



**PART 2 A
ENVIRONMENTAL PROTECTION
ACT 1990

PUBLIC REGISTER**

If you have any questions about this register
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Details of Revision	Date	Officer
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Section 1



ENVIRONMENTAL PROTECTION ACT 1990, SECTION 78H(7)

THE CONTAMINATED LAND (ENGLAND) REGULATIONS 2000 (SI 2000/227)

REMEDICATION STATEMENT

Prepared by Warrington Borough Council

Sankey Bridges Phase I, Warrington

Environmental Protection Act 1990, Section 78H(7)

**Remediation Statement for Sankey Bridges, Warrington
Prepared by Warrington Borough Council**

**The Contaminated Land (England) Regulations 2000 SI2000/227,
The Contaminated Land (England) (Amendment) Regulations 2001 SI2001/663.**

This Remediation Statement has been prepared by Warrington Borough Council (WBC) in relation to contaminated land identified under section 78B of the Environmental Protection Act 1990 (the 1990 Act).

The contaminated land has not been designated as a special site under 78C of the Act.

The location and extent of the contaminated land to which this Remediation Statement relates (the Land) are set out in Schedule 1.

The Council as enforcing authority in relation to the land is undertaking the remediation scheme itself, acting under powers granted it by virtue of section 78N paragraph 3(e) of the Act.

The current use of the land is residential. A summary of the inspection of the contaminated land is given in Schedule 2.

The Council as enforcing authority in relation to the land, is precluded by section 78H(5)(b) from serving a Remediation Notice and has therefore prepared this Remediation Statement in accordance with section 78H(7) and (8).

The things which have been done by way of remediation and the date of completion are set out in Schedule 3.

Details of the substances and reasons why the land is contaminated land by virtue of there being significant possibility of significant harm are set out in Schedule 4.

Details of any revisions to this Remediation Statement are given in Schedule 5.

The name and address of the person (the 'Responsible Person' for the purpose of section 78H(7) of the Act) who has prepared this Remediation Statement and who has carried out the work detailed in Schedule 3 to this Remediation Statement is:

Warrington Borough Council

Warrington Borough Council
Environment & Regeneration Directorate
Environment & Public Protection Services
New Town House
Buttermarket Street
Warrington
WA1 2NH

For Warrington Borough Council as enforcing authority for Part IIA of the Act:

Land Quality Team

Environmental Protection
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Contact: Senior Environmental Protection Officer, at the above address

Prepared by: Vicky Simcott

Signed: _____

Position: Senior Environmental Protection Officer

Signature of person issuing the statement on behalf of Warrington Borough Council:

Issued by: Tommy Wallace

Signed: _____

Position: Head of Service Housing Protection & Community

Date: 3 October 2008

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SCHEDULE 1

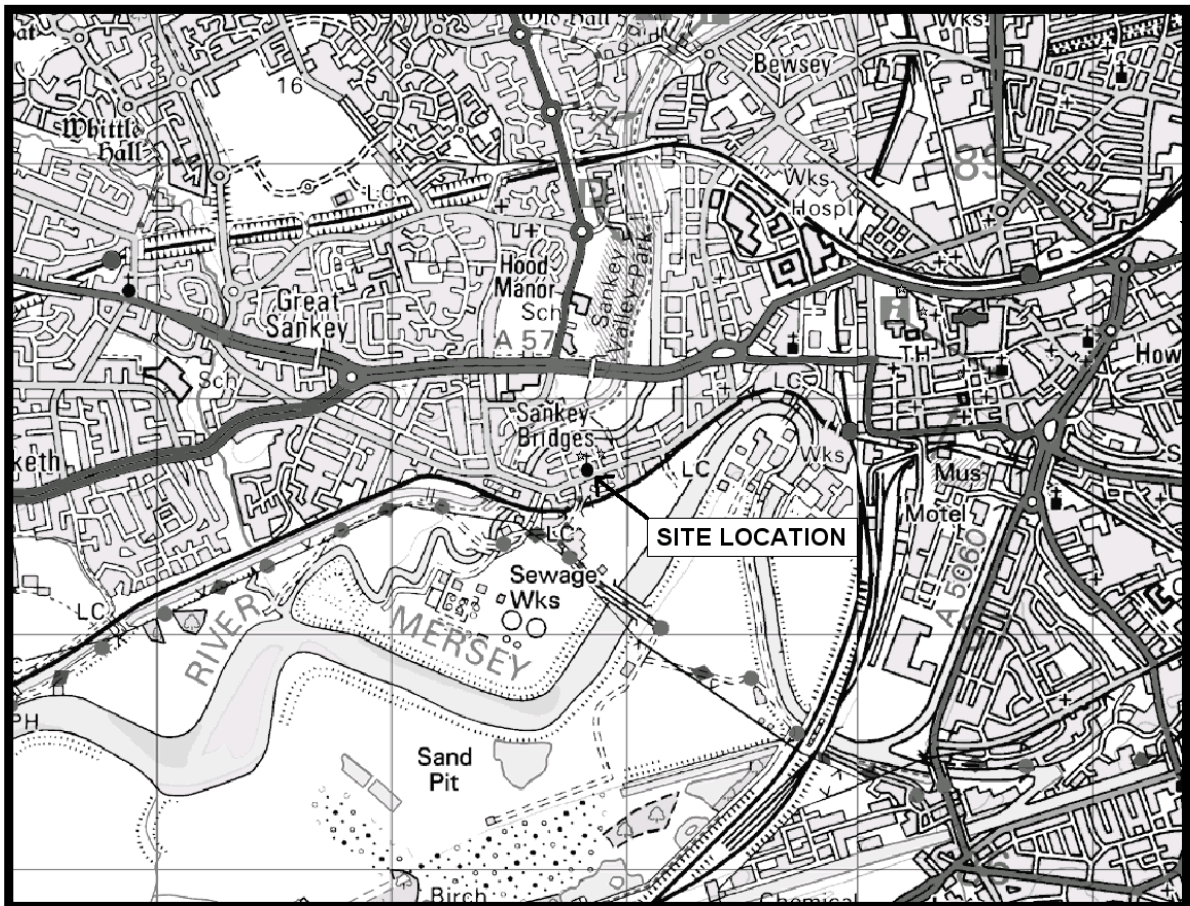
LOCATION AND EXTENT OF CONTAMINATED LAND TO WHICH THIS REMEDIATION STATEMENT RELATES

1.1 Location of the contaminated land to which this Remediation Statement relates

1.1.1 Name: Land at Sankey Bridges, Warrington.

1.1.2 The location of the land is indicated in Figure 1 below.

Figure 1: Site Location Plan

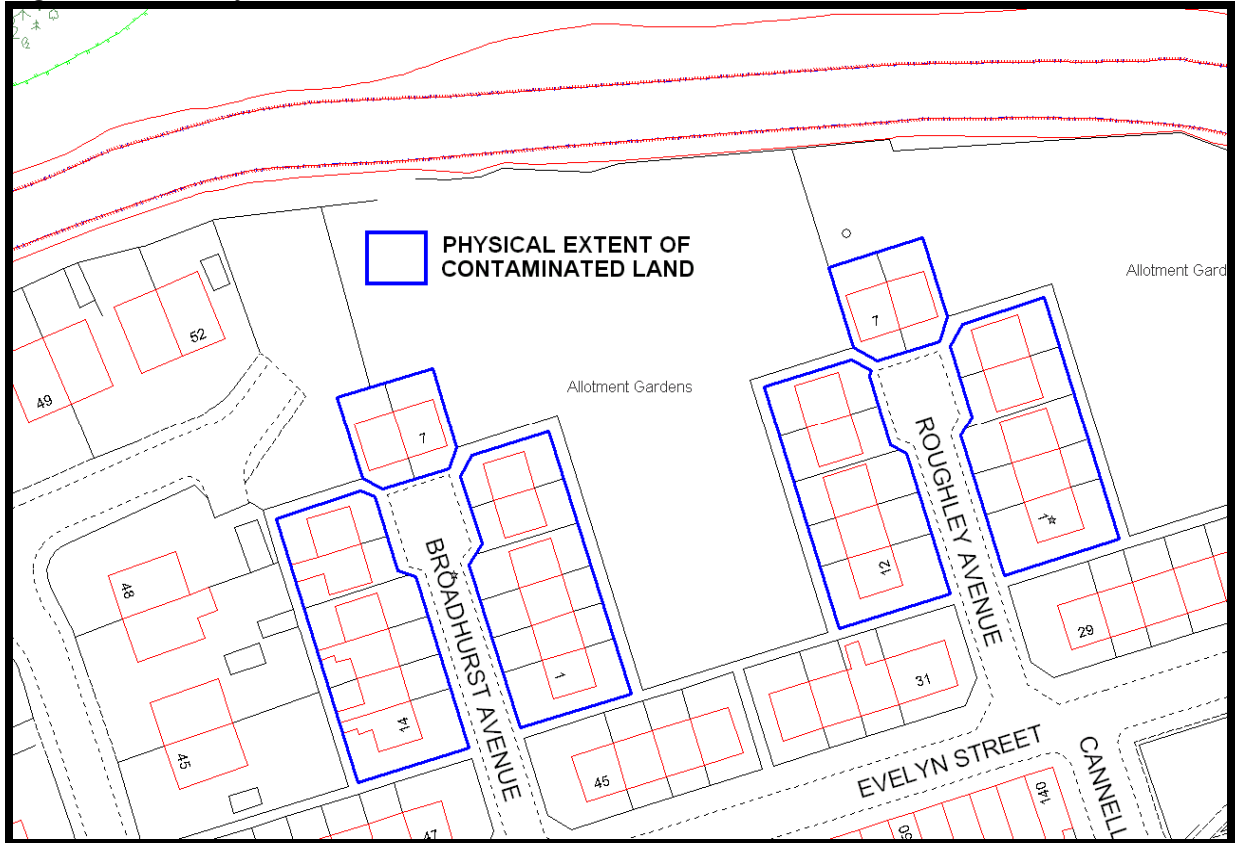


1.1.3 1-12 Roughley Avenue is located at approximate NGR: 358,809; 387,759
1-14 Broadhurst Avenue is located at approximate NGR: 358,880; 387,777

1.2 The extent of the contaminated land to which this Remediation Statement relates

1.2.1 The physical extent of the land identified as contaminated land is shown in Figure 2 below.

Figure 2: Site Layout Plan



1.2.2 The contaminated land comprises garden areas at 26 individual residential properties.

1.3 The current use of the contaminated land to which this Remediation Statement relates

1.3.1 The current use of the land is residential with gardens

1.4 The grounds for identification as contaminated land

1.4.1 Each area of land under separate ownership or occupation, which has been identified as contaminated land, is covered by a separate Written Record of Determination published on 16 November 2004.

1.4.2 The grounds for each determination were:

(a) An unacceptable risk to human health arising from the presence of one or more of the following contaminants in the shallow soils: arsenic, lead, cadmium, chromium, mercury, nickel, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, ideno(1,2,3-cd)pyrene, benzo(k)fluoranthene.

(b) The pollution of controlled waters is being caused by the presence of **arsenic**, **lead**, **copper**, **nickel**, **chromium**, **zinc** and **ammoniacal nitrogen** in the shallow groundwater underlying the site; and the pollution of controlled waters is likely to be caused from the entry of **copper**, **lead**, **nickel**, **zinc** and **ammonia** into Sankey Brook.

1.4.3 The Remediation Statement only covers pollutant linkages that have been identified for human health. The pollutant linkages identified for controlled waters are not being remediated following a cost benefit analysis. Therefore a Remediation Declaration has been prepared for controlled waters. This document is available for viewing on the contaminated land public register.

1.4.4 The details of the significant pollutant linkages are set out in Schedule 4.

SCHEDULE 2

A SUMMARY OF THE INSPECTION OF THE CONTAMINATED LAND

- 2.1 October 1989 alkali waste was discovered in the allotment area following works carried out on the banks of Sankey Brook by the then National Rivers Authority (NRA). This waste was found to contain elevated concentrations of boron, sulphate and sulphide.
- 2.2 A series of site investigations and a risk assessment were carried out during 1990-1991, where elevated levels of lead, copper, zinc, cadmium, arsenic and mercury were present. The allotments were then subsequently closed in 1991 due to the potential for uptake of contaminants into fruit and vegetables grown on site and the potential for direct exposure to the waste by any deep excavations in the allotments.
- 2.3 A groundwater investigation, which also comprised soil sampling, was carried out in 1994. Borehole logs indicated the presence of elevated levels of arsenic, chloride and sulphide compared to drinking water quality standards within the ground water, and ICRCCL 59/83 or where not relevant, Kelly or Canadian Guidelines for soil samples. Following this investigation detailed proposals were put together and in early 2001 a reclamation scheme was carried out on the allotment site. The scheme incorporated the emplacement of a geotextile membrane and imported topsoil cover to isolate the waste material previously found on the site. The site was then put out to short amenity turf and shrubs to create an open public amenity area. During the proposals for the reclamation scheme at the allotments it was considered a possibility that the waste may exist beneath the houses.
- 2.4 In 2000 a risk assessment comprising existing documentation was carried out by Environmental Advice Centre (EAC) to identify any potential risk to site residents. The risk assessment included both chemical contamination of ground and groundwater and the potential generation of land gas off the adjacent allotment site. Waste was considered likely to be present in the garden areas of several properties adjacent to the former allotment site, so a site investigation was undertaken in 2001 to collect data within property boundaries. The investigation confirmed the presence of alkali waste and a further ash and clinker fill layer above this waste material in the properties located on Roughley and Broadhurst Avenue and Rostherne Close. The analytical data indicated the presence of elevated concentrations of arsenic, lead, copper, nickel and zinc within soil samples and sulphate, sulphide and ammonia above the former ICRCCL trigger values, within samples of alkali waste. Samples were also analysed for Volatile Organic Compounds (VOC's) and Semi-Organic Volatile Compounds (SVOC's), the concentrations of, which were all low. Groundwater samples were taken and

analysed against Environmental Quality Standards (EQS's) recommended by the Environment Agency, which indicated the presence of slightly elevated concentrations of sulphate and ammonia. Gas monitoring was undertaken from boreholes and within some of the properties. This monitoring did not indicate the presence of significant quantities of carbon dioxide or methane.

- 2.5 In order to determine whether or not the Council had sufficient information to determine the area as statutory contaminated land under Part 2A it was decided to have the reports peer reviewed. The report was reviewed in 2002 by Land Quality Management (LQM) to determine an appropriate way forward for the site. Land Quality Management recommended that further investigations would need to be carried out including the collation of more site-specific data in relation to the ash and clinker layer identified from previous investigations. The samples taken would also need to meet new statistical requirements under Contaminated Land Exposure Assessment (CLEA), and address the different Significant Pollutant Linkage's (SPL's) at each individual property within the study area.
- 2.6 A further investigation was carried out in November 2003 by EAC, and included the re-sampling of all the properties, sampling of groundwater and surface water (Sankey Brook). The investigation found elevated concentrations of the contaminants generally present within samples of made ground, comprising ash and clinker fill and alkali waste. The made ground present on site extends to varying depths of up to 4.0 m below ground level (bgl). The ash and clinker layer extends from the ground surface to depths of between 0.2 and 1.8 m bgl, and the alkali waste extends to depths of between 1.5 and 4.0 m bgl. Elevated concentrations of contaminants were also identified in the shallow groundwater and within Sankey Brook. This investigation and report [Interpretative Report, April 2004, Ref.: J690/V1/04.2004] forms the basis of this written determination, so further detailed information can be found within this report (available on request from Warrington Borough Council) and is summarised in the evidence for determination below.

2.7 References

- [1] Site Investigation of Land off Rostherne Close, Sankey Bridges, November 1990, Environmental Advice Unit (EAU)
- [2] Soil Augering, 10 January 1991, WBC
- [3] Soil Augering, 24 January 1991, WBC
- [4] Soil Sampling, February 1991, Environmental Advice Unit
- [5] Vegetable Analysis, March 1991, Environmental Advice Unit
- [6] Borehole Investigation, April 1991, Mini Soil Surveys

- [7] Evelyn Street Allotments; Ground Water Investigations Report; April 1994; Biffa Waste Services Limited. Ref.: 9114/C
- [8] Evelyn Street; Site Investigation and Risk Assessment; January 2000; Environmental Advice Centre Ltd. Ref: J184/v2/01-0
- [9] Evelyn Street; Risk Assessment for Residential Areas; May 2000; Environmental Advice Centre Ltd. Ref.: P290/V1/05-2000
- [10] Evelyn Street; Executive Summary; November 2001; Environmental Advice Centre Ltd. Ref.: J346/V1/11.2001
- [11] Evelyn Street; Site Investigation and Risk Assessment; November 2001; Environmental Advice Centre Ltd. Ref.: J346/V2/11.2001
- [12] Sankey Bridges Interpretative Report; April 2004, Environmental Advice Centre, Ref.: J690/V1/04.2004

SCHEDULE 3

REMEDIATION REQUIREMENTS & PERIODS (SECTION 78H(7)(a) AND (c))

The remediation outlined below relates to all of the significant pollutant linkage set out in Schedule 4.

3.1 Outline of Remediation Undertaken

An environmental consultant was commissioned to project manage and design the remediation scheme. A principle contractor was commissioned to carry out the remediation works designed by the consultants.

The remediation has been undertaken in accordance with CLR11. The methodology for the remediation was chosen following a full options appraisal. The remediation undertaken involved the removal of the top 0.30 to 0.35 m of made ground and capping of the gardens with hard standing in the form of a reinforced concrete slab, underlying sub-base, geotextile and a geomembrane.

3.1.1 Summary of the principle remedial actions described in this Remediation Statement

- Drainage survey to assess the condition of the public sewer.
- A pre-condition survey of the properties including a structural survey internally and externally of the majority of properties.
- Mapping of utility services including excavation to locate services.
- A topographical survey of all existing garden areas to establish ground levels, and record garden layouts and the location of existing structures.
- Garden clearance of fencing and garden items.
- Excavation and disposal off-site of contaminated soils to a maximum depth of 350mm.
- Installation of a geotextile membrane layer.
- Replacement of some clean compacted hardcore followed by sand layer
- Installation of a geomembrane.
- Installation of a 150mm concrete layer with a reinforced steel mesh grid.
- Reinstatement of fences and placement of brick or block paving.
- Reconstruction of garden items i.e. garden sheds.
- A post-condition survey including a structural survey internally and externally of each property.

3.1.2 Basis on which these actions will reduce/manage the risks arising from the significant pollutant linkages identified.

The removal of the upper layer of contaminated soil will remove some of the source of contamination. The installation of a permanent concrete barrier will provide a physical barrier to prevent future human contact with contaminants within the ground and any potential uptake in home grown vegetables.

3.2 Remediation/Assessment Actions

3.2.1 No detailed investigative Assessment Actions were required prior to commencement of the remedial treatment actions. Sufficient information to characterise the Pollutant Linkage, decide on Remedial Objectives; and establish the technical specification and design of the Remedial Treatment Actions, was provided by the following reports:

[1] Sankey Bridges Remediation Options Appraisal, Entec UK Ltd, May 2006, Ref: 033i2

[2] Sankey Bridges Remediation Strategy, Entec UK Ltd, May 2007, Ref: rr086i1

3.2.2 A Pre-Condition survey was completed by a qualified independent surveyor to record the condition of structures including the property internally and externally prior to excavations and reinstatement works commencing.
Reference: Pre-Condition Survey Reports 11-12 Roughley Avenue; 1-14 Broadhurst Avenue, March 2007, Dixon Webb LLP

A limited number of shallow trial trenches were excavated to confirm the foundation details and underlying ground conditions at the properties to ensure that the scheme of limited excavation and reinstatement would not cause any risk of subsidence.

3.2.3 A drainage survey of the public sewer which ran through the back garden areas of all the properties was carried out to establish the condition prior to installing the concrete barrier. As a United Utilities asset it was considered to be necessary to carry out this survey as the installation of a concrete barrier may affect loading on a public sewer.
Reference: Drainage CCTV Survey Broadhurst/Roughley Avenue, February 2008, General Utility Services Limited (GUS),

3.2.4 A line and level survey was carried out to establish ground levels prior to the commencement of excavations to enable the fill operations at each plot to be designed so that the original levels could be restored once the remediation was completed.

Reference: VHE Construction

3.2.5 The contents of each garden were surveyed, logged, photographed and recorded prior to garden clearance to ensure that the correct restoration works was carried out once the reinstatement works were completed.

3.2.6 A Post-Condition survey was completed by a qualified independent surveyor to record the condition of structures including the property internally and externally following completion of the remediation.

Reference: Post-Condition Survey Reports 11-12 Roughley Avenue; 1-14 Broadhurst Avenue, October 2008, Dixon Webb LLP.

3.2.7 A drainage survey of the public sewer was completed following completion of the works to ensure that the reinstatement had not affected the condition of the public sewer. This was a requirement from United Utilities.

Reference: Drainage CCTV Survey Broadhurst/Roughley Avenue, September 2008, General Utilities Northwest Limited

3.3 Remedial Treatment Action

3.3.1 The standard of remediation to be achieved; Paragraph C.17 of the Statutory Guidance states that it is the Government's intention that remediation should result in the land being "suitable for use". Paragraph C.18 states: "The standard to which the relevant land or waters as a whole should be remediated should be established by considering separately each significant pollutant linkage identified on the land in question". For each such linkage the standard remediation should be that which would be achieved by the use of a remediation package which forms the best practicable techniques of remediation for:

(i) ensuring that the linkage is no longer a significant pollutant linkage, by doing any one or more of the following:

- a. removing or treating the pollutant;
- b. breaking or removing the pathway; or
- c. protecting or removing the receptor; and

(ii) remedying the effect of any significant harm or pollution of controlled waters which is resulting, or has resulted from, the significant pollutant linkage."

In this case, the best practicable technique and good practice is considered to be:

- (i) removal of some of the contaminated shallow soils for disposal off site (“part removal of the pollutant”)
- (ii) installation of a permanent concrete barrier to prevent access to underlying soils (“physical barrier between the pollutant(s) and receptor”)
- (iii) reinstatement of garden areas with paving to reinstate to current use as garden area.

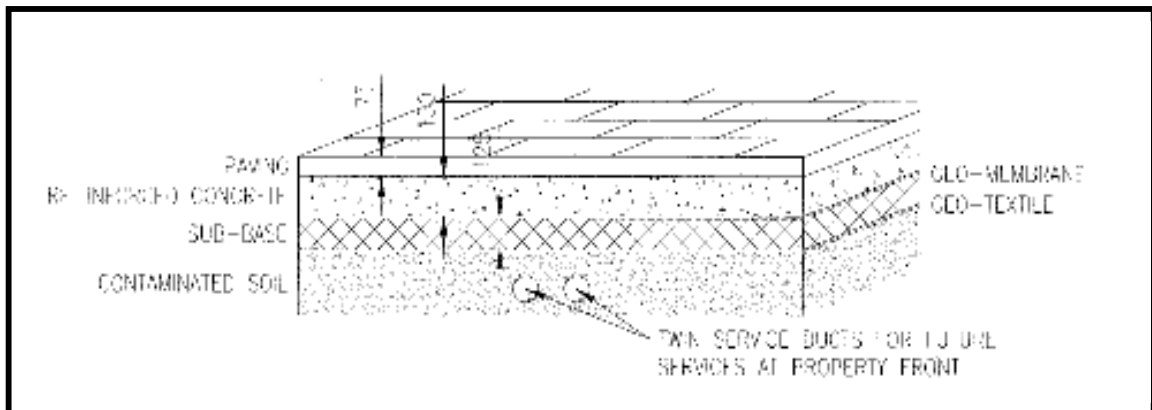
3.3.2 The Remedial Treatment Actions listed below have been considered appropriate to break the Significant Pollutant Linkages upon which the Determination(s) were based in the area defined in Schedule 1; considering Best Practical Technique (BPT) as specified by paragraph C19 of the Statutory Guidance Circular 01/2006.

3.3.3 The standard of remediation is to ensure that the identified pollutant linkages are no longer significant pollutant linkages through a combination of removing the pollutant linkage and breaking the pathway, as set out in paragraph C.18 of the Statutory Guidance.

3.3.4 The following Remedial Treatment Action is required to ensure that the Pollutant Linkages are broken:

Installation of a concrete barrier to prevent access to contaminated soils and break the pollutant linkages to human health.

Figure 3: Diagram of the Concrete Barrier. Source: Entec UK Ltd



The following Remedial Treatment Actions are shared actions that apply to all the identified Significant Pollutant Linkages set out in Schedule 3.

Shared Remedial Treatment Actions	
Action	Remedial Treatment Action
1.	<p>Site Set Up</p> <p>A welfare, office and storage facilities as well as stockpiling of waste material was set up on an area adjacent to the site. This area was subject to a planning application which was granted on 28 August 2008 under application number 2007/11168.</p>
2.	<p>Site Clearance</p> <p>The removal of all vegetation, garden features and semi-permanent areas of hard standing prior to excavation.</p>
3.	<p>Excavation and Disposal off-site of Contaminated Soils</p> <p>Underlying soils were excavated to a maximum date of 350 mm below ground level. Soils removed off site were classified as either hazardous or non-hazardous prior to the removal from the site. The waste was classified in accordance with Hazardous Waste Directive (HWD), Council Directive 91/689/EC and the Waste Management Duty of Care provisions of the 1990 Act.</p>
4.	<p>Installation of a Geotextile Membrane & Clean Material</p> <p>A geotextile layer was laid on top of the exposed excavation, which was then over lain by approximately 0.125 m of clean compacted hardcore (Type 1 MOT material). Approximately 236 m³ of Type 1 MOT material (originally planned to be Class 6f1 material) was imported to site. A layer of sand was also incorporated in the top of the MOT layer to prevent penetration of the overlying geomembrane.</p>
5.	<p>Installation of a Geomembrane & Engineered Layer</p> <p>A geomembrane was placed between the hardcore layer and the concrete layer. Concrete was placed in 150 mm thickness and formed by a CC37 mix, with reinforced mesh grid on a nominal 150 mm spacing with 10-20 mm diameter aggregate. At the rear of the properties saw cut joint and crack inducer were placed over the United Utilities sewer to allow ease of future access. Cuts were made both parallel to and off set by, 1.5 m from, the rear wall of the properties. Joints were also made perpendicular to the house wall and parallel cut,</p>

	<p>every 2-3 m depending on the width of the garden. All saw cuts were sealed with a specialist sealant. The slabs at the front and rear of each property were individually poured and surrounded by expansion joints, to allow expansion and contraction of the slabs.</p> <p>All services were left beneath the concrete slab. Two 100 mm diameter black polyethylene ducts were placed in front gardens to allow installation of future below ground services between the houses and the pavement.</p>
6.	<p>Reinstatement</p> <p>The top of the slab was finished with a 75 mm thickness of paving and screeding sand. A variety of paving was used, depending on the request of the individual property owners/tenants.</p>
7.	<p>Site Demobilisation</p> <p>The compound area was removed from site.</p>

3.3.5 Programme of Works

The main contract for the remediation works was effective from 27 May 2008 for a target period of 11 weeks. Site works commenced on 27 May 2008 and the remediation, for contract purposes was substantially completed on 19 August 2008. This substantial completion was subject to some outstanding works such as remedial works including snagging of garden items and tarmacing repairs to roads and pavements. All works were completed by the end of September 2008.

3.3.6 Validation

The environmental consultant will provide documentary evidence that the works have been undertaken and the general objectives of the scheme have been satisfactorily achieved in the form of a completion report. A verification report will also be produced for each property included within the remediation works.

3.3.7 Post Completion

Warrington Borough Council Development Control and Building Control Departments will be informed of the works undertaken and the conditions that should be attached to approval for any future work which might compromise the effectiveness of the remediation and for which planning permission of Building Regulations approval is required.

Owners and occupiers will be provided with an advice pack detailing the works that have been carried out at their properties and the precautions to be observed to avoid compromising remediation measures.

3.4 Monitoring Actions

The Monitoring Actions listed below have been considered appropriate to provide validation of the break in the Significant Pollutant Linkage upon which the determination was based, in the area defined in Schedule 1; considering Best Practical Technique (BPT) as specified by paragraph C19, and the Quality Assurance (QA) as required by C25 of the Statutory Guidance Circular 01/2006. The Monitoring Action will also provide a mechanism for reviewing the need for additional assessment or remediation.

The following Monitoring Action is required to ensure that the Remedial Treatment Actions have been successful and the relevant Pollutant Linkages have been broken

The concrete barrier will be the responsibility of the relevant property owner or occupier to ensure that it is not removed or damaged. The Monitoring Action is a shared action that applies to all identified Significant Pollutant Linkages.

Responsibility for ensuring this Monitoring Action is undertaken as described will be as follows:

- Private residents
- Tenants
- Landlords

All relevant information will be passed to the responsible people to ensure that the remediation remains effective.

SCHEDULE 4

PARTICULARS OF SIGNIFICANT POSSIBILITY OF SIGNIFICANT HARM AND PARTICULARS OF SUBSTANCE

4.1 Ground Conditions

- 4.1.1 Ground conditions at Sankey Bridges have been established as follows from geological maps. The ground comprises a solid geology of Upper Mottled Sandstone. The northern part of the site comprises drift geology of alluvium and the southern part of the site fluvio-glacial sand and gravel and Mersey High Terrace.
- 4.1.2 The site investigations found a topsoil material, noted at most locations, extending to depths of between 0.05 to 0.9 m bgl, beneath which the site was underlain by a layer of ash and clinker fill, incorporating some clay and brick/ gravel fragments, to depths ranging from 0.2 to 1.6 m bgl. At some locations, alkali waste was present beneath this material, extending from a range of depths from 0.2 to 1.6 m bgl. Beneath the alkali waste is material which appears to be natural, consisting of organic silty clays, probable evidence of the former watercourse. Groundwater was encountered at depths ranging from 0.6 to 2.0 m bgl, but was generally in the range of 1.0 to 1.5 m bgl. The ground surface was made up of a mixture of hardstanding (paving slabs, tarmac or concrete) and grass or planted beds. In general, the front of the properties were grassed with hardstanding to the rear.

4.2 Sources

- 4.2.1 The shallow soils in the garden areas of the residential properties which have been determined to be contaminated land contain significantly elevated levels of several heavy metals and organic contaminants.
- 4.2.2 The relative concentrations of the contaminants vary from plot to plot, and different contaminants or a number of contaminants are of concern at different plots.
- 4.2.3 The contaminants are present at levels in excess of site-specific assessment criteria derived from the site [Reference: "Sankey Bridges Interpretive Report, EAC, 2004].

4.3 Pathways

4.3.1 The following potential pathways for exposure are considered to be present:

- (i) Direct ingestion of soil and indoor dust;
- (ii) Consumption of home-grown vegetables;
- (iii) Indirect ingestion of soil attached to home grown vegetables.

4.4 Receptors

4.4.1 The receptors considered at risk are human beings, namely current and future residents of the properties (receptor type 1 in Table A of Annex 3 of the Statutory Guidance).

4.4.2 In the case of the legal determination the critical receptor is the female child in the first six years of life.

4.5 Identification of Receptors

4.5.1 The identification of receptors is based on the current use of the land for housing with gardens.

4.5.2 The area is a mixture of private and Council ownership as some of the properties all of which were originally owned by Warrington Borough Council are now in private ownership after some were subject to Right-to-Buy from the 1970's onwards.

4.6 Types of Significant Harm

4.6.1 The significant harm would be a "human health effect" as defined in Table A of Annex 3 of the Statutory Guidance, arising from the "intake of a contaminant", or other direct bodily contact with a contaminant" (description 1 in Table B of the Statutory Guidance).

4.7 Significant Possibility of Significant Harm

4.7.1 The risk assessment carried out for this site derived site-specific criteria based on published CLR documents and associated toxicological data. Exposure to levels of contamination in excess of these criteria was considered by the Council to be "unacceptable". On the basis of the risk assessment the Council considers that the

land shown identified in Schedule 1 appears to meet the statutory definition of contaminated land by virtue of their being a significant possibility of significant harm to human health, in accordance with Chapter A (Table B) of the Statutory Guidance.

Table 4.1 Particulars of Significant Harm and Particulars of Substances

Substance	Source Location	Pathway	Receptor	Receptor Location	Description of Significant harm
Arsenic (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Lead (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Mercury (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Nickel (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Benzo(a)anthracene (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Chrysene (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Benzo(b)fluoranthene (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Benzo(a)pyrene (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Ideno(1,2,3-cd)pyrene (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)
Benzo(k)fluoranthene (Ash & Clinker Fill)	Located within garden soil	Intake of substances by ingestion	Human Beings: Residents	Residents using garden area	Significant Possibility of Significant Harm, (Table B, Chapter A Statutory Guidance)

Note 1 Not all substances were found above action levels in every garden

Note 2 This table includes those pollutant linkages identified for human health only as this statement does not cover controlled waters.

SCHEDULE 5

REVISIONS

Details of Revision	Date	Officer
None to Date		



REMEDICATION DECLARATION

Environmental Protection Act 1990

Sankey Bridges, Warrington

ENVIRONMENTAL PROTECTION ACT 1990, SECTION 78H(6)

REMEDICATION DECLARATION

Remediation Declaration for Sankey Bridges Warrington Prepared by Warrington Borough Council

The Contaminated Land (England) Regulations 2000 SI2000/227, The Contaminated Land (England) (Amendment) Regulations 2001 SI2001/66, The Contaminated Land (England) Regulations 2006 SI2006/1380

1. This Remediation Declaration has been prepared by Warrington Borough Council in relation to Contaminated Land identified under 78B of the Environmental Protection Act 1990 (the 1990 Act). Warrington Borough Council has prepared this Remediation Declaration because the site was determined as causing:

- The pollution of controlled waters is being caused by the presence of **arsenic, lead, copper, nickel, chromium, zinc** and **ammoniacal nitrogen** in the shallow groundwater underlying the site; and
- The pollution of controlled waters is likely to be caused from the entry of **copper, lead, nickel, zinc** and **ammonia** into Sankey Brook;

This Remediation Declaration should be read in conjunction with section 1.1 from the Remediation Statement, which is on Warrington Borough Councils public register. A copy of section 1.1 can be found in Schedule 1.

2. The location and extent of the Contaminated Land to which this Remediation Declaration relates (the Land) are set out in Schedule 2.

3. Warrington Borough Council is obliged to consider whether any remediation is likely to be reasonable [in relation to Section 78E(4)] having regard to the cost that is likely to be involved and the seriousness of the harm or the pollution of controlled waters to which it relates. Warrington Borough Council considers that remediation of controlled waters is unreasonable having regard to [Section 78E(4)], [Section 78E(5)] and [Section 78H(5)(a)] of the 1990 Act.

4. Accordingly, Warrington Borough Council is required to prepare and publish this Declaration under Section 78H(6) of the 1990 Act.

5. The grounds on which Warrington Borough Council is satisfied that it has precluded from serving a Remediation Notice for controlled waters are set out in Schedule 3.

Any communications should be directed to the contact name given below.

Signature of person issuing the declaration on behalf of WBC:

Signed:..... **Printed:**

Position:..... **Date:**

The contact name for the purposes of this remediation declaration is:

Name: **Position:**

Contact Details:

Warrington Borough Council
Environment & Regeneration Directorate
Environment & Public Protection Services
New Town House
Buttermarket Street
Warrington
WA1 2NH

Tel: 01925 443245

Fax: 01925 442564

Email: landquality@warrington.gov.uk

SCHEDULE 1
REMEDIATION STATEMENT SECTION THAT REFERS TO THE REMEDIATION
DECLARATION

1.5 The grounds for identification as contaminated land

- 1.5.1 Each area of land under separate ownership or occupation, which has been identified as contaminated land, is covered by a separate Written Record of Determination published on 16 November 2004.
- 1.5.2 The grounds for each determination were:
- (c) An unacceptable risk to human health arising from the presence of one or more of the following contaminants in the shallow soils: arsenic, lead, cadmium, chromium, mercury, nickel, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, ideno(1,2,3-cd)pyrene, benzo(k)fluoranthene.
 - (d) The pollution of controlled waters is being caused by the presence of **arsenic**, **lead**, **copper**, **nickel**, **chromium**, **zinc** and **ammoniacal nitrogen** in the shallow groundwater underlying the site; and the pollution of controlled waters is likely to be caused from the entry of **copper**, **lead**, **nickel**, **zinc** and **ammonia** into Sankey Brook.
- 1.5.3 The Remediation Statement only covers pollutant linkages that have been identified for human health. The pollutant linkages identified for controlled waters are not being remediated following a cost benefit analysis. Therefore a Remediation Declaration has been prepared for controlled waters. This document is available for viewing on the contaminated land public register.
- 1.5.4 The details of the significant pollutant linkages at each area of land under separate ownership or occupation are set out in Schedule 4.

SCHEDULE 2

LOCATION AND EXTENT OF CONTAMINATED LAND TO WHICH THIS REMEDIATION DECLARATION RELATES

The location and extent of the contaminated land to which this declaration relates is known as Sankey Bridges, Warrington (National Grid Reference SJ 58828 87740). The land lies at an elevation of around 6 m AOD, and consists of the following residential properties:

- 1 - 12 Roughley Avenue
- 1 - 14 Broadhurst Avenue

The boundary of the site that this declaration relates to is the same as the boundary that the determination(s), dated 16 November 2004, relates; see figure 1, area determined is outlined in blue.

SCHEDULE 3

THE GROUNDS ON WHICH WARRINGTON BOROUGH COUNCIL IS SATISFIED THAT IT HAS PRECLUDED FROM SERVING A REMEDIATION NOTICE

BACKGROUND

Since the 26 properties were determined in November 2004, Warrington Borough Council has consulted with the Environment Agency's Contaminated Land Officers regarding the pollutant linkages identified to controlled waters.

A cost benefit analysis to assess the reasonableness of remediation was produced by Warrington Borough Council in April 2007 and was approved by the Environment Agency in May 2007.

PRACTICABILITY, DURABILITY AND EFFECTIVENESS OF A CONTROLLED WATERS REMEDIATION SCHEME

In considering a remediation scheme for controlled waters the best practicable technique needs to be considered taking into account practicability, effectiveness and durability of a scheme.

TEST FOR REASONABLENESS

Section 78E(4) requires action on the part of the local authority to be reasonable, and the guidance requires this also in relation to the cost of the remediation. In measuring the total costs against the benefits of intervention it involves weighing the seriousness of pollution and the remedial effects of the works.

To assess the reasonableness of remediation for the pollution of controlled waters Warrington Borough Council has made referenced to Section C.29-C.43 of the statutory guidance [Defra Circular 01/2006].

EVIDENCE FOR UNREASONABLENESS OF REMEDIATION

Adjacent Former Allotment Site

The site lies adjacent to an open space area known to be underlain with substantial quantities of contaminated waste infill materials. Groundwater contamination exists within the open space area and groundwaters from within the site will also be in hydraulic continuity with the Brook. Remediation is unreasonable for controlled waters given that the contribution from the determined site is marginal considering the presence of soap waste, ash and clinker between the property boundaries and Sankey Brook.

Site Locality & Wider Environmental Risks

Other, as yet unidentified, diffuse sources of contaminated groundwater may also be discharging into the Brook in the locality of the determined site. The site is located adjacent and within close proximity to many other areas of potential contaminated land.

Water Quality: Sankey Brook

The nearest surface water quality data has been monitored 350 m downstream of the site at National Grid Reference SJ 59084, 88115.

Information obtained from the Environment Agency shows the river quality of Sankey Brook classified as GQA F (Bad) improving slightly to GQA E (Poor) from 1998 to 2000, then GQA F (Bad) from 2003 to 2005.

In the locality many former historic industrial sites were commonly located along the banks of watercourses so there is likely to be contributions coming from numerous sources.

It is known that substantive contaminated groundwater/leachate discharges occur into the Brook elsewhere within the catchment upstream of the site. It is possible that the magnitude of adverse impact associated with groundwater discharge from the site will be extremely low. This is suggested by the fact that, to date, there has been no evidence from surface water sampling within the brook that water quality is significantly different at monitoring stations located upstream and downstream of the site.

Notwithstanding the above there are other pollutants present from other leaching sources within Sankey Brook reducing its overall water quality that are not attributable from the site itself. A remediation scheme would only address the contaminants present at the determined site.

Flood Risk at Sankey Bridges

According to the Environment Agency the site is situated with a high flood risk zone. The site is also known to have flooded in recent years. Although there are current flood defence measures in place it does not completely remove the likelihood of flooding and can be over topped or fail in extreme weather conditions. A number of remediation schemes at the site could be compromised because of this high flood risk and the presence of wider area contamination.

Levels of Identified Water Pollution

The concentrations of contaminants within the groundwater and the potential to enter Sankey Brook are relatively small exceedences of the relevant assessment criteria.

CONCLUSION

As agreed with the Environment Agency remedial actions for controlled waters would not be reasonable having regard to their likely cost and the evidence of pollution of controlled waters. Capping the site provided some benefit to the controlled waters pollutant linkage, as it involved a partial improvement to the current situation through either removing part of the source/hazard and through reducing the pathway by reducing infiltration and subsequent leaching of contaminants.

Section 2



ENVIRONMENTAL PROTECTION ACT 1990, SECTION 78H(7)

THE CONTAMINATED LAND (ENGLAND) REGULATIONS 2006 (SI 2006/1380)

REMEDICATION STATEMENT

Prepared by Warrington Borough Council

Sankey Bridges Phase II, Rostherne Close, Warrington

Environmental Protection Act 1990, Section 78H(7)

**Remediation Statement for Sankey Bridges, Warrington
Prepared by Warrington Borough Council**

The Contaminated Land (England) Regulations 2006 S.I.2006/1380,

This Remediation Statement has been prepared by Warrington Borough Council (WBC) in relation to contaminated land identified under section 78B of the Environmental Protection Act 1990 (the 1990 Act).

The contaminated land has not been designated as a special site under 78C of the Act.

The location and extent of the contaminated land to which this Remediation Statement relates (the Land) are set out in Schedule 1.

The Council as enforcing authority in relation to the land is undertaking the remediation scheme itself, acting under powers granted it by virtue of section 78N paragraph 3(e) of the Act.

The current use of the land is residential. A summary of the inspection of the contaminated land is given in Schedule 2.

The Council as enforcing authority in relation to the land, is precluded by section 78H(5)(b) from serving a Remediation Notice and has therefore prepared this Remediation Statement in accordance with section 78H(7) and (8).

The things which have been done by way of remediation and the date of completion are set out in Schedule 3.

Details of the substances and reasons why the land is contaminated land by virtue of there being significant possibility of significant harm are set out in Schedule 4.

Details of any revisions to this Remediation Statement are given in Schedule 5.

The name and address of the person (the 'Responsible Person' for the purpose of section 78H(7) of the Act) who has prepared this Remediation Statement and who has carried out the work detailed in Schedule 3 to this Remediation Statement is:

Warrington Borough Council

Environment & Regeneration Directorate
Environment & Public Protection Services
New Town House
Buttermarket Street
Warrington
WA1 2NH

For Warrington Borough Council as enforcing authority for Part 2A of the Act:

Land Quality Team

Environment & Regeneration Directorate
Environment & Public Protection Services
New Town House
Buttermarket Street
Warrington
WA1 2NH
Tel: 01925 443 245

Contact: Senior Environmental Protection Officer, at the above address

Prepared by: Vicky Simcott

Signed: _____

Position: Senior Environmental Protection Officer

Date: 21 March 2012

Signature of person issuing the statement on behalf of Warrington Borough Council:

Issued by: Peter Taylor

Signed: _____

Position: Assistant Director - Development & Public Protection

Date: 21 March 2012

CONTENTS

Schedule 1: The Contaminated Land to which this Remediation Statement relates

Schedule 2: Summary of inspection of land at Sankey Bridges (Phase II)

Schedule 3: Remediation Requirements and time periods (section 78H(7))

Schedule 4: Particulars of significant pollutant linkages

Schedule 5: Revisions

SCHEDULE 1

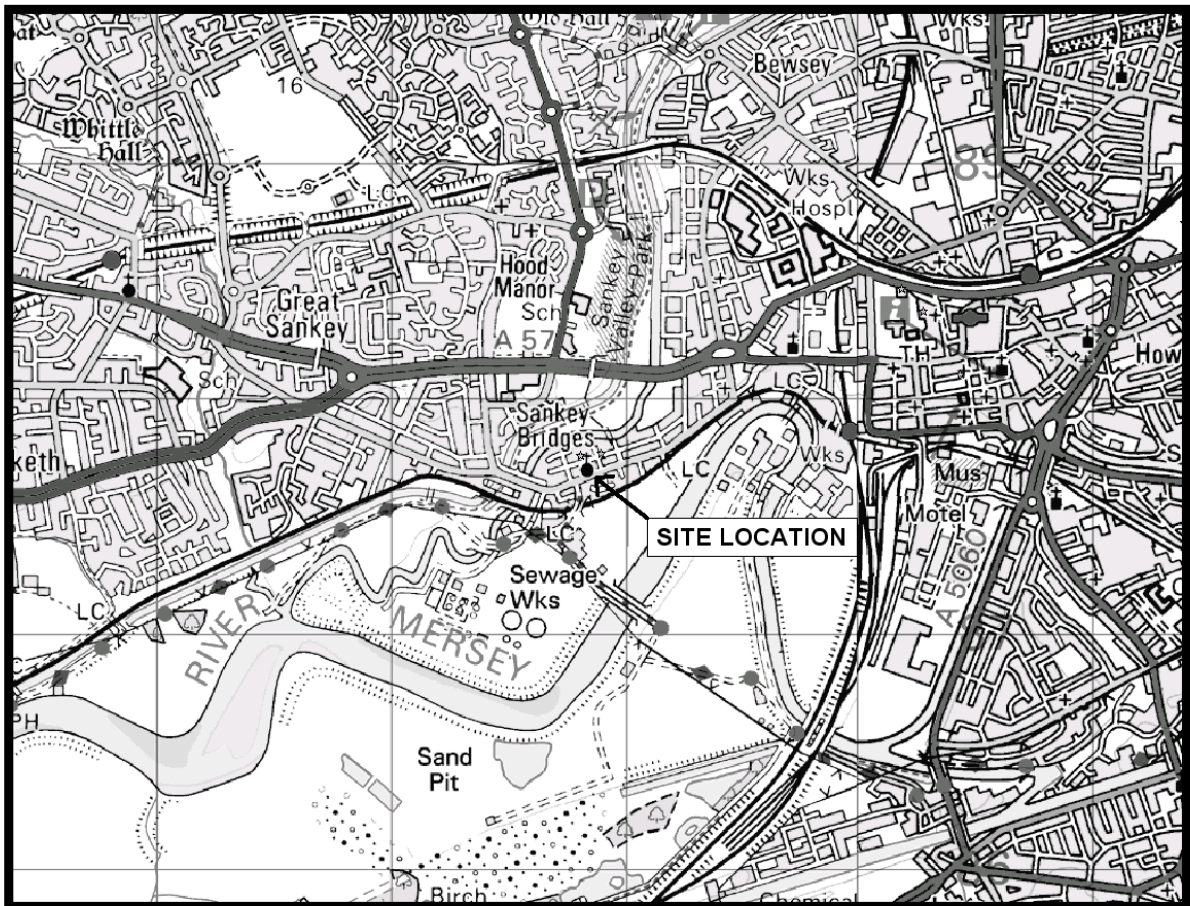
LOCATION AND EXTENT OF CONTAMINATED LAND TO WHICH THIS REMEDIATION STATEMENT RELATES

1.6 Location of the contaminated land to which this Remediation Statement relates

1.6.1 Name: Land at Sankey Bridges, Warrington.

1.6.2 The location of the land is indicated in Figure 1 below.

Figure 1: Site Location Plan

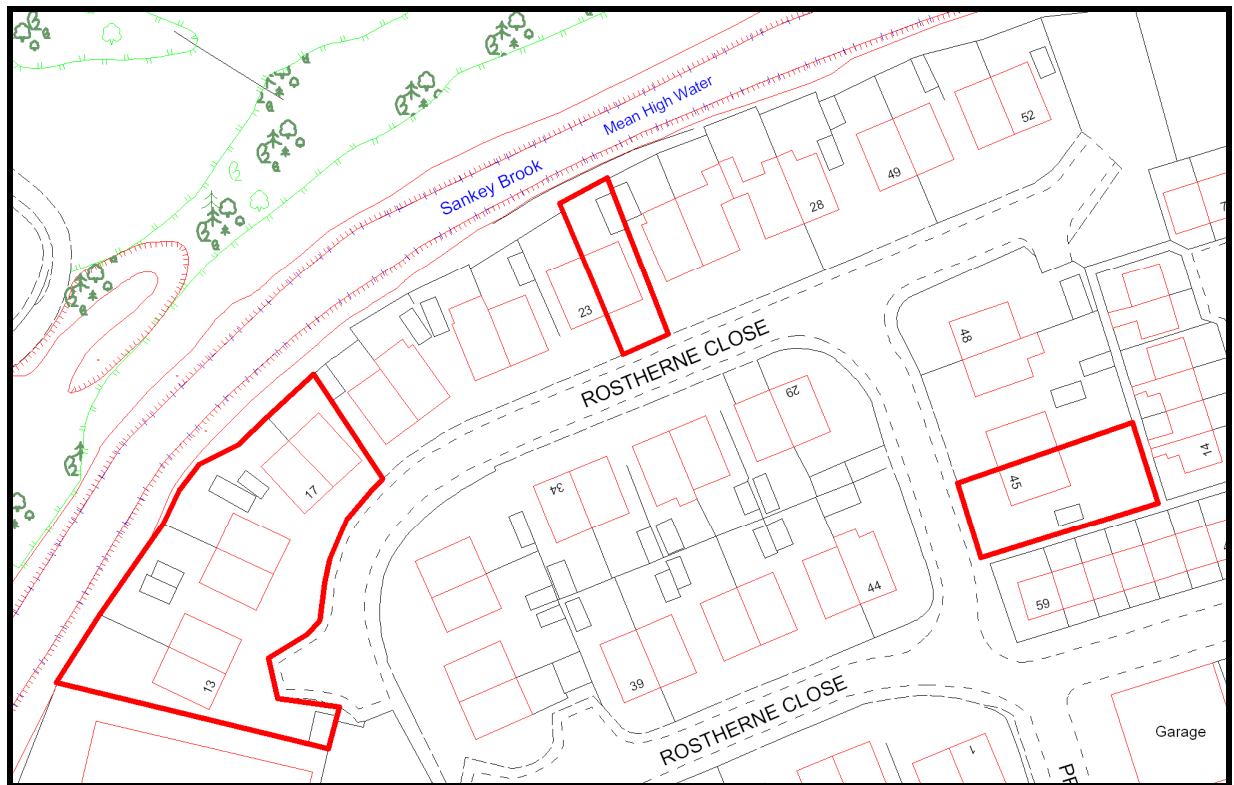


- 1.6.3 13-18 Rostherne Close is located at approximate NGR: 358,645; 387,714
24 Rostherne Close is located at approximate NGR: 358,708; 387,758
45 Rostherne Close is located at approximate NGR: 358,779; 387,723

1.7 The extent of the contaminated land to which this Remediation Statement relates

1.7.1 The physical extent of the land identified as contaminated land is shown in Figure 2 below.

Figure 2: Site Layout Plan



1.7.2 The contaminated land comprises garden areas at 8 individual residential properties.

1.7.3 For the purposes of the legal determination the full property boundary was included. For the purposes of the remediation works some properties had either front or back or both remediated based on the findings and conclusions of the risk assessment.

1.8 The current use of the contaminated land to which this Remediation Statement relates

1.8.1 The current use of the land is residential with front and back gardens

1.9 The grounds for identification as contaminated land

1.9.1 Each area of land under separate ownership or occupation, which has been identified as contaminated land, is covered by a separate Written Record of Determination published on 1 September 2010.

1.9.2 The grounds for each determination were:

(e) An unacceptable risk to human health arising from the presence of one or more of the following contaminants in the shallow soils/superficial materials: arsenic, chromium, lead, PAH's and TPH.

1.9.3 The details of the significant pollutant linkages are set out in Schedule 4.

SCHEDULE 2

A SUMMARY OF THE INSPECTION OF THE CONTAMINATED LAND

2.8 In November 2004, a number of properties in the Sankey Bridges (Phase I) area were determined as statutory contaminated land, following a detailed site investigation and risk assessment. These properties were subsequently remediated in 2008. It was decided that 'ash and clinker' identified within the garden areas of these properties may also extend across the surrounding area (Phase II) including Rostherne Close. The Authority therefore commissioned a desk study and preliminary investigation in 2005 of additional properties in the Sankey Bridges (Phase II) area.

2.9 Preliminary Investigation

2.9.1 A desk study was prepared by EAC Limited in 2005 which comprised information on the environmental setting and site history, a summary of previous investigations and an initial conceptual model (Ref: J984/V1/04.2005).

2.9.2 An initial site investigation was undertaken by AMEC Earth & Environmental UK, formerly EAC Limited, in 2005 from which factual and interpretative reports were prepared (Refs: J984factual/V1/07.2005 and J984interp/V2/08.2005). The investigation comprised the collection of samples using a hand auger to depths of between 1.0 and 2.5m below ground level (bgl); the precise depth of sampling was dependent on the ground conditions encountered.

2.9.3 The sampling strategy included testing of superficial materials, where possible, from the front and rear gardens of properties located within the study area. Samples were not taken within garden areas with hardstanding where this would require breaking out or damaging an existing surface.

2.10 Detailed Investigation

2.10.1 The preliminary investigation identified elevated concentrations of contaminants requiring further assessment. Therefore a second phase of sampling was undertaken by AMEC Earth & Environmental UK in 2006 with factual and interpretative reports prepared (Refs: 5788001139 and 5788001139-Interpretive).

2.10.2 The sampling strategy included additional testing of superficial materials, where possible, from the front and rear gardens of properties located within the study area in order to achieve a statistically robust dataset including samples available from the preliminary investigation. Additional investigations also included:

- Installation of 35no. deep window sampling boreholes across the site to allow examination of the deeper ground conditions and collection of samples at depth.
- Installation of 9no. deep boreholes with monitoring standpipes to permit gas and groundwater monitoring, which was undertaken on 2no. occasions.

Note: All properties with extensions into their rear gardens were visually assessed as to whether any potential pollutant linkages were likely to exist.

2.10.3 The risk assessment identified that an extensive number of properties across the site contained superficial materials in garden areas which exhibited concentrations of one or more contaminants that exceeded the Contaminated Land Exposure Assessment (CLEA) model, Soil Guideline Values (SGVs) and/or SSAC derived using the CLEA model or SNIFFER methodologies.

2.10.4 The report was reviewed by the Environment Agency (EA), who accepted in 2007 that no contamination of the surrounding controlled waters is being caused by the site.

2.11 Further Investigation and Risk Assessment

2.11.1 A further report was undertaken by MRH consultants (Ref: mrh0010) in 2007 that carried out appropriate statistical assessment of the data previously collected, following the withdrawal of various guidance documents (Contaminated Land Report (CLR) 7 and Toxicological (TOX) reports) used previously. Further detailed quantitative risk assessment and a peer review was also undertaken to identify critical concentration values for several key contaminants. Following this assessment a number of properties were excluded from the investigation.

2.11.2 In 2008, following discussions with the Health Protection Agency and Primary Care Trust, an assessment was undertaken by Land Quality Management Limited (Ref: LQM P968/AGG/lt01) which involved the derivation of an SSAC for lead. This report highlighted the need for further sampling to be undertaken at a number of properties.

2.11.3 In 2009/10, additional sampling of soils and groundwater was undertaken by WYG Environment. As well as providing a statistically robust dataset this analysis attempted to establish whether the contamination could be attributed to a nearby vehicle repair garage. The WYG Environment interpretative report (Ref: A51527) identified that the shallow contamination at the site is likely to be related to the incidence of ash and clinker rather than the garage and that the properties meet the definition of statutory contaminated land in accordance with Part 2A of the EPA 1990.

2.12 References

- [1] Sankey Bridges II Desk Study, Amec Earth & Environmental UK, April 2005
Reference: J984/V1/04.2005
- [2] Sankey Bridges Phase II Factual Report on Site Investigation 2005, Amec Earth & Environmental UK, July 2005, Reference: J984factual/V1/07.2005
- [3] Sankey Bridges Phase II Interpretative Report on Site Investigation 2005, Amec Earth & Environmental UK, August 2005, Reference: J984interp/V2/08.2005
- [4] Sankey Bridges Phase II Factual Report on Site Investigation 2006, Amec Earth & Environmental UK, April 2006, Reference: 5788001139
- [5] Sankey Bridges Phase II Interpretative Report on Site Investigation 2006, Amec Earth & Environmental UK, July 2006, Reference: 5788001139- Interpretive
- [6] Statistical Assessment of Sankey Bridges Phase II Data, MRH Consultants Ltd, August 2007, Reference: mrh0010
- [7] Derivation of Site Specific Assessment Criteria for Lead at the Sankey Bridges Site, Warrington (Phase 2), Land Quality Management Ltd, December 2008, Reference: LQM P968/AGG/lt01
- [8] PART 2A Investigation and Interpretative Report, WYG Environment, May 2010, Reference: A51527

SCHEDULE 3

REMEDIATION REQUIREMENTS & PERIODS (SECTION 78H(7)(a) AND (c))

The remediation outlined below relates to all of the significant pollutant linkage set out in Schedule 4.

3.2 Outline of Remediation Undertaken

An environmental consultant “the consultant” (Parsons Brinckerhoff Ltd) was commissioned to project manage and design the remediation scheme. A principle contractor (VHE Construction PLC) was commissioned to carry out the remediation works designed by the consultants.

The remediation has been undertaken in line with current best practice, including that detailed in the Environment Agency (EA) document CLR11, Model procedures for the Management of Land Contamination. The methodology for the remediation was chosen following a full options appraisal.

Remediation was required to break the human health significant pollutant linkages known to exist at the site. There are no identified pollutant linkages to controlled waters. The remediation undertaken involved the excavation and removal of 500mm of made ground/contaminated soils from the gardens, disposal of the material to landfill, and replacement with acceptable imported soil, on top of a suitable permeable liner, and restoration of surfacing on a property by property basis.

The works were designed and carried out in such a way to make sure that residents affected by the remediation were kept safe and there was as minimum disruption as possible.

3.1.3 Summary of the principle remedial actions described in this Remediation Statement

- A pre-condition survey of the properties including a structural survey of the properties.
- Drainage survey to assess the condition of the public sewer.
- Mapping of utility services including excavation to locate services.
- A topographical survey of all existing garden areas to establish ground levels, and record garden layouts and the location of existing structures.
- Geotechnical assessment of the flood wall.
- Removal of ground features
- Excavation and disposal off-site of contaminated soils to a maximum depth of 500mm.

- Installation of a geogrid and geotextile membrane layer.
- Replacement of material (subsoil, sub base, topsoil, topsoil dressing) dependant of finished surfacing
- Reinstatement and placement of surface features (turf, gravel, flowerbeds or flagstones)
- A post-condition survey including a structural survey externally of each property.

3.1.4 Basis on which these actions will reduce/manage the risks arising from the significant pollutant linkages identified.

Excavation and disposal, with replacement of soils and incorporation of a geogrid, removes the source soils within the shallow risk layer, and will therefore achieve remediation of the relevant pollutant linkage identified at the site;

3.2 Remediation/Assessment Actions

No detailed investigative Assessment Actions were required prior to commencement of the remedial treatment actions. Sufficient information to characterise the Pollutant Linkage, decide on Remedial Objectives; and establish the technical specification and design of the Remedial Treatment Actions, was provided by the following reports:

- [1] Remediation Options Appraisal: Rostherne Close, Sankey Bridges Warrington. Parsons Brinckerhoff Ltd, December 2010. FSE3511031a. 9603
- [2] Remediation Strategy, Rostherne Close, Sankey Bridges, Warrington. Parsons Brinckerhoff Ltd, February 2011 FSE3511031A.2306
- [3] Remediation Implementation Plan (Employers Requirements), Rostherne Close, Sankey Bridges, Warrington. Parsons Brinckerhoff Ltd, November 2011 FSE3511031A.2295

3.3.5 Pre Remediation Activities

- (a) A Pre-Condition Survey was completed by consultant. . The survey recorded the condition of the properties before commencement of the remediation works. The survey also recorded the condition of the front and rear gardens, boundary construction details and materials, planting schemes and hard landscaping. *Reference: Rostherne Close Remediation Works – Property Survey, November 2011 3511215a-zev.2465, Parsons Brinkerhoff.*

- (b) A CCTV survey of the drains and manholes up to the point of entry into the properties was carried out prior to commencement of the remediation works. *Reference: Rostherne Close, Warrington Inspection 1 (17702), 17 January 2012, Lanes Group Plc (North Wales Division).*
- (c) A detailed Services Search was undertaken for each property along with a site visit by a qualified surveyor which included lifting manholes, recording drain depths and scanning for services. This information was then utilised by the contractor when carrying out the remediation works. *Reference: Sankey Bridges (whole site) Utility Survey (Drawing No. GGB11088), 16 November 2011, Glover GB Site Investigation Ltd.*
- (d) A Topographical Line and Level Survey was carried out to establish ground levels prior to the commencement of excavations to enable the fill operations at each property to be designed so that the original levels could be restored once the remediation works were completed. *Reference: Sankey Bridges Warrington Topographic Survey (Drawing No. 001), 20 December 2012, Landform Surveys Ltd.*
- (e) A Geotechnical Assessment of the flood wall at the rear of a number of the properties was carried out to establish the condition of the wall and footings prior to any excavation works being undertaken. This included a limited number of shallow trial trenches along the base of the wall. For this activity consent was obtained from the Environment Agency. *Reference: Original consent number SFD 280/2011.*

3.3.6 Remediation Actions

- (a) Where required the removal of vegetation, garden features and flagstones was carried out. All items were logged and photographed prior to commencing any excavation works.
- (b) The excavation and disposal of identified shallow contaminated soil to 0.5m bgl was carried out using a 3t min digger and a 1t dumper with hand digging around boundaries and obstructions. All materials were tested prior to going off site and sent to a suitably licensed landfill site.
- (c) Installation of warning mesh and geotextile was laid at the base of the excavations.

- (d) Reinstatement materials, or “cover system” varied at each plot depending on the surface finish. The general filling detail for each property is given below:

Flowerbed	300mm subsoil and 200mm topsoil
Lawn /Turf	450mm Subsoil, Topsoil Dressing and Turf
Flagstones	450mm Subbase, Sand Dressing and Reused Slabs
Gravel	Gravel 450mm Subsoil, Geotextile and 50mm Thickness of 20mm Pea Gravel

Imported soil which satisfied the acceptance criteria was brought into each garden, emplaced within the excavation, and lightly compacted until the pre-works site level was achieved.

Reinstatement of the cover system was carried out in line with the garden designs contained within the Implementation Plan. The reinstatement material beneath flagstones was altered from the initial implementation plan during the works following agreement with residents for geotechnical reasons.

3.3.7 Post Remediation Activities

A post condition survey including a photographic record was carried out by the consultants and contractors. This included an inspection of the condition of structures including the properties and roads.

3.4 Remedial Treatment Action

3.4.1 The standard of remediation to be achieved; Paragraph C.17 of the Statutory Guidance states that it is the Government’s intention that remediation should result in the land being “suitable for use”. Paragraph C.18 states: “The standard to which the relevant land or waters as a whole should be remediated should be established by considering separately each significant pollutant linkage identified on the land in question”. For each such linkage the standard remediation should be that which would be achieved by the use of a remediation package which forms the best practicable techniques of remediation for:

- (iii) ensuring that the linkage is no longer a significant pollutant linkage, by doing any one or more of the following:
- a. removing or treating the pollutant;
 - b. breaking or removing the pathway; or
 - c. protecting or removing the receptor; and

(iv) remedying the effect of any significant harm or pollution of controlled waters which is resulting, or has resulted from, the significant pollutant linkage.”

In this case, the best practicable technique and good practice is considered to be:

- (iv) removal of the contaminated shallow soils for disposal off site (“part removal of the pollutant”)
- (v) installation of a cover system to prevent access to underlying soils (“physical barrier between the pollutant(s) and receptor)
- (vi) re-instatement of garden areas with turf, gravel, flower beds or flagstones

3.4.2 The Remedial Treatment Actions listed below have been considered appropriate to break the Significant Pollutant Linkages upon which the Determination(s) were based in the area defined in Schedule 1; considering Best Practical Technique (BPT) as specified by paragraph C19 of the Statutory Guidance Circular 01/2006.

3.4.3 The standard of remediation is to ensure that the identified pollutant linkages are no longer significant pollutant linkages through a combination of removing the pollutant linkage and breaking the pathway, as set out in paragraph C.18 of the Statutory Guidance.

3.4.4 The following Remedial Treatment Action is required to ensure that the Pollutant Linkages are broken:

Installation of a 500mm cover system to prevent access to contaminated soils and break the pollutant linkages to human health.

3.3.5 Programme of Works

The main contract for the remediation works was effective from 09 January 2012 for a target period of 6 weeks. Site works commenced on 09 January 2012 and the remediation, for contract purposes was substantially completed on 22 February 2012. This substantial completion was subject to some outstanding works such as remedial works including snagging of garden items. All works were completed by the end of February 2011.

3.3.6 Validation

The consultant has provided documentary evidence that the works have been undertaken and the general objectives of the scheme have been satisfactorily achieved in the form of a completion/verification report. A

verification report has also been produced for each property included within the remediation works.

3.3.7 Post Completion

The Council's Development Control and Building Control departments have been informed of the remediation works undertaken and the necessary conditions that should be attached to approval(s) for any future work which may compromise the effectiveness of the remediation and for which planning permission or Building Regulations approval is required.

Property owners have been provided with an advice pack detailing the works that have been carried out at their properties and the precautions to be observed to avoid compromising remediation measures.

3.4 **Monitoring Actions**

The Monitoring Actions listed below have been considered appropriate to provide validation of the break in the Significant Pollutant Linkage upon which the determination was based, in the area defined in Schedule 1; considering Best Practical Technique (BPT) as specified by paragraph C19, and the Quality Assurance (QA) as required by C25 of the Statutory Guidance Circular 01/2006. The Monitoring Action will also provide a mechanism for reviewing the need for additional assessment or remediation.

The following Monitoring Action is required to ensure that the Remedial Treatment Actions have been successful and the relevant Pollutant Linkages have been broken

The cover system will be the responsibility of the relevant property owner to ensure that it is not removed or damaged. The Monitoring Action is a shared action that applies to all identified Significant Pollutant Linkages.

Responsibility lies with private residents to ensure this Monitoring Action is undertaken. All relevant information will be provided to the residents to ensure that the remediation remains effective.

SCHEDULE 4

PARTICULARS OF SIGNIFICANT POSSIBILITY OF SIGNIFICANT HARM AND PARTICULARS OF SUBSTANCE

4.8 Ground Conditions

- 4.8.1 Previous ground investigations have encountered shallow made ground overlying granular and cohesive alluvial deposits, and subsequently underlain at depth by Sherwood Sandstone.
- 4.8.2 The investigation observations and logs found a surface covering of bare earth (flower borders), grass, gravel or flagstones underlain by made ground comprising sandy/clayey soil including gravel, brick fragments and clinker in some locations. The made ground generally extended to depths of 0.2m bgl to 1.0m bgl with a maximum depth recorded of 2.5m bgl. Dense or frequent ash and clinker was found at some of the properties. Natural ground was present beneath the made ground in several locations and comprised clay, sand, silt and gravel.

4.9 Sources

- 4.9.1 The shallow soils in the garden areas contained significantly elevated levels of heavy metals and organic contaminants.
- 4.9.2 The type and relative concentrations of the contaminants varied from plot to plot.
- 4.9.3 The contaminants are present at concentrations in excess of site-specific assessment criteria derived for the site. [Reference: "PART 2A Investigation and Interpretative Report, WYG Environment, May 2010, Reference: A51527"].

4.10 Pathways

- 4.10.1 The following potential pathways for exposure are considered to be present:

Intake of contaminated soil/dust through ingestion, inhalation, direct contact, consumption of contaminated vegetables.

4.11 Receptors

- 4.11.1 The receptors considered at risk are human beings and domestic pets, namely current and future residents of the properties (receptor type 1 in Table A of Annex 3 of the Statutory Guidance).

4.11.2 In the case of the legal determination the critical receptor is a female child in the first six years of life.

4.12 Identification of Receptors

4.12.1 The identification of receptors is based on the current use of the land for housing with gardens.

4.12.2 All of the properties are privately owned.

4.13 Types of Significant Harm

4.13.1 The significant harm would be a “human health effect” as defined in Table A of Annex 3 of the Statutory Guidance, arising from the “intake of a contaminant”, or other direct bodily contact with a contaminant” (description 1 in Table B of the Statutory Guidance).

4.14 Significant Possibility of Significant Harm

4.14.1 The risk assessment derived site-specific assessment criteria based on published CLR documents and associated toxicological data. Exposure to levels of contamination in excess of these criteria was considered by the Council to be “unacceptable”. On the basis of the risk assessment the Council considers that the land shown identified in Schedule 1 appears to meet the statutory definition of contaminated land by virtue of there being a significant possibility of significant harm to human health, in accordance with Chapter A (Table B) of the Statutory Guidance.

Table 4.7 Particulars of Significant Harm and Particulars of Substances

<i>'SIGNIFICANT POSSIBILITY OF SIGNIFICANT HARM BEING CAUSED'</i>				
SOURCE		PATHWAY(S)		RECEPTOR(S)
Arsenic (within 0.5m of the surface)	⇒	Intake of contaminated soil/dust through ingestion, inhalation, direct contact, consumption of contaminated vegetables	⇒	Human beings * Domestic Pets
Lead (within 0.5m of the surface)	⇒	Intake of contaminated soil/dust through ingestion, inhalation, direct contact, consumption of contaminated vegetables	⇒	Human beings * Domestic Pets
Chromium (within 0.5m of the surface)	⇒	Intake of contaminated soil/dust through ingestion, inhalation, direct contact, consumption of contaminated vegetables	⇒	Human beings * Domestic Pets
PAHs (within 0.5m of the surface)	⇒	Intake of contaminated soil/dust through ingestion, inhalation, direct contact, consumption of contaminated vegetables	⇒	Human beings * Domestic Pets

Note 1 Not all substances were found above action levels in every garden

Note 2 This table includes those pollutant linkages identified for human health.

SCHEDULE 5

REVISIONS

Details of Revision	Date	Officer
None to Date		