

Appendices

Appendix A. Chemical Criteria

A.1. Imported Material Criteria

WRAP imported material does not require testing as it has met end of waste criteria. However, for reassurance purposes in this instance, all WRAP material will be checked for evidence of gross contaminated as defined in Table 5-1.

All imported material shall be certified as free of asbestos and invasive plants, as defined by Environment Agency and in particular Japanese Knotweed. A visual assessment of the material upon entry at the site will be carried out to confirm the absence of visual contaminants, olfactory contamination, and deleterious material.

The criteria presented in Table A-1 is applicable to material imported to site. The criteria are a combination of Atkins derived soil screening values (SSVs) for a residential (without plant uptake) land use scenario, applicable Atkins derived site-specific assessment criteria (SSAC) taken from the 2023 DQRA [3] and concentrations indicative of anthropogenic activity.

Table A-1: Imported Material Criteria

Contaminant of concern	Import (mg/kg unless otherwise specified)	
	Criteria	Source
General Inorganics		
Asbestos	No detection(1)(2)	LOD
Heavy Metals/Metalloids		
Arsenic	3.99E+01	SSV – Residential without plant uptake
Cadmium	1.49E+02	SSV – Residential without plant uptake
Chromium III	6.85E+02	SSV – Residential without plant uptake
Chromium VI	2.05E+01	SSV – Residential without plant uptake
Lead	1.00E+01	Reduced limit compared to SSV to minimise the contaminant concentrations being brought onto site.
Mercury	1.00E-01	Pragmatic limit to minimise the contaminant concentrations being brought onto site.
Nickel	1.88E+02	SSV – Residential without plant uptake
Selenium	5.95E+02	SSV – Residential without plant uptake
Zinc	1.00E+02	Pragmatic limit based on background concentrations and existing site concentrations to prevent contamination.
BTEX		
Benzene	3.92E-02	Controlled Waters DQRA derived SSAC
Toluene	3.12E+02	SSV – Residential without plant uptake
Ethylbenzene	1.41E+02	Controlled Waters DQRA derived SSAC
Xylenes	2.68E+01	SSV – Residential without plant uptake
TPH		
TPH (sum of all compounds)	1.00E+03	To prevent any gross contaminated material import
PAHs		
Anthracene	2.07E-02	Controlled Waters DQRA derived SSAC
Benzo(a)pyrene	1.00E+00	Pragmatic limit to prevent gross contamination being brought onto site. Benzo(a)pyrene is not a risk driver.
Fluoranthene	4.80E-02	Controlled Waters DQRA derived SSAC
Naphthalene	9.07E-01	Controlled Waters DQRA derived SSAC
Other Organics		
Trichloroethene (TCE)	1.59E-03	SSV – Residential without plant uptake
Tetrachloroethene (PCE)	6.78E-01	SSV – Residential without plant uptake

Contaminant of concern	Import (mg/kg unless otherwise specified)	
	Criteria	Source
Vinyl Chloride (VC)	3.00E-04	SSV – Residential without plant uptake
Phenol	2.18E+00	Controlled Waters DQRA derived SSAC

(1) Laboratory limit of detection <0.001%w/w. (2) To also be used for aggregate re-use under the WRAP Quality Protocol.
 LOD – Limit of detection

A.2. Re-Use and Validation Criteria

Site won material shall comply with the criteria presented in Table A-2. This excludes inert materials arising from the demolition works, that will be processed in accordance with the WRAP Quality Protocol. The criteria are selected based on the applicable AtkinsRéalis derived site-specific assessment criteria (SSAC) taken from the 2023 DQRA [3] as a priority, followed by AtkinsRéalis derived soil screening values (SSVs) and calculated soil saturation limits at 1% SOM, using the CLEA model. Additional olfactory and visual indicators of contamination have also been adopted for select compounds.

Table A-2: Re-Use and Validation Criteria

Contaminant of concern	Re-Use and Validation		
	Criteria		Source
	Soil (mg/kg)	Leachate (mg/l)	
General Inorganics			
Asbestos	0.01%	-	A suitable anthropogenic threshold.
Ammonium	8.82E-01	7.16E-01	Controlled Waters DQRA derived SSAC
Total Cyanide	2.84E+00	2.80E-01	Controlled Waters DQRA derived SSAC
BTEX			
Benzene	3.92E-02	5.81E-03	Controlled Waters DQRA derived SSAC
Toluene	8.69E+02	-	Calculated soil saturation limit using the CLEA model
Ethylbenzene	1.41E+02	3.17E-01	Controlled Waters DQRA derived SSAC
Xylenes	5.76E+02	-	Calculated soil saturation limit using the CLEA model
TPH Bands			
TPH Aliphatic > C5-C6	3.04E+02	-	Calculated soil saturation limit using the CLEA model
TPH Aliphatic > C6-C8	1.44E+02	-	Calculated soil saturation limit using the CLEA model
TPH Aliphatic > C8-C10	7.77E+01	-	Calculated soil saturation limit using the CLEA model
TPH Aliphatic > C10-C12	1.23E+04	-	SSV – Commercial
	Free of staining and odours, PID < 100ppm		
TPH Aliphatic > C12-C16	4.13E+04	-	SSV – Commercial
	Free of staining and odours, PID < 100ppm		
TPH Aromatic > C5-C7	3.92E-02	5.81E-03	Controlled Waters DQRA derived SSAC, for benzene
TPH Aromatic > C7-C8	8.69E+02	-	Calculated soil saturation limit using the CLEA model
TPH Aromatic > C8-C10	1.41E+02	3.17E-01	Controlled Waters DQRA derived SSAC, for ethylbenzene
TPH Aromatic > C10-C12	1.23E+04	-	SSV – Commercial
	Free of staining and odours, PID < 100ppm		
TPH Aromatic > C12-C16	4.13E+04	-	SSV – Commercial
	Free of staining and odours, PID < 100ppm		
PAHs			
Anthracene	2.07E-02	3.37E-05	Controlled Waters DQRA derived SSAC

Contaminant of concern	Re-Use and Validation		
	Criteria		Source
	Soil (mg/kg)	Leachate (mg/l)	
Naphthalene	9.07E-01	1.34E-02	Controlled Waters DQRA derived SSAC
Fluoranthene	4.80E-02	2.16E-05	Controlled Waters DQRA derived SSAC
Other Organics			
Phenol	2.18E+00	3.17E-01	Controlled Waters DQRA derived SSAC

Appendix B. Preliminary COSHH Assessment

B.1. Introduction

In accordance with the requirements of the COSHH Regulations [19] as amended, an assessment of the likely hazards posed to site staff during the environmental improvement and development works has been carried out. This COSHH assessment has been produced to inform the Contractor's COSHH assessment and is to be updated by the appointed Contractor for his own staff and those of any nominated sub-contractors.

All subcontractors and site visitors shall record their arrival at the site offices and shall be subject to the COSHH assessment controls [19] as part of a site induction given by the Contractor. All staff and visitors will therefore be fully acquainted with this document and/or the equivalent document produced by the Contractor before being allowed on the site. A copy of the Contractor's site regulations will be issued to all visitors and these regulations will detail the site procedures and the health and safety measures which are to be observed.

B.2. Hazards and Risk Assessment

The hazards associated with the different types of materials which may be encountered on the site (including contaminants identified during previous site investigation works (most notably PAHs, TPH, heavy metals, cyanide and ACM and other typical gasworks contaminants which may be present) are detailed in Tables B-1 to B-3.

A monitoring strategy for gases, vapours and dusts will be derived by the Contractor, as appropriate.

Table B-1 Hazards Associated with Waste Types (Solid and Liquid)

Substances	Characteristics			Hazards						
	Physical Form	Colour	Odour	Acid	Alkaline	Toxic	Combustible	Corrosive	Irritant	Dust
Spent oxide	Solid	Blue/green	Sulphurous	✓		✓	✓	✓	✓	✓
Foul Lime	Solid	White/yellow	-		✓	✓		✓	✓	✓
Total Petroleum Hydrocarbons	Solid/liquid	Black	Organic			✓	✓		✓	
Ash, clinker, coal, coke	Solid	Black/grey	-			✓	✓			✓
BTEX	Solid/liquid	-	Distinctive sweetish, petrol			✓	✓			
Naphthalene	Solid/liquid	-	Mothballs			✓			✓	
Phenolics	Solid/liquid	-	TCP			✓		✓	✓	
Ammoniacal liquors	Liquid	-	Ammonia, smelling salts			✓		✓	✓	
Asbestos	Solid/ Fibrous material	Grey/blue				✓			✓	✓
Contaminated groundwater	Liquid	-	-	✓	✓	✓		✓	✓	
PAH	Solid/liquid	Black/grey				✓			✓	
Arsenic/lead	Solid/liquid	-				✓			✓	✓
Coal tars	Viscous liquid	Black	Tarry odour	✓		✓			✓	

Table B-2 Hazards Associated with Gases and Vapours

Gas/Vapour	Characteristics	Hazards
Benzene vapour	Sweetish distinctive or petrol or tarry odours. Detectable at 2.5 ppm – 5 ppm. Insoluble in water.	Highly flammable. Toxic by inhalation. Skin contact should be avoided. Carcinogenic.

Gas/Vapour	Characteristics	Hazards
Naphthalene vapour	Mothball odour.	Toxic by inhalation. Flammable. Irritation.
Ammonia gas (NH ₃)	Distinctive smelling salts pungent odour. Odour perception threshold below 5 ppm.	Toxic by inhalation. Irritation. Asphyxiation. Flammable. (N.B. significant build-up likely only in confined spaces).
Hydrogen sulphide gas (H ₂ S)	Malodorous, rotten egg smell. Exposure to H ₂ S may dull sense of smell. Generated under acidic conditions.	Irritation. Loss of consciousness. Asphyxiation. Flammable, explosive.
Hydrogen cyanide gas (HCN)	Faint odour of bitter almonds. Generated under acidic conditions.	Toxic by inhalation and in contact with skin. Extremely flammable. Irritation. (N.B. significant volumes and concentrations likely only in confined spaces).
Methane gas	Odourless and colourless.	Flammable in air at between 5% and 15%.
Carbon dioxide gas	Odourless and colourless.	Toxic and an asphyxiant.
Phenol vapour	Acrid odour.	Toxic.

Table B-3 Exposure Routes Associated with Potential Waste Types

Substances	Likelihood of Occurrence	Exposure Route				
		Eyes	Skin	Inhalation		Ingestion
				Dust	Vapour	
Spent oxide (solid)	Moderate	✓	✓	✓		✓
Foul lime (solid)	Low	✓	✓	✓		✓
PAH	High	✓	✓		✓	✓
Arsenic/lead	Low	✓	✓	✓		✓
Mineral oil (liquid)	Moderate	✓	✓		✓	✓
Ash, clinker, coal, coke (solid)	Moderate			✓		✓
BTEX	Low	✓	✓		✓	✓
Naphthalene	Low	✓	✓		✓	
Phenolics	Low	✓	✓	✓	✓	✓
Ammoniacal liquors	Low	✓	✓		✓	✓
Asbestos	High			✓		
Contaminated groundwater	Moderate	✓	✓		✓	✓

Notes: There is some uncertainty regarding the ability of benzene to penetrate skin and therefore skin contact should be avoided.

B.3. Health and Safety Procedures

The following sections provide an initial overview of anticipated health and safety procedures which will be employed by the Contractor. However, development of the detailed health and safety procedures for the project will be the responsibility of the Contractor. The project must be completed in accordance with the Construction, Design and Management (CDM) Regulations [20] where the appointed contractor are anticipated to fulfil both the roles of Principal Contractor and Designer (Atkins will act as Principal Designer).

B.3.1. Safe Working Practices

The site shall be separated into clearly designated "clean" and "dirty" areas by Heras fencing with movement between the two areas being controlled via a decontamination unit. The boundaries between "clean" and "dirty" areas and the offices/stores may change during the course of the contract. In addition, a Heras fencing/hoarding will be erected to protect the site tenants from the works.

Eating, drinking and smoking shall be prohibited except in designated clean areas. Washing facilities shall be provided in the decontamination units. Staff shall wash hands and face thoroughly, after first

having removed protective equipment, prior to all meal breaks and before leaving the site on completion of the day's work. All protective equipment shall be stored in the decontamination units and will not be taken home. Overalls, etc. shall be disposable in nature and shall not be taken home at the end of the working day, but left on-site within the decontamination unit.

Water spraying equipment shall be provided by the Contractor to control dust emissions where significant fugitive dust emissions are created by site operations. This equipment shall also be used should ACM be identified. Emissions of VOCs shall be minimised by the use of a variety of methods as specified above.

Detailed safe working practices shall be specified by the Contractor, which will be subject to approval by the Client.

Inspections shall be carried out throughout the contract to check compliance with all health and safety procedures specified (i.e. compliance with approved safe working practices and the use of PPE and RPE, proper use of decontamination facilities, condition and maintenance of safety equipment).

B.3.2. Personal Protective Equipment

As a minimum all staff shall be issued with the following PPE which shall be worn at all times in designated operational areas:

- protective overalls (disposable);
- protective footwear (steel toe caps and insoles to BS1870);
- safety helmets;
- safety glasses;
- appropriate gloves; and
- reflective jackets or waistcoats.

The following equipment shall be available for use as necessary:

- ear defenders;
- fall arrest equipment;
- chemical protection suits (resistant to the specified contaminants);
- waterproof overalls;
- gloves/gauntlets appropriate to specific tasks (resistant to the specified contaminants);
- safety goggles or visors on helmets;
- orinasal dust masks;
- organic vapour/particulate respirator (appropriate for the specified contaminants);
- exceptionally, powered helmet respirators with carbon filters and neck sleeves; and
- breathing apparatus – escape sets.

All PPE and RPE shall be selected, maintained and supplied by the Contractor, subject to approval by the Client. All RPE shall be HSE approved for the proposed use and the maximum usage level (i.e. the maximum multiple of the Occupational Exposure Limit (OEL) for which the equipment provides protection) for specific vapours/gases clearly stated. All staff using RPE shall be aware of the maximum usage levels for the different RPE provided.

B.3.3. Environmental Supervision

Environmental Scientist(s) with experience of the hazards posed by gasworks contaminants shall be available to provide advice and guidance to the Client and the Contractor throughout the environmental and development improvement works contract.

B.3.4. Environmental and Personal Exposure Monitoring

Monitoring for respirable contaminants shall be carried out for the following reasons:

- to confirm the expected risks of exposure associated with specific contaminants;
- to measure personal exposure in relation to specific high-risk activities in conjunction with the anticipated use of RPE;
- to obtain baseline data and confirm expected risk of exposure to site neighbours; and
- to revise working practices, use of RPE/PPE as appropriate.

Three different monitoring strategies are considered appropriate to be used on-site:

- personal exposure monitoring (sampler or portable monitoring device located within the breathing zone of site operative);
- work area boundary monitoring (a fixed sampler or a portable monitor located at the boundary of working area); and/or
- baseline monitoring (fixed sampler located at site boundaries or adjacent to specific features).

A monitoring strategy for odours, vapours and dusts shall be derived by the Contractor, as appropriate.

B.3.5. Maintenance of Safety Equipment

Any specialised maintenance required for PPE and RPE shall be performed by a suitable qualified person. Written maintenance procedures shall be established and followed on the site which shall include the following:

- storage procedures;
- records of use;
- maintenance requirements i.e. cleaning and repair; and
- disposal requirements and records.

The Contractor shall be responsible for the maintenance and supply of safety equipment associated with their work.

B.4. First Aid and Health Surveillance

All staff shall be aware of the location of the designated First Aid station and the identity of the first aiders. Mobile first aid kits and eyewash shall be available for work carried out distant from the nearest first aid equipment.

If any staff member has minor wounds such as cuts and/or grazes on exposed areas (i.e. hands, neck, face) these shall be protected with waterproof plasters at all times.

Vigilance against both Weil's and Lyme's disease shall be maintained in accordance with good practices.

Records shall be kept of any adverse health effects experienced during the site works i.e. headache and nausea related to benzene exposure and rapid action shall be taken as appropriate. Staff shall be monitored for their suitability to work with RPE particularly for heavy colds and other respiratory conditions which may be incompatible with the use of RPE. They shall also have had RPE face fit tests to ensure the safe application and use of the equipment.

The Contractor shall be responsible for the welfare of their own staff, sub-contractors and site visitors. The Contractor shall assess the need for medical surveillance particularly in relation to employees working in high-risk areas using RPE.

B.5. Information, Instruction and Training

Training of staff shall be carried out before the start of the site works and shall cover the following issues:

- nature of likely hazards;
- site rules and SHE documents;
- communication procedures;
- safe working practices;
- use, storage and maintenance of PPE, RPE and breathing apparatus;
- use of decontamination facilities;
- emergency responses and rescue; and
- site security procedures.

B.6. Emergency Procedures

As part of the Contractor's Safety Method Statement detailed emergency procedures shall be established.

The issues which need to be considered as part of the emergency procedures are listed below (this list is not exhaustive):

- identification of personnel with specific emergency response roles;
- training of emergency personnel in appropriate first aid and decontamination procedures;
- liaison with emergency services (i.e. local hospitals and fire services); and
- documentation and reporting requirements.

The Contractor shall supply relevant emergency response equipment which should, as a minimum, include the following:

- rescue equipment (i.e. breathing apparatus and appropriately designed stretchers and hoists for rescue from confined spaces) – if applicable;
- emergency decontamination facilities (i.e. drench showers);
- provision of neutralising solutions for high-risk contaminants; and
- background information (this document should be referenced within this section).

B.7. Review and Update

This assessment shall be reviewed and updated to reflect any changing site circumstances or work methods. Review of the COSHH [19] shall be triggered by the following events:

- change in Principal Contractor;
- changes in specified work activities;
- changes in control measures;
- ill-health related to work being reported;
- monitoring revealing unexpected results; or
- new information concerning hazards on-site.

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