

Name	Location	Permit	Description
3C Waste Limited	Maw Green Landfill, Maw Green Lane, Crewe, CW1 5MG	BS7722ID	Waste landfilling; >10 T/D with capacity >25,000 excluding inert waste Other waste disposal; non-hazardous waste >50T/D BY physico-chemical treatment Associated process

5.7.2 It is possible that agricultural activities in the surrounding area impact on the local air quality. No other potentially significant sources of aerial emissions have been identified in the vicinity of the Site that may affect the Proposed Development.

5.8 Wind Speed and Direction

5.8.1 The most important meteorological parameters governing the atmospheric dispersion of pollutants are:

- wind direction: determines the broad direction of the transport of the emission;
- wind speed: affects the ground levels concentrations by determining the initial dilution of pollutants emitted;

[21] Cheshire East Council, 2018 Monthly Diffusion Tube Data. Available at: https://opendata.cheshireeast.gov.uk/Environment/Air-Quality-2018-Nitrogen-Dioxide-NO2-Monthly-Diff/gkv7-vnd3/data. Accessed 31.01.19

- atmospheric stability: a measure of atmospheric turbulence and hence dispersion of pollutants.

5.8.2 The closest meteorological station for which data is available for the assessment is the Met Office station at Rostherne No.2, 27.5 km to the north of the Site. CEC recommend the use of Rostherne or Manchester Airport data for assessments in the Cheshire East area. Given the nature of the local topography and setting the use of data for Rostherne No.2 is considered appropriate for this assessment. Wind roses for the period of November 2012 (when Rostherne No.2 opened) to the end of January 2019 are attached at Appendix C.

5.8.3 The wind rose depicts percentage wind speeds and directions for the whole year. Data derived from the wind rose are summarised in the following table.

Table 5.7: Summary Wind Data, Rostherne No.2

Direction	Annual percentage occurrence (%)	
	All winds	Winds >10 knots
N	5.5	2.3
NE	4.7	2.3
E	9.4	4.0
SE	14.0	4.9
S	20.5	11.2
SW	14.7	8.0
W	16.0	10.7
NW	16.3	9.0
Calm	0.1	

Note: “All winds” % occurrence does not total 100 due to rounding

5.8.4 The data show that, as an annual average, winds blow from the westerly quarter (SW, W, NW) for 47% of the time and from the south and southeast for 20.5% and 14%, respectively.

5.8.5 Winds greater than 10 knots (5 m/s) blow from the south for 11.2% of the time annually, and for 27.7% of the time from the westerly quarter. Wind speeds in excess of 10 knots are important as the onset of potentially significant airborne dust emissions due to wind-raising of loose dry dusts from bare ground and stockpiles.

5.9 Complaints

5.9.1 Complaints received by Maw Green Landfill have related to odour rather than dust over the past three years (2016-2018). SGP has reviewed the complaints log for Maw Green Landfill since 30th January 2017. Odour complaints typically originate from the south of the site on days of where wind speed is low and wind direction is from the northerly sectors, where dispersion of odours if present would be expected to be low.

5.10 Landfill Dust Monitoring

5.10.1 Maw Green Landfill undertakes dust monitoring at 4 locations onsite using Frisbee dust gauges, to monitor compliance with the Environmental Permit. The dust monitoring results from the previous three years (2016–2018) have been reviewed. No exceedances of the deposited dust limit of 200 mg/m^2/day as specified in Table S3.6 of the Environmental Permit have been recorded for 2016–2018.

6 Assessment of Impacts: Dust

6.1 General Observations

6.1.1 Airborne dust occurs when fine particles are disturbed and loosened by physical activity such as loading, tipping and transport, or by an airstream passing over such materials. Dust is defined as having particles sizes in the range 1 to 75 µm. Wind speeds greater than 10 knots (~5 m/s) across loose fine materials can cause windblown dust emissions.

6.1.2 Light winds will transport fine particles already suspended in the atmosphere due to disturbance. In calm conditions, any raised dust tends to settle out in the vicinity of the source. In windier conditions, the dust may be carried for a greater distance before settling out. The distance the dust will be carried depends on the wind speed, the particle size, the topography of the site and its surroundings.

6.1.3 Large dust particles, greater than 30 µm, which constitute the greatest proportion of dust emitted from mineral workings will largely deposit within 100m of the source. Finer particles, which constitute a small proportion of the dust emitted from most operations, are only deposited slowly, although their concentrations decrease rapidly from the source due to dispersion and dilution.

6.2 Sources of Dust

6.2.1 The principal potential sources of airborne dust associated with the proposed STF activities will include:

- soils storage (e.g. stockpiles),
- loading and tipping (e.g. during delivery and during transfer to/from the piling pad)
- processing (screening),
- site haulage during delivery,
- road transport, and
- wind blow across bare ground and stockpiles.

6.2.2 During loading and tipping of material there is a risk of potentially significant dust emissions. However, these are likely to be short lived within any one locality. They are also unlikely to be significantly different in terms of potential dust generation compared to agricultural operations such as cultivation and harvesting on the surrounding agricultural land.

6.2.3 Haulage HGVs may result in localised dust emissions. Site haulage can be the greatest source of fugitive dust at sites, particularly over long-haul distances when vehicle speeds tend to be higher and there is an added requirement to maintain a smooth well-drained surface. Maintenance of the haul road surface and limitation of vehicle speeds as is currently undertaken by the landfill site will therefore be important in minimising dust emissions.

6.2.4 During dry windy conditions, visible windblown dust could be raised from areas such as soils storage stockpiles or the treatment pad, particularly where the materials are loose due to recent disturbance e.g. by traffic or other operations.

6.2.5 In summary, in the absence of mitigation measures, the principal dust sources have been identified as loading / tipping, haulage, and material handling including turning during the treatment process.

6.2.6 Other activities at the site are considered likely to be relatively minor and insignificant sources of dust.

6.3 Assessment of Impacts

6.3.1 The impact assessment takes into account existing measures on the Landfill site that will serve to provide in-design mitigation. These include the presence of trees to the south and east of the Site, the presence of a paved haul road from the Site access to the weighbridge and landfill access road and an established speed limit of 15 mph.

6.3.2 In addition, emissions of dust would be controlled under the Environmental Permit which will include conditions relating to emissions such as fugitive dust. The management of dust at the Site would continue to be undertaken in accordance with the FCC Integrated Management System (IMS) which outlines general requirements such as road sweeping, a speed limit, a dust suppression procedure as per the landfill's environmental permit and dust monitoring.

6.3.3 The approximate distance of selected representative receptors from the proposed STF area are summarised below with the approximate frequency at which winds will be blown from the soils placement area towards these receptors. The closest representative receptors to the Site are noted in the following table, together with their minimum distance and direction from the nearest source of dust emissions to the air and the presence of any screening between the receptor and the potential dust source:

Table 6.2: Representative Potentially Sensitive Receptors (in absence of mitigation)

Ref	Receptor	Type	Distance, orientation[1]	Existing screening	Wind Frequency (%)
R01	Brook House Farm	residential	240m, E	partial (embankment)	13.4
R02	Meadow Croft Cottage	residential	210m, SE	partial (embankment)	26.8
R03	Maw Green Road / Cattle Arch Farm	residential	20m, SSW	none	11.0
R04	The Barn House	residential	410m, SW	partial (trees)	8.6
R05	Shandon House Farm	residential	465m, W	none	10.7

Ref	Receptor	Type	Distance, orientation[1]	Existing screening	Wind Frequency (%)
R06	Acton House Farm	residential	670m, WNW	none	13.0
R07	Sandbach Flashes	ecological	645m, NW	partial (topography)	8.8

1: distance taken from Site boundary to receptor to nearest 5m except for R03 where distance is to road network used by haulage vehicles; orientation from Site to receptor

6.3.4 The identified receptors are shown on Drawing D01. All other potentially sensitive receptors are effectively subsumed by the locations identified above.

6.3.5 The assessment takes into account the presence of screening. In the absence of additional mitigation measures, the probability of dust being carried towards the key potentially sensitive receptors, and the probability of wind-raised dust being generated, based on the wind data for Rostherne, has been assessed in accordance with Appendix B. In practice, the probability of winds carrying dust may be reduced particularly outside the summer months, when rainfall can be typically expected to suppress fugitive dust emissions over more than one third of the time.

6.3.6 Full assessment details are provided in Appendix C. The potential risks of dust effects at the specific receptor locations are summarised below:

Table 6.3: Summary of Dust Soiling Effects at Specific Receptors

Ref	Source Dust Potential	Pathway Effectiveness[1]	Risk of Dust Exposure	Receptor Sensitivity	Likely Dust Effect[3]
R01	medium	ineffective	negligible	high	negligible
R02	medium	slightly effective	low	high	slight adverse
R03	medium	ineffective	negligible	high	negligible
R04	*negligible; >350m from source*				
R05	*negligible; >350m from source*				
R06	*negligible; >350m from source*				
R07	*negligible; >350m from source*				

1: takes into account distance and orientation to source and existing screening

6.3.7 The data indicate that the highest cumulative frequency of winds blowing towards the nearest sensitive properties to the proposed STF, Meadow Croft (R02), is about 26.8%. There is partial screening for these properties from the railway embankment resulting in a slightly effective pathway. There is a resulting low risk of dust impacts (exposure) at these properties with resulting potential *slight* adverse effects due to dust deposition without any use of specific dust control measures.

6.3.8 The cumulative frequency of winds blowing towards properties at Maw Green Road / Cattle Arch (R03) is about 11%. These properties are located in close physical proximity to the road (20m)

to be used by haulage vehicles. There is no screening for these properties from the road, resulting in a moderately effective pathway. There is a resulting low risk of dust impacts (exposure) at these properties with resulting potential *slight* adverse effects due to dust deposition without any use of specific dust control measures.

6.3.9 The risk of potential impacts is reduced at more distant residential receptors such as R04-R07, which are over 350m from the Site. The risk of dust impacts at all other receptors, including the ecological receptor Sandbach Flashes (R07), is therefore considered *negligible*.

6.3.10 The overall significance with regards to dust soiling effects is considered **not significant**.

6.4 Track Out

6.4.1 Factors determining the potential dust emission magnitude of vehicle track-out are vehicle size, numbers of vehicle movements and duration. As discussed in Section 8 only a small number of daily HGV movements are expected in associated with the proposed development. The site access road is surfaced. On this basis it is considered that there is a ***small*** dust emission magnitude associated with the proposals. In accordance with IAQM guidance[19], for sites of small risk track-out is considered up to 50m from the site access.

6.4.2 Vehicles leaving the Site would travel approximately 250m to the weighbridge and a further 220m to the site access junction with Maw Green Road. There are sensitive receptors as represented by R03 within 25m of the site access junction and on Maw Green Road these sensitive receptors are set back by less than 15m of the side of the road. The sensitivity of the area is considered to be low (1-10 high sensitivity receptors within 50m of the site access). Potential resulting effects are *negligible* and the overall impacts of track-out associated with the development are considered to be **not significant**.

6.5 PM_{10}

6.5.1 PM_{10} will make up a small proportion of any emitted dust. Although PM_{10} may travel distances of 1,000m or more, concentrations decrease rapidly on moving away from a source due to dispersion and dilution. Concentrations are expected to return to background concentrations within 400m of a surface mineral source. Given the proximity of residential properties to the Site further consideration has however been made of potential impacts associated with PM_{10}.

6.5.2 IAQM guidance[18] advises that where existing background ambient PM_{10} concentrations are less than 17 $\mu g/m^3$ there is little risk that additional contributions from mineral operations would lead to an exceedance of the long-term AQAL. Predicted background Defra PM_{10} concentrations for the locality are in the range of 11.52 to 12.01 $\mu g/m^3$ for 2019, less than 17 $\mu g/m^3$. Given the nature of the area and the local road network, it is considered these estimated concentrations are likely to be representative of concentrations at the nearby receptors.

6.5.3 On this basis, it is concluded that the proposed STF would not result in adverse impacts on local air quality due to PM_{10} emissions and it is not considered that further assessment of potential PM_{10} impacts is required. Proposed mitigation measures to manage fugitive dust emissions will similarly serve to reduce potential PM_{10} emissions and additional mitigation above those measures outlined below is not considered necessary.

7 Assessment of Impacts: Odour

7.1 Key Odour Sources

7.1.1 The receipt, handling and tipping of untreated and treated soils may give rise to odorous emissions. The generation of odour in waste and waste soils is primarily related to the releases of odorous volatile organic compounds. EA Sector Guidance[22] notes: *'The handling of any substance that is or may contains a VOC (or other odorous substances, for example, merceptans or other sulphur-containing compounds) will potentially lead to odour noticeable beyond the installation boundary, even at concentrations that that may be well below benchmark emission limit values (ELV). Odours may arise from storage, transfer or bulking up of wastes containing VOC or other odorous substances.'*

7.1.2 The potential sources of odours would be associated with any significant quantities of organic compounds that may be present within the untreated soils, such as:

- hydrocarbons;
- polycyclic aromatic hydrocarbons (PAHs);
- creosote;
- phenols;
- chlorinated solvents;
- other VOCs.

7.1.3 The presence of these materials would be limited to within the hazardous soils, which would only form a proportion of the total soils to be imported to the site.

7.1.4 The key potential odour sources associated with the proposed operations are therefore considered to be:

- loading / tipping and handling operations of untreated soils;
- storage of untreated soils;
- bioremediation treatment, especially during turning operations;
- dewatering / wastewater settlement tank;
- venting of air used in treatment process;
- removal of contaminated residues from treatment process.

7.1.5 The continuous extraction of air from the biopiles will serve to reduce the potential for odorous emissions from the soils themselves during storage and treatment. All extracted air from the biopiles is to be treated in a biofilter which would reduce potential odorous emissions.

[22] Environment Agency & Environment and Heritage Services (2004). Guidance for the Recovery and Disposal of Hazardous and Non-Hazardous Waste, Integrated Pollution Prevention and Control (IPPC), Sector Guidance Note IPPC S5.06, Issue 4

7.2 Assessment of Impacts

7.2.1 The management of odour at the Site would be undertaken in accordance with the FCC Integrated Management System (IMS) for the wider Landfill. In addition, the Environmental Permit would incorporate a condition to ensure potential odorous emissions from the site are reduced as far as practicable so they do not cause off-pollution, as perceived by the EA Officer. An Odour Management Plan (OMP) would be required for the operations.

7.2.2 Taking into account the maximum volume of potentially odorous soils to be treated and the operation of the biofilter, the overall Odour Source Potential is considered to be, at most, **medium**.

7.2.3 A representative selection of potentially sensitive receptors that have been identified within the vicinity of the Site are detailed below in Table 7.1 and shown on Drawing D01. The approximate distance from the Site and the approximate frequency at which winds will be blown from the proposed operations towards these receptors, based on the Rostherne No.2 windrose, are provided.

Table 7.1: Representative Potentially Sensitive Receptors (in absence of mitigation)

Ref	Receptor	Type	Distance, orientation[1]	Wind Frequency (%)
R01	Brook House Farm	residential	240m, E	13.4
R02	Meadow Croft Cottage	residential	210m, SE	26.8
R03	Maw Green Road / Cattle Arch Farm	residential	270m, SSW	11.0
R04	The Barn House	residential	410m, SW	8.6
R05	Shandon House Farm	residential	465m, W	10.7
R06	Acton House Farm	residential	670m, WNW	13.0
R07	Sandbach Flashes	ecological	645m, NW	8.8

1: distance taken from Site boundary to receptor to nearest 5m; orientation from Site to receptor

7.2.4 All other potentially sensitive receptors in the area are effectively subsumed by the above.

7.2.5 The potential risks of odour effects at the specific receptor locations are summarised below:

Table 7.2: Summary of Odour Effects at Specific Receptors

Ref	Source Odour Potential	Pathway Effectiveness	Risk of Odour Exposure[1]	Receptor Sensitivity	Likely Odour Effect[2]
R01	medium	slightly effective	negligible	high	negligible
R02	medium	moderately effective	low	high	slight adverse
R03	medium	ineffective	negligible	high	negligible
R04	medium	ineffective	negligible	high	negligible
R05	medium	ineffective	negligible	high	negligible

Ref	Source Odour Potential	Pathway Effectiveness	Risk of Odour Exposure[1]	Receptor Sensitivity	Likely Odour Effect[2]
R06	medium	slightly effective	negligible	high	negligible
R07	medium	ineffective	negligible	low	negligible

7.2.6 The data indicate that the highest cumulative frequency of winds blowing towards the nearest sensitive properties to the proposed STF, Meadow Croft (R02), is about 26.8% resulting in a moderately effective pathway of odour flux to these receptors. Given the medium odour source potential the operations may result in a low risk of odour impacts (exposure) at these properties with resulting potential *slight* adverse effects.

7.2.7 Effects at all other receptors are reduced due to distance from the proposed site and lower frequencies of winds blowing towards the receptors. The risks of odour impacts at all other receptors are considered *negligible*.

7.2.8 Taking into account the assessed effects the overall significance with regards to odour is considered to be **not significant**.

8 Assessment of Impacts: Other Considerations

8.1 Aerial VOC Emissions

8.1.1 The VOCs present within the soils could pose a risk to human health if released at certain concentrations as well as presenting an odour risk. However, the concentrations of any such VOCs released from the soils, including during handling and treatment, would be expected to be well below any such levels that may pose such a risk. The forced extraction of air through the biopiles and subsequent treatment through the biofilter will also serve to reduce such concentrations that may be emitted direct from the soils. Information provided by the technology provider indicates that 98% elimination of BTEX (benzene, toluene, ethylbenzene, and xylenes), TPH (total petroleum hydrocarbons) and PAHs (Polycyclic Aromatic Hydrocarbons) is expected to be achieved through the biofilter. Following release from the biofilter concentrations would be subject to atmospheric dispersion. Given the distance of the nearest sensitive human health receptor from the site (Meadow Croft Cottage at 220m distant), the risk of adverse impacts due to releases of such chemicals is considered to be *negligible*.

8.2 HGV Exhaust Emissions

8.2.1 IAQM guidance[8] provides indicative criteria for determining whether a detailed air quality assessment should be undertaken in relation to exhaust emissions arising from vehicle movements associated with a development. The criteria of relevance to this assessment are:

- development results in a change in HDV flows or more than 25 AADT (annual average daily traffic) and / or LDV flows more than 100 AADT, where within or adjacent to an AQMA and where relevant exposure is present;
- development results in a change in HDV flows of more than 100 AADT or a change of LDV flows of more than 500 AADT, where distant from an AQMA and where relevant exposure is present.

8.2.2 All HGV movements associated with the current landfill operations are routed right out / left in along Maw Green Road to Sydney Road. No changes to this routing are proposed for the STF operations.

8.2.3 Axis has advised that the landfill has consent for 200 vehicles in and 200 vehicles out per day under the existing planning consent (i.e. 400 2-way movements per day), although it is actually operating at approximately 40 2-way movements per day currently.

8.2.4 As much of the material to be imported to the Site for the Proposed Development is intended for use in the restoration of Maw Green Landfill (approximately 97%), the associated vehicle trips do not represent an increase in operational traffic.

8.2.5 On the basis of 305 working days per annum and a maximum of 50,000 tonnes per annum of soil to be delivered, it is assumed that 8 HGV deliveries of soil will be made per each working day, resulting in 16 2-way movements per working day. Potential AADT numbers will be lower than these movements when averaged across a full year. Based on the above it is considered highly unlikely that the IAQM screening criteria of a change in HDV flows of more than 100 AADT would be exceeded.

8.2.6 Furthermore, it is possible that instead of additional vehicle trips to remove the approximately 1,500 tonnes of treated soils unsuitable for use in landfill restoration, the materials will be backloaded on to the delivery HGVs or deposited within the Maw Green landfill itself, resulting in fewer additional vehicle trips on top of the delivery movements.

8.2.7 No specific issues of air quality concerns have been identified within the vicinity of the Site or along Maw Green Road. Movements associated with the current and existing operations on the local road network therefore fall substantially below the relevant IAQM screening criteria. Any Site related movements at the nearest AQMAs on roads in the centre of Crewe will be reduced to those detailed above due to distribution on the local road network to / from the Site, and are similarly expected to fall below the relevant IAQM screening criteria.

8.2.8 On this basis it is concluded that the HGV movements predicted at the Site in associated with the proposed development would not result in adverse impacts on local air quality. Further detailed assessment is deemed unnecessary and additional mitigation is not considered necessary.

9 Mitigation

9.1 Dust Control Methods

9.1.1 Additional mitigation measures will be employed to minimise potential impacts and the handling of soils will be conducted in accordance with best practice guidance[5]. The essence of the guidance is that dust emissions can be controlled by effective site management.

9.1.2 The measures will be detailed in a Dust Management Scheme (DMS) to be provided in advance of the commencement of operations. These measures are outlined below.

9.1.3 As an over-riding requirement, should winds carry visible dust towards any site boundary, and particularly to the south-eastern and southern boundaries in the direction of sensitive receptors, the operations giving rise to dust will be modified and suspended until more suitable conditions pertain, or until effective dust control measures are implemented.

9.1.4 General matters and the management of the site can affect the likelihood of significant dust emissions. These include:

- provision on site of a water bowser equipped with rain gun and adequate year-round water supply and dust suppression by regular spraying in dry conditions;
- use of clean water for dust suppression, to avoid re-circulating fine material;
- high standards of house-keeping to minimise track-out and windblown dust;
- a preventative maintenance programme, including readily available spares, to ensure the efficient operation of plant and equipment;
- minimisation of drop heights during tipping;
- clear delineation of stockpiles to deter vehicles from running over edges; and
- effective staff training in respect of the causes and prevention of dust.

9.1.5 Additional provisions in respect of plant and vehicle movements around the site that will be implemented include:

- inspection and maintenance of all trafficked surfaces;
- avoiding abrupt changes in horizontal and vertical alignment;
- regular compaction, grading and maintenance of haul routes and unsurfaced routes;
- setting an appropriate speed limit;
- fitting all site vehicles and plant with upswept exhausts and radiator fan shields where practical;
- even loading of vehicles to avoid spillages;
- sheeting of haulage loads;
- regular removal of spilled material from site routes.

9.1.6 A site logbook will be available on site. All activities with the potential to cause airborne dust emissions will be monitored at the start of operations and subsequently at least twice more throughout the working day, and observations recorded on a daily record form. This will include a visual assessment of any impacts at the site boundaries.

9.1.7 In the event that any visible dust emissions beyond the site boundary occur the Site Manager will investigate the cause and take appropriate action to remedy the cause. Similarly, should any complaints about dust be received, the Site Manager will investigate the cause and will take appropriate action to address any complaint that may be substantiated. A written record will be kept and the complainant advised within one week of the finding, and of any actions to be taken.

9.1.8 The dust management scheme will be reviewed as necessary, in the event of complaints, adverse climatic conditions and changes in site operations and processes.

9.1.9 All complaints would be logged and investigated by reference to the current conditions, observation logs and weather records. Where substantiated evidence for the STF as a source of odour is found, then further actions or modification to the working plans should be proposed and agreed with CEC and the EA.

9.2 Odour Control Methods

9.2.1 The above odour assessment takes into account the management measures required under the existing Maw Green Landfill Environmental Permit. Additional proposals include for the use of a biofilter to treat the extracted air from the biopiles, management and monitoring of which would be expected to be specified under the Environmental Permit for the proposals. Additional details are provided below to provide further information.

9.2.2 Responsibility for ensuring that the risk of nuisance and hazards arising from the Site are minimised would lie with the Site manager.

9.2.3 The minimisation of odour impacts as far as reasonably practicable will be achieved primarily by strict adherence to the conditions attached to the Environmental Permit for the site and in an Odour Management Plan (OMP) for the specific operations. In addition, the site will be operated in accordance with FCC's Environmental Management System.

9.2.4 Weather conditions, including wind strength and direction, will be routinely monitored and regular olfactory inspections will be undertaken of the site and at the site boundary. If necessary, in the event of potential off-site emissions, operating practices will be amended. In the event that odour is detected at the boundary additional monitoring will be undertaken at sensitive receptors.

9.2.5 In the event that odour is found to be causing a problem at the installation, as determined by off-site complaints or during routine on-site monitoring, the action plan will be instigated. In the event of a complaint or detection of a moderate odour investigative actions may include an olfactory survey, review of site activities at the time of the complaint and a review of weather conditions at the time of the complaint. Corrective actions will be determined as necessary dependant on the outcome of the investigation. Such actions may include review of incoming wastes, termination of acceptance of malodorous wastes, utilisation of odour masking sprays, audit of air / water extraction system and repairs as necessary to water extraction infrastructure. Daily records will be maintained.

9.2.6 Mitigation measures included to minimise the risk of adverse impacts from odours include strict waste acceptance procedures, use of forced air extraction thought the biopiles and subsequent treatment of extracted air in a biofilter.

9.2.7 The biofilter would be subject to routine inspections and monitoring, such as for pH, moisture content, particle size and nutrients, to ensure continuous optimal operation.

9.2.8 These measures would be outlined in the Odour Management Plan (OMP) to be agreed with the EA.

10 Conclusions

10.1 Proposals are for the installation of a Soil Treatment Facility and associated activities within the boundary of Maw Green Landfill, Crewe. The proposed site for the lies to the immediate south/southeast of the existing landfill.

10.2 The STF will capable of treating up to a maximum of 50,000 tonnes per annum of hazardous and non-hazardous soils. The soils to be accepted are to be primarily used in the restoration scheme for Maw Green Landfill (expected to primarily include soils, stones, dredging materials, and waste materials from non-metal mineral excavation and processing). It is estimated 1,500 tonnes per annum will be unsuitable for use in the restoration scheme and will require removal for disposal, though this may involve disposal within the landfill itself as waste.

10.3 Received soils will be stockpiled and subject to compliance analytical testing. If accepted, soils will be treated via bioremediation on a concrete pad. The soils are subject to moisture controls and the addition of suitable amendments (such as soil nutrients); aerobic conditions will be maintained as a result of the and vacuum aeration to encourage micro-organism growth and thus breakdown of hydrocarbon compounds (e.g. petrol, diesel, biodegradable organics etc.). The water and air used in and resulting from the treatment process would be passed through an air-water separation tank, with the waste water to be ultimately removed via the foul sewer and the air to be passed through a vacuum aeration system and an air treatment system, in the form of a biofilter, before being discharged. Once soils are treated they will be physically screened where required to ensure suitability for the restoration areas on the Maw Green landfill.

10.4 The operations would be controlled under an Environmental Permit issued by the Environment Agency; this would either be as a variation to the existing Permit held for the landfill or a separate stand-alone Permit.

10.5 The principal sources of fugitive dust have been identified as loading / tipping, haulage, and material handling. The proposed activities may give rise to potential slight adverse impacts in the absence of mitigation, due to dust deposition at nearby residential receptors, primarily Meadow Cottage, particularly in the event of dry conditions and strong winds.

10.6 The principal sources of odour have been identified as the soils handling throughout the treatment process, the waste wastewater settlement tank and the removal of contaminated residues from treatment process. The proposed activities may give rise to potential slight adverse impacts in the absence of mitigation due to odours at nearby residential receptors, primarily Meadow Cottage, particularly in still conditions with little dispersion.

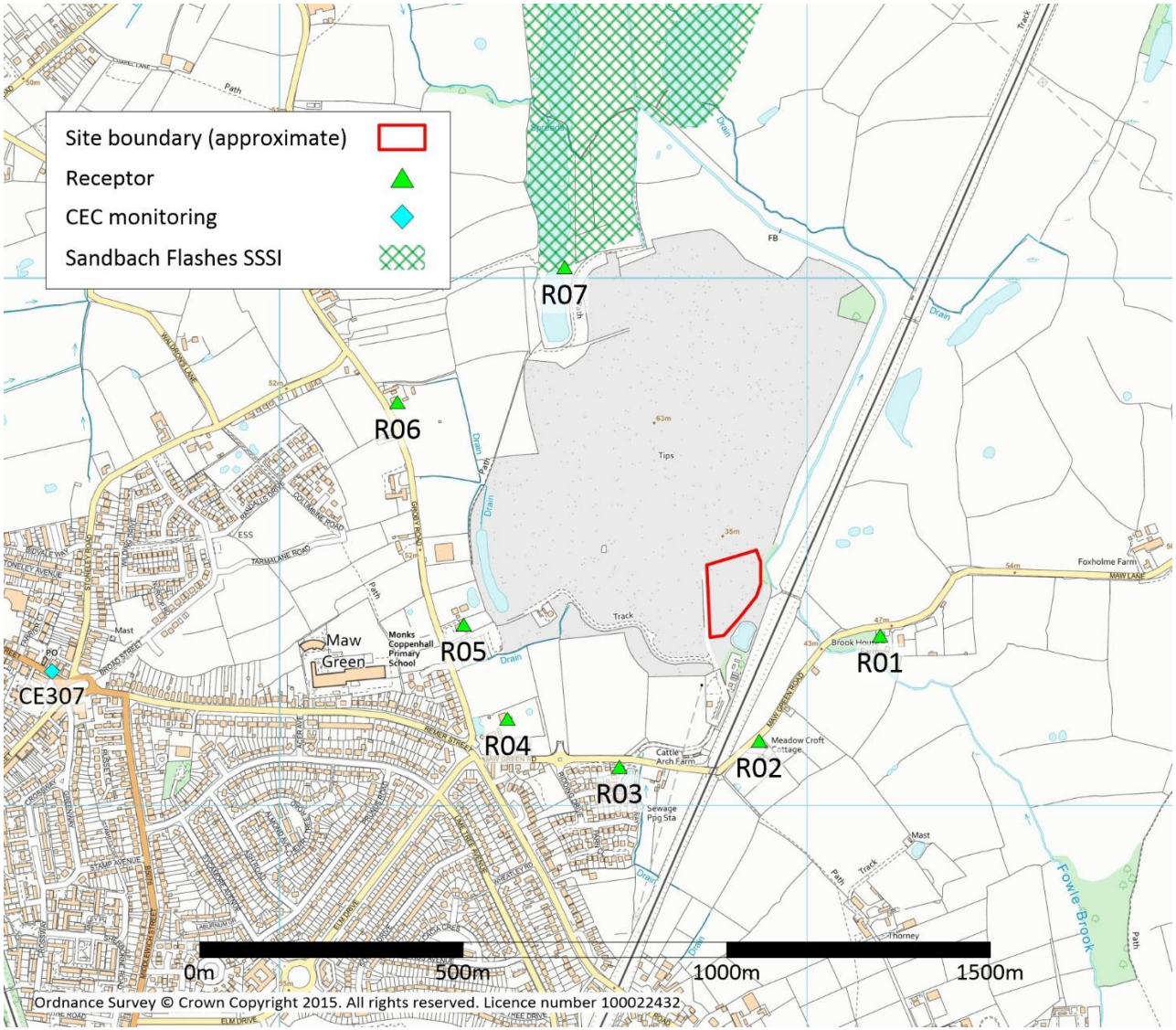
10.7 The potential risks associated with disamenity dust and odour can however be readily mitigated through the implementation of appropriate good working practices and strict adherence to the conditions attached to the Environmental Permit for the site. These would be implemented through a Dust Management Scheme (DMS) and an Odour Management Plan (OMP) as outlined above and which is expected to be a condition of any planning permission. Through the implementation of appropriate mitigation measures potential unacceptable impacts due to dust and odour have not been identified.

10.8 Potential risks to human health associated with the emissions of VOCs themselves from the soils are considered to be negligible and would be further mitigated through the air extraction and treatment system.

10.9 The current and predicted movements are below indicative criteria provided in guidance to indicate when an assessment of air quality impacts associated with exhaust emissions arising from vehicle movements should be undertaken. Potential adverse impacts at receptors due to the vehicle movements on the local access roads are considered to be negligible.

10.10 No unacceptable impacts and effects on human health, amenity or ecological receptors have been identified in association with the Proposed Development.

DRAWINGS



Drawing D01: Site Location, Nearby Features and Sensitive Receptors

APPENDIX A

PHOTOGRAPHIC RECORD

APPENDIX B

ASSESSMENT METHODOLOGIES

APPENDIX C

WIND ROSE, ROSTHERNE NO.2

Appendix 3

Trade Effluent Consent

WATER INDUSTRY ACT 1991

CONSENT TO THE DISCHARGE OF TRADE EFFLUENT

Whereas **Provectus Soils Management Ltd**

(hereinafter called "the Trader") whose Head Office or Registered Office is at

9 Kingsdale Business Centre, Regina Road, Chelmsford, Essex, CM1 1PE

Is the **occupier** of the trade premises at:

Maw Green Soil Treatment Centre
Maw Green Landfill Site
Maw Green, Crewe
Cheshire
CW1 5NG

and by the Duly made application dated **6 July 2021**

Have applied to UNITED UTILITIES WATER LIMITED (hereinafter called "the Company") for consent to discharge trade effluent from the said trade premises into the sewers.

Under the provisions of the above mentioned Act the discharge of trade effluent in accordance with the said application form would not be lawful without the consent of the Company.

NOW THEREFORE in exercise of the powers conferred upon them by the above Act the Company HEREBY CONSENT to the discharge of trade effluent by the Trader from the said premises into their sewers SUBJECT TO THE FOLLOWING CONDITIONS:

Nature of discharge

1a) Subject to the provisions of conditions 6,7,8 and 9 below the nature or composition of the trade effluent to be discharged under this Consent shall be solely as specified in the said application form and shall consist solely of waste water derived from **soil treatment - Bioremediation.**

1b) The trader shall give to the Company prior written notice of any change in the process or the process materials or any other circumstances likely to alter the constituents of the trade effluent as set out in condition 1(a). In such circumstances, no substance of which the Company has not had previous notice, may be discharged unless and until the Company has agreed to accept the substance at a limit imposed by the Company which shall then be deemed to be incorporated in this Consent by agreement and shall not prejudice the right of the Company to serve a Direction earlier than two years from the date of such incorporation.

The Trader shall also give not less than seven days written notice to the Company of any change in the name of the occupier or owner.

Sewer affected

2. The sewer into which the trade effluent may be discharged and the point of discharge is the foul sewer situate at **private pipeline leading to Groby Road (MH: 3201)**.

Connections

3. No connections shall be made to the said sewer without the prior approval of the Company and all such connections shall be constructed and maintained to the satisfaction of the Company at the expense of the Trader.

Maximum volume of discharge

4. The maximum amount of the trade effluent discharged in any one day of twenty four hours shall not exceed **20** m^3 without prior written consent of the Company.

Maximum rate of discharge

5. The highest rate at which the trade effluent may be discharged shall not exceed **2** litre/sec.

Matters to be eliminated prior to discharge to sewers

6. The following matters shall be eliminated from the trade effluent before it is discharged into the sewers of the Company:

a) petroleum spirit;

b) calcium carbide;

c) carbon disulphide;

d) except as provided in paragraph 7 hereof, the prescribed substances listed in Schedule 1 to The Trade Effluents (Prescribed Processes and Substances) Regulations 1989, as amended from time to time, insofar as they are in concentration greater than the background concentration (as defined in the said Regulations);

e) where the trade effluent derives from a prescribed process mentioned in Schedule 2 to the said Regulations, and except as provided in paragraph 7 hereof, asbestos (as defined in the said Regulations) and chloroform in concentration greater than the background concentration (as defined in the said Regulations);

f) organo-halogen compounds including pesticide residues and degreasing agents;

g) any substances which either alone or in combination with each other or with any other matter lawfully present in the said sewers would be likely to;

i) cause a nuisance or produce flammable, harmful or toxic vapours either in the sewers or at the sewage works of the Company;

ii) injure the sewers or interfere with the free flow of their contents or affect prejudicially the treatment and disposal of their contents or have injurious effects on the sewage treatment works to which it is conveyed or upon any treatment plant there;

iii) be dangerous to or cause injury to any person working in the sewers or at the sewage treatment works;

iv) affect prejudicially any watercourse, estuary or coastal water into which the treated effluent will eventually be discharged.

Matters to be limited prior to discharge to sewer

7. The trade effluent shall not contain

   a) Ammonia and its compounds as N in excess of 250 mg/l

   b) Cyanides and cyanogen compounds which produce hydrogen cyanide on acidification in excess of 1 mg/l

   c) Separable grease and oil in excess of 100mg/l

   d) Sulphates as SO_4 in excess of 1,000 mg/l

   e) Sulphides, hydrosulphides, polysulphides and substances producing hydrogen sulphide on acidification in excess of 1 mg/l

   f) Total suspended solids at pH 7.0 and dried at 110° C in excess of 1,000 mg/l

   g) Toxic metals in excess of 10,000 ug/l either individually or in total ie Antimony, Beryllium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Tin, Vanadium, Zinc;

Temperature

8. No trade effluent shall be discharged which has a temperature higher than 43.3°C (110°F).

pH value

9. No trade effluent shall be discharged having a pH of less than **6** or greater than **10**

Inspection Chamber

10. a) An inspection chamber or manhole shall be provided and maintained by the Trader in a suitable position in connection with each pipe through which the trade effluent is discharged and shall be so constructed and maintained as to enable a person readily to obtain at any time samples of the trade effluent so discharged, to the approval of the Company.

    b) There shall be provided, operated and maintained in working order by the Trader a meter in such a position and of such specification as shall be approved by UUWLtd such as will measure and provide a continuous record of the quantity and rate of discharge of any trade effluent being discharged from the premises into the said sewer and following the written request of UUWLtd to have the accuracy of the meter independently tested by an agreed body.

    c) If the measuring and recording apparatus as aforesaid ceases to function satisfactorily, then the Company shall have the right to make estimates of the volume and composition of the trade effluent until such time as the said apparatus is again operating to the satisfaction of the Company.

    d) Records shall be kept by the Trader of the volume, rate of discharge, nature and composition of the trade effluent discharged to the sewer, together with any records required to be kept by the Trader under the provisions of any Notice of Determination issued by the Secretary of State under Sections 120 and 132 of the Water Industry Act 1991. Such records shall be kept available for inspection at all reasonable times by an authorised officer of the Company and copies shall be sent to the Company on demand.

e) The foregoing provision of this condition shall be deemed to be complied with if other methods of sampling the trade effluent, determining its nature and composition, and measuring and recording the discharge are agreed and confirmed in writing by the Company.

Dated **09 September 2021**

Issuing Office
Wastewater Services
Lingley Mere Business Park
Lingley Green Avenue
Great Sankey
Warrington
WA5 3LP

Signed PP

WASTEWATER ASSET MANAGER
for and on behalf of United Utilities Water Limited

Your attention is drawn to Section 122 of the Water Industry Act 1991 which provides that any person aggrieved by any conditions attached to this Consent may appeal to the Director General of Water Services.

Caulmert
engineering environmental planning

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