AIR QUALITY MANAGEMENT PLAN

Introduction

This Air Quality Management Plan (AQMP) details the site specific monitoring and control procedures for the works at Horwich End, Whaleybridge.

Risk Assessment

A risk assessment of the potential occupational and environmental risks associated with the works is provided in Appendix A of the Environmental Monitoring Strategy.

Method and Justification for Location of Monitoring Points

There will be three total deposited dust monitors (Frisbee monitors) at the site with one located along each of the site boundaries to cover the east, west, north and south parts of the site. The location of these monitors is shown on drawing VHE/CONPLAN/001.

Each morning the Environmental Engineer will discuss with the Site Foreman the site activities that will be taking place that day, identifying those which have the greatest potential to give rise to significant dust, odour, gas and/or vapour emissions and the where they will be taking place that day. Taking this into account the Environmental Engineer will decide upon the monitoring point(s) for that day giving consideration to the location of the nearest or most sensitive receptor(s). Methodology as follows:

- The location of the sidekick pumps will target those site activities giving rise to significant emissions of dust (as determined within the risk assessment) and their subsequent location to receptors. The general methodology will be based on the wind conditions of each day. A sidekick pump will be placed on the downwind boundary of such works and where appropriate, should a sensitive receptor be located close to the works but not downwind, then a second sidekick pump will be placed within the vicinity of this receptor. Should a second sidekick pump not be required for point source monitoring, then the Environmental Engineer shall deem where is the most appropriate location for the monitor that day.
- The environmental monitoring PID (Mini Rae) will be used for the daily site walkover assessment and when not in use, will target those works where contaminated soils are being excavated, treated and/ or stockpiled. The monitor will be placed downwind along the site boundary at the closest point to the nearest and/ or most sensitive receptor.

- The occupational health monitoring PID (Toxi Rae) will be used whenever site personnel are working within the vicinity of the contaminated soils. The monitor will be carried by those deemed most at risk of exposure, specifically excavator drivers or banksmen working within tar/liquor tank areas and treatment areas. In the case of the excavator drivers the PID will be placed in the driver's cab within the operative's breathing zone and for the banksmen the PID will be attached to the lapel of their outer clothing.

The location of the monitors will be recorded within the Daily Environmental Monitoring Log (discussed below).

Monitoring Records and Reporting

The Environmental Engineer will be responsible for collating data on a daily and weekly basis. A Daily Environmental Monitoring Log will be completed each day as part of the site walkover. The Daily Environmental Monitoring Log for the site is provided in Appendix C of the EMS. Should any action need to be taken in response to incidents of elevated levels, this will be recorded here also.

All data logged within monitors will be downloaded daily and assessed against the appropriate limits to ensure that any exceedances are recognised quickly and mitigation measures can be actioned as appropriate.

Weekly reporting to the Supervisor will be carried out and will contain as a minimum:

- Details of the time and date of each monitoring event,
- Details of the person undertaking the assessment,
- Details of the instrumentation used including serial numbers and calibration details,
- Details of monitoring locations or names of personnel monitored (as appropriate),
- Details of the monitoring techniques,
- Details of the site activities occurring during the surveys,
- Details of the meteorological conditions prevailing during the surveys,
- Data from the daily visual and olfactory assessments,
- The result of all measurements,
- A comparison of the measured levels against the Workplace Exposure Limits,
- A comparison of the measured levels against adopted criteria,
- Details of the time and date of any sampling, and

- Details of the initial and final flow rates, where appropriate, of each individual filter exposure (dusts).

CONTROL OF DUSTS, ODOURS, GASES AND VAPOURS

In the first instance VHE will undertake all available means to reduce the likelihood of emissions from the works. Where levels may be exceeded VHE will take appropriate action to prevent or adequately control exposure according to principles of best practice. VHE will have a place a hierarchy of control measures, where control at the source is implemented in the first instance and control by PPE is considered a last resort.

A daily site walkover will be undertaken by the Environmental Engineer where the climatic conditions will be recorded to include: weather, wind speed and direction, air pressure and temperature. Where reasonably practicable the Site Agent and Foreman will use this information to schedule the works in a manor to minimise the spread of any potential vapours and odours that may arise from the planned works.

Where odours are identified to impact on site personnel and local residents neutralising mist sprays shall be established around the point of source such as an excavation and any treatment areas. Road vehicles removing soils from site may be sprayed with an odour neutraliser or a PVA mixture that will lock in any potential odours/ vapours at the surface, and then suitably sheeted.

When removing the soils from site all vehicles will be suitably sheeted to control any emissions and/ or odours.

Gas and Vapour Workplace Exposure Limits

Due to the nature of contaminants on the site, which are typical of former gas works, the Workplace Exposure Limits as provided within the EH40/2005 will be used to address any potential for VOC impact during the remediation works.

With respect to vapours, the remediation works will potentially have a risk to on and off-site receptors as these are associated with hydrocarbon contaminated soils, tar tanks and other similar structures where there may be liquid tar present. The change in pore pressure brought on by the agitation of excavation processes can result in the instantaneous release of vapour, which could build up within an excavation. Of the known contaminants associated with coal tars, benzene is interpreted as the primary concern in regard to the generation of hazardous vapours. Benzene has relatively high vapour pressure and is a proven human carcinogen. Relatively short exposures to low concentrations (approximately 1 ppm) of benzene vapours can induce dizziness and nausea.

As a result the Workplace Exposure Limits for Benzene will be used as detailed within Table 1 below. As the EH40/2005 does not provide a Short Term Exposure Limit (STEL) a limit of 3ppm for 15mins will be used.

Table 1 - Workplace Exposure Limits extracted from EH40/2005

Substance	Long Term Exposure Limit (8 hour TWA) ppm		Short Term Exposure Limit (15min)	
	ppm	mg/m^3	ppm	mg/m^3
Benzene	1	-	-	-
Toluene	50	191	100	384
Ethyl benzene	100	441	125	552
Xylene	50	220	100	441
Naphthalene	10	53	15	80
Phenol	2	-	-	-

Typically associated with coal tars are Polycyclic Aromatic Hydrocarbons (PAHs) of which are typically made up of 16 priority chemicals (by GCMS). The PAH of primary concern is Naphthalene due to it having the highest vapour pressure (in comparison to other PAHs) and sublimates straight from its solid to gaseous phase. Although the vapour pressure of Naphthalene is 3 orders of magnitude less than that of Benzene, this is counteracted by the considerably higher concentrations of Naphthalene compared to Benzene, generally observed in tar samples.

As it is difficult to ascertain the exact composition of the vapours likely to be generated at the site, it has to be assumed that the potential exists for Naphthalene vapour concentrations to exceed their TWA and STEL. Therefore if necessary the EH40/2005 limit for Naphthalene could be used instead, as shown in **Error! Reference source not found.** above.

Monitoring Equipment

Photo Ionisation Detectors (PIDs) will be used to monitor VOCs during the site works during which operations are likely to release vapour. As discussed above these will be set to detect for Benzene using the EH40/2005 Workplace Exposure Limits and an STEL of 3ppm 15mins. Calibrating the PID to Benzene provides a 'worst case' estimate of benzene concentrations in the air as it assumes the detected concentration consists entirely of benzene.

Each monitor will have an audio / visual alarm set to trigger in response to any exceedance of the benzene limits of 1ppm 8hour TWA and 3ppm 15mins STEL. These monitors will also have instantaneous alarm levels for Benzene set at 10ppm (low alarm) and 20ppm (high alarm).

The PID monitors will be calibrated and checked daily before use using isobutylene to ensure there is no 'calibration drift' or erroneous readings. Each monitor will be set for data logging, which will be downloaded daily and a record will be kept in the site file.

In addition, where necessary, further VOC monitoring shall be carried out using dragger tubes or similar to ascertain the composition of the vapours. Should it be determined that other VOC's are present other than benzene, as discussed previously, the action levels/alarms can be altered accordingly (and the PID re-calibrated to the relevant compound) using values derived from EH40.

Baseline Monitoring

Prior to any works commencing, background monitoring shall be undertaken using a PID calibrated to benzene to provide a baseline for comparison with information recorded during the works. This will be monitored along the site boundaries and the data would give an indication of the difference between the baseline and trigger concentrations.

The methodology for baseline monitoring will follow those procedures outlined below for all monitoring to ensure collected data is comparable.

Where thresholds are established based on the baseline data VHE propose to set trigger concentrations based on the UK Air Quality Standards (UK Air Quality Strategy 2007) where available, or guidelines will be established from workplace exposure limits divided by a suitable safety factor.

Should background concentrations equate to average concentrations that exceed the UK Air Quality Standards then the trigger threshold could be adjusted to the baseline concentrations. In setting the baseline under these circumstances we would also take into account National Archive Data (www.airquality.co.uk) for the local area derived from the modelling predictions and actual measurements at nearby equivalent locations that are available on the archive.

Occupational Health Monitoring and Control

Vapours

Dedicated personal organic vapour monitors (Photo Ionisation Detector (PID) – Toxi RAE or similar) will be carried by site workers deemed most at risk of exposure to contaminated materials during the site excavation works, specifically excavator drivers or banksmen working within tar/liquor tank areas and treatment areas. In the case of the excavator drivers the PID will be placed in the driver's cab, within the operative's breathing zone and for the banksmen the PID will be attached to the lapel of their outer clothing.

Twin cartridge respirators, that conform to BS EN 140:1999, and fitted with Class 1 filter cartridges that conform to BS EN 14387 (A1, A2, ABE1 or ABEK1 filters) will be issued to all employees working within excavation / treatment areas and face fitting tests will be carried out by competent personnel prior to works commencing. Therefore should any of the PID alarms sound, as a precaution any workers in the affected area shall put on a cartridge respirator (as above), and keep it on until the levels drop and the alarm stops sounding.

Should the high alarm of 20ppm be triggered at any time, works shall cease immediately and site management will review the works, taking any necessary action that may be needed to reduce the values. This may involve sealing stockpiles, covering/ coating contaminated soils, reducing excavation and transportation of materials or undertaking further monitoring for specific VOCs using drager tubes as discussed previously.

If at any time during the works involving highly odorous materials, personnel become unwell and develop headaches or sore throats, then they are to inform site management immediately. An assessment will be made with regards to the use of respiratory equipment and additional VOC testing will be carried out. Dependent upon the results further action may be required, as discussed above. During the site induction and regular Tool Box Talks site personnel will be informed of the potential health effects from inhalation of vapours and the necessity to inform site management immediately.

Asbestos

Air monitoring for asbestos will be carried out when soil containing asbestos is moved or stockpiled on site. Monitoring will comprise personal and portable air monitors placed downwind of soils being moved / stored.

Environmental Monitoring and Control of Nuisance Odours, Vapours and Gases

Daily assessments for VOCs using a PID (Mini Rae or similar) set to benzene, shall be carried out during the works. This will involve a site walkover taking point readings around the site boundaries and at key site locations on the site such as the water treatment area, soil treatment area, stockpiles associated with contaminated materials and excavation areas.

The PIDs will be calibrated and checked daily using isobutylene and the results will be recorded on the Daily Environmental Monitoring Log and kept in the site files.

During the site walkover a daily olfactory assessment of odours shall be undertaken at the same key site locations and on the site boundary. These will be assessed by the Environmental Engineer and gauged against a scale of 1 to 5 for intensity and extent of odour as shown in Table 2 below.

Table 2 – Odour Score Guide

Intensity		Extent
No detectable odour	**1**	**Local and persistent** (Only detectable when wind drops or blows)
Faint (Barely detectable, need to inhale facing wind)	**2**	**Impersistent** (As 1 but detectable off site)
Moderate (Easily detectable with back to wind)	**3**	**Persistent** (But fairly localised)
Strong (Bearable, may lead to lingering smell to clothes/ hair)	**4**	**Persistent and pervasive** (Detected up to 50m from site boundary)
Very strong (Unbearable, may introduce retching/ vomiting)	**5**	**Persistent and widespread** (Detected over 50m from boundary)

These observations will be recorded on the Daily Environmental Monitoring Log contained within Appendix C of the EMS and shall be kept on site as record for future reference.

During the boundary monitoring should vapour levels should the 15 minute average (STEL) or the 10ppm instantaneous low alarm sound, then woks will be temporarily suspended, slowed down or re-located until the vapour levels have reduced below the limits.

Should any of the PID alarms sound, further VOC monitoring may be carried out using drager tubes or similar to ascertain the composition of the vapours. Should it be determined that other VOC's are present other than benzene, the action levels and alarms can be altered accordingly (and the PID recalibrated to the relevant compound) using values derived from EH40 as shown **Error! Reference source not found.**.

If levels continually exceed the limits the works shall cease until additional mitigation measures are implemented such as the establishment of an odour control unit around the identified source(s), such as an excavation, or an alternative method of works is established.

When not in use for the site walkover, the PID will placed at the downwind boundary for that day. It will be set up to record readings across the working day and the results will be downloaded on a daily basis and kept in the site records.

Dust Monitoring

The activities associated with the works may give rise to nuisance dust as identified within the risk assessment for the site. Environmental monitoring for total deposited dust and PM_{10} will take place during the works.

Monitoring Equipment

Table 3 below demonstrates the monitoring equipment that will be used at the site, the type of dust monitored and the frequency at which the monitoring will take place.

Table 3 – Dust monitoring summary

Monitoring Equipment	Dust Type Monitored	Frequency
'Frisbee' dust monitor	Total Deposited Dust	Weekly
Sidekick SKC pump	PM_{10}	Daily

All records of calibration, downloaded data and results shall be collated and tabulated on a weekly basis.

Baseline Monitoring

Prior to commencement of the works, background monitoring will be undertaken to provide baseline data of dust levels arising at the site. These will be used to assess the impact of dust generated at the site in relation to non-site activities. The baseline monitoring will be undertaken at the site boundaries.

Monitoring Approach

Activities that may give rise to elevated dust levels are considered to be those associated with excavation, loading, breaking hard-standing materials, hauling materials to stock and off-site disposal/ transport.

During the daily site walkover carried out by the Environmental Engineer the weather conditions will be recorded, including wind direction and strength. Observations of dusts at key receptor locations will also be assessed and gauged against a scale of 1 to 4 as identified below:

1. Not noticeable
2. Slight dust
3. Moderate dust
4. Unacceptable dust (remedial action required)

This will be recorded on the Daily Environmental Monitoring Log and will be kept in the site records.

The Site Foreman will also visually assess the amount of dust generated by the works and implement remedial measures if necessary. They will also be responsible for assessing the climatic conditions and organising any screening or crushing works accordingly.

A sidekick pump will be placed on the downwind boundary of such works and, where appropriate, should a sensitive receptor be located close to the works but not downwind, then a second sidekick pump will be placed within the vicinity of this receptor. Should a second sidekick pump not be required for point source monitoring, then the Environmental Engineer shall deem where is the most appropriate location for the monitor that day.

The total deposited dust will be monitored using the 'Frisbee' type dust deposit gauges (in accordance with BS 1747) or as required in the specification. The dust gauges will be located at key receptor locations around the site, as shown on VHE/CONPLAN/001. These will be collected on weekly intervals and sent to an approved laboratory to determine the quantity of dust generated through undissolved solids at the site.

Monitoring for daily PM10 dust shall be carried out on a daily basis using the Sidekick SKC pumps with the appropriate filter size and collection heads. The pumps will be calibrated daily and configured according to recommendations in MDHS 14/3.

Dust Action Levels

All data will be downloaded by the Environmental Engineer on a daily basis and assessed against the dust guideline values shown in Table 4 below.

Table 4 – Dust Guideline Values

Dust Type	Guideline Value	Reason for Guideline Value
Total Deposited Dust	200mg/m^2/ day	It is considered levels at this or above are likely to cause a nuisance to neighbouring residents and public.
PM_{10}	10mg/m^3 for 8 hour TWA	In accordance with 'The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance' (BPG)/ EH40-2005

Control of Dust

Should these limits be exceeded, appropriate action will be taken to remediate the situation, which may require the monitoring frequency to be increased, suppression measures to be employed or in severe cases, works to be ceased. Suppression measures will include sprayed water from a tractor/bowser system.

Should this not alleviate the problem, then the foreman will cease all operations giving rise to elevated dust levels and alternative work methods employed.

To further reduce potential for dust on the site, all site dump trucks are to have exhausts which do not discharge towards the ground.