principal driver, in line with industry best practice, CLR11 / CLRM guidance, the ethos of the NPPF and development principle of the SPD, the prevention of pollution and betterment of the existing conditions will be integral to the successful delivery of any remediation scheme.

Thermal remediation methods of incineration and desorption, together with stabilisation and solidification methods of hydraulic binders or vitrification have not been taken forward for evaluation due to energy input requirements and comparatively low treatment volumes. They may be appropriate for local remediation of targeted hotspots but are not considered to be viable for widespread deployment on the site.

Solvent extraction, air sparging, soil vapour extraction (SVE) and dual phase SVE have not been carried forward for evaluation due to the absence of widespread solvent and/or hydrocarbon contamination. Chemical oxidation and dehalogenation are also not applicable to the remediation of heavy metals or asbestos. Soil flushing, surface amendments or soil washing are not appropriate for asbestos contamination.

Biological remediation methods are not applicable for the remediation of asbestos or the ubiquitous heavy metals present within the sites Made Ground deposits. The low nutrient and high pH typical of the Made Ground would also prohibit targeted remediation of hydrocarbons without notable pre-treatment / augmentation or dilution.

Localised in ground barrier solutions may be applicable on a local scale but are not considered, particularly where they may compliment any landfill gas mitigation measures but are not considered to be appreciate for site wide deployment.

4.4 Outline Remediation Options Appraisal

The outline remediation options appraisal is presented in Table 4.2 and considers contaminant linkages CL1, CL2 and CL4 identified in Table 3.4. CL3 has been excluded from the appraisal on the basis that development principle STDC9 of the SPD has already established that '*development proposals located in proximity to former landfill sites should be supported by a Gas Risk Assessment and should incorporate any necessary protection measures, such as those to protect buildings from landfill gas migration*'.

Exposure pathways for commercial/industrial end use include direct soil and indoor dust ingestion, skin contact with soils and dusts, and inhalation of dust and vapours. As it is not pragmatic to remove all potentially impacted materials the overarching remediation strategy needs to consider options to break contaminant linkages is to manage the associated risks and to prepare the site for redevelopment without constraints.

Applicable media **S** = Soils, Made Ground and sediments **W** = Groundwater and surface water		Organic substances							Inorganic substances				
		Volatile organic compounds (VOCs)	Halogenated hydrocarbons	Non-halogenated hydrocarbons	**Polyaromatic hydrocarbons (PAHs)**	**Polychlorinated biphenyls (PCBs)**	**Dioxins and furans**	Pesticides and herbicides	**Heavy metals**	**Non-metals**	**Asbestos**	**Cyanides**	Explosives
Method	**Remediation options**	Applicable media							Applicable media				
Civil engineering	Containment - cover systems	**S**	S	S	**S**	**S**	**S**	S	**S**	**S**	**S**	**S**	S
	Containment - hydraulic barriers	**W**	W	W	**W**	**W**	**W**	W	**W**	**W**		**W**	W
	Containment - in ground barriers	**S, W**	S, W	S, W	**S, W**	**S, W**	**S, W**	S, W	**S, W**	**S, W**		**S, W**	S, W
	Excavation and disposal	**S**	S	S	**S**	**S**	**S**	S	**S**	**S**	**S**	**S**	S
Biological	Natural attenuation	**W**	W	W	**W**			W	**W**	**W**			W
	Biopiles	**S**		S	**S**			S					S
	Bioventing	**S**	S	S	**S**								
	Biosparging	**S, W**	S, W	S, W	**S, W**			S, W					
	Landfarming	**S**		S	**S**			S					S
	Slurry phase biotreatment	**S**	S	S	**S**		**S**	S				**S**	S
	Windrow turning	**S**		S	**S**			S					S
Chemical	Chemical oxidation	**S, W**	S, W	S, W	**S, W**			S, W		**S, W**			
	Chemical dehalogenation	**S**	S			**S**	**S**						
	Soil flushing	**S**	S	S	**S**				**S**				
	Surface amendments								**S**	**S**			
	Solvent extraction	**S**	S	S	**S**	**S**	**S**	S					S
Physical	Soil vapour extraction (SVE)	**S**	S	S									
	Dual phase SVE	**S, W**	S, W	S, W									
	Air sparging	**W**	W	W									
	Permeable reactive barriers	**W**	W	W	**W**	**W**	**W**	W	**W**	**W**		**W**	W
	Soil washing		S	S	**S**	**S**		S	**S**	**S**		**S**	
Stabilisation and solidification	Hydraulic binders (such as cement)			S	**S**	**S**	**S**	S	**S**	**S**	**S**	**S**	
	Vitrification	**S**	S	S	**S**	**S**	**S**	S	**S**	**S**		**S**	S
Thermal	Incineration	**S**	S	S	**S**	**S**	**S**	S	**S**	**S**		**S**	S
	Thermal desorption	**S**	S	S	**S**	**S**		S	**S**		**S**	**S**	

Table 4.1 Outline Remediation Options Appraisal

Contaminant Linkage	Technique	Summary of Technique	Logistical Requirements	Advantages	Disadvantages	Relative Cost	Conclusion
CL1, CL2 & CL4	Capping of the site with up to 0.3 m of material	Placement of chemically suitable for use materials over contaminated ground. Designed to reduce hazard to human health and enable a clean zone for construction and placement of utilities and associated infrastructure.	Site regrading and in-ground structure removal anticipated to approximately 2.5m bgl. Minimal to no compaction of the underlying material is envisaged prior to placement of suitable cover material. A no dig layer may be considered necessary given the depth of capping. Subject to construction requirements relating to the development, a low permeability break layer may be required.	Cost effective for use across entirety of site. Significantly reduces hazard to human health. Well established / proven technique. Easily incorporated into the redevelopment of the site and appropriate to phased development of discrete land parcels. The installation of positive drainage and a reduction in surface water percolation through the contaminated made ground to the River Tees.	Will not treat contaminant sources. Contaminant source remains in-situ. Capping material must chemically meet site specific assessment criteria and be geotechnically suitable. Suitable for use materials may need to be imported.	Low to medium	Proven cost-effective technique in the UK, subject to sourcing and transport of capping materials. Environmentally sustainable for the wider development with reuse of materials. Protection of in-ground service/ infrastructure and also future maintenance workers. STDC may be able to utilise materials derived from their wider development works, thereby a sustainable approach.
CL1, CL2 & CL4	Excavation and disposal	Excavation of the contaminated material and off-site disposal to landfill (including those within STDC wider area) or off-site treatment facility.	Vast amounts of groundwork required. Appropriate levels of site investigation to characterise and delineate conditions to reduce the need for movement and/or disposal. Logistical transport arrangements. Dewatering of come materials required and then disposal of potentially contaminated water.	Removes source of contamination. Easily incorporated into the redevelopment of the site. Existing adjacent landfills permitted to accept iron and steel industry wastes. Very low risk of technique failing.	Not a sustainable technique. Waste would require segregation dependent on type and level of contamination. Capacity of adjacent landfills not enough to accept all potentially contaminated Made Ground. Very costly, as material sent off-site for disposal will need to be replaced with imported material. Very unsustainable.	Very high	Standalone remediation option: Relative cost is high to very high. Not considered environmentally sustainable. Environmentally, logistically and economical viable if combined with other techniques for target disposal and utilising existing landfills within the STDC area.
CL1, CL2 & CL4	Hard Surfacing	Use of concrete and or other appropriate hard surfacing to break pathway	Large scale concrete requirement. Protection against aggressive soils will be required. Clean service runs and/or barrier pipes (see below) likely to be required.	Significantly reduces hazard to human health. Well established / proven technique. Relatively easily incorporated into the redevelopment of the site.	Not very sustainable. Requires a great deal of long-term management and maintenance of the site. Protection of in ground workers and assets required in short and long term	High to very high	Standalone remediation option: Relative cost is high to very high and not viable given the site area. Not considered environmentally sustainable. Cost effective and sustainable when considered as a complimentary option to other techniques and incorporated into development layout design.

4.5 Selection of final feasible remediation options

The selection of feasible remediation options (Section 4.3) set out the evaluation of options excluded. The SPD acknowledges that areas of the site may be subject to different levels of contamination and the approach of the STDC will be to assess the degree of contamination and to adopt a ground remediation strategy that will deal with the contamination based on site delivery and viability.

Given the size of the site, together with the range and distribution of contaminants, and apparent limited risks to potential future industrial end users the most appropriate overarching remediation option comprises the formation of a capping layer across the site to break Made Ground contaminative linkages. In areas of the development this may comprise the hardstanding/building slab associated with the development.

This overarching approach is compatible with the phased remediation of the site and flexibility of layout design, allowing development hard surfacing to also contribute to remediation solutions. The option for selective excavation and disposal at adjacent hazardous waste facility of limited 'hotspots' of contamination complements a capping approach as a balanced approach to remediation.

To enable the protection of the remediation capping layer during both the construction and full site operational phase, it may be necessary to provide an additional layer of engineering fill. This would be provided as part of the building construction phase of works, and the form and nature of any additional layer will be dealt with under a separate application. As such this does not form part of the current Remedial Strategy.

5. Proposed Remediation Works

The recommended outline remediation strategy is based on our current understanding of the site.

5.1 Outline of Proposed Remediation

Given the size of the site it is not feasible to remediate the whole site as a single operation. Redevelopment will be phased over numerous years. Consequently, a pragmatic approach will be for remediation works to be undertaken as part of the development platform construction phase for individual land parcels, this will allow remediation tasks to be incorporated into the design of the development.

It is recommended that as specific land parcels are brought forward for redevelopment via the planning regime future planning applications are accompanied with a summary remediation Design Statement. Confirming how the proposed remediation tasks are compliant with the overarching Remediation Strategy, taking into consideration any supplementary site information and/or regulatory amendments, and ensure that the land parcel is suitable for individual proposed end use.

5.2 Development Platform Remediation – Proposed Works

Initial enabling activities will comprise demolition of legacy structures and ground preparation operations including vegetation clearance and infilling of voids.

The outline remediation strategy does not require the existing site levels to be raised beyond remediation cover system requirements and to enable a level platform for ease of the development.

Site won and imported clean cover soils will be placed under a controlled methodology, mainly driven by geotechnical requirements, to form the development platform. Therefore, the materials are likely to be put down in compacted layers to satisfy these requirements.

Subject to viability and if piling is used in the final design it may be possible to re-use pile and foundation arisings within the confines of the site, beneath the capping layer. This will be subject to chemical analysis of the arisings to ensure they are in keeping with the soil chemistry in the shallow Made Ground and do not lead to leachable contaminants.

To enable the protection of the remediation capping layer during both the construction and full site operational phase, it may be necessary to provide an additional layer of engineering fill, of approximately 0.5 m. This would be provided as part of the building construction phase of works, and the form and nature of any additional layer will be dealt with under a separate application. As such this does not form part of the current Remedial Strategy.

Verification Works

Confirmatory chemical analysis to ensure suitability for use of any capping materials will be required before placement commences and monitored throughout the works. The land parcel specific remediation design statement will set out the testing frequency. All materials will be subject to visual and olfactory assessment during the works, if deemed necessary additional confirmatory analysis will be undertaken. Site specific remediation criteria are not anticipated to be required for the proposed redevelopment of the site. Suggested generic screening criteria, together with determinands to be analysed for those listed in Table 5.1.

Table 5.1 Chemical Suitability Assessment Criteria (Industrial/ Commercial) for Soils

Determinand	Assessment Criteria (mg/kg)	Assessment Criteria Source
Arsenic	640	C4SL (Commercial)
Cadmium	410	C4SL (Commercial)
Chromium III	8,600	LQM/CIEH S4UL (Commercial/ Industrial)
Chromium VI	49.00	C4SL (Commercial)
Copper	68,000	LQM/CIEH S4UL (Commercial/ Industrial)
Lead	2,300	C4SL (Commercial)
Nickel	980	LQM/CIEH S4UL (Commercial/ Industrial)
Selenium	12,000	LQM/CIEH S4UL (Commercial/ Industrial)
Zinc	730,000	LQM/CIEH S4UL (Commercial/ Industrial)
Inorganic mercury	1,100	LQM/CIEH S4UL (Commercial/ Industrial)
Benzo(a)pyrene	77	Wood GAC (Commercial/ Industrial)
Naphthalene	1,900	Wood GAC (Commercial/ Industrial)

Additional verification of the placement of the materials will be undertaken based on geotechnical characteristics required to develop the building platform.

It will also be necessary to ensure that a suitable thickness of capping has been placed across the site and this will be demonstrated through surveying of the site before and after remediation works.

Disposable of unsuitable materials

Where materials are chemically and physically suitable they will be retained on site. A site wide MMP will be in operation for re-use of materials. As noted above the existing adjacent landfills, within the wider STDC area, will be utilised wherever appropriate. Responsibility for the correct handling, storage, sampling, analysis and classification of such material will rest with the appointed remediation contractor.

Discovery of Unrecorded Contamination during the Works

Although areas of the site and wider area have been subject to extensive previous ground investigation, there remains the potential for unrecorded contamination which may be encountered during the remediation or site preparation works. The assessment of such material may be based on visual / olfactory evidence of contamination initially, with the material set aside for sampling and analysis to confirm whether the material can be retained or requires off-site disposal. The material will be stored within the site, in a suitable location, pending sampling and analysis. Responsibility for the correct handling, storage, sampling, analysis and classification of such material will rest with the appointed remediation contractor.

5.3 Verification Reporting

The proposed methods of verification are detailed in Section 5.2. Reporting of the verification works is required to provide evidence that the remediation works have been undertaken in accordance with the land parcel remediation design statement (specification) and approved outline remediation strategy, for the benefit of the regulators and future developers. The Verification Report shall also form part of the Health and Safety File.

Verification Reports will be prepared in accordance with CLR11 and include:

- Factual account of all works undertaken, supported with as-built drawings, where appropriate;
- Environmental monitoring records;
- Duty of care information for any wastes removed off-site;
- Confirmation of capping layer thickness;
- Re-appraisal of contaminant linkages post-works; and
- Remediation Statement to confirm works completed or highlight any works which remain outstanding.

5.4 Future Site Maintenance / Redevelopment

Under the requirements of both the Health & Safety at Work Act and the Construction, Design, Management Regulations, 2015 a Health and Safety file is required to be prepared following the completion of the remediation works. The Health and Safety File is to be made available to those intending to undertake any works at the site which involves ground disturbance so that appropriate safe systems of work can be prepared which manage the potential for exposure to contaminants that remain in the ground following redevelopment. The Health and Safety File should also outline requirements for reinstatement of any hardstanding and cover systems on completion of any works to ensure the works have not left any contamination at surface which may pose risk to site users.

6. Control of the Works

6.1 Design Statement?

6.2 Implementation Plan

In line with CLR11, the works shall be delivered in accordance with a Design Statement. This document shall set out:

- Overview of the remediation objectives, in line with the Remediation Strategy;
- The detailed design of the works, which shall be used to develop the Remediation Works Technical Specification, and which shall be based on the Remediation Strategy;
- Roles and responsibilities with regard to managing and delivering the works;
- Programme for the works;
- Supervision requirements;
- Regulatory permit requirements; and
- Verification requirements.

6.3 Construction (Design and Management) (2015) Regulations

The remediation works will be carried out on behalf of the Client by an appointed remediation contractor, who will be appointed as 'Principal Contractor' under the Construction (Design and Management) Regulations 2015 (CDM 2015).

6.4 Site Supervision

The remediation works will be supervised by both a suitably qualified and experienced geoenvironmental engineer.

6.5 Materials Management Plan

In accordance with the CL:AIRE Definition of Waste Code of Practice, a Materials Management Plan (MMP) will be produced for the works. All recoverable materials will be tracked through this document, with waste materials detailed in the Waste Management Plan (summarised in Section 6.6). The overall approach is to retain as much material on site as possible, thereby minimising the requirement to export materials off-site for disposal, thus reducing landfill burden and minimising CO_2 emissions from waste transport. The MMP will be subject to review by a Qualified Person (QP).

6.6 Environmental & Waste Management

The remediation works will be undertaken in accordance with the remediation contractor's Environmental Management Plan (EMP) and WMP.

Potential environmental impacts arising from the remediation works, measures to mitigate those impacts and those responsible for their implementation are outlined below.

Waste

The remediation contractor shall prepare a WMP for the works. This document shall identify all anticipated waste streams associated with the works and identify appropriate disposal routes. It shall also include mitigation measures to be implemented to ensure no nuisance arises from waste storage such as odour or littering. The document shall be updated throughout the works to include all waste consignment notes.

Dust

Dust may be generated during excavation, haulage, backfilling and soil stockpiling, particularly during periods of dry weather. It will be the responsibility of the remediation contractor to ensure no nuisance arises. Mitigation measures to be adopted include:

- Maintenance of site traffic routes, and enforcement of speed limits to minimise the potential generation of dust.
- All wagons leaving the site to be sheeted.
- Water sprays to be used during operations as and when required to minimise potential for dust generation.
- Road sweeper to be deployed to clean public highways adjacent to site, where required. Road sweepers are not appropriate for the internal roadways.

Noise & Vibration

Noise and vibration will be associated principally with the breaking out and crushing of any hard materials present in the areas that are to be subject to remediation. The contractor will be required to use the most suitable equipment appropriate to the task, considering noise levels and anticipated duration of the task, to minimise potential for nuisance. In addition, consideration shall be given to restricting works to particular hours, where required.

Odour

Odours may arise during the works, however the potential for generation of significant odours is expected to be relatively low. If significant odours are noted, appropriate mitigation measures will be implemented by the remediation contractor. This may, for example, include covering odorous materials, amending working practices to minimise odours and/or utilising odour suppression and mitigation equipment.

Vapours

Organic vapours were not encountered at significant concentrations during previous site or adjacent site investigation works. Therefore, it is not considered that monitoring of organic vapours is required during the works.

Surface Water

The remediation contractor shall implement appropriate mitigation measures to protect any surface water drains during the works to ensure no pollutants or sediments enter the surface water network. This will include siting soil stockpiles and temporary storage tanks away from surface water drain entry points and where necessary, protecting those entry points with impermeable barriers or covers.

Traffic

Vehicle movements associated with the works are unavoidable. The remediation contractor will be required to implement a Construction Traffic Management Plan (CTMP) which will outline any measures required to minimise disruption and nuisance to adjacent land users.

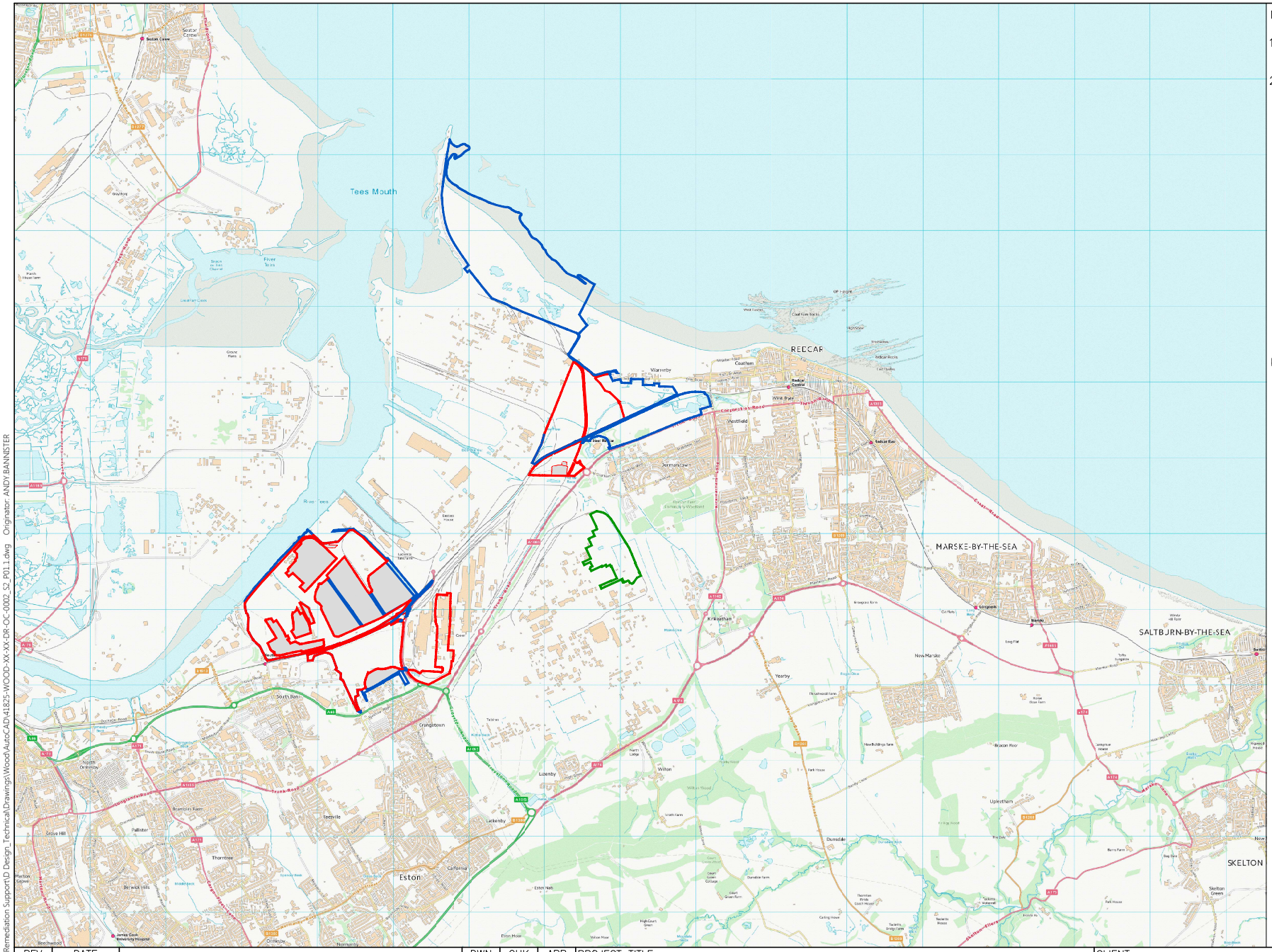
Mud on Roads

There is a potential for mud to be carried out of the site on to local roads during the works. Mitigation measures will be implemented, where necessary, and may include use of a wheel wash and/or deployment of a road sweeper.

Licences / Permits

All relevant environmental permits will be obtained and maintained by the remediation contractor, if required. The remediation contractor will be responsible for adhering to any conditions specific to such permits.

Figures



NOTES:

1. All units are in metres unless otherwise noted.
2. This drawing has been produced using information taken from South Tees Development Corporation drawings STDC–SCW–XX–PLA–0001 dated May 2019 and STDC–SCW–XX–GEN–0003 dated April 2019.

KEY:

- STDC Land ownership boundaries
- Proposed STDC works red line planning boundaries
- Sirius Wilton site boundary
- Areas not included within works

REV	DATE		DWN	CHK	APP
P01.1	18/06/19	FIRST ISSUE	AB	MR	MR

REVISIONS

REV	DATE		DWN	CHK	APP
P02	24/06/19	Minor amendments to spot level text	AB	MR	MR

PROJECT TITLE: Former Steel Works
South Tees

DRAWING TITLE: Site Location Plan

SCALES : 1:50,000 @ A3 Original Drawing Size – A3

CLIENT: South Tees Development Corporation

REF:

Canon Court, Abbey Lawn,
Abbey Foregate,
Shrewsbury SY2 5DE.
Tel: (01743) 342000
Fax: (01743) 342010

DRAWING No.
41825–WOOD–XX–XX–DR–OC–0002_P02

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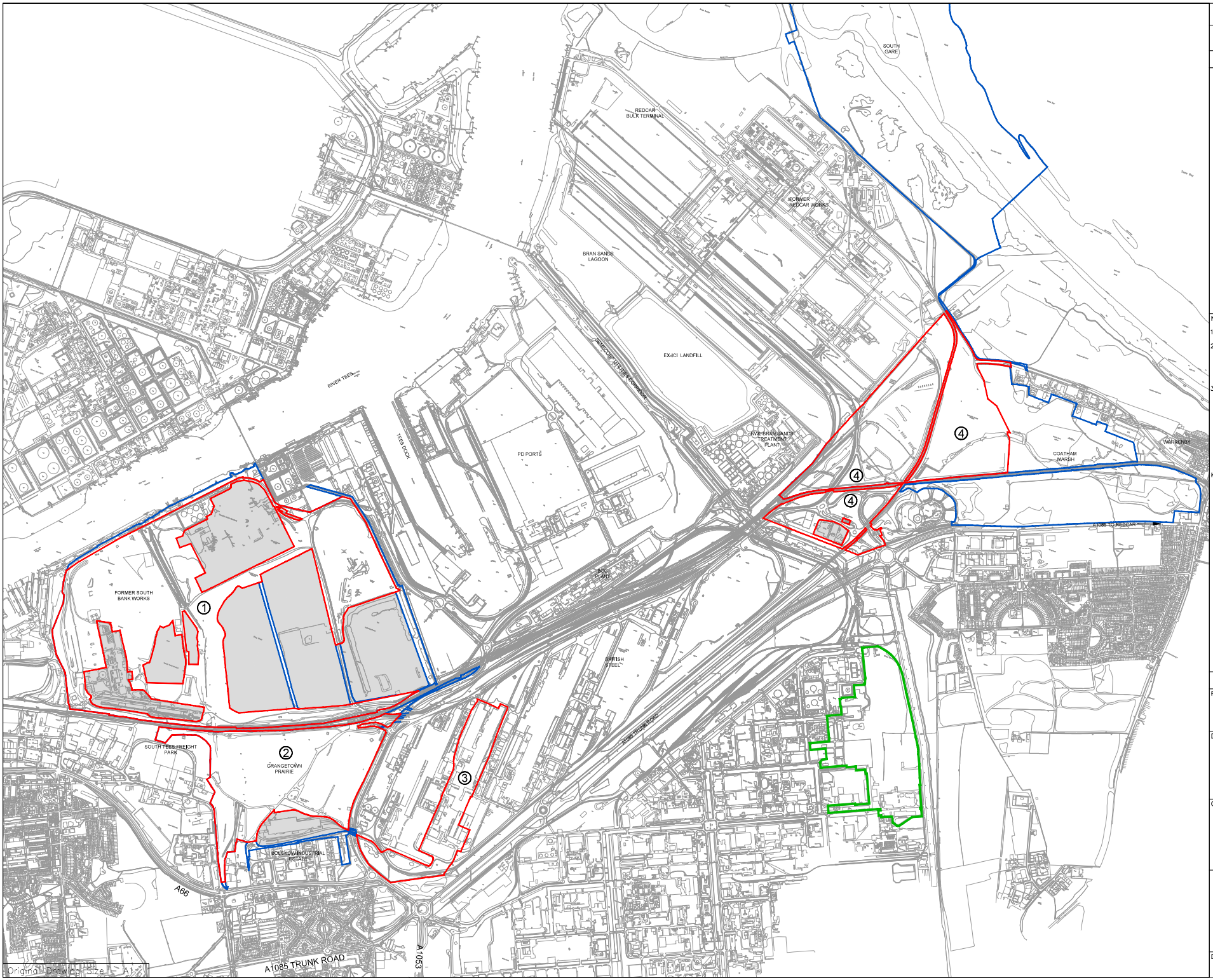

DESCRIPTION

REV	DATE		DWN	CHK	APP
A	18/06/2019	FIRST ISSUE	AB	MR	MR

REVISIONS

REV	DATE		DWN	CHK	APP
P02	24/06/2019	Amendment to planning boundaries and associated changes to text in key	AB	MR	MR

NOTES:

1. All units are in metres unless otherwise noted.
2. This drawing has been produced using information taken from South Tees Development Corporation drawings STDC-SCW-XX-PLA-0001 dated May 2019 and STDC-SCW-XX-GEN-0003 dated April 2019.
3. Zoned solely for the purpose of historical site review and environmental context appraisal to support overarching remediation Strategy

   Zone 1: Former South Bank Works
   Zone 2: Grangetown Prairie
   Zone 3: Lakenby Coil Plate Mill
   Zone 4: Warrenby Landfill & Coatham Marsh

KEY:

- STDC Land ownership boundaries
- Proposed STDC works red line planning boundaries
- Sirius Wilton site boundary
- Areas not included within works

DRAFT

0m 200m 400m 600m 800m

SCALE 1:10,000

SCALES: 1:10,000 @ A1

PROJECT TITLE:
Former Steel Works
South Tees

DRAWING TITLE:
Site Zones for Environmental Context

CLIENT:
South Tees Development Corporation

REF:

CANON COURT, ABBEY LAWN,
ABBEY FOREGATE,
SHREWSBURY,
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wood.

DRAWING No. 41825-WOOD-XX-XX-DR-OC-0001

Rev. P02

Original Drawing Size A1

Appendix A
Former South Bank Works

Appendix A1
Enviro Insight Report

Appendix A2
Geo Insight Report

Appendix A3
Maps

Small Scale Grid Index

Small Scale Section 1-1

Small Scale Section 1-2

Small Scale Section 2-1

Small Scale Section 2-2

1:1250 Scale Grid Index

1:1250 Scale Sections 1-1 to 1-3

1:1250 Scale Sections 1-4 to 2-3

1:1250 Scale Sections 2-4 to 3-4

1:1250 Scale Sections 3-5 to 4-2

1:1250 Scale Sections 4-3 to 5-2

1:1250 Scale Sections 5-3 to 5-5

1:1250 Scale Sections 6-2 to 6-4

1:2500 Scale Grid Index

1:2500 Scale Sections 1-1 to 2-1

1:2500 Scale Sections 2-2 to 2-4

1:2500 Scale Sections 3-1 to 3-4

1:2500 Scale Sections 4-1 to 4-3

1:2500 Scale Sections 4-4 to 5-3

Appendix B
Grange Town Prairie

Appendix B1
Enviro Insight Report

Appendix B2
Geo Insight Report

Appendix B3
Maps

Appendix C
Plate Mill

Appendix C1
Enviro Insight Report

Appendix C2
Geo Insight Report

Appendix C3
Maps

1:1250 Scale Sections 1-1 to 1-2

1:1250 Scale Sections 2-1 to 2-3

1:1250 Scale Sections 2-4 to 3-1

1:1250 Scale Sections 3-2 to 3-4

1:2500 Scale Maps

Appendix D
Coatham Marsh & Warrenby Landfill

Appendix D1
Enviro Insight Report

Draft - see disclaimer

Appendix D2
Geo Insight Report

Appendix D3
Maps

Small Scale Maps

1:1250 Scale Grid Index to Section 1-2

1:1250 Scale Sections 1-3 to 2-2

1:1250 Scale Sections 2-3 to 2-5

1:1250 Scale Sections 3-1 to 3-3

1:1250 Scale Sections 3-4 to 4-5

1:2500 Scale Grid Index to Section 1-4

1:2500 Scale Sections 2-1 to 2-4

1:2500 Scale Sections 3-1 to 3-4

Appendix E
Risk Assessment Methodology

The environmental risk assessment aims to assess the significance of each potential contaminant linkage. The key to the classification is that the designation of risk is based upon the consideration of both:

- **The magnitude of the potential consequence (i.e. severity).** It takes into account both the potential severity of the hazard and the sensitivity of the receptor.
- **The magnitude of probability (i.e. likelihood).** It takes into account both the presence of the hazard and receptor and the integrity of the pathway.

The definitions for the qualitative risk assessment have been taken from "Guidance for the Safe Development of Housing on Land Affected by Contamination" Annex 4 R&D Publication 66: 2008 Volume 2.

The Likelihood Probability Classifications of SPR Linkage being realised is presented in Table E.1

Table E.1 Likelihood Probability Classifications of SPR Linkage being realised

Classification	Definition	Examples
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.	a) Elevated concentrations of toxic contaminants are present below hardstanding. b) Light industrial unit <10 yrs old containing a double skinned UST with annual integrity testing results available.
Low Likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.	a) Elevated concentrations of toxic contaminants are present in soils at depths >1m in a residential garden, or 0.5-1.0m in public open space. b) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space. b) Ground/ groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution	a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden. b) Ground/groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years.

"Potential Consequence of Contaminant Linkage" gives an indication of the sensitivity of a given receptor to a particular source or contaminant of concern under consideration. It is based on full exposure via the particular linkage being examined. The classification of consequence is presented in Table E.2.

Table E.2 Outline of Hazard Consequence Classifications for Receptor Types from Contamination Impact:

Classification	Human Health	Controlled Water	Ecology	Property Structures/ Crops and animals	Examples
Severe	Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs.	Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce.	Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population.	Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of Hazardous or priority substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs.	Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce.	Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population.	Significant damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.

Classification	Human Health	Controlled Water	Ecology	Property Structures/ Crops and animals	Examples
Mild	Exposure to human health unlikely to lead to "significant harm".	Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce.	Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.	Minor damage to crops, buildings or property.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.
Minor	No measurable effects on humans	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.

The risk matrix to link the likelihood and consequence is shown in Table E.*3*

Table E.3 Risk Matrix

Likelihood:	Unlikely	Low Likelihood	Likely	High Likelihood
Potential Consequence:				
Severe	Moderate/low risk	Moderate Risk	High Risk	Very High Risk
Medium	Low	Moderate/low risk	Moderate Risk	High Risk
Mild	Very low risk	Low Risk	Moderate/low risk	Moderate Risk
Minor	Very low risk	Very low risk	Low Risk	Low Risk

The overall risk definitions are summarised in Table E.4

Table E.4 Risk Definitions

Risk	Definition
Very Low	It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.
Low	It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
High	Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.