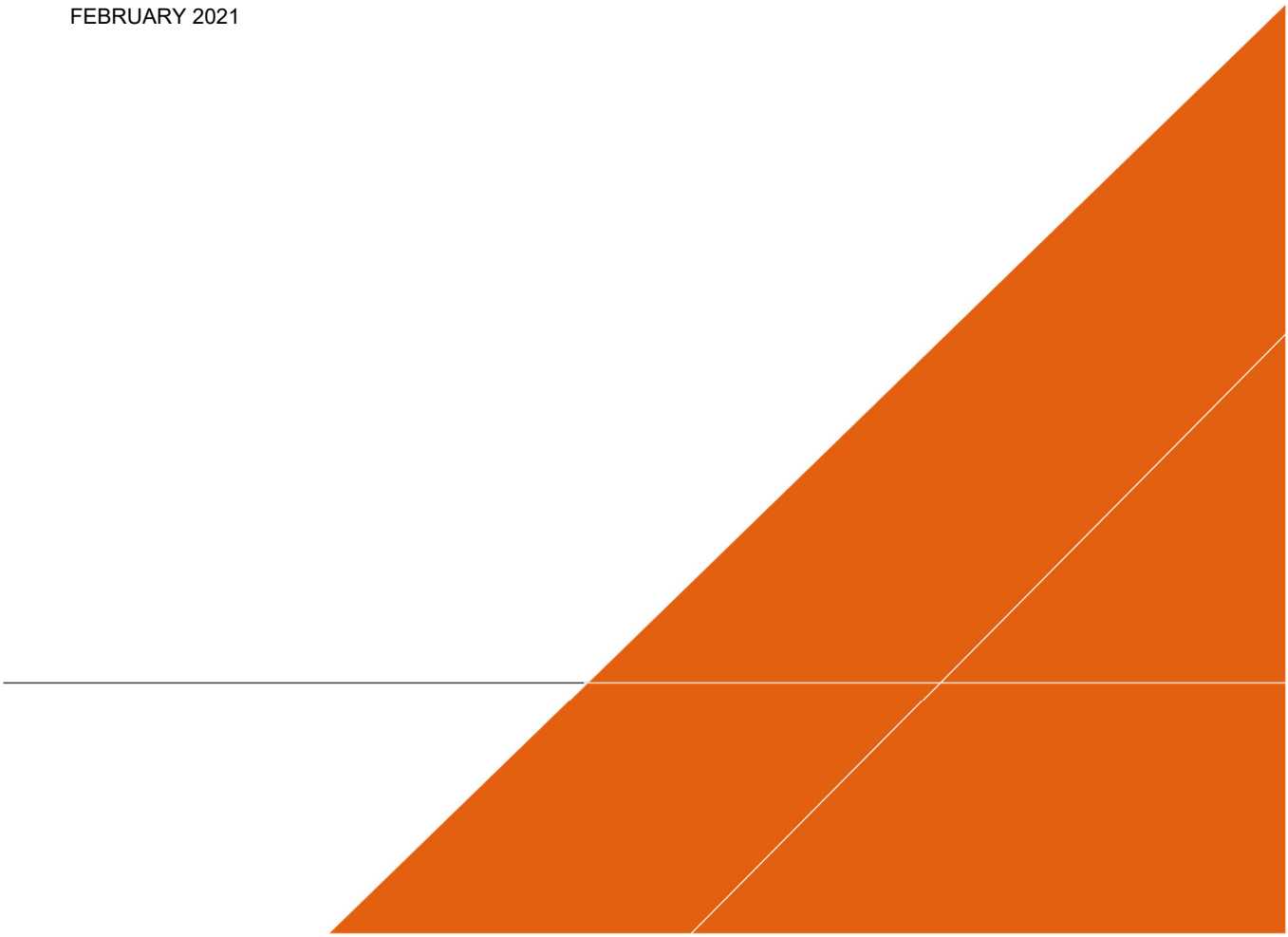
ARCADIS Design & Consultancy for natural and built assets

ENVIRONMENTAL PERMIT DEPLOYMENT APPLICATION - SUPPORTING INFORMATION DOCUMENT

Redcar Steelworks

10035118-AUK-XX-XX-RP-ZZ-0250-02-EP_Deployment

FEBRUARY 2021



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01		Adam Bethell	Chris Piddington	Chris Piddington	First Issue

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FIGURES

APPENDICES

1 Introduction

Arcadis (UK) Limited (Arcadis) was commissioned by South Tees Development Corporation (STDC) to undertake soils remediation works at the Former Redcar Steelworks (the Site).

The Site location is presented on Figure 1 on a map scale of 1:25,000 and a Site Layout Plan, showing the Site Boundary is presented on Figure 2.

The purpose of this document is to present the required details to support the Deployment Form to enable remediation works at the Site to be carried out under Arcadis' Environmental Permit reference EA/EPR/HP3295VK (EAWML/ 75105).

1.1 Customer Number

This Section has been left blank as we do not have a customer number

1.2 Discussions before Deployment Form Application

Discussions regarding the remediation scheme at the Former Redcar Steelworks have been held with Gary Wallace, at the Environment Agency (EA) (External Tel 02030255309) and Mick Gent Contaminated Land Officer, Redcar & Cleveland Borough Council.

1.3 Contact Details

Details of the Arcadis contact are presented below:

Name:	Adam Bethell
Organisation:	Arcadis (UK) Limited
Address:	3rd Floor, Charter House, 62-68 Hills Road, Cambridge, UK
Postcode:	CB2 1LA
Office Telephone Number:	01223 935011
Mobile Telephone Number:	07730 814938
Email Address:	adam.bethell@arcadis.com

1.4 Permit Details

The Permit under which this deployment will be taking place is:

EA/EPR/HP3295VK (EAWML 75105)

1.4.1 Details of Permit Holder

Name of the Operator:	Arcadis (UK) Limited
Address:	Arcadis House, 34 York Way, London
Postcode:	N1 9AB

2 Deployment Details

2.1 Operating Site

Details of the operating Site are summarised below:

Address: Redcar Steelworks
Postcode: TS6 7RT
Grid Reference: 455486, 521377
OSGB36 Grid ref: NZ 5548621377

2.2 Area of Treatment

2.2.1 Operating Site Boundary

The proposed Operating Site area is presented on Figure 2.

2.2.2 Security and Access Arrangements

The Operating Site is sited within the Former Redcar Steelworks. The wider Redcar Steelworks is fenced with security-controlled access points. The Operating site shall be fenced from the wider operations within the Redcar Steelworks using temporary mesh panel fencing to prevent unauthorised access.

2.2.3 Areas of Waste Soils and Contaminated Material, Substances or Products for Remediation by The Mobile Plant

Made ground and natural geology materials identified as unsuitable for direct reuse from the former Redcar Steelworks primarily from the Grangetown Prairie area are planned to be accepted for treatment at the facility.

2.2.4 Location/Siting of Principle Plant and Equipment

The principal remediation treatment will be required to be supplemented with a Water Treatment Plant and where required air ventilation equipment. The siting of these plant and equipment items is proposed to be located at the areas identified within Figure 3.

2.2.5 Process Treatment and Storage Areas

The material processing and storage areas which are sited on impermeable surfacing are identified on Figure 3.

2.2.6 Drainage Systems

The Operating Site is to have impermeable surfacing applied to the treatment zone which shall be graded to an approximate 1:100 fall and collected via grid drainage. The drainage shall be connected to attenuation tanks, sediment handling, oil water separator and where required treatment using secondary treatment via granular activated carbon. The output from the water treatment shall terminate within the Foul Drainage network which will be under a Discharge Consent through Northumbrian Water Limited.

2.2.7 Proposed Location of Boundary Monitoring Points

Boundary monitoring points have been selected to provide protection to the potential receptors identified in Section 2.2.8 with particular focus on the residential receptors to the south of the site. The boundary monitoring points are presented on Figure 2.

2.2.8 Potential Receptors

The Operating Site is a land parcel situated at the Former Redcar Steelworks located within the Redcar, Lackenby, Grangetown and South Bank conurbations of the Borough of Redcar & Cleveland, within the industrial area generally known as 'South Tees'. The area surrounding the Operating Site is dominated by the Former Steelworks and Industrial Zone. The nearest residential, commercial, surface water and recreational area receptors are identified on Figure 4.

Receptor	Distance from Operating Site boundary
Residential	250m South
Commercial	200m East (British Steelworks) 250m West (electrical transformer station)
Surface Water	100m South West – Unnamed Pond Culverted Kinkerdale Beck below the Operating Site boundary
Recreational	275m South Allotment Gardens

2.2.9 Protected Sites

The site is greater than 1.5 km south of the Teesmouth and Cleveland Coast SPA, Ramsar and SSSI site. At the time of writing this report it is not known if the site is currently being used by designated bird species from the Teesmouth and Cleveland Coast SPA (Special Protection Area). The designated site has not been identified on the Operating Site Plan as they are greater than the 1km from the Operating Site.

2.3 Other Environmental Permits

Arcadis is aware that Sahaviriya Steel Industries UK Limited (SSI) – that is now non-operational and in Liquidation operated an Environmental Permit (EPR/JP3638HM) within the same operational boundary as the proposed treatment area within this application.

This permit was disclaimed by the Official Receiver for SSI UK when they left site in October 2020.

2.3.1 Contaminants to be Treated

Materials which are identified as unsuitable for reuse under the Materials Management Plan shall be transported to the Soil Treatment Area. These materials are predominately impacted by Hydrocarbons Non-Aqueous Phase Liquid (NAPL) identified within the site ground investigation and encountered during excavation works to remove relic structures.

2.3.2 Treatment Technologies

Following the decision-making process outlined by Construction Industry Research and Information Association (CIRIA) guidance for the selection of remediation strategies and considering the primary main objectives of the remediation, a number of treatment options have been identified. The treatment processes selected to remediate the materials at the Former Redcar Steelworks site are identified below.

2.3.2.1 Ex-Situ Bio Remediation

Ex-situ, aerobic bioremediation. Most commonly applied through the use of biopiles, windrows or landfarming techniques involves the excavation and treatment of contaminated materials through bioaugmentation or the use of existing populations of microorganisms. These microorganisms degrade and breakdown the organic contaminants present whereby the by-products of this breakdown process are utilised as an energy source for the microbial population. The soil piles are placed on hardstanding or an impermeable layer with drainage to prevent leachate from entering the ground and to also facilitate the collection of contaminated liquids from the soil. Amendments can be introduced, and the materials are routinely turned to aerate, homogenises and break up the soils. A geomembrane cover is required to prevent the soil from becoming saturated by rain. Once successfully treated the material can be reinstated and reused on site.

2.3.2.2 Stabilisation and/ or Solidification

Soil Stabilisation/Solidification (S/S) is a remediation process that relies of the physical and chemical reactions between the stabilisation or solidification agent and the contaminated materials. These reactions reduce the mobility or availability of the contaminant through immobilisation through chemical reaction and / or physical encapsulation.

A range of reagents can be considered dependant on the material-specific conditions and the contaminant range present, but they typically include;

- Cement-based materials like Portland cement
- Clays including organo-clays
- Pozzolanic-based materials like fly ash, kiln dust, pumice, or blast furnace slag

2.3.2.3 Water / runoff treatment

The treatment area will be sited on an impermeable bund structure which shall capture runoff f from any materials stockpiled as well as collected precipitation from within the treatment area. The collected water and runoff will be subject to treatment prior to discharge to foul drainage under a temporary Trade Effluent Discharge Consent.

2.4 Cluster Project

This Site is proposed to form the Treatment Hub for a cluster project for treatment of materials from the Redcar Steelworks site remediation.

3 Duration of The Deployment

It is anticipated that the proposed remediation system will be operated at the Site for a period of 52 weeks.

The duration of this deployment is: **52 weeks** with no anticipated breaks.

4 Management Supervision

4.1 Technically Competent Manager

Details of the Arcadis Technically Competent Managers are presented below:

Name:	Victoria Lee Morten
Organisation:	Arcadis (UK) Limited
Address:	Part 3rd Floor, Charter House, 62-68 Hills Road, Cambridge, UK
Postcode:	CB2 1LA
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Email Address:	vicki.morten@arcadis.com

Name:	Richard Swarbrick
Organisation:	Arcadis (UK) Limited
Address:	Duxford House, 12a Willie Snaith Road, Newmarket, UK
Postcode:	CB8 7SU
Office Telephone Number:	01223 935011
Mobile Telephone Number:	07870574405
Email Address:	Richard.swarbrick@arcadis.com

Name:	Sarah Grainger
Organisation:	Arcadis (UK) Limited
Address:	10th Floor, 3 Piccadilly Place, Manchester, UK
Postcode:	M1 3BN
Office Telephone Number:	
Mobile Telephone Number:	07552 212227
Email Address:	sarah.grainger@arcadis.com

Copies of the Technically Competent Managers award certificates are presented in Appendix A.

4.2 Provide information on the site supervision plan for your TCM

4.2.1 Biopiles / Windrows

Following construction the Biopiles / Windrows the materials shall be left in treatment for periods without full time supervision whilst the treatment occurs. Complementary process shall be undertaken with automation and telemetry where required

4.2.1.1 Bio Remediation Ventilation Systems

Where required as part of the ex-situ bioremediation approach a forced ventilation system is designed to be operated automatically, with Critical Safety Devices (CSD) to ensure safe unattended operation.

An automatic shut-down will be fitted to activate in the event of:

- High vapour levels accumulating within the vapour extraction system
- High levels of liquid accumulating in the moisture separator
- System component failure.

In order to prevent unauthorised access to the SVE system and minimise the effects of potential vandalism, critical above ground components of the system will be housed within a secure locked shipping container.

4.2.1.2 Water Treatment Systems

Primary water treatment shall be undertaken with gravity fed attenuation / settlement tanks and an oil / water interceptor. Where the requirements for secondary treatment are identified in order to make the water suitable for discharge under consent to the foul drainage network an above ground treatment system including activated carbon filtration units, shall be deployed.

The water treatment system would typically be equipped with an oil-water separator with internal bunding and bes placed on an external bund located within the operating site. The aqueous-phase GAC (granular activated carbon) treatment vessels are also located on the external bund within the on-Site drainage system. The treated groundwater is discharged to sewer under a discharge consent granted by the sewerage undertaker. The system is designed to be operated automatically, with Critical Safety Devices (CSD) to ensure safe unattended operation.

Automatic shut-down will be fitted to activate in the event of:

- High levels within internal bunding
- High levels of liquid accumulating in the oil / water separator
- System component failure.

4.2.2 Arcadis Staff

During active construction of biopiles/windrows and during active batch treatment works, including turning and sampling of biopiles/windrows, a a suitably trained and competent engineer shall oversee the works. They shall be supported by the Technically Competent Manager who will attend the Operating Site for a minimum 1 hour per week on average.

Monthly system monitoring work will be conducted on the complementary processes which are controlled using automation via telemetry. The system monitoring shall be by suitably trained Arcadis personnel or authorised subcontractors. Only persons who have completed the Arcadis internal training for monitoring will conduct monitoring. The results collected will be interpreted by a senior member of Arcadis staff after samples have been collected.

Monthly site visits will be undertaken to undertake monitoring (including VOC (volatile organic compounds), odour emissions and noise) and maintenance.

5 Waste Types and Quantities

Waste Type	EWC Code	Quantity (m3)	Medium
Soil, contaminated soil, stones–	17 05 03* to 17 05 04	120,000	Solid Waste
Spent GAC from extracted water treatment and Ventilation System	19 13 01* Solid wastes from soil remediation containing dangerous substances	Estimated approximately 50 tonnes	Solid Waste to be taken off-site for high temperature regeneration / disposal
Untreatable Solids from the remediation process	19 13 01 solid wastes from soil remediation containing hazardous substances	Estimated approximately 100	Solid Waste
Untreatable Solids from the remediation process	19 13 02 solid wastes from soil remediation other than those mentioned in 19 13 01		Solid Waste
Sludges recovered from runoff from soil treatment area	19 13 03 sludges from soil remediation containing hazardous substances	Estimated approximately 50	Sludge
Sludges recovered from runoff from soil treatment area	19 13 04 sludges from soil remediation other than those mentioned in 19 13 03		Sludge
Recovered Non-Aqueous Phase Liquids	19 13 07 aqueous liquid wastes and aqueous concentrates from groundwater remediation containing hazardous substances	Estimated approximately 20	Liquid

6 Acceptance Procedures

6.1 Assessment of treatment

Please supply details of the procedures to be adopted at the site to ensure that only those materials that are treatable with the specified technology will be treated

Arcadis has undertaken a detailed ground investigation of the areas that are being redeveloped and remediated. The ground investigation was to identify materials that would not be suitable for reuse without treatment. During the excavation works any materials identified as being potentially unsuitable for use shall be segregated and tested chemically and / or using a hydrocarbon field test kits undertaken as part of the acceptance into the treatment process at the Operating Site.

A Materials Management Plan (MMP) has been submitted to track and manage the materials and ensure that material that are not suitable for reuse without treatment are segregated. Materials that require treatment shall be logged within the MMP tracking sheet prior to entering the Operating Site.

6.2 Residual Materials and Waste

Detail how residual materials or waste which cannot be treated by the specified technology are to be handled at the site

Residual materials or waste that cannot be treated by the technologies within this deployment form application shall be segregated from the treatable materials and held within the quarantine bay whilst waste characterisation testing and where required Waste Acceptance Criteria testing is undertaken. Following characterisation and where no viable recovery or recycling option exists, the waste shall be disposed of under full duty of care to a licenced disposal facility.

Where liquid residual materials are generated, these shall be stored in tanks, Intermediate Bulk Containers (IBCs), drums or other suitable containers within a bunded area. The bunds will have a minimum capacity of 25% of the total volume contained within the bund, or 110% of the largest container, whichever is greater.

6.3 Maximum Capacity

Specify the maximum capacities of quarantine facilities to be used for the storage of contaminated materials destined for re-testing, re-processing or off-site disposal

It is anticipated that up to 25,000m3 of material can be actively treated (at any one time) on the soil treatment bund which is to be constructed with the following specifications:

- Approximately 12,000m² of impermeable surfacing which is graded to a fall to allow the capture of runoff and rainwater.
- Bunded walls to contain lateral runoff.
- Grided collection drainage to capture liquid runoff which is directed through water treatment.
- Attenuation tanks to capture runoff.
- Water Treatment Plant to remove free phase hydrocarbons and suspended sediments.
- Where required to meet consented discharge criteria additional water treatment capacity shall be deployed.

Samples of material within active treatment will be taken at regular intervals to determine when materials are suitable for reuse from the bioremediation processes, aterials shall be kept on the impermeable treatment areas until suitable for reuse. The maximum soil storage capacity of the quarantine facilities for retesting or reprocessing/continued processing shall be up to the maximum treatment capacity of 25,000m3. In addition

an area of the impermeable surfacing shall be designated as a Quarantine area for materials which will require disposal off site, the capacity of this storage area shall be up to 1,000m3 of solid materials and up to 20m3 of aqueous wastes stored in appropriate EN waste containers. This quarantine area is identified on Figure 4.

In addition solid wastes will arise through the use of filtration media such as GAC and sand. This material will remain in its process vessel until disposal off-Site in accordance with Environmental Permitting and Waste Management Regulations.

7 Conceptual Site Model and Risk Assessment

A plan showing potential receptors and surrounding land use is presented on Figure 4.

The Conceptual Site Model (CSM) and Environmental Risk Assessment for remediation works is presented on Figure 5.

8 Pollution Control

Operation of the remedial system will produce waste streams. The relevant waste streams and controls to prevent pollution are summarised below.

8.1 Noise

It is not anticipated that noise generated through the remediation process will produce detriment or impact to the surrounding receptors. The Operating Site boundary is over 300m from the nearest residential receptors. It is also noted that a number of earth bunds and mature tree planting exist that provided noise protection during the time when the steelworks was in operation.

Plant movements shall be limited to Monday through Friday and between the hours of 0700 to 1800 hrs

Water treatment systems and bioremediation forced air ventilation systems where required will be housed in locked sound insulated shipping containers. However, to ensure that the operation of the remediation systems does not result in complaints regarding noise, a noise emission monitoring plan will be implemented at the Operating Site (described in Section 9.2.1).

8.2 Dust (including Particulates and Fibres)

As necessary prevention of wind-blown dust arising from Bioremediation process shall be undertaken through engineering the windrows to suppress the generation of dust, through the use of covers and through damping down.

During the construction and turning of the bioremediation windrows additional care shall be taken to ensure that the materials do not create an unacceptable level of dust generation. Where required dust suppression shall be deployed to prevent dust becoming mobile outside of the Operational Site.

8.3 Vibration

Arcadis does not anticipate vibration being an issue at this Site in general due to the size and type of equipment being used and the distance to receptors.

8.4 Litter

Arcadis does not anticipate litter being an issue at this Site and the remediation works do not involve activities that generate large quantities of litter.

8.5 Pests

Arcadis does not anticipate pests being an issue at this Site in general due to the nature of the materials that are to be treated being granular soils and stones contaminated predominately with hydrocarbons.

8.6 Gaseous Waste (VOCs, Vapours and Odours)

Where required extracted soil vapour will be passed through an absorbent media (GAC) to reduce contaminant concentrations and odour prior to discharge to the atmosphere. The air discharge will be monitored during the monthly system monitoring visits and absorbent media renewed as required.

8.7 Liquid Wastes

Arcadis anticipate that Light Non Aqueous Phase Liquid (LNAPL) will be recovered from the treated soils and associated runoff from the impermeable surfaced treatment area. The separated LNAPL shall, once recovered, be stored in UN approved waste containers within bunded areas prior to off-Site disposal in accordance with the applicable Environmental Permitting and Waste Management Regulations under Duty of Care documentation.

8.8 Solid Waste

Arcadis anticipate that small quantities of non-treatable solid waste will be encountered during the remediation. These solid untreatable wastes generated by the remediation programme will be disposed of off-Site in

accordance with the applicable Environmental Permitting and Waste Management Regulations under Duty of Care documentation.

Where required to treat the extracted soil vapour and recovered water, prior to discharge, GAC has been incorporated into the remediation system. The GAC will be replaced periodically as it becomes saturated and unable to absorb. The saturated GAC will be removed from the vessels and will be sent for reactivation, where possible, as a more environmentally responsible approach that disposing of the GAC to landfill. Arcadis will retain copies of Duty of Care documentation with the Site records.

8.9 Groundwater and surface water protection

The location of the operating site has been selected to allow the installation of a bunded treatment and storage area to prevent contamination of groundwater. The bunded area shall be created to provide;

- Approximately 12,000m² of impermeable surfacing which is graded to a fall to allow the capture of runoff and rainwater.
- Bunded walls to contain lateral runoff
- Grided collection drainage to capture liquid runoff which is directed through water treatment
- Sediment and LNAPL capture
- Where required to meet consented discharge criteria additional treatment shall be deployed

The nearest surface water feature (an unnamed pond) to the Operating site is 100m south west of the operating site boundary and approximately 200m from the bunded treatment zone. The remediation operation is not anticipated to produce any impact to these features. The surface water features shall be routinely inspected to ensure that there is no impact from the remediation.

9 Emission Monitoring Plans

9.1 Emissions Generated

Arcadis has identified the following emissions that may be generated during the remediation works:

- Noise
- Odour
- Dust

The monitoring plans for these emissions are discussed in more detail below. The monitoring plans include the following:

- Defining the pollutants to be monitored;
- Emission limits and trigger levels;
- Information on monitoring locations;
- Monitoring scheme details, including frequency of monitoring, instrumentation etc;
- Monitoring team;
- Action plan if trigger levels are exceeded; and,
- Baseline monitoring plan.

9.2 Monitoring Plans

9.2.1 Monitoring Plan – Noise

To ensure that the operation of the remediation process and systems does not result in complaints regarding noise, a noise emission monitoring plan will be implemented at the Site. If the remediation processes / systems result in complaints regarding noise, operation of the remediation systems will be ceased and action will be taken to reduce the noise level as appropriate.

The noise emission monitoring plan is discussed in more detail below:

Noise Emission Monitoring Plan	
Potential Pollutant	**Noise**
Emission Limits & Trigger Levels	Should Site staff, Arcadis monitoring personnel or neighbouring residents be exposed to the remediation plant which generates noise that may periodically or continuously exceed the second action limit (85 dB) it could potentially result in acute/ partial hearing loss or high/ low tone deafness. Therefore, to be protective of the potential receptor's hearing, the following emission limit & trigger levels are proposed for the noise emission monitoring plan:

Noise Emission Monitoring Plan Continued	
Emission Limits & Trigger Levels Continued	**Emission Level: Not more than 5 dB above background noise level according to British Standard BS4142: 2014 *** **Trigger Level: 80 db**
Monitoring Locations	The proposed monitoring locations to undertake noise monitoring during the remediation works are presented on Figure 2.
Monitoring Scheme	Arcadis proposes to undertake noise monitoring on a fortnightly basis at the locations proposed on Figure 2. The monitoring will be undertaken using a digital sound level meter with a range of approximately 30 dB to 130 dB. On a monthly basis and at each location, noise measurements will be taken using the meter over a period of 10 minutes. A measurement will be collected each minute and the peak and average reading will be recorded and compared to the trigger level. To ensure quality control, duplicate readings will be undertaken over an additional 10 minute monitoring period at one location per visit. **Frequency of Monitoring: Fortnightly** **Type of Equipment: Sound Level Monitor**
Monitoring Team	The proposed monitoring work will be conducted by suitably trained Arcadis personnel. Only persons who have completed the Arcadis internal training for monitoring will conduct monitoring. The results collected will be interpreted by a senior member of Arcadis staff after data has been collected. In addition, the Technically Competent Manager will regularly attend Site to ensure appropriate data is collected. **Monitoring Team: Suitably Trained Arcadis Personnel**
Action Plan	If the trigger level of 80 dB is exceeded at one or more of the proposed monitoring locations the following actions will be undertaken: **If the trigger level is exceeded in the remediation treatment area only:** • Duplicate readings will be undertaken over an additional 10 minute monitoring period at the location where the trigger level is exceeded and if the noise emission continues to exceed the trigger level of 80db minimum Personal Protective Equipment (PPE) required – ear protection for Arcadis staff will be mandatory. **If the trigger level is exceeded in the remediation treatment area and at the monitoring points located external to the remediation containers**: • Arcadis will increase the sound insulation measures within the remediation system container(s) to reduce ambient noise.
Baseline Monitoring Plan	A round of noise monitoring, following the proposed monitoring scheme detailed above, will be undertaken prior to and during remediation

	system commissioning works to obtain baseline data prior to the remediation works.

* BS 4142: 1997 Method of Rating Noise Affecting Mixed Residential and Industrial Areas

9.2.2 Monitoring Plan – Odour

To ensure that the remediation work does not result in complaints regarding odour, an odour emission monitoring plan will be implemented at the Site. If the remediation process / systems result in complaints regarding odour, operation of the remediation systems will be ceased and action will be taken to reduce the odour level as appropriate.

The odour emission monitoring plan is detailed below.

Odour Emission Monitoring Plan	
Potential Pollutant	**Odour**
Emission Limits & Trigger Levels	Should Site staff, Arcadis monitoring personnel or neighbouring residents be exposed to malodour it can be perceived as an indication of reduced quality of life. Therefore, the following emission limit & trigger levels are proposed for the odour emission monitoring plan: **Emission Level: Malodour detected by Arcadis staff during Fortnightly Site visit** **Trigger Level: Complaint received regarding malodour**
Monitoring Locations	The proposed monitoring locations to undertake odour monitoring during the remediation works are presented on Figure 2.
Monitoring Scheme	Arcadis proposes to undertake odour monitoring on a Fortnightly basis at the locations proposed on Figure 2. This will comprise olfactory assessment by the Arcadis consultant. On a fortnightly basis and at each location, olfactory measurements will be recorded. The following information will be recorded: • Odour strength (scaled from 1 – 5); • Extent and type of odour (following EA guidelines IAQM) • Weather conditions; • Other relevant information. **Frequency of Monitoring: Fortnightly**
Monitoring Team	The proposed remediation and monitoring work will be conducted by suitably trained Arcadis personnel. Only persons who have completed the Arcadis internal training for monitoring will conduct monitoring. The results collected will be interpreted by a senior member of Arcadis staff after data has been collected. In addition, the Technically Competent Manager will regularly attend Site to ensure appropriate data is collected. **Monitoring Team: Suitably Trained Arcadis Personnel**

Odour Emission Monitoring Plan Continued	
Action Plan	Malodour issues are not anticipated due to the control measures proposed, the geographical location of the site and the natural barriers that are present (earth bunds, building structures and dense tree lines. However, if the trigger level is exceeded at one or more of the proposed monitoring locations the following actions will be undertaken: If complaints regarding malodour are repeatedly received Arcadis will consider the use of odour suppression chemicals or other techniques for reducing odour emissions.
Baseline Monitoring Plan	A round of odour monitoring, following the proposed monitoring scheme detailed above, will be undertaken prior to remediation to obtain baseline data.

9.2.3 Monitoring Plan – Dust

During the construction / dismantling of bioremediation treatment piles during dry weather there is a potential for dust generation at an unacceptable level.

To ensure that the remediation work does not result in complaints regarding dust, a dust emission monitoring plan will be implemented at the Site. If the remediation process / systems result in a substantiated complaint regarding dust, operation of the remediation process / systems will be paused and action will be taken to reduce the dust level as appropriate.

The dust emission monitoring plan is detailed below.

Dust Emission Monitoring Plan	
Potential Pollutant	**Dust**
Emission Limits & Trigger Levels	Should Site staff, Arcadis monitoring personnel or neighbouring residents be exposed to dusts generated by the processing of materials they could potentially have a harmful effect on their health. Therefore, to be protective of the potential receptor's health, the following trigger levels are proposed for the dust emission monitoring plan: Level 1 indicator – generation of unacceptable levels of dust are transported more than 10m from generation point. Level 2 indicator Visual unacceptable dust production from processing material identifiable at monitoring points Level 3 trigger - visual monitoring identifies unacceptable dust generation / significant movement of dust across the boundary The use of visual trigger levels will identify when additional mitigation measures are required, or when modification of operations is required (including the cessation of operations during windy conditions).
Monitoring Locations	The proposed monitoring locations to undertake dust monitoring during the remediation works are presented on Figure 2.
Monitoring Scheme	Arcadis proposes to undertake dust monitoring on a fortnightly basis at the locations proposed on Figure 2. On a fortnightly basis and at each location, a visual assessment of the dust generation and transport is to be made. **Frequency of Monitoring: Fortnightly** **Type of Equipment: Visual**

Monitoring Team	The proposed remediation and monitoring work will be conducted by suitably trained Arcadis personnel. Only persons who have completed the Arcadis internal training for monitoring will conduct monitoring. The results collected will be interpreted by a senior member of Arcadis staff after data has been collected. In addition, the Technically Competent Manager will regularly attend Site to ensure appropriate data is collected. **Monitoring Team: Suitably Trained Arcadis Personnel**
Action Plan	If one of the trigger levels are exceeded at one or more of the proposed monitoring locations the following actions will be undertaken: **Duplicate Monitoring** Duplicate monitoring will be undertaken over an additional 10 minute monitoring period at the location where the trigger level is exceeded to confirm the identified trigger level exceedance **Dust Reduction Measures** Where duplicate monitoring confirms exceedances of the trigger levels or where a substantiated dust complaint is received – active works shall be paused to assess the method of generation and deployment of management measures such as damping down stockpiles.
Baseline Monitoring Plan	A round of dust monitoring, following the proposed monitoring scheme detailed above, will be undertaken prior to and during remediation system commissioning works to obtain baseline data prior to the remediation works.

10 Record Keeping

Records made in relation to the remediation works will be stored on Site, within a locked and secured location (e.g. site office / remediation container) and will therefore be available for inspection on Site. A digital copy (photograph, scan etc.) will be made and stored on Arcadis' secure server for reference from the office.

The records will include a Site diary, which will contain details of the following events, if they occur during the remediation works:

- Construction works;
- Remediation system maintenance works;
- Remediation system breakdowns and periods of cessation of operation;
- Incidents, accidents or emergencies on-Site;
- Variations from or problems with the Acceptance Procedure (see Section 6 of this document);
- Site Inspections;
- Attendance of the Technically Competent Manager, including the date and time on-Site and the time they leave the Site;
- Weather conditions;
- Complaints regarding the remediation works; and,
- Pollution incidents and measures taken to remedy.

10.1 Details of Commissioning

Prior to mobilisation of the remediation plant to support the main remedial activities, a pre commissioning check will be undertaken by competent staff to ensure system is functioning safely and correctly and that safety features such as high level switches etc. are in full working order. These checks will be undertaken again as part of the commissioning works on site and records will be made of the process plant and equipment used. The plant will subsequently be operated in accordance with the details in this Deployment Form.

10.2 Details of Operating and Maintenance

During operation of water treatment and forced air ventilation systems, monthly CSD checks will be undertaken alongside general system maintenance (as required) and site inspections will be undertaken to ensure that they are not creating a pollution issue during the system operation *etc*.

The results of all monitoring works, including the date of the reading / sampling will be recorded on the appropriate Site log. Samples will be dispatched with an appropriate chain of custody and duplicates of the chain of custody will also be retained with the Site documentation.

The volume of contaminated material, substances or products treated or removed from the Site will also be recorded and stored in electronic form along with the results of the monthly monitoring.

11 Summary

This Deployment Form has been submitted for the proposed remediation of soils at the Former Redcar Steelworks site. The remediation approach comprises bioremediation and / or stabilisation & solidification deployed on an impermeable surfacing with supporting remediation system and infrastructure presented on Figure 3.

This Deployment Form outlines the following procedures and processes that will be adhered to following the commissioning of the remediation process and associated systems and during the envisaged 12 months of operation:

- Management supervision;
- Acceptance procedure;
- Pollution control; and,
- Record keeping.

For further information please contact Arcadis using the contact details provided.

FIGURES

LEGEND

SITE LOCATION

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 100 200 400 600 800 1,000 Metres

N

TITLE:

SITE LOCATION PLAN

SITE :

REDCAR STEEL WORKS

CLIENT :

STDC

PROJECT :	**10035118**	**FIGURE 1**	
DATE :	15/01/21	DRAWN BY :	AP
DRG No. :	10035118-AUK-XX-XX-DR-ZZ-0001-P1		
SCALE :	**1 : 25,000**	PRINT :	**A3**

ARCADIS Design & Consultancy for natural and built assets

LEGEND

OPERATING SITE BOUNDARY

MONITORING_IOCATIONS

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 30 60 120 180 240 300 Metres

N

TITLE:
ENVIRONMENTAL COMPLIANCE MONITORING LOCATIONS

SITE :
REDCAR STEEL WORKS

CLIENT :
STDC

PROJECT :	**10035118**	**FIGURE 2**	
DATE :	15/01/21	DRAWN BY :	AP
DRG No. :	10035118-AUK-XX-XX-DR-ZZ-0002-P1		
SCALE :	**1 : 8,000**	PRINT :	**A3**

ARCADIS Design & Consultancy for natural and built assets

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- OPERATING SITE BOUNDARY
- IMPERMEABLE SURFACING FOR PRIMARY TREATMENT
- MATERIAL QUARANTINE AREA
- TREATED MATERIAL STORAGE AREA
- WATER TREATMENT AREA

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 10 20 40 60 80 100 Metres

N

TITLE:
REMEDIATION INFRASTRUCTURE LOCATION PLAN

SITE :
REDCAR STEEL WORKS

CLIENT :
STDC

PROJECT :	**10035118**	**FIGURE 3**	
DATE :	15/01/21	DRAWN BY :	AP
DRG No. :	10035118-AUK-XX-XX-DR-ZZ-0003-P1		
SCALE :	**1 : 2,500**	PRINT :	**A3**

ARCADIS Design & Consultancy for natural and built assets

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

OPERATING SITE BOUNDARY

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

N

0 30 60 120 180 240 300 Metres

TITLE:
POTENTIAL RECEPTORS AND SURROUNDING LAND USE

SITE :
REDCAR STEEL WORKS

CLIENT :
STDC

PROJECT :	**10035118**	**FIGURE 4**	
DATE :	15/01/21	DRAWN BY :	AP
DRG No. :	10035118-AUK-XX-XX-DR-ZZ-0002-P1		
SCALE :	**1 : 8,000**	PRINT :	**A3**

ARCADIS Design & Consultancy for natural and built assets

Redcar Steelworks remediation

Conceptual Site Model & Risk Assessment

Source	Receptor	Harm	Pathway	Probability of Exposure	Consequence	Magnitude of Risk	Justification of Magnitude	Risk Management	Residual Risk
Contaminant: Hydrocarbons, Poly Aromatic Hydrocarbons incidental Asbestos containing materials	Groundwater Surface Water - unnamed pond and culverted Kinkerdale beck Underlying Secondary 'undifferentiated' & Secondary B Aquifers	Contamination of groundwater	Leaching of contaminants from soils to groundwater or surface water features and off-site migration by groundwater / surface water flow	Medium	High	High	Effect of contaminant on underlying aquifer quality and potential for off-site migration.	Materials for treatment are to be placed on impermeable surfacing with integrated drainage to contain contaminated sediments and water from treatment Monitoring of groundwater quality post remediation	Low
	Commercial workers and neighbouring residents	Human health	Exposure to contaminant vapour from contaminated soils during treatment and from complementary water treatment and forced ventilation of bioremediated piles	Medium	Low	Low	The nearest residential receptors are 270m south of the remediation area. Nearest offsite commercial worker receptors are 290m East South East. The nearest onsite commercial worker immediately adjacent to remediation areas.	Odour survey to screen boundary of remediation area and site monthly during works. Odour suppression contingency measures available if trigger levels exceeded.	Low
Dust, Fibres & Particulates	Commercial workers and neighbouring residents	Human health	Exposure to contaminated dusts generated from soil treatment	Medium	Medium	Medium	Dust may be generated from the construction, dismantling and processing of soil treatment piles especially within dry weather conditions	Limited periods of construction, processing and dismantling of soil treatment piles where the active works shall be intensively surveyed to screen boundary of remediation area to ensure that trigger levels are not breached. Where trigger levels are exceed dust suppression contingency measures available such as dampening down.	Low
Dust, Fibres & Particulates	Site workers and neighbouring residents	Visual amenity impact	Spread of windblown dust/ particulates to adjoining parts of the site and beyond site boundary.	Low	Low	Low	Dust may be generated from the construction, dismantling and processing of soil treatment piles especially within dry weather conditions	Limited periods of construction, processing and dismantling of soil treatment piles where the active works shall be intensively surveyed to screen boundary of remediation area to ensure that trigger levels are not breached. Where trigger levels are exceed dust suppression contingency measures available such as dampening down.	Low
Noise	Impacts on site workers, properties and persons in the vicinity of the site boundary	Greater perception of nuisance than actual harm itself	Noise generated by use of remediation equipment on-site	Low	Low	Low	Greater perception of nuisance than actual harm itself	Remediation system equipment will be located within an insulated container /housing. Noise monitoring will be undertaken monthly adjacent to the remediation system and at the site boundaries. Contingency measures (e.g. install noise suppression fencing) if trigger levels exceeded. Personal Protective Equipment will be provided to on-site Arcadis staff if required.	Low
Vibration	Impacts on properties and persons in the vicinity of the site boundary	Greater perception of nuisance than actual harm itself	Limited vibration generated by use of infrastructure plant & remediation equipment on-site	Low	Low	Low	Large distance to closest receptors with works producing limited vibration.	ARCADIS does not anticipate vibration being an issue at this Site in general due to the size and type of equipment being used and the distance to receptors.	Low
Litter	Site workers and neighbouring residents	Visual amenity impact & hygiene issues	Spread of windblown litter (paper, cardboard, plastics *etc.*) to adjoining parts of the site and beyond site boundary.	Low	Low	Low	No activities that generate large quantities of litter are anticipated as part of the remediation works.	Waste produced to be stored appropriately and removed from site in accordance with applicable UK Waste Legislation	Low
Pests	Site workers and neighbouring residents	Visual amenity impact & hygiene issues	Storage of organic wastes increasing risk of pests such as rats.	Low	Low	Low	No activities that increase the risk of pests are anticipated as part of the remediation works.	ARCADIS does not anticipate pests being an issue at this Site in general due to the nature of the materials being treated through the works.	Low
Odour	Site workers and neighbouring residents	Odour nuisance	Windborne odours from soil treatment and/or remediation system detectable by site workers and at the site boundary by general public and neighbouring residents	Medium	Low	Low	Greater perception of nuisance than actual harm itself	Odour survey and PID to screen boundary of remediation area and site monthly during works. VOC/Odour suppression contingency measures available if trigger levels exceeded. Water treatment and forced air ventilation system will be designed and applied to effectively control & treat soil gas and any associated odours.	Low
Fuels for Remediation System Generator	Groundwater	Damage of waters	Off-site migration by groundwater flow	Low	Low	Low	Effect of contaminant on underlying aquifer quality and potential for off-site migration.	Small volumes of fuels to be stored in appropriate labelled containers within a bunded area in the Arcadis Compound. Spill kits to be available and routine check of storage to undertaken. Operating site treatment area is covered in hardstanding.	Low
	Site Workers	Human Health	Exposure to vapours during use	Low	Low	Low	Nearest indoor commercial worker receptors are immediately adjacent to remediation areas.	Small volumes of fuels to be stored in appropriate labelled containers within a bunded area in the Arcadis Compound. Spill kits to be available and routine check of storage to undertaken. Operating Site is treatment area is covered in hardstanding. Appropriate PPE to be worn when handling products.	Low

APPENDIX A

Technically Competent Managers - Documents

Continuing Competence Certificate

This certificate confirms that

Sarah Grainger

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 15/11/2019

CLR Contaminated Land Remediation

Expiry Date: 15/11/2021

Verification date: 11/11/2019

Authorised:

WAMITAB Chief Executive Officer

Learner ID: 15915

Certificate No.: 5153972

Date of Issue: 15/11/2019

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

00136386

WAMITAB

Waste Management Industry
Training and Advisory Board

QCA
Qualifications and
Curriculum Authority

National Vocational Qualification

Qualification Title:

Level 4 in Waste Management Operations - Managing Treatment Hazardous Waste (Remediation 4TMHCL)

Qualification Accreditation Number:

10026587

This Certificate is awarded to

Sarah Elizabeth Grainger

Awarded: 18/01/2008

Serial No:15915/4TMHCL/2

Authorised

.....
Lawrence Strong
Director General, WAMITAB

.....
Ray Burberry
Qualifications Manager, WAMITAB

WAMITAB. Waste Management Industry Training and Advisory Board. Peterbridge House, 3 The Lakes, Northampton, NN4 7HE
Telephone: 01604 231950 Fax: 01604 232457 Email: info.admin@wamitab.org.uk Website: www.wamitab.org.uk

WAMITAB

Waste Management Industry
Training and Advisory Board

Qualification Title:

Level 4 in Waste Management Operations - Managing Treatment Hazardous Waste (Remediation 4TMHCL)

Qualification Accreditation Number:

10026587

Units gained by Sarah Elizabeth Grainger

U1027789	Create effective working relationships (MCI Unit C4)
R1013863	Provide information to support decision making on a waste management site.
K1013867	Control the reception of hazardous waste
M1013871	Control the movement, sorting and storage of hazardous wastes
U1051769	Monitor procedures to control risks to health and safety (Employment NTO Unit B)
F1013860	Control maintenance and other engineering operations
J1013861	Control improvements to waste management operations
U1026119	Support the efficient use of resources (MCI Unit B1)
K1013884	Review the performance of teams and individuals
M1013918	Control site operations for the remediation of contaminated land
F1013924	Control the disposal of outputs and residues from the remediation of contaminated land
H1014015	Ensure protection of the environment on hazardous waste treatment or transfer sites

Serial No: 15915/11/2

WAMITAB. Waste Management Industry Training and Advisory Board. Peterbridge House, 3 The Lakes, Northampton, NN4 7HE
Telephone: 01604 231950 Fax: 01604 232457 Email: info.admin@wamitab.org.uk Website: www.wamitab.org.uk

WAMITAB

WASTE MANAGEMENT INDUSTRY TRAINING AND ADVISORY BOARD

CERTIFICATE No: 09390

CERTIFICATE OF TECHNICAL COMPETENCE

This Certificate confirms that

Sarah Elizabeth Grainger

has demonstrated the standard of technical competence required for the management of a facility of the type set out below

Facility Type:

Level 4 in Waste Management Operations - Managing

Treatment Hazardous Waste (Remediation 4TMHCL)

Authorising Signatures:

Director General

Director

Date of issue: 18 January 2008

Certificate No. CCC5810

Continuing Competence Certificate

This certificate confirms that

Victoria Lee Morten

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current to 29 February 2016:

CLR Contaminated Land Remediation

Expiry Date: 29/02/2016

Awarded: 17/12/2013

Authorised

WAMITAB Chief Executive Officer

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

00047991

wamitab

Certificate No. CCC11887

Continuing Competence Certificate

This certificate confirms that

Victoria Lee Morten

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 03/03/2016

CLR Contaminated Land Remediation

Awarded: 03/03/2016

Expiry Date: 03/03/2018

Authorised

WAMITAB Chief Executive Officer

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

00104342

Certificate No. CCC16861

Continuing Competence Certificate

This certificate confirms that

Victoria Lee Morten

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 01/03/2018

CLR Contaminated Land Remediation

Awarded: 01/03/2018

Expiry Date: 01/03/2020

Authorised

WAMITAB Chief Executive Officer

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

00126707

WAMITAB

Waste Management Industry
Training and Advisory Board

QCA
Qualifications and
Curriculum Authority

National Vocational Qualification

Qualification Title:

Level 4 in Waste Management Operations - Managing Treatment Hazardous Waste (Remediation 4TMHCL)

Qualification Accreditation Number:

10026587

This Certificate is awarded to

Victoria Lee Mitchell

Awarded: 02/07/2008

Serial No:16399/4TMHCL/1

Authorised

.....

Lawrence Strong
Director General, WAMITAB

.....

Ray Burberry
Qualifications Manager, WAMITAB

WAMITAB Waste Management Industry Training and Advisory Board Peterbridge House, 3 The Lakes, Northampton, NN4 7HE
Telephone: 01604 231950 Fax: 01604 232457 Email: info.admin@wamitab.org.uk Website: www.wamitab.org.uk

WAMITAB

WASTE MANAGEMENT INDUSTRY TRAINING AND ADVISORY BOARD

CERTIFICATE No: 09876

CERTIFICATE OF TECHNICAL COMPETENCE

This Certificate confirms that

Victoria Lee Mitchell

has demonstrated the standard of technical competence required for the management of a facility of the type set out below

Facility Type:

Level 4 in Waste Management Operations - Managing

Treatment Hazardous Waste (Remediation 4TMHCL)

Authorising Signatures:

Director General _____

Director _____

Date of issue: 02 July 2008

Continuing Competence Certificate

This certificate confirms that

Victoria Morten

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 05/03/2020

CLR Contaminated Land Remediation

Expiry Date: 05/03/2022

Verification date: 03/03/2020

Authorised:

WAMITAB Chief Executive Officer

Learner ID: 16399

Certificate No.: 5162052

Date of Issue: 05/03/2020

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

00146524

wamitab

Qualification Title:

WAMITAB Level 4 Certificate in Waste and Resource Management

Qualification Accreditation Number:

603/3581/6

This Certificate is awarded to

Richard Swarbrick

Verification date: 02/06/2020

Authorised:

Chris James
WAMITAB Chief Executive Officer

Learner ID: 109490

Certificate No.: 5165496

Date of Issue: 03/06/2020

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Corff dyfarnu cydnabyddedig
Cymwysterau Cymru Qualifications Wales
Recognised awarding body

The qualifications regulators logos on this certificate indicate that the qualification is accredited only for England and Wales. Qualifications Wales regulates this qualification where it is awarded to learners assessed wholly or mainly in Wales.

00148523

Units achieved by

Richard Swarbrick

Units gained:

		Level
M/617/2098	Health and safety in the waste and resource management industry	L4
T/617/2099	Environmental protection in the waste and resource management industry	L4
D/617/2100	Principles of sustainable waste and resource management	L4
H/617/2101	Legislation for the operation of a waste management facility	L4
K/617/2102	Stakeholder communication and other non-legislative factors affecting the waste and resource management industry	L4
F/617/2106	Principles and practices of managing land remediation activities	L4

Verification date: 02/06/2020

Authorised:

Learner ID: 109490

Certificate No.: 5165496

Date of Issue: 03/06/2020

Chris James
WAMITAB Chief Executive Officer

Corff dyfarnu cydnabyddedig
Cymwysterau Cymru Qualifications Wales
Recognised awarding body

The qualifications regulators logos on this certificate indicate that the qualification is accredited only for England and Wales. Qualifications Wales regulates this qualification where it is awarded to learners assessed wholly or mainly in Wales.

00148524

Operator Competence Certificate

Title:

Waste and Resource Management - Land Remediation

This Certificate is awarded to

Richard Swarbrick

Verification date: 02/06/2020

Authorised:

WAMITAB Chief Executive Officer

Learner ID: 109490

Certificate No.: 5165496

Date of Issue: 03/06/2020

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

This certificate is jointly awarded by WAMITAB and the Chartered Institution of Wastes Management (CIWM) and provides evidence to meet the Operator Competence requirements of the Environmental Permitting (EP) Regulations, which came into force on 6 April 2008.

00148525

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