

Afon WSYG BESS

784-B068873



Reactive Remediation Strategy Report



Final

AW1 Energy Storage Ltd

December 2024

Document prepared by **Tetra Tech Limited**. Registered in England number:
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Reactive Remediation Strategy

B068873
December, 2024

PRESENTED TO

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AOD	above Ordnance Datum
bgl	below ground level
BGS	British Geological Survey
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C4SL	Category 4 Screening Levels
CIEH	Chartered Institute of Environmental Health
CLEA	Contaminated Land Exposure Assessment
CoC	Constituent of Concern
CSM	Conceptual Site Model
DEFRA	Department of Environment, food and Rural Affairs
DQRA	Detailed Quantitative Risk Assessment
DTS	Desktop Study
DRO	Diesel Range Organics
DWS	Drinking Water Standard
EA	Environment Agency (England)
EPH	Extractable Petroleum Hydrocarbons
EQS	Environmental Quality Standards
FOC	Fraction Organic Carbon
GPR	Ground Penetrating Radar
LOD	Limit of detection
LQM	Land Quality Management
NRW	Natural Resources Wales
OS	Ordnance Survey
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PPE	Personal Protection Equipment
ppm	parts per million
PRO	Petroleum Range Organics
SGV	Soil Guideline Values
SOM	Soil Organic Matter
SVOC	Semi-volatile organic compounds
TPH	Total Petroleum Hydrocarbon
TSV	Tier 1 Screening Values
VOC	Volatile Organic Carbon
VPH	Volatile Petroleum Hydrocarbons

1.0 INTRODUCTION

1.1 INSTRUCTION

Tetra Tech Limited (Tt) was commissioned by AW1 Energy Storage Ltd (the client) to prepare a Reactive Remediation Strategy to support the proposed development for a Battery Energy Storage System (BESS) at a site known as Uskmouth B Power Station (known hereafter as “the site”).

1.2 BRIEF

Planning permission for the BESS scheme was granted on 8th December 2022 subject to a series of Planning Conditions including the following conditions which relate to the management and assessment of contamination on the site:

Condition 2 - *No development (including any engineering works to cut or fill the site), of land known to be/suspected of contamination shall commence until the following components of a scheme to deal with the risks associated with contamination at the site, has been submitted to and approved in writing by the Local Planning Authority.*

- 2a – A Preliminary Risk Assessment (PRA).
- 2b – A Site Investigation Scheme based on the findings of the PRA.
- 2c – Remediation Options Appraisal and Strategy.
- 2d – Verification Plan

Condition 9 - *Prior to the occupation or operation of the development a verification report demonstrating completion of works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted to and approved in writing by the Local Planning Authority. The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan to demonstrate that the site remediation criteria have been met. It shall also include a long-term monitoring and maintenance plan for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency actions, as identified in the verification plan (Condition 2d). The long-term monitoring and maintenance plan shall be carried out in accordance with the approved details.*

Condition 15 – *If, during development, contamination not previously identified is found to be present at the site then no further development (unless otherwise agreed in writing with the Local Planning Authority) shall be carried out until a remediation strategy detailing how this unsuspected contamination shall be dealt with has been submitted to and approved in writing by the Local Planning Authority. The remediation strategy shall be carried out as approved.*

Additional planning conditions are also presented in relation to the development of a long-term contamination monitoring plan for the site and the requirement for a piling risk assessment, these conditions are not considered within this report.

A ground investigation has been undertaken on the site by Tetra Tech, which are presented in the following reports:

- Tetra Tech. Afon WSYG Cond Discharge, Factual Report V1.1. AW1 Energy Storage Ltd. November 2024.
- Tetra Tech. Afon WSYG Cond Discharge, Ground Investigation Interpretive Report V1. AW1 Energy Storage Ltd. December 2024.

- Tetra Tech. Afon WSYG Cond Discharge, CW-DQRA Report V1. AW1 Energy Storage Ltd. December 2024.

The results of the ground investigations did not identify any significant contamination associated with the onsite materials, other than asbestos, and as such a focused Remediation Options Appraisal and Strategy is not considered necessary, however given the industrial nature of the site a Reactive Remediation Strategy has been developed to establish a framework whereby any previously unencountered contamination is identified, tested and managed appropriately within the context of the proposed development.

This document also includes a Verification Plan outlining the requirement for a Verification Report on completion of the groundworks.

Ground gas protection measures are also required for the site but are not considered within this document.

A separate Asbestos Management Plan (AMP) is recommended for the site.

1.3 PROPOSED DEVELOPMENT

The proposed development on site is understood to comprise the construction of a Battery Energy Storage System (BESS) consisting of a series of batteries along with ancillary plant and cable runs. The existing road is to be used for haulage purposes, and a section of road is to be prepared for establishing a grid connection line.

1.4 REPORT SCOPE

The Reactive Remediation Strategy presented herein includes a summary of the ground conditions, methodologies for the identification of ground contamination, associated control measures, monitoring and sampling requirements and the requirement to seek regulatory approval for any subsequent remedial works.

The overall objectives of the Reactive Remediation Strategy are as follows:

- Outline management procedures which may be required to protect key receptors in the event of contamination being identified on the site;
- A requirement to undertake an updated risk assessment to identify any remedial measures required to protect end users and controlled waters.
- Requirement to obtain approval from the Local Authority before implementing any remedial works.
- Provide a defined criteria and validation procedure for demonstrating that any remediation works have been implemented to a suitable degree.

1.5 LIMITATIONS

The recommendations and opinions expressed in this report are based on information obtained as part of the data review or provided by others. Information provided from other sources is taken in good faith and Tetra Tech cannot guarantee its accuracy.

This report is subject to the report conditions presented in Appendix A.

The information contained in this report is intended for the use of the AW1 Energy Storage Ltd and Tetra Tech can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.

2.0 SITE INFORMATION

2.1 LOCATION

The site is located on the former cooling towers area within Uskmouth Power Station. The main part of the site is approximately 4.50ha in area and is centered on National Grid Reference (NGR) 332912, 183934.

The site address is: Uskmouth Power Station, West Nash Road, Nash, Newport, NP18 2BZ.

A site location plan is presented in Figure 1.

2.2 SITE DESCRIPTION

The site is situated within the land associated with the Uskmouth Power Station, located on the bank of the River Usk, which is approximately 4km south of Newport, South Wales. The main area of the site is situated within the former cooling tower area and consists of largely open lightly vegetated landscape with two remaining concrete basins which are present at the north and south of the site, trending east to west. Two sections of road to the south and west are captured within site bounds.

The main area of ground investigation was noted to be sparsely vegetated with gentle slope to the east. During the ground investigation, numerous areas of standing water were noted, with concrete basins having several inches in the base. The site surface in the main site area comprises gravel hardcore and demolition rubble of the cooling towers. Surrounding the main site is a grass covered area. The road sections and car park comprise asphalt. The main area of site was noted to be soft underfoot.

The site is largely level, with exploratory hole location levels between 8 m AOD and 9 m AOD.

2.3 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

Ground conditions on site were found to comprise localised Made Ground to a maximum proven depth of 4.50m which is anticipated to be present across the entirety of the site. The Made Ground comprised of both granular and fine materials, typically described as a silty sandy GRAVEL, sandy clayey GRAVEL, sandy gravelly CLAY or slightly sandy CLAY. The stratum has an abundance of rootlets and local variance in gravel and cobble content. Anthropogenic materials are also present including concrete, brick and slag. Hardstanding was located at the surface of fourteen exploratory hole locations to a maximum thickness of 0.35m bgl.

Underlying the Made Ground are superficial strata associated with the Tidal Flat Deposits, encountered within sixteen locations in the GI. The strata comprised fine grained material and typically described as a mottled silty CLAY or a clayey SILT.

The superficial deposits are, in turn, underlain by strata associated with the Mercia Mudstone Group. This stratum was not encountered during the ground investigation, but are anticipated to consist of *“Dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas. Thin beds of gypsum/anhydrite are widespread; thin sandstones are also present”*.

The Mercia Mudstone Group bedrock is designated as a Secondary B Aquifer. The Superficial Deposits of Tidal Flat Deposits are designated as Unproductive Strata. These are predominantly rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The site is located approximately 200m from the River Usk at its closest point and the main area of site has an overflow drainage system which flows into Julian's Reen to the west of site, which drains into the River Usk, which is tidally influenced at this point.

2.4 SUMMARY OF SITE HISTORY

It is understood that from around 1963 the site has been developed for use in association with Uskmouth A Power Station and used as cooling towers which overtime has built up and lead to significant thickness of Made

Ground. The site largely remained unchanged, with tanks shown on site plans in 2003. A railway which was present to the south has now been demolished. Currently the land remains as an empty parcel following the demolition of the cooling towers.

3.0 REACTIVE STRATEGY

3.1 INTRODUCTION

The objective of the Discovery Strategy is to ensure that a methodology is in place to identify, manage and deal with any previously unidentified areas of contamination which may be encountered during future site works. The strategy is consequently required to address the following:

- The identification of previously un-encountered ground contamination during the site development works including the requirement for further assessment and implementation of appropriate risk management methodologies to ensure the protection of human health and controlled waters; and,
- Protection of groundwork contractors and others who may be at risk due to contamination and hazardous materials encountered during site preparation and construction.

It is noted that a separate Asbestos Management Plan has been recommended for the site.

3.2 PROACTIVE APPROACH (WATCHING BRIEF)

In common with all brownfield sites, there is potential for contamination to be present within the soils beneath the site over and above that identified during the site investigation, for example in areas between investigation locations advanced as part of the original site investigation. Due to the nature of the site and the historical land use additional caution is required.

Assessment based on trial pit/borehole data cannot provide a complete picture and as such, a detailed proactive 'watching brief' will be maintained during excavation works.

The Contractor for the works will be responsible for providing an experienced banksman to observe and control excavations. In addition, the supervising person must be suitably trained and experienced in order to identify the presence of other visible or olfactory evidence of contamination including hydrocarbons and asbestos.

3.3 IDENTIFICATION OF POTENTIAL CONTAMINANTS

Based on the industrial nature of the site, and the use as a long term cooling tower area, the potential remains for contamination to be present including, but not limited to:

Table 3-1 – Summary of Potential Contaminants

Contaminant Type	Method of Identification on site
Hydrocarbons (fuels, oils, tars).	Oily sheen on groundwater / perched water Odours Discolouration of soils Tarry wastes (likely to be dark in coloration)
VOC	Solvent like odours, may also be associated with the presence of hydrocarbons
PCBs	Present as oils and greases
Heavy metals	Present in concentrations of ash

Contaminant Type	Method of Identification on site
PAH	Present in concentrations of ash, oily and tarry materials.
Asbestos	Present as fibrous materials, or within asbestos containing materials such as cement sheet, insulation boards. Operatives should be trained in asbestos identification.
General waste materials	Accumulations of unsuitable materials including scrap metal, and general waste materials which may require removal to facilitate the development.

3.4 OUTLINE APPROACH

Visual and olfactory inspection shall be used to identify potentially impacted soils. Following agreement on a plan of action it is possible that a conventional delineation exercise can be used to segregate impacted soil from the surrounding material. The discovery and management of potentially impacted soils should be dealt with on a case-by-case basis in order to address the specific nature of the ground conditions uncovered. However, a general approach is described below:

In the event that evidence of previously unencountered contamination is identified, works should cease in this area and advice sought from a suitably experienced Geoenvironmental Consultant independent of the contractor. The following methodology should be followed as a minimum.

- Potentially contaminated ground conditions are identified by groundworker(s) and the works are halted in this area;
- Contractor assesses the requirement for any additional health and safety or environmental management control measures;
- The site manager is informed of the identification of potential contamination who will inform the client and Geoenvironmental Consultant to agree a proposed methodology for managing the impacted materials;
- Excavated materials will be separately stockpiled within a dedicated storage area which is bunded and lined with plastic sheeting to prevent contaminants migrating into the underlying soils. Stockpiles should also be covered with plastic sheeting during periods of heavy rain and / or prolonged dry weather. Materials containing suspected ACM should be covered / damped down at all times.
- Requirements for additional sampling and risk assessment is confirmed with the contractor, Geoenvironmental Consultant, and Contaminated Land Officer for the Local Planning Authority and Natural Resources Wales. The following is presented as a minimum requirement:
 - Samples of the stockpiled material, and extents of the excavations should be obtained at a rate confirmed by the Geoenvironmental Consultant, but at a minimum of 1 sample per 250m³ from stockpiled materials, and a minimum of five samples from the excavation (four from the lateral extents and one from the base). Actual frequency of testing may be greater depending on the nature and extent of the contamination and will be determined by the Geoenvironmental Consultant in liaison the Local Authority.
- The samples will be subject to chemical analysis (testing suite to be determined by the Geoenvironmental Consultant in liaison the Local Planning Authority).
- Additional risk management procedures including remedial action, if necessary, and programming of the works will be agreed with the Local Planning Authority;

- Implementation of agreed remedial actions on site. Works to be overseen by Geoenvironmental Consultant.
- Records updated for inclusion in the Verification Report for the works.
- The requirement for long term monitoring will be agreed with the client, Geoenvironmental Consultant, and Contaminated Land Officer for the Local Planning Authority and Natural Resources Wales.

3.5 ASBESTOS

In the event of previously unidentified asbestos containing materials being encountered on site during the groundworks the following procedures should be implemented:

- An Asbestos Management Plan is recommended for the site and all works should be undertaken in accordance with the requirements.
- Works should cease immediately in the vicinity of the identified asbestos;
- The affected area should be fenced off and covered with plastic sheeting;
- The site manager informed of the identification of potential contamination who will inform the Geoenvironmental Consultant or specialist asbestos consultant to agree a proposed methodology for managing the impacted materials;
- Specialist advice should be obtained from an asbestos consultant with regard the identification of the asbestos and risk management procedures;
- Agreement will be sought between the Contractor, the Specialist Asbestos Consultant, client, Geoenvironmental Consultant, and Local Planning Authority with regard to the additional site procedures and risk management required to appropriately manage the identified asbestos containing materials;
- This document will be updated in line with the additional requirements for risk management in the light of this additional information.

4.0 MATERIALS MANAGEMENT

4.1 REUSE OF SITE WON MATERIALS

Excavated materials should be recorded and managed under the procedures outlined within a Materials Management Plan (MMP) in line with the requirement of the Definition of Waste Industry Code of Practice, Version 2 (CL:AIRE, March 2011).

Excavated soils, Made Ground, and natural strata will be stockpiled separately at the site. Prior to the re-use of any materials, the geotechnical suitability of the materials will be tested and confirmed prior to re-use as fill materials.

To confirm the chemical suitability of the excavated materials for re-use on site, the material will be subject to chemical testing at a rate of one sample per 250m³. The material will be deemed suitable for use provided the test results are compliant with the generic assessment criteria for a commercial / industrial end use presented in Appendix B.

In addition to the above, soil samples at a frequency of one per 1,000m³ will be scheduled for single state batch leachate analysis at 10:1 ratio (BS EN 12457-2) and screened against water quality standards which are protective against controlled waters, and an updated risk assessment undertaken.

A formal MMP document will need to be produced in due course to support the development on the site.

4.2 IMPORTATION OF MATERIALS

With the exception of natural aggregates, to ensure materials brought to site are suitable for use within the proposed development, imported materials will be subject to the following assessment.

- Details of the proposed source, supplier and results of chemical analysis must be recorded and independently validated by a suitable qualified geo-environmental engineer.
- Imported materials will be sampled at a rate of one sample per 250m³. Results must be compared to the screening criteria presented in Appendix B.
- In addition to the above, soil samples at a frequency of one per 1,000m³ will be scheduled for single state batch leachate analysis at 10:1 ratio (BS EN 12457-2) and screened against water quality standards which are protective against controlled waters, a risk assessment will be undertaken by a suitably qualified Geoenvironmental Consultant to confirm the acceptability of the material.
- Soils must be visually free from extraneous materials (plastic, wood, glass, metal, tarmac etc).
- Imported aggregate materials should be tested at a frequency of one per 500m³ for the presence of asbestos at the source.

Imported materials will also be subject to the requirements of the Materials Management plan for the site.

In the case of imported natural aggregates, the movement of materials should be documented and copies of the associated consignment notes retained on site.

4.3 OFFSITE DISPOSAL

- If the excavated material is designated for off-site disposal, the materials will be removed in accordance with the requirements of the Duty of Care Regulations, 1991 and where appropriate the Hazardous Waste Regulations, 2005.

- Materials removed from site as waste will be subject to waste classification testing to allow for appropriate classification, to ensure correct disposal to an appropriately licensed facility.
- It is the responsibility of the Contractor, as waste producer, to classify any materials prior to offsite disposal and to identify an appropriate disposal facility and suitable haulage contractor with appropriate waste management licences in place.
- Copies of Waste Transfer Notes and Consignment notes should be maintained on site and presented within the verification report.

5.0 VERIFICATION PLAN

5.1 INTRODUCTION

An integral part of the reactive remediation strategy proposed for the site involves suitable monitoring of the works to ensure they are undertaken as specified, to demonstrate the achievement of the remediation objectives and to document all aspects of the remediation work.

This includes the monitoring of the works undertaken on site and confirmation that residual risks no longer pose an unacceptable risk to receptors.

5.2 ON SITE DOCUMENTATION

The reactive remediation works will be controlled by the appointed contractor. The following records will be maintained on site as a minimum, and provided as necessary to the regulatory authorities for approval:

- i) Details of any previously unencountered contamination identified during the development works including;
 - a. Nature, extent and location of unsuitable materials.
 - b. Record of liaison with Geo-environmental Specialist and relevant regulators (Local Authority and NRW as required).
- ii) Details of any remedial works undertaken following regulatory approval, including but not limited to:
 - a. Records of the excavations undertaken, including:
 - i. Records of the extent of the areas requiring excavation;
 - ii. Records of the volume of soil excavated from each area;
 - b. Details of the storage of material prior to off-site disposal (if required) including location and number of stockpiles and management systems to minimise cross contamination with clean soils;
 - c. Records pertaining to the volume of soil disposed and waste transfer notes (if required).
- iii) Results of any additional contamination testing in the event that unexpected and suspect materials are identified, including laboratory quality assurance accreditation information.
- iv) Details of the actions taken to store, contain, treat, dispose or re-use any suspect materials.
- v) Results of testing of all soils proposed for import, including information on the source location and quantity imported. Contamination testing results are to be approved by a competent person before the soils are brought to site.
- vi) Chain of custody documentation for any soils imported.
- vii) Record of all disposals of unsuitable soils or hazardous / contaminated materials, including waste transfer documentation if applicable.
- viii) Records of health, safety and environmental controls and any variations to the original strategy/specification.
- ix) Copies of all relevant correspondence with the regulatory authorities during the course of the works.
- x) Photographic records as required.

If at any time during remediation any unsuspected contamination is identified, the local authority Contaminated Land Officer will be contacted in order to agree a strategy for its remediation. If required by the Local Planning Authority, interim reports shall be provided as necessary for progress monitoring purposes.

5.3 LONG TERM MONITORING

The need for long term monitoring will be confirmed following the completion of any remedial works in conjunction with the client, Geoenvironmental Consultant, and Contaminated Land Officer for the Local Planning Authority and Natural Resources Wales.

5.4 VERIFICATION REPORT

Information collected as part of the remedial works (outlined above) should be presented in a Verification Report prepared by a Geoenvironmental Specialist.

The report should include an updated risk assessment to demonstrate that any residual pollutant linkages no longer pose a significant risk to identify receptors associated with the site. Site records will also be presented in this document along with any relevant regulatory communications.

The report should be submitted to the relevant planning authority to support the discharge of any associated planning conditions.

FIGURES

Figure 1- Site Location Plan

APPENDICES

APPENDIX A – REPORT CONDITIONS

APPENDIX A - REPORT CONDITIONS

This report is produced solely for the benefit of *AW1 Energy Storage Ltd* and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Tetra Tech. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.

APPENDIX B – CHEMICAL SCREENING CRITERIA FOR RE-USE AND IMPORTATION

Appendix E1 – Soil Suite – General Contaminants including screening values for Commercial / Industrial End Use

Determinand	Units	Assessment Criteria	Derivation Tool
pH	pH Units	<5, >9	-
Asbestos	-	Presence	
Metals and Metalloids			
Arsenic	mg/kg	640	C4SL
Beryllium	mg/kg	12	LQM/CIEH S4UL
Boron	mg/kg	240,00	LQM/CIEH S4UL
Cadmium	mg/kg	410	C4SL
Chromium VI	mg/kg	49	C4SL
Chromium III	mg/kg	8,600	LQM/CIEH S4UL
Copper	mg/kg	68,000	LQM/CIEH S4UL
Lead	mg/kg	2,300	C4SL
Mercury (Inorganic)	mg/kg	1,100	LQM/CIEH S4UL
Nickel	mg/kg	980	LQM/CIEH S4UL
Selenium	mg/kg	12,000	LQM/CIEH S4UL
Vanadium	mg/kg	9,000	LQM/CIEH S4UL
Zinc	mg/kg	730,000	LQM/CIEH S4UL
Speciated PAHs			
Acenaphthene	mg/kg	84,000 (57.0)sol	LQM/CIEH S4UL
Acenaphthylene	mg/kg	83,000 (86.1)sol	LQM/CIEH S4UL
Anthracene	mg/kg	520,000	LQM/CIEH S4UL
Benz[a]anthracene	mg/kg	170	LQM/CIEH S4UL
Benzo[a]pyrene	mg/kg	44	C4SL
Benzo[b]fluoranthene	mg/kg	1,200	LQM/CIEH S4UL
Benzo[g,h,i]perylene	mg/kg	3,900	LQM/CIEH S4UL
Benzo[k]fluoranthene	mg/kg	77	LQM/CIEH S4UL
Chrysene	mg/kg	350	LQM/CIEH S4UL
Dibenz[a,h]anthracene	mg/kg	3.5	LQM/CIEH S4UL
Fluoranthene	mg/kg	23,000	LQM/CIEH S4UL
Fluorene	mg/kg	63000 (30.9)sol	LQM/CIEH S4UL
Indeno[1,2,3-c,d]pyrene	mg/kg	500	LQM/CIEH S4UL
Naphthalene	mg/kg	190 (76.4)sol	LQM/CIEH S4UL
Phenanthrene	mg/kg	22,000	LQM/CIEH S4UL

Determinand	Units	Assessment Criteria	Derivation Tool
Pyrene	mg/kg	54,000	LQM/CIEH S4UL
Phenol and Cyanide			
Phenol	mg/kg	440	LQM/CIEH S4UL
Easily Liberatable Cyanide (free)	mg/kg	40	Acute effects (infant, 1 dose of 3g soil)
(TPHCWG Hydrocarbon Fractions)			
Aliphatic >EC5-EC6	mg/kg	3,200 (304)sol	LQM/CIEH S4UL
Aliphatic >EC6-EC8	mg/kg	7,800 (144)sol	LQM/CIEH S4UL
Aliphatic >EC8-EC10	mg/kg	2,000 (78)sol	LQM/CIEH S4UL
Aliphatic >EC10-EC12	mg/kg	9,700 (48)sol	LQM/CIEH S4UL
Aliphatic >EC12-EC16	mg/kg	59,000 (24)sol	LQM/CIEH S4UL
Aliphatic >EC16-EC35	mg/kg	1,000,000#	LQM/CIEH S4UL
Aliphatic >EC35-EC44	mg/kg	1,000,000#	LQM/CIEH S4UL
Aromatic >EC5-EC7 (benzene)	mg/kg	27	LQM/CIEH S4UL
Aromatic >EC7-EC8 (toluene)	mg/kg	56,000 (869)vap	LQM/CIEH S4UL
Aromatic >EC8-EC10	mg/kg	3,500 (613)vap	LQM/CIEH S4UL
Aromatic >EC10-EC12	mg/kg	16,000 (364)sol	LQM/CIEH S4UL
Aromatic >EC12-EC16	mg/kg	36,000 (169)sol	LQM/CIEH S4UL
Aromatic >EC16-EC21	mg/kg	28,000	LQM/CIEH S4UL
Aromatic >EC21-EC35	mg/kg	28,000	LQM/CIEH S4UL
Aromatic >EC35-44	mg/kg	28,000	LQM/CIEH S4UL

Appendix E2 – Soil Derived Leachate Suite – General Contaminants

Determinand	
pH	Phenanthrene
Sulphate	Anthracene
Cyanide (Total)	Fluoranthene
Ammonia (NH ₃)	Pyrene
Ammonium (NH ₄)	Benzo (a) anthracene
Nitrate (NO ₃)	Chrysene
Nitrite (NO ₂)	Benzo (b) fluoranthene
Chloride	Benzo (k) fluoranthene
Dissolved Organic Carbon (DOC)	Benzo (a) pyrene
Alkalinity as CaCO ₃	Indeno (1,2,3-cd) pyrene
Antimony	Dibenzo (a,h) anthracene
Arsenic	Benzo (g,h,i) perylene
Barium	TPH Aliphatic >C5-6
Beryllium	TPH Aliphatic >C6-8
Cadmium	TPH Aliphatic >C8-10
Chromium	TPH Aliphatic >C10-12
Lead	TPH Aliphatic >C12-16
Mercury	TPH Aliphatic >C16-35
Molybdenum	TPH Aromatic >EC5-7 (Benzene)
Selenium	TPH Aromatic >EC7-8 (Toluene)
Copper	TPH Aromatic >EC8-10
Nickel	TPH Aromatic >EC10-12
Zinc	TPH Aromatic >EC12-16
Boron	TPH Aromatic >EC16-21
Total Phenol	TPH Aromatic >EC21-35
Naphthalene	Benzene
Acenaphthylene	Toluene
Acenaphthene	Ethylbenzene
Fluorene	Xylenes (mixed isomers)