

Briefing Note

Our ref 63262 STDC NZT 20971461v1
Date 6 May 2022
To Redcar and Cleveland Borough Council and Environment Agency

Subject **Response to comments from the Environment Agency on Planning Application Ref: R/2021/1048/FFM - 'Engineering operations associated with ground remediation and preparation of the site'**

1.0 Background

- 1.1 Redcar and Cleveland Borough Council (RCBC) are currently considering an application for, “*Engineering operations associated with ground remediation and preparation of the site.*” the application was validated on 7 December 2021 and has been given the reference number R/2021/1048/FFM.
- 1.2 The grant of planning permission would enable Teesworks to create appropriate ground conditions for the final end-use development of the site in the vicinity of the former Redcar Steel Works on land now referred to as The Foundry. The ground remediation and preparation of the site referred to within the application is to be undertaken by the applicant in order to construct a development platform.
- 1.3 Importantly, the application is limited to ground preparation only, the end use development will be subject to a separate consenting process at a later date. This is anticipated to be via a Development Consent Order for the project known as Net Zero Teesside. The applicant is concerned that the EA appear to have conflated the two separate planning processes. Although some documentation pertinent to the DCO has been used to support the above application and the applicant has discussed the remediation with the third party to coordinate alignment with their expectations, the two projects are not linked and should be assessed separately and in isolation within their respective planning frameworks.
- 1.4 Where the EA refer to the Net Zero Teesside Development in their response, this is factually incorrect in terms of this planning application.
- 1.5 We note that the Environment Agency refer to the Materials Management Plan (MMP) and requested that it (the MMP) be provided for their review as part of the planning application. In response, it should be noted that the MMP process sits outside of the Planning System and is subject to its own Code of Practice and Regulation under a separate consenting regime. Planning Guidance sets out very clearly that a planning application/conditions should not require compliance with other regulatory requirements. On this point the Government’s Planning Practice Guidance states that (Para: 005 Reference ID: 21a-005-20190723), “Conditions requiring compliance with other regulatory regimes will not meet the test of necessity and may not be relevant to planning.”

1.6 After reviewing the guidance and the particulars of the case, we do not feel that it is necessary for the MMP to be submitted to the Environment Agency (or any other party) as part of the planning application.

2.0 Legal Framework

2.1 Section 70(2) of the Town and Country Planning Act 1990 and section 38(6) of the Planning and Compulsory Purchase Act 2004 confirm that any decision made on a planning application **must** be taken in accordance with the statutory development plan unless there are material considerations that indicate otherwise. Policies of the development plan are statutory, whereas national planning policy is a material planning consideration.

2.2 As with all applications, we would expect the subject planning application to be determined in line with the above legal provisions.

2.3 The statutory development plan for the application site comprise:

- Redcar & Cleveland Local Plan (adopted 2018); and
- The Tees Valley Joint Materials and Waste Development Plan Documents; comprising;
 - i Minerals and Waste Core Strategy DPD (adopted September 2011); and
 - ii Minerals and Waste Policies and Sites DPD (adopted September 2011).

2.4 The National Planning Policy Framework (NPPF), as up-to-date government planning policy, is a material consideration that must be taken into account where it is relevant to a planning application.

3.0 Consultation

3.1 In accordance with normal practice, RCBC have consulted with neighbours and other statutory and non-statutory consultees on this application.

3.2 Whilst most of the consultees have responded to the application and raised either no objection or recommended the imposition of conditions, the Environment Agency has objected to the application. The reasons given for their objection centre around the potential impact on controlled waters.

3.3 Within their objection (page 9) the Environment Agency state that *“The “environmental betterment” to controlled waters should be fully demonstrated with appropriate lines of evidence.”*

3.4 This note responds to the aforementioned aspect of the objection from the Environment Agency. Other consultants acting for Teesworks are responding to the remaining issues, where necessary (See Appendix 1).

4.0 Policy Context

4.1 As set out above, planning applications must be considered in accordance with the Development Plan (unless material considerations indicate otherwise). When considering

any potential impacts on water quality arising from this application, the following is considered to be especially relevant.

- 4.2 Policy SD7 from the Council's Local Plan sets out the following on water quality: *"The drainage system must be designed and constructed so surface water discharged does not adversely impact the water quality of receiving water bodies, both during construction and when operational. New development should **seek to improve water quality where possible**, as well as maintaining and enhancing the biodiversity and habitat of watercourses.*
- 4.3 Section 15 of the NPPF deals with issues around 'Conserving and enhancing the natural environment'. Of particular relevance to this matter is paragraph 174 which states that,
- 4.4 *"Planning policies should contribute to and enhance the natural and local environment by...*
- e) preventing new and existing development from contributing to, being put at **unacceptable risk** from, or being adversely affected by, **unacceptable levels** of soil, air, water or noise pollution or land instability. Development should, **wherever possible**, help to improve local environment conditions such as air and water quality".*
- (All bold and underline emphasis added by Lichfields).
- 4.5 Crucially, neither the statutory planning policy for the area – the Local Plan – or national planning policy – the NPPF – requires development (at Teesworks or any other location) to prove (i.e through continuous monitoring, post development) environmental betterment is achieved in respect of water quality, in order to make that development acceptable in planning terms.

5.0 Decision Making

- 5.1 In accordance with the 'Presumption in favour of Sustainable Development' set out in the NPPF, where applications are in accordance with an up-to-date development plan, they should be approved without delay.
- 5.2 The NPPF (paragraph 55) makes it clear that planning conditions should be kept to a minimum however, where the following tests can be satisfied, conditions may be added:
- 1 necessary;
 - 2 relevant to planning;
 - 3 relevant to the development to be permitted;
 - 4 enforceable;
 - 5 precise; and
 - 6 reasonable in all other respects.
- 5.3 In response to the objection from the Environment Agency and in particular the comment on the need for the development to provide "environmental betterment" and for this to be demonstrated through long term monitoring, we are firmly of the view that there is no

planning policy basis (locally or nationally) on which this request could be based. Therefore, if the EA were to request that Redcar Council impose a planning condition(s) that requires evidence of water quality betterment (through monitoring over time, post development), such a condition would not meet the tests set out above, as it is not necessary to ensure that the proposed development complies with policy, it is not relevant to the development to be permitted as without such a condition, the development remains acceptable when assessed against prevailing planning policy.

- 5.4 Furthermore, in the extreme and unlikely event that Redcar Council was to refuse planning permission in the absence of a commitment to prove betterment in water quality over time, we are firmly of the view that such a reason for refusal would be challengeable through the appeal process and that any such appeal would be successful as a) there is no policy basis to substantiate such a reason for refusal and b) to uphold such a reason for refusal would set a precedent that is out of step with the planning system and its approach to environmental management.

6.0 Summary

- 6.1 There is no statutory policy basis or national planning policy to support the view that there is a planning requirement for environmental betterment (in respect of water quality) to be proven in respect of this application proposal or indeed any other planning application proposal. Any condition requiring such demonstration, or any refusal of planning permission in the absence of such, could not be substantiated by, or upheld on grounds of, planning policy or by the tests applied to planning conditions.
- 6.2 The commentary above is, we feel, a reasonable interpretation of the matter from a planning perspective. It should not be taken as a lack of commitment on Teeswork's part to seeking to achieve, where possible, betterment in water quality and, indeed, Teesworks fully expects that betterment will be achieved through the proposed works.
- 6.3 This note merely serves to explain that it is not reasonable or necessary for the determination of the subject application to be contingent upon the demonstration of water quality betterment.

Appendix 1 - Environment Agency Response

David Pedlow
Redcar & Cleveland Borough Council
Redcar & Cleveland House Kirkleatham
Street
Redcar and Cleveland
TS10 1RT

Our ref: NA/2021/115684/02-L01
Your ref: R/2021/1048/FFM
Date: 29 March 2022

Dear David

**ENGINEERING OPERATIONS ASSOCIATED WITH GROUND REMEDIATION
AND PREPARATION OF THE SITE (AMENDED PLANS SUBMITTED
10.02.2022) FORMER REDCAR STEELWORKS (TEESWORKS) LAND TO
WEST OF WARRENBY REDCAR**

Thank you for referring additional information which we received on 10 February 2022.

Environment Agency Position

We have reviewed the additional information submitted and **wish to maintain our OBJECTION to the proposed development as submitted.**

In summary, we object to the proposed development for the following reasons:

1. The information submitted with the application does not demonstrate that the risk of pollution to controlled waters is acceptable / can be appropriately managed; and
2. The risks to groundwater from the development are unacceptable. The applicant has not supplied adequate information to demonstrate that the risks posed to groundwater can be satisfactorily managed.

In order to overcome our objection, the Applicant needs to provide the following information:

- A Desk Study specific to the Net Zero Teesside development;
- Undertake ground investigations of areas previously not investigated and/or not accessible;
- An updated Generic Quantitative Risk Assessment which reflects the Net Zero Teesside development and the ground investigation data;
- An updated Detailed Quantitative Risk Assessment may be required;



- An updated Remediation Strategy reflecting the updated Desk Study, Ground Investigations, Generic Quantitative Risk Assessment and Detailed Quantitative Risk Assessment; and
- Letters of Reliance associated with the use of third party data and reports.
-

The full details of our objections are outlined below:

We have reviewed the following additional information which was submitted in support of this planning application:

- Arcadis Response to EA Document Net Zero Plot (NA/2021/115684/01-L01). Ref No. 10035117-AUK-XX-XX-CO-ZZ-0486-01-Net_Zero_Rem_Clarification_EA.
- SSI1 Redcar Works – Phase 1 Geo-Environmental Desk Study. Prepared by CH2M on behalf of Homes and Communities Agency. Dated August 2017.
- SSI2 Redcar Works – Phase 2 Geo-Environmental Desk Study. Prepared by CH2M on behalf of Homes and Communities Agency. Dated August 2017.
- Geoenvironmental Summary of Former SSI Steelworks, Redcar – Initial Ground Investigation Works. Prepared by CH2M on behalf of South Tees Site Company Limited. Dated May 2018.
- SSI Redcar – SSI1 – Factual Report – Initial Trial Pitting. Prepared by CH2M on behalf of South Tees Site Company. Dated November 2017.
- SSI Redcar – SSI2 – Factual Report – Initial Trial Pitting. Prepared by CH2M on behalf of South Tees Site Company. Dated November 2017.
- The Former SSI Steelworks, Redcar: Priority Areas with SSI Landholdings Contract 1 and 2A. Contract 1 and 2A Site Condition Report. Prepared by Arcadis on behalf of South Tees Site Company. Dated August 2018.
- Detailed Quantitative Risk Assessment for Net Zero Plot, Teesworks, Redcar. Prepared by Arcadis on behalf of South Tees Development Corporation. Dated January 2022.
- Net Zero Ground Investigation Data Memo. Prepared by Arcadis. Dated 14 January 2022.
- Draft Preliminary Onshore Ground Investigation for Net Zero Teesside (Main Site and onshore CO2 Export Pipeline Corridor). Prepared by Allied Exploration and Geotechnics and dated September 2021.
- Final Factual Report - The Former SSI Steelworks, Redcar – Ground Investigation Contract – Priority Areas within SSI Landholdings Contract 1 and Contract 2 (Area A). Prepared BY Allied Exploration and Geotechnics and dated June 2018.
- Enabling Earthworks and Remediation Strategy Report for Net Zero Plot, Teesworks, Redcar. Report Ref. 10035117-AUK-XX-XX-RP-ZZ-0417-02-Rem_Strat_Net Zero. Prepared by Arcadis and dated February 2022.



Our assessment of land contamination relates to the impact on Controlled Waters only.

Objection 1: Risk of Pollution to Controlled Waters

We **OBJECT** to this development because the information submitted with the application does not demonstrate that the risk of pollution to controlled waters is acceptable / can be appropriately managed. We therefore recommend that planning permission is refused on this basis in line with the National Planning Policy Framework.

Reason(s)

The previous use of the proposed development site as former steelworks including sinter plant, coal blending yard, pellet plant and railway lines which presents a high risk of contamination that could be mobilised during construction to pollute controlled waters.

Controlled waters are particularly sensitive in this location because the development site is underlain by various superficial deposits and bedrock units with varying aquifer designations. This site is located in an area where superficial groundwater body or bodies may interact with each other, surface water bodies and may be tidally influenced.

The application does not demonstrate that the risks of pollution have been fully understood or provide adequate mitigation for these risks.

Objection 2: Risks to Groundwater are Unacceptable

We **OBJECT** to the planning application, as submitted, because the risks to groundwater from the development are unacceptable. The applicant has not supplied adequate information to demonstrate that the risks posed to groundwater can be satisfactorily managed. We recommend that planning permission should be refused on this basis in line with the National Planning Policy Framework.

Reason(s)

The previous use of the proposed development site as former steelworks including sinter plant, coal blending yard, pellet plant and railway lines which presents a high risk of contamination that could be mobilised during construction to pollute controlled waters.

Controlled waters are particularly sensitive in this location because the development site is underlain by various superficial deposits and bedrock units with varying aquifer designations. This site is located in an area where superficial groundwater body or bodies may interact with each other, surface water bodies and may be tidally influenced.

The application does not demonstrate that the risks of pollution have been fully



understood or provide adequate mitigation for these risks.

The Applicant must provide adequate information to demonstrate that the risks posed by development to groundwater can be satisfactorily managed. In this instance the Applicant has failed to provide this information, and we consider that the proposed development may pose an unacceptable risk of causing a detrimental impact to groundwater quality.

Overcoming Our Objections

The Applicant must provide the following information:

- A Desk Study specific to the Net Zero Teesside development;
- Undertake ground investigations of areas previously not investigated and/or not accessible;
- An updated Generic Quantitative Risk Assessment which reflects the Net Zero Teesside development and the ground investigation data;
- An updated Detailed Quantitative Risk Assessment may be required;
- An updated Remediation Strategy reflecting the updated Desk Study, Ground Investigations, Generic Quantitative Risk Assessment and Detailed Quantitative Risk Assessment; and
- Letters of Reliance associated with the use of third party data and reports.

In addition, the applicant should submit information addressing our previous planning response dated 13 December 2021 (reference NA/2021/115684/01) and the comments outlined below.

AEG Preliminary Onshore Ground Investigation for Net Zero Teesside (Main Site and onshore CO2 Export Pipeline Corridor) dated September 2021.

This report is in a draft format. We require the final approved factual report to be submitted as part of this application.

Arcadis Response to EA Document Net Zero Plot

It is reported that information prepared by Enviro has been submitted in support of the application. However, this information has not been submitted and must be submitted on the planning portal. In addition, we request that the Applicant makes it clear what relevant information pertains to the planning application boundary for Net Zero Teesside development.

It is reported that comments relating to CLAIRE Definition of Waste Code of Practice (DoWCoP), will be addressed separately. However, the Applicant has provided limited information regarding the movement and treatment of materials on site, and has failed to address the comments raised in our previous consultation response. We require further information regarding the materials to be used on site, the volume and treatment of materials, as this may have implications on the remediation of the site.



With respect to areas of the site which have not been investigated. Whilst it is acknowledged that such areas may not have been investigated due to existing structures and demolition activities, we understand that it is now possible to investigate any areas which are considered to represent data gaps. The Applicant therefore needs to clearly state what data gaps exist within the proposed development area and sources of potential contamination investigated accordingly.

It is noted that there are areas which do not appear to have been investigated and do not have any groundwater monitoring wells present. We require further ground investigation to be undertaken in areas previously not investigated in order to determine the presence or otherwise of land contamination and establish baseline conditions.

The documentation refers to an Earthworks Specification and Materials Management Plan. However, this report has not been submitted on the planning portal. We therefore request that these documents are submitted as part of the application, as it would provide details on the reuse of on-site soils and the movement of such soils around the site (and whether they would impact on controlled waters), including further details on the exact nature of earthworks proposed to be undertaken.

Until the above is addressed it would not be appropriate to provide further comment on the proposed remediation of the site.

Requirement for Interpretative Report Specific to Net Zero Development

The supporting assessments are based on a number of third party factual reports and interpretative assessments which cover a much larger area than the proposed Net Zero Development. The Applicant should submit an appropriate report that specifically highlight the baseline conditions for the proposed development area, and which provides details of fully reliable data and the results of further ground investigation.

A comprehensive geo-environmental assessment report with Generic Quantitative Risk Assessment (GQRA) should be submitted specific to the Net Zero Teesside development site which addresses / provides the following;

- Collates all relevant factual information from previous and current phases of ground investigation including exploratory hole records and plans, plans, soil testing, soil leachate testing, groundwater analysis, slag testing and groundwater monitoring visits and results;
- Ground and groundwater conditions specific to the development area.
- Scaled cross sections which interprets the ground and groundwater conditions prevailing at the site and any adjacent areas which are considered to impact on site conditions;
- Boreholes across the site and details of their response zones;



- Details / results of groundwater level data and the number of occasions groundwater level data from all boreholes has been collected;
- Groundwater contour plans from each monitoring visit undertaken which clearly demonstrate the movement of groundwater;
- Monitoring works undertaken on site to demonstrate the influence of tides and the interaction of groundwater with surface water bodies;
- Details / results of groundwater analysis from each water body on site and the number of occasions groundwater sampling / chemical analysis has been undertaken;
- Details / results of any off site groundwater analysis which is considered to impact on site conditions;
- Soil and soil leachate analysis including slag testing;
- Commentary of any deviation from testing laboratory protocols in relation to chemical analysis;
- Presence of visual / olfactory evidence of soil / groundwater contamination including Non Aqueous Phase Liquid (NAPL) and tars and associated chemical analysis signature and where relevant dissolved concentrations;
- Site Conceptual model specific to the Net Zero site and covering any off site features which are considered to impact on site conditions. This should include assessment to controlled water receptors (surface and groundwater); and
- An up to date generic quantitative controlled waters risk assessment. This should contain appropriate chemical analysis of soil and soil leachate samples, representative of the ground conditions identified. Chemical analysis of surface water and groundwater receptors should be undertaken on a minimum of three occasions.
- With respect to Controlled Waters Risk Assessment and Generic Assessment Criteria (GAC) hierarchy. The GAC hierarchy for assessment of surface waters should be Environmental Quality Standard (EQS) followed by Drinking Water Standard (DWS), then laboratory detection limits if no GAC value is available. The GAC hierarchy for assessment of groundwater should be DWS, followed by EQS and where no appropriate GAC are available, laboratory detection limits should be used.
- The site conceptual model and risk assessment should take into consideration the presence of underground relic structures for example existing piled foundations, tunnels associated with the former pellet plant and existing below ground services, and which may remain after remediation works have been undertaken. These are considered to form potential pollution pathways.

Detailed Quantitative Risk Assessment for Net Zero Plot, Teesworks

Until the above is addressed to provide clarity on the baseline conditions specific to the Net Zero site, it would not be appropriate to provide full detailed comment on the DQRA. However, please note the following comments;

- The DQRA should ensure the correct aquifer designation is referred to



- within the submitted documentation;
- It is stated within section 1.2 (background) that Arcadis does not have reliance on the third party dataset providing the basis of the risk assessment and is therefore used as a secondary line of supporting evidence for site condition. The risk assessment should be underpinned by fully reliable data which form primary lines of supporting evidence for site conditions;
 - Section 1.2 also indicates that as part of future redevelopment a foundation risk assessment would be required, particularly if piled foundations were required. Based upon the ground conditions identified, piled foundations are a realistic possibility and the risk assessment (and presumably subsequent remediation works) does not take into account this aspect which would present a greater risk to controlled waters;
 - Section 1.3 (previous Reports) refers to a number of reports which instructs the reader to read in conjunction with the DQRA. However, some of the reports have not been submitted as part of the planning application or whether they solely relate to the Net Zero site. Relevant information pertaining to the Net Zero site from these reports needs to be incorporated into this document or other information submitted in support of this planning application;
 - Section 2.3 (geology): third party cross sections have been included within the document. However the interpretation of geological conditions is different between AEG and AECOM. Scaled cross sections which interpret existing ground and groundwater conditions at the site should be submitted. The majority of the submitted cross sections do not interpret ground and groundwater conditions and are therefore not acceptable;
 - Section 2.4 (hydrogeology): it is not clear how many monitoring wells are located within the application site and their response zones. It is also not clear whether all groundwater wells have been monitored and the frequency of monitoring. All groundwater level monitoring data should be included. In addition, the interpretative information from AECOM is referenced but not included. The Applicant should interpret groundwater conditions prevailing at the site including provision for groundwater contour plans for the various water bodies from the individual monitoring visits;
 - Section 2.4.5 (tidal Influence): suggests that there is no tidal influence on groundwater across the site but the groundwater is described as brackish. The Applicant should provide further details on the monitoring works undertaken to determine tidal influence including whether the Applicant considers the results to be correct. In particular, is the monitoring works undertaken to date appropriate and sufficient to determine tidal influence?;
 - Section 2.5 (hydrology): this refers to assessments carried out by AECOM. However, this information has not been submitted on the planning portal. The Applicant must provide information which demonstrates there is no hydraulic continuity between surface water ponds and groundwater;
 - Section 3 (potentially active pollutant linkages): states that lateral migration



of contaminated groundwater associated with an off-site source onto site presents a risk to the identified water resource receptors. However, further details are required on what the off-site source is, from which boreholes off site groundwater have been sampled and analysed to conclude that this presents a risk to site conditions;

- Section 4 (GQRA): it needs to be made clearer what general suite of testing has been undertaken, whether it includes all the contaminants of concern highlighted, and the number of occasions groundwater sampling and chemical analysis has been undertaken from each water body. It is not clear whether all on-site monitoring wells have been sampled for chemical analysis on a minimum of three occasions as part of this current assessment;
- It is noted that leaching of Contaminates of Concern (CoC) from soil into groundwater was not modelled on the basis that steady state conditions are likely. We require information which demonstrates that leaching from on-site made ground soils is not occurring at the present time; and
- Modelled Remedial Target Methodology (RTM) spreadsheets, along with the various appendices comprising the comparison spreadsheets should be provided in excel. The RTM information submitted is visually difficult to read.

Enabling Earthworks and Remediation Strategy Report

Based upon the previous comments, it would not be appropriate at this stage to comment on remediation proposals when baseline conditions have not been established. However, we would reiterate the comments as set out below;

- Section 4.3.8 (remediation criteria) and Appendix C refers to derivation of remediation criteria developed and protective of human health. It is indicated that all reused soils will be tested for this criteria prior to incorporation into the permanent works. However, no remediation criteria has been derived which is protective of risk to controlled waters;
- Section 4.3.8.1 (compliance sampling frequency) refers to importation and testing of soils for the remediation criteria. The proposed remediation criteria would not be appropriate for importation of soils and there is no criteria which is protective of risk to controlled waters;
- Section 4.3.9 (management of contaminated soils) refers to the placement of protective cover layers in areas where contaminants in soils are identified above the reuse criteria as highlighted in Appendix C. However, it has mentioned previously that unacceptable soils not complying with the remediation criteria will not be incorporated into the permanent works. We therefore do not agree with approach as it may have implications on the risks to controlled water.
- Whilst it is recognised that controlled waters may have been impacted on by historic activity, it should be considered as a receptor and the development should aim to prevent the entry of hazardous and non hazardous substances into controlled waters. Redevelopment through the



planning regime should result in an overall enhancement to the wider environment and improvement in groundwater and surface water quality (be it superficial or otherwise);

- **The “environmental betterment” to controlled waters should be fully demonstrated with appropriate lines of evidence.** We consider an essential component of the remediation activities to comprise the construction of a comprehensive monitoring network across the former steelworks site and implementation of a comprehensive monitoring programme over the long term to demonstrate that redevelopment of the site has resulted in “environmental betterment” to controlled waters. This would presumably also provide evidence support over the long term for any DQRA undertaken across the site. It is not acceptable to rely on the dilution of contamination which may occur in the River Tees Estuary; and
- It has also previously been highlighted that the reclamation and earthworks to be undertaken may lead to a localised short term deterioration in groundwater quality, and that betterment in groundwater quality may not be apparent for a number of years. This gives weight to our position that groundwater / surface water should be considered as receptors. It also demonstrates the requirement for long term monitoring of controlled waters to record the degree of any deterioration and environmental betterment over the long term period.

Reliance on Third Party Data and Reports

Arcadis highlights within the DQRA that they do not have reliance on third party dataset. The third party dataset has been utilised to inform the risk assessment and underpin the proposed remediation at the site. Arcadis highlight that the third party dataset is therefore used as a secondary line of supporting evidence for site condition. Furthermore, the risk assessment also refers to third party reports along with conclusions and interpretations of site conditions contained within. This is not considered appropriate and we cannot provide our full considered professional opinion on third party datasets or reports which cannot be fully relied upon. All information and data contained within the risk assessment is required to be fully reliable.

Desk Studies and Factual Information Reports

The Desk Studies submitted relate to site areas (SS1 and SS2) which cover a significantly larger area than the planning application boundary relating to the Net Zero Development. Therefore, these reports include information which may not be pertinent or relevant to the planning application boundary. A Desk Study needs to be submitted which relates to the Net Zero Development planning application boundary. It must be made clear what information from the factual reports has been used in the supporting documents.

Arcadis Report - The Former SSI Steelworks, Redcar: Priority Areas with SSI Landholdings Contract 1 and 2A. Contract 1 and 2A Site Condition



Report

The risk assessment must be updated to reflect the Net Zero Teesside Development area. It currently assesses the wider area rather the specific Net Zero Site.

CH2M Geoenvironmental Summary of Former SSI Steelworks, Redcar – Initial Ground Investigation Works, Dated May 2018

The risk assessment must be updated to reflect the Net Zero Teesside Development area. It currently assesses the wider area rather the specific Net Zero site.

Separate to the above matters, we also have the following advice to offer:

Model Procedures and good practice - Advice to Applicant

We recommend that developers should:

- Follow the risk management framework for dealing with land contamination detailed in Land Contamination Risk Management which is found on Gov.uk and which now supercedes CLR 11, Model Procedures for the Management of Land Contamination.
- Refer to our Guiding principles for land contamination for the type of information that we require in order to assess risks to controlled waters from the site - the local authority can advise on risk to other receptors, such as human health
- Consider using the National Quality Mark Scheme for Land Contamination Management which involves the use of competent persons to ensure that land contamination risks are appropriately managed

Refer to the contaminated land pages on gov.uk for more information

Requirement for an Environmental Permit - Advice to Applicant

The discharge of groundwater from remediation activities or dewatering purposes, associated with this development will require an environmental permit under the Environmental Permitting (England & Wales) Regulations 2016, from the Environment Agency, unless an exemption applies. The applicant is advised to contact the Environment Agency on 03708 506 506 for further advice and to discuss the issues likely to be raised. You should be aware that there is no guarantee that a permit will be granted. Additional 'Environmental Permitting Guidance' can be found at: <https://www.gov.uk/environmental-permit-check-if-you-need-one>.

The Environment Agency's approach to groundwater protection' (pre-application) - Advice to Applicant

We would like to refer the applicant/enquirer to our groundwater position statements in 'The Environment Agency's approach to groundwater protection', available from gov.uk. This publication sets out our position for a wide range of



activities and developments, including:

- Waste management
- Discharge of liquid effluents especially the latter positions on polluted groundwater
- Land contamination
- Ground source heat pumps
- Cemetery developments
- Drainage
- Groundwater resources
- Groundwater flooding

Please do not hesitate to contact me if you have any questions regarding this letter.

Yours sincerely

Lucy Mo
Planning Technical Specialist - Sustainable Places

Direct dial 020847 46524

Direct e-mail lucy.mo@environment-agency.gov.uk



Appendix 2 - Arcadis Response to Environment Agency

SUBJECT
Land to West of Warrenby Redcar – Response to (EA document reference NA/2021/115684/02-L01)

DATE
26/04/22

DEPARTMENT
Arcadis Leeds

COPIES TO
John McNicholas (Teesworks)
Lauren Carr-Duffy (Teesworks)
Anthony Grealley (Lichfields)
Rachel Dodd (Lichfields)
Sarah Bullock (Atkins)
Chris Piddington (Arcadis)

TO
Lucy Mo (EA)

OUR REF
10035117-AUK-XX-XX-CO-ZZ-0519-01-Land West of Warrenby Redcar, Response to EA

PROJECT NUMBER
10035117

FROM
Jonathan Miles
E Jonathan.Miles@arcadis.com

Net Zero Plot – Response to (EA document reference NA/2021/115684/02-L01)

Arcadis understand that the Environment Agency (EA) have objected and commented on planning application R/2021/1048/FFM. These comments were detailed in communication NA/2021/115684/02-L01 to David Pedlow (RCBC) dated 29/03/22 and subsequently passed to Arcadis via STDC (Appendix 1).

Arcadis have previously responded to comments from the EA (NA/2021/115684/01-L01) as document 10035117-AUK-XX-XX-CO-ZZ-0486-01-Net_Zero_Rem_Clarification_EA.

Clarification on Remediation Approach

As discussed in the meeting between the EA, STDC, Lichfields, Arcadis, and Atkins held in the Teesworks Management Office (TMO) on 30/03/22 remediation is not proposed in the grey area, as shown on drawing *TSWK-STDC-NZT-ZZ-DR-C-0005 Net Zero Teesside - Remediation Zones - Rev B* (provided as Appendix 3). As part of the works undertaken under this Application a suitable cover system is to be installed across the grey area to make it suitable for construction / laydown activities prior to the current intention of being leased to the Net Zero developer for a period of approximately 4 years.

Remediation of the grey area will be undertaken at a later date under a separate planning application.

Discussion of EA Comments

The EA objected to the proposed development for the following reasons:

- 1. The information submitted with the application does not demonstrate that the risk of pollution to controlled waters is acceptable / can be appropriately managed; and*
- 2. The risks to groundwater from the development are unacceptable. The applicant has not supplied adequate information to demonstrate that the risks posed to groundwater can be satisfactorily managed.*

In response STDC have submitted the following additional information to that listed in NA/2021/115684/02-L01:

- Soil and Groundwater Baseline Characterisation Study, Teesside Works, prepared by Enviro for Corus UK Ltd [Enviros 2004], comprising:
 - Volume 1 – Factual Report, Ref. Rlp250604corusteessidefactual.Doc dated 25th June 2004 and marked Final;
 - Volume 2 – Interpretive Report Ref. Mwicorusdraftinterpretivemmdv#2.Doc dated 25th June 2004 and marked Final; and,
 - Volume 3 – Summary Report dated June 2004
- Preliminary Onshore Ground Investigation for Net Zero Teesside (NZE) – South Tees Development Corporation (STDC) ‘Main Site’ and Onshore CO2 Export Pipeline Corridor, prepared by AEG and dated September 2021 and marked Final Factual Report [AEG 2021].
- Net Zero Teesside – Environmental Statement Volume III – Appendix 9C Water Framework Directive Assessment prepared by AECOM for net Zero Teesside.
- Net Zero Teesside – Environmental Statement Volume III – Appendix 10A Primary Sources Study Report prepared by AECOM for net Zero Teesside.
- Earthworks Specification Net Zero Teesside Plot, Redcar, Report Ref. 10035117-AUK-XX-XX-RP-ZZ-0420-04-Net_Zero_Earthworks prepared by Arcadis for South Tees Development Corporation, dated February 2022 [Arcadis 2022c].

In addition, the following documents will be provided.

- Phase 1 Environmental Assessment, Land West of Warrenby, Report Ref. 10035117-AUK-XX-XX-RP-ZZ-0520-01-Land West of Warrenby Redcar
- Remedial Targets Work (RTW) sheets

Arcadis will also up issue the previously provided Detailed Quantitative Risk Assessment and remedial strategy to address comments within NA/2021/115684/02-L01. The new document references will be:

- Land West of Warrenby, Teesworks, Site Condition Report, Generic Quantitative Risk Assessment and Detailed Quantitative Risk Assessment , 10035117-AUK-XX-XX-RP-ZZ-0428-02-LWoW_DQRA, prepared by Arcadis for South Tees Development Corporation, dated April 2022 [Arcadis 2022a].
- Enabling Earthworks and Remediation Strategy Report for Land West of Warrenby, Teesworks, Redcar. Report Ref. 10035117-AUK-XX-XX-RP-ZZ-0417-03-Rem_Strat_LWoW. Prepared by Arcadis and dated April 2022 [Arcadis 2022b].

The Applicant also provides the following commentary under the following table headings, which addresses specific comments from the EA pertaining to controlled waters:

- Table 1. Information required to overcome objection
- Table 2. Requirement for Interpretive Report Specific to Net Zero Development [sic]
- Table 3. Detailed Quantitative Risk Assessment for Net Zero Plot [sic], Teesworks
- Table 4. Enabling Earthworks and Remediation Strategy Report

In addition to the above a response and commentary to EA comments relating to CL:AIRE DoWCoP, are provided by Atkins, on behalf of the Applicant. These are included in Table 5.

The attached Briefing Note prepared by Lichfields (dated 5 May 2022) has been prepared on behalf of the Applicant and it responds to the comments from a planning perspective, this note should be read where referenced in combination with the comments below.

Table 1. Information required to overcome objection

EA Comment	Applicant Response
In order to overcome our objection, the Applicant needs to provide the following information:	
A Desk Study specific to the Net Zero Teesside development [sic];	A new document covering the planning redline boundary is provided.
Undertake ground investigations of areas previously not investigated and/or not accessible;	<p>As agreed in the meeting between the EA, STDC, Lichfields, Arcadis, and Atkins held in the TMO on 30/03/22 remediation in areas considered to represent data gaps will be conditioned within the grant of planning</p> <p>Further ground investigation (GI) will be undertaken in these areas prior to remediation works being undertaken.</p> <p>The commencement of remediation in areas where data gaps are not present will not be conditioned.</p> <p>The applicant's Planning Consultant (Lichfields) have prepared a suite of planning conditions that could be attached to ensure that the development is carried out in accordance with the relevant planning policies (Attached as Appendix 4) .</p>
<p>An updated Generic Quantitative Risk Assessment which reflects the Net Zero Teesside development and the ground investigation data</p> <p>An updated Detailed Quantitative Risk Assessment may be required;</p> <p>An updated Remediation Strategy reflecting the updated Desk Study, Ground Investigations, Generic Quantitative Risk Assessment and Detailed Quantitative Risk Assessment; and</p>	<p>As agreed in the meeting between the EA, STDC, Lichfields, Arcadis, and Atkins held in the TMO on 30/03/22 these documents will be reviewed on the basis of the EA's current comments.</p> <p>The EA will review as a consultee the up issued documents in the context of the areas where data gaps are not considered to be present. It is hoped the objection will be withdrawn for these areas.</p> <p>As described above further GI will be conducted in areas where data gaps are considered to be present, as conditioned within the grant of planning.</p> <p>The GI data will be assessed and the documents referred to will be amended as required before submission to the EA to discharge the condition and allow remediation to be completed in the conditioned areas.</p>
Letters of Reliance associated with the use of third party data and reports	<p>Letters of Reliance from the third parties will not be obtained.</p> <p>As agreed in the meeting between the EA, STDC, Lichfields, Arcadis, and Atkins held in the TMO on 30/03/22</p>

EA Comment

Applicant Response

In order to overcome our objection, the Applicant needs to provide the following information:

Arcadis have provided the following clarification as to why Letters of Reliance are not a material concern on the consideration of the application.

“The EA have asked Arcadis to provide clarification around the information that has been used in this assessment and any reliance upon it. For clarity the word reliance is used here as a legal term, signifying that some form of recourse is available to the user of information from the entity or person providing said information, should it become apparent that the data is inaccurate or unsuitable.

This legal reliance in no way makes any comment or verification that the information in question is either reliable or unreliable, more simply it bestows an obligation that the provider of the information has a responsibility to remedy matters should the reliance by others on the data cause future problems.

In terms of accuracy and reliability of the information in question Arcadis can confirm that they have assessed and reviewed all the data that has been utilised in this assessment and are satisfied that it is all accurate and suitable for its intended use.

Specifically in this instance the fact that no reliance on the data has been granted by BP to STDC / Arcadis does not mean the information cannot be used, it simply means that BP have no obligation to STDC should any of the information be found to be inaccurate. Having reviewed the information Arcadis and STDC are satisfied that the data is reliable, accords with our previous understanding of the site and represents an accurate reflection of site conditions. As such we consider it acceptable for us to utilise this data, as part of the much wider data set for the site, in our assessment of the site. If for any reason this is found to be inaccurate then the onus is on STDC / Arcadis to remedy the matter and no recourse from BP can be sought.

We would further add that this is a standard and usual practice when reports or information are issued to third parties. For example, when issuing a report it is standard practice for Arcadis to provide reliance on their work to the named client only i.e. the entity paying for the works. This does not mean that the report is not accurate or indeed that other interested parties cannot review the report and use the information contained therein, it simply means that they have no recourse to Arcadis in the event that the information provided is deemed by them to not be accurate.

STDC have instructed Arcadis that they should place reliance on the third party data at STDCs risk.

We trust this addresses any ambiguity that may have existed over the nature of the data that has been used

EA Comment	Applicant Response
In order to overcome our objection, the Applicant needs to provide the following information:	
	<i>to make this assessment and reassures the EA that all necessary and reasonable steps have been taken to ensure the most accurate and robust conceptual site model can be derived for the site. “</i>
the applicant should submit information addressing our previous planning response dated 13 December 2021 (reference NA/2021/115684/01)	The responses set out in this document are considered to address and/or supersede comments made in the EAs previous planning response, save for any comments or responses relating to the CLAIRE DoWCoP which is addressed separately by Atkins on behalf of the Applicant in Table 5.
AEG Preliminary Onshore Ground Investigation for Net Zero Teesside (Main Site and onshore CO2 Export Pipeline Corridor) dated September 2021. This report is in a draft format. We require the final approved factual report to be submitted as part of this application.	The "Final" version of the document has now been provided. This report contains additional groundwater data not available at the time of the completion of the DQRA as submitted, review of this data has been undertaken and will be included in the updated DQRA.
It is reported that information prepared by Enviros has been submitted in support of the application. However, this information has not been submitted and must be submitted on the planning portal.	This information has now been provided.
In addition, we request that the Applicant makes it clear what relevant information pertains to the planning application boundary for Net Zero Teesside [sic] development.	This will be undertaken in the up issued documents.
It is reported that comments relating to CLAIRE Definition of Waste Code of Practice (DoWCoP), will be addressed separately. However, the Applicant has provided limited information regarding the movement and treatment of materials on site, and has failed to address the comments raised in our previous consultation response. We require further information regarding the materials to be used on	Response to comments are provided in Table 5.

EA Comment	Applicant Response
In order to overcome our objection, the Applicant needs to provide the following information:	
<p>site, the volume and treatment of materials, as this may have implications on the remediation of the site.</p>	
<p>The documentation refers to an Earthworks Specification.</p>	<p>The Earthworks Specification has now been provided for information although we note this is not a formal planning document and we do not consider a review by the EA to be necessary.</p>
<p>Requirement for Interpretative Report Specific to Net Zero Development [sic] The supporting assessments are based on a number of third party factual reports and interpretative assessments which cover a much larger area than the proposed Net Zero Development [sic]. The Applicant should submit an appropriate report that specifically highlight the baseline conditions for the proposed development area, and which provides details of fully reliable data and the results of further ground investigation.</p>	<p>As agreed in the meeting between the EA, STDC, Lichfields, Arcadis, and Atkins held in the TMO on 30/03/22 an appendix document containing extracts of all the relevant data (borehole logs, summary tables, logger data etc.) will be provided referencing the source reports. This document will serve as a single source of reference for the data referred to in the GQRA / DQRA. It was agreed this would negate the requirement for an "Interpretative Report Specific to Net Zero Development [sic]"</p>

Table 2. Requirement for Interpretative Report Specific to Net Zero Development [sic]

EA Comment -	Applicant Response
<p>A comprehensive geo-environmental assessment report with Generic Quantitative Risk Assessment (GQRA) should be submitted specific to the Net Zero Teesside development site which addresses / provides the following;</p>	
<p>Collates all relevant factual information from previous and current phases of ground investigation including exploratory hole records and plans, plans, soil testing, soil leachate testing, groundwater analysis, slag testing and groundwater monitoring visits and results;</p>	<p>Arcadis believe the previously submitted documentation contains this information however we will review and update the report for clarity where necessary including the provision of the appendix discussed above.</p>
<p>Ground and groundwater conditions specific to the development area.</p>	<p>Arcadis believe the previously submitted documentation contains this information however we will review and update the report for clarity including the provision of the appendix discussed above.</p>
<p>Scaled cross sections which interprets the ground and groundwater conditions prevailing at the site and any adjacent areas which are considered to impact on site conditions;</p>	<p>The cross sections will be updated to further discuss the interaction of groundwater.</p>
<p>Boreholes across the site and details of their response zones;</p>	<p>Arcadis believe the previously submitted documentation contains this information however summary tables will be created for clarity.</p>
<p>Details / results of groundwater level data and the number of occasions groundwater level data from all boreholes has been collected;</p>	<p>Arcadis believe the previously submitted documentation contains this information however summary tables will be created for clarity.</p>
<p>Groundwater contour plans from each monitoring visit undertaken which clearly demonstrate the movement of groundwater;</p>	<p>Groundwater plans will be submitted however Arcadis believe that, although all data sets should be reviewed in terms of the conceptual site model to identify consistency of behaviour within groundwater, plans need not be submitted for each visit. Plans will only be submitted if inconsistent observations are identified.</p>
<p>Monitoring works undertaken on site to demonstrate the influence of tides and the interaction of groundwater with</p>	<p>Arcadis believe the previously submitted documentation contains this information however we will review and update the report for clarity where necessary including the provision of the appendix discussed above.</p>

EA Comment -	Applicant Response
A comprehensive geo-environmental assessment report with Generic Quantitative Risk Assessment (GQRA) should be submitted specific to the Net Zero Teesside development site which addresses / provides the following;	
surface water bodies;	
Details / results of groundwater analysis from each water body on site and the number of occasions groundwater sampling / chemical analysis has been undertaken;	Arcadis believe the previously submitted documentation contains this information however summary tables will be created for clarity.
Details / results of any off site groundwater analysis which is considered to impact on site conditions;	The discussion in the report around off-site sources relates to the surrounding historical industrial land uses, as identified in the desk study. This includes Made Ground across the wider Teesworks site. This will be clarified in the report.
Soil and soil leachate analysis including slag testing;	Arcadis believe the previously submitted documentation contains this information however summary tables will be created for clarity.
Commentary of any deviation from testing laboratory protocols in relation to chemical analysis;	This will be provided.
Presence of visual / olfactory evidence of soil / groundwater contamination including Non Aqueous Phase Liquid (NAPL) and tars and associated chemical analysis signature and where relevant dissolved concentrations;	Arcadis believe the previously submitted documentation contains this information however a plan will be provided for clarity.
Site Conceptual model specific to the Net Zero [sic] site and covering any off site features which are considered to impact on site conditions. This should include assessment to controlled water receptors (surface and groundwater);	Arcadis believe the previously submitted documentation contains this information however we will review and update the report for clarity where necessary.

EA Comment -	Applicant Response
<p>A comprehensive geo-environmental assessment report with Generic Quantitative Risk Assessment (GQRA) should be submitted specific to the Net Zero Teesside development site which addresses / provides the following;</p>	
<p>An up to date generic quantitative controlled waters risk assessment. This should contain appropriate chemical analysis of soil and soil leachate samples, representative of the ground conditions identified. Chemical analysis of surface water and groundwater receptors should be undertaken on a minimum of three occasions.</p>	<p>Arcadis believe the previously submitted documentation contains this information however we will review and update the report for clarity where necessary.</p> <p>Arcadis note there is no specific requirement for a minimum of three monitoring visits, sufficient data should be collected to adequately characterise the site. We have now received additional groundwater sampling data, which includes three rounds of monitoring in the Final Factual Report AEG 2021.</p>
<p>With respect to Controlled Waters Risk Assessment and Generic Assessment Criteria (GAC) hierarchy. The GAC hierarchy for assessment of surface waters should be Environmental Quality Standard (EQS) followed by Drinking Water Standard (DWS), then laboratory detection limits if no GAC value is available. The GAC hierarchy for assessment of groundwater should be DWS, followed by EQS and where no appropriate GAC are available, laboratory detection limits should be used.</p>	<p>The GQRA undertaken used both EQS and drinking water standards to assess both the aquifer and surface water risks separately.</p>
<p>The site conceptual model and risk assessment should take into consideration the presence of underground relic structures for example existing piled foundations, tunnels associated with the former pellet plant and existing below ground services, and which may remain after remediation works have been undertaken. These are considered to form potential pollution pathways.</p>	<p>As per the discussion above the former Pellet Plant is not within the remediation area but the construction laydown area.</p> <p>Where preferential pathways are identified within the remediation area they will be appropriately managed during the remediation. Were relic structures extend beyond the boundaries of the remediation area these will be removed so far as required to allow future removal of the residual structure without disturbance of the remediated area. Preferential pathways noted within relic structures will be appropriately sealed beyond the remediation boundary to prevent migration of gross contamination from unremediated areas of the Teesworks site (to be subject to future remediation) on to the remediated plot.</p> <p>Except for piles vertical preferential pathways (if present) extending below the planned remediation dig depth will be assessed on a case-by-case basis and either removed or appropriately managed in situ to minimise the risk of acting as preferential pathways.</p>

EA Comment -

Applicant Response

A comprehensive geo-environmental assessment report with Generic Quantitative Risk Assessment (GQRA) should be submitted specific to the Net Zero Teesside development site which addresses / provides the following;

It is not the intention to remove piles below the planned excavation depths, these are not considered to represent significant preferential pathways following completion of the remediation.

The text within the Remediation Strategy will be reviewed for clarity where necessary.

Table 3. Detailed Quantitative Risk Assessment for Net Zero Plot [sic], Teesworks

EA Comments on:	Applicant Response
Detailed Quantitative Risk Assessment for Net Zero Plot [sic], Teesworks	
<p>The DQRA should ensure the correct aquifer designation is referred to within the submitted documentation</p>	<p>The documents have been checked and updated.</p>
<p>It is stated within section 1.2 (background) that Arcadis does not have reliance on the third party dataset providing the basis of the risk assessment and is therefore used as a secondary line of supporting evidence for site condition. The risk assessment should be underpinned by fully reliable data which form primary lines of supporting evidence for site conditions;</p>	<p>As per above discussion.</p>
<p>Section 1.2 also indicates that as part of future redevelopment a foundation risk assessment would be required, particularly if piled foundations were required. Based upon the ground conditions identified, piled foundations are a realistic possibility and the risk assessment (and presumably subsequent remediation works) does not take into account this aspect which would present a greater risk to controlled waters;</p>	<p>As agreed in the meeting between the EA, STDC, Lichfields, Arcadis, and Atkins held in the TMO on 30/03/22 the planning application under discussion concerns remediation to a generic commercial industrial platform. Consideration of pilling risk and the creation of preferential pathways such be addressed by future developers. This would be within the remit of the DCO should that proposed development proceed.</p>
<p>Section 1.3 (previous Reports) refers to a number of reports which instructs the reader to read in conjunction with the DQRA. However, some of the reports have not been submitted as part of the planning application or whether they solely relate to the Net Zero site. Relevant information pertaining to the Net Zero site from these reports needs to be incorporated into this document or other information submitted in support of this planning application;</p>	<p>Arcadis believe the additional reports have now been provided.</p>

EA Comments on:	Applicant Response
Detailed Quantitative Risk Assessment for Net Zero Plot [sic], Teesworks	
<p>Section 2.3 (geology): third party cross sections have been included within the document. However the interpretation of geological conditions is different between AEG and AECOM. Scaled cross sections which interpret existing ground and groundwater conditions at the site should be submitted. The majority of the submitted cross sections do not interpret ground and groundwater conditions and are therefore not acceptable;</p>	<p>Updated cross sections will be provided.</p>
<p>Section 2.4 (hydrogeology): it is not clear how many monitoring wells are located within the application site and their response zones. It is also not clear whether all groundwater wells have been monitored and the frequency of monitoring. All groundwater level monitoring data should be included. In addition, the interpretative information from AECOM is referenced but not included. The Applicant should interpret groundwater conditions prevailing at the site including provision for groundwater contour plans for the various water bodies from the individual monitoring visits;</p>	<p>Arcadis believe the previously submitted documentation contains this information however summary tables will be created for clarity.</p> <p>The AECOM information referred to cannot be provided and reference will be updated / clarified.</p>
<p>Section 2.4.5 (tidal Influence): suggests that there is no tidal influence on groundwater across the site but the groundwater is described as brackish. The Applicant should provide further details on the monitoring works undertaken to determine tidal influence including whether the Applicant considers the results to be correct. In particular, is the monitoring works undertaken to date appropriate and sufficient to determine tidal influence?;</p>	<p>Arcadis believe the previously submitted documentation contains this information however we will review and update the report for clarity where necessary, including the provision of the appendix discussed above. Tidal influence has not been identified by either Arcadis or AECOM. We consider the testing undertaken to be sufficient and appropriate to accurately characterise any potential tidal influences.</p>

EA Comments on:	Applicant Response
Detailed Quantitative Risk Assessment for Net Zero Plot [sic], Teesworks	
<p>Section 2.5 (hydrology): this refers to assessments carried out by AECOM. However, this information has not been submitted on the planning portal. The Applicant must provide information which demonstrates there is no hydraulic continuity between surface water ponds and groundwater;</p>	<p>Net Zero Teesside – Environmental Statement Volume III – Appendix 9C Water Framework Directive Assessment prepared by AECOM for Net Zero Teesside has now been provided</p> <p>Arcadis believe the previously submitted documentation contains this information however we will review and update the report for clarity where necessary.</p>
<p>Section 3 (potentially active pollutant linkages): states that lateral migration of contaminated groundwater associated with an off-site source onto site presents a risk to the identified water resource receptors. However, further details are required on what the off-site source is, from which boreholes off site groundwater have been sampled and analysed to conclude that this presents a risk to site conditions;</p>	<p>The discussion in the report around off-site sources relates to the surrounding historical industrial land uses, as identified in the desk study. This includes Made Ground across the wider Teesworks site. This will be clarified in the report.</p>
<p>Section 4 (GQRA): it needs to be made clearer what general suite of testing has been undertaken, whether it includes all the contaminants of concern highlighted, and the number of occasions groundwater sampling and chemical analysis has been undertaken from each water body. It is not clear whether all on-site monitoring wells have been sampled for chemical analysis on a minimum of three occasions as part of this current assessment;</p>	<p>Arcadis believe the previously submitted documentation contains this information however we will review and update the report for clarity where necessary.</p> <p>Arcadis note these is no specific requirement for a minimum of three monitoring visits, sufficient data should be collected to adequately characterise the site. We have now received additional groundwater sampling data, which includes three rounds of monitoring in the Final Factual Report AEG 2021</p>
<p>It is noted that leaching of Contaminates of Concern (CoC) from soil into groundwater was not modelled on the basis that steady state conditions are likely. We require information which demonstrates that leaching from on-site made ground soils is not occurring at the present time; and</p>	<p>The statement regarding steady state conditions relates to the fact that conditions on site are considered to be effectively at equilibrium and any leaching from soils will not lead to a further increase in groundwater concentrations. The report does not state that leaching is not occurring from soils; leachate analysis has been undertaken on site soils which indicates a potential for leaching from soils, and analysis identified leachate concentrations of several CoC above either the EQS or DWS. However, the water quality of the leachate is not considered significantly different to that of the groundwater, such that it could lead to a significant increase in</p>

EA Comments on:	Applicant Response
Detailed Quantitative Risk Assessment for Net Zero Plot [sic], Teesworks	
	<p>groundwater concentrations. Additionally, the risk to groundwater is considered to be low given its low resource potential.</p> <p>As well as the above empirical data, justification for the presence of steady state conditions between the source material and groundwater is based on the fact that groundwater is resting within the Made Ground (conceptualised as the source) and these conditions have existed for at least 50 years, and on the majority of the site nearer 100 years.</p>
<p>Modelled Remedial Target Methodology (RTM) spreadsheets, along with the various appendices comprising the comparison spreadsheets should be provided in excel. The RTM information submitted is visually difficult to read.</p>	<p>These will be provided.</p>

Table 4 Enabling Earthworks and Remediation Strategy Report

EA Comments on:	Applicant Response
Enabling Earthworks and Remediation Strategy Report	
<p>Section 4.3.8 (remediation criteria) and Appendix C refers to derivation of remediation criteria developed and protective of human health. It is indicated that all reused soils will be tested for this criteria prior to incorporation into the permanent works. However, no remediation criteria has been derived which is protective of risk to controlled waters;</p>	<p>It is not Arcadis' intention to derive reuse criteria for soils protective of Controlled Waters</p> <p>The risk assessment concludes that there is a hypothetical risk to the underlying aquifers, but that this risk is low and, as such, should not drive decision making based on a number of factors including the aquifer resource value. The underlying aquifers are considered of low resource potential on the basis of; brackish composition due to proximity to the sea and that it is land reclaimed from the sea, industrial nature of the surrounding area, which is widely built upon reclaimed land including from slag materials, and the low potential for future permitted abstractions, particularly given the nearby ecologically protect status.</p> <p>The evaluation of risk to controlled waters is based on the risk to the North Sea (assessed via a compliance point prior to the North Sea, modelled without dilution), which it concludes is not significant. As such, remediation is not warranted in relation to controlled waters.</p> <p>The source of CoC associated with the potential risk to controlled waters is Made Ground beneath the site. While it is not Arcadis' objective to remediate Made Ground in order to improve groundwater quality, the re-use of soils from the site of origin and movement of Made Ground from one area of site to another will not lead to a detrimental impact on existing groundwater quality. This is on the basis that the soil quality of the Made Ground was not found to vary significantly.</p> <p>Also, as discussed above, groundwater rests within Made Ground and conditions are considered to be at steady state. No long-term deterioration of groundwater quality is likely to occur. Furthermore, as part of the proposed development works NAPL will be removed and compaction of soils will be undertaken, reducing the contaminant leaching potential.</p>
<p>Section 4.3.8.1 (compliance sampling frequency) refers to importation and testing of soils for the remediation criteria. The proposed remediation criteria would not be appropriate for importation of soils and there is no criteria which is protective of risk to controlled waters;</p>	<p>Currently no import outside the Teesworks site boundary is proposed. Further detail on the assessment of imported material for direct transfer and re-use is provided in Table 5.</p>

EA Comments on:	Applicant Response
Enabling Earthworks and Remediation Strategy Report	
<p>Section 4.3.9 (management of contaminated soils) refers to the placement of protective cover layers in areas where contaminants in soils are identified above the reuse criteria as highlighted in Appendix C. However, it has mentioned previously that unacceptable soils not complying with the remediation criteria will not be incorporated into the permanent works. We therefore do not agree with approach as it may have implications on the risks to controlled water.</p>	<p>Arcadis have reviewed and updated the wording, for clarity the criteria apply to all soils.</p> <p>Where contaminants other than NAPL are identified in excavated and processed soils above the reuse criteria further assessment of the impacted soils will be undertaken. Where assessment indicates the exceedance of the reuse criteria represents a localised hotspot of contamination this material will be either treated or removed from site. Where assessment indicates the exceedance is sporadic, localised, not representative of, and not practical to separate from the bulk material these soils will be reused within the permanent works as bulk fill below the clean cover system. The location of the placed soils will be recorded on as built records for the works.</p> <p>It is not Arcadis' intention to derive reuse criteria for soils protective of Controlled Waters. We do however note that soils will be assessed using visual and olfactory assessment, field screening with a photoionization detector (PID), and testing with Sudan IV NAPL testing kits. Material containing visible NAPL including based on Sudan IV testing will not be reused as bulk fill on site.</p> <p>Arcadis do not believe any further criteria pertaining to the remediation of NAPL impacted soils are required based on Arcadis 2022a.</p>
<p>Whilst it is recognised that controlled waters may have been impacted on by historic activity, it should be considered as a receptor and the development should aim to prevent the entry of hazardous and non hazardous substances into controlled waters. Redevelopment through the planning regime should result in an overall enhancement to the wider environment and improvement in groundwater and surface water quality (be it superficial or otherwise);</p>	<p>Aquifers and surface waters were considered as a receptor in the DQRA and modelled accordingly, but our position is that aquifers do not drive the requirement for remediation and the risk to the North Sea is not significant. The remedial strategy with removal of NAPL and backfill compaction undertaken will reduce contaminant load and reduce infiltration.</p> <p>Please also refer to the appended Briefing Note (ref 63262 STDC NZT) produced by Litchfield on behalf of the Applicant setting out a planning perspective.</p>
<p>The "environmental betterment" to controlled waters should be fully demonstrated with appropriate lines of evidence. We consider an essential component of the remediation activities to comprise the construction of a comprehensive monitoring network across the former steelworks site and implementation of a comprehensive monitoring programme</p>	<p>As set out above the DQRA demonstrates that remediation is not required to protect Controlled Waters. Whilst the proposed works will result in an environmental improvement and associated betterment of the ground conditions at the site such improvement does not require formal validation. The term will be removed from the updated document.</p> <p>A dilution assessment has not been undertaken as part of the DQRA. The assessment comprises a compliance</p>

EA Comments on:	Applicant Response
<p>Enabling Earthworks and Remediation Strategy Report</p> <p>over the long term to demonstrate that redevelopment of the site has resulted in “environmental betterment” to controlled waters. This would presumably also provide evidence support over the long term for any DQRA undertaken across the site. It is not acceptable to rely on the dilution of contamination which may occur in the River Tees Estuary;</p>	<p>point at 50m, within the aquifer, and a further compliance point at 200m, prior to the North Sea (without dilution). Both hazardous and non-hazardous substances exceeded the 50m compliance point. A limited number of non-hazardous substances exceeded at the 200m compliance point. The report includes a qualitative discussion on the potential risk presented to the North Sea from these CoC including: conservatism in model, potential for degradation and sorption, uncertainties in compliance criteria and high potential for dilution as a further line of evidence. On the basis of this evaluation, the report concludes that the risk to the North Sea is not significant.</p> <p>Arcadis understand Lichfields will provide a response to the EA comment concerning a monitoring programme.</p>
<p>It has also previously been highlighted that the reclamation and earthworks to be undertaken may lead to a localised short term deterioration in groundwater quality, and that betterment in groundwater quality may not be apparent for a number of years. This gives weight to our position that groundwater / surface water should be considered as receptors. It also demonstrates the requirement for long term monitoring of controlled waters to record the degree of any deterioration and environmental betterment over the long term period.</p>	<p>It was recognised in the meeting between the EA, STDC, Lichfields, Arcadis, and Atkins held in the TMO on 30/03/22 that any large earthworks may lead to a localised short term deterioration in groundwater quality during any development. Arcadis do not believe that it is usual, proportionate, or required by guidance that monitoring be undertaken.</p> <p>Arcadis understand Lichfields will provide a response to the EA comment concerning a monitoring programme.</p>

Table 5 Material Management

EA Comments on:	Applicant Response
Material Management – 290322 & 270122	
<p>It is reported that comments relating to CLAIRE Definition of Waste Code of Practice (DoWCoP), will be address separately. However, the Applicant has provided limited information regarding the movement and treatment of materials on site, and has failed to address the comments raised in our previous consultant response. We require further information regarding the materials to be use don site, the volume and treatment of materials, as this may have implications on the remediation of the site.</p>	<p>Comments in the previous consultant response have been considered and addressed below.</p>
<p>The documentation refers to a Materials Management Plan. However, this report has not been submitted on the planning portal. We therefore request that these documents are submitted as part of the application, as it would provided details on the re-use of on-site soils and the movement of such soils around the site (and whether they would impact on controlled waters), including further details on the exact nature of earthworks proposed to be undertaken.</p>	<p>Material Management Plan is not a formal planning document and therefore we do not consider a review by the EA to be necessary.</p> <p>DoWCoP is a voluntary scheme, which is managed by a CL:AIRE. A review of this document will be undertaken by a Qualified Person who is approved by CL:AIRE prior to submitting the declaration to CL:AIRE.</p> <p>This MMP has yet to be declared as this cannot be completed without grant of planning.</p>
<p>With regards to section 2.14 (Material Management), materials that are unsuitable for re-use will be classed as waste and materials that require treatment prior to re-use on site will be classed as waste until a non-waste status has been reached.</p>	<p>This section has been updated in the Remediation Strategy to reflect these comments.</p>
<p>Sections 2.14.1 (Achieving Non Waste Status), 4.3.4 (Materials Management) and 4.3.4.1 (Achieving Non Waste Status) do not appear to be correct. CL:AIRE does not</p>	<p>This section has been updated in the Remediation Strategy to reflect these comments.</p>

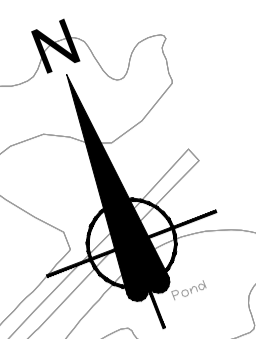
EA Comments on:	Applicant Response
<p>change the status of a material from waste to non-waste. Any unsuitable materials, excess/surplus materials or any materials that require treatment in order to render it suitable for its intended use is a waste and waste controls apply.</p>	
<p>Sections 2.14.3 (Materials Management Plan) and 4.3.9.5 (Management of Potentially Expansive Refractory Materials) refer to crushing of materials into an aggregate under CL:AIRE DoW CoP. Some of the proposed materials are not suitable.</p> <p>Concrete and brick materials from demolished buildings on the site of origin can be crushed and re-used under CLAIRE DoW CoP. However, no other materials can be crushed and re-used.</p> <p>It should be clearly stated within the remediation strategy whether materials are to be generated under WRAP QP and what those materials are.</p>	<p>Brick and concrete won on site from the demolition of buildings, structures above and below ground will be managed in accordance with DoWCoP.</p> <p>Slag rich Made Ground will be crushed in accordance with DoWCoP. Slag rich Made Ground is to be re-used at the site in accordance with the agreement with the EA dated 15 December 2020. Slag rich Made Ground will be crushed into general fill in accordance with the Earthworks Specification to ensure the material is geotechnically suitable for re-use.</p>
<p>Section 2.14.3 (Materials Management Plan) and Section 4.3.9.4 (Management of Asbestos Containing Materials) refers to reuse of asbestos materials. If asbestos is found within the soil materials on site, it is possible for the re-use of some of the existing soil materials that have been impacted by asbestos. If asbestos contaminated materials are visible there is a requirement for trained specialists to oversee an asbestos watching brief and have measures in place to hand pick observable pieces of asbestos, The soil material that do not contain visible asbestos fragments, are classified as non-hazardous and are below the asbestos hazardous waste threshold of 0.1% can be re-used. It is assumed that these soil materials would be placed beneath appropriate clean cover as proposed along with a</p>	<p>A section has been added to the Remediation Strategy to cover the management of materials including asbestos during the remediation that exceed the reuse criteria.</p> <p>No material containing bulk visible asbestos will be re-used in the works. Material with observable/visible asbestos present will either be handpicked to remove the visible asbestos material, if suitable, or taken off-site for disposal.</p> <p>Material with a quantifiable laboratory testing results of <0.1% will be deemed suitable for re-use provided they are placed below a clean cover system.</p> <p>Where asbestos is identified in excavated and processed soils in laboratory testing above the reuse criteria further assessment of the impacted soils will be undertaken. Where assessment of the exceedance of the reuse criteria indicates a localised hotspot of contamination this material will be either treated or removed from site. Where assessment indicates the exceedance is sporadic, localised, not representative of, and not practical to separate from the bulk material these soils will be reused within the permanent works as bulk fill below the</p>

EA Comments on:	Applicant Response
<p>membrane. It is not acceptable for soils contaminating observable asbestos fragments to be incorporated into the permanent development.</p>	<p>clean cover system. The location of the placed soils will be recorded on as built records for the works.</p>
<p>Section 4.3.8.1 (Compliance Sampling Frequency) refers to importation and testing of soils for the remediation criteria. The proposed remediation criteria would not be appropriate for importation of soils since such thresholds would be hazardous. Additionally, there is no criteria which is protective of risk to controlled waters.</p>	<p>Currently it is not proposed to import material from outside of the Teesworks site boundary, but the remediation and earthworks strategy have been written to cover all potential eventualities.</p> <p>Discussions were undertaken between Lloyd Tyson (EA) and Sarah Bullock (Atkins) during a phone call on the 13th April that if clean naturally occurring topsoil or subsoil were to be imported, in addition to a visual inspection of the material to confirm it is clean and naturally occurring and testing of the material, the results in addition to be being compared to the reuse criteria, will also be compared to the hazardous waste threshold limits to ensure that material that is classified as hazardous waste is not imported onto site. A reference to this procedure has been added to the remediation and earthworks strategy.</p>
<p>Section 4.3.9 (Management of Contaminated Soils) refers to the placement of protective covers layers in areas where contaminants in soils are identified above the reuse criteria as highlighted in Appendix C. However, it has mentioned previously that unacceptable soils not complying with the remediation criteria will not be incorporated into the permanent works, We therefore, do not agree with this approach.</p>	<p>Material with a laboratory testing results less than the reuse criteria will be deemed suitable for re-use.</p> <p>Where exceedance of the reuse criteria is identified in the laboratory testing in excavated and processed soils, further assessment of the impacted soils will be undertaken. Where the assessment of the exceedance of the reuse criteria indicates a localised hotspot of contamination this material will be either treated to render it suitable for reuse or removed from site. Where assessment indicates the exceedance is sporadic, localised, not representative of, and not practical to separate from the bulk material these soils will be reused within the permanent works as bulk fill below the clean cover system. The location of the placed soils will be recorded on as built records for the works.</p>
<p>Section 4.3.13 refers to a surplus of material in the order of 32,413m³ following completion of the earthworks. It is also mentioned within the report for importation of materials to be undertaken. It is no certain how a surplus of material is to be generated and it gives rise to uncertainty over whether Factor 3 (certainty for use) and 4 (quantity of material) have been or will be met.</p>	<p>The cut and fill balance provided is as accurate as it can be at the current time until work starts. The volumes of materials excavated and reused will be tracked during the works and the MMP will be updated accordingly.</p> <p>There is a likelihood that there will be a deficit of material during the works as some material will be found to be impacted with contamination to be taken to the soil treatment facility and the works are likely to identify below ground structures and voids which will need to be removed and infilled.</p> <p>Material will be brought onto site from the wider Teesworks site to fill any deficit, but currently that source of material is unknown, as it will be dependant on the programme and availability of material at the time it is required. Therefore, Teesworks will liaise with the EA on the source of this material when required.</p>

Appendix 3 - Net Zero Teesside Remediation Zones

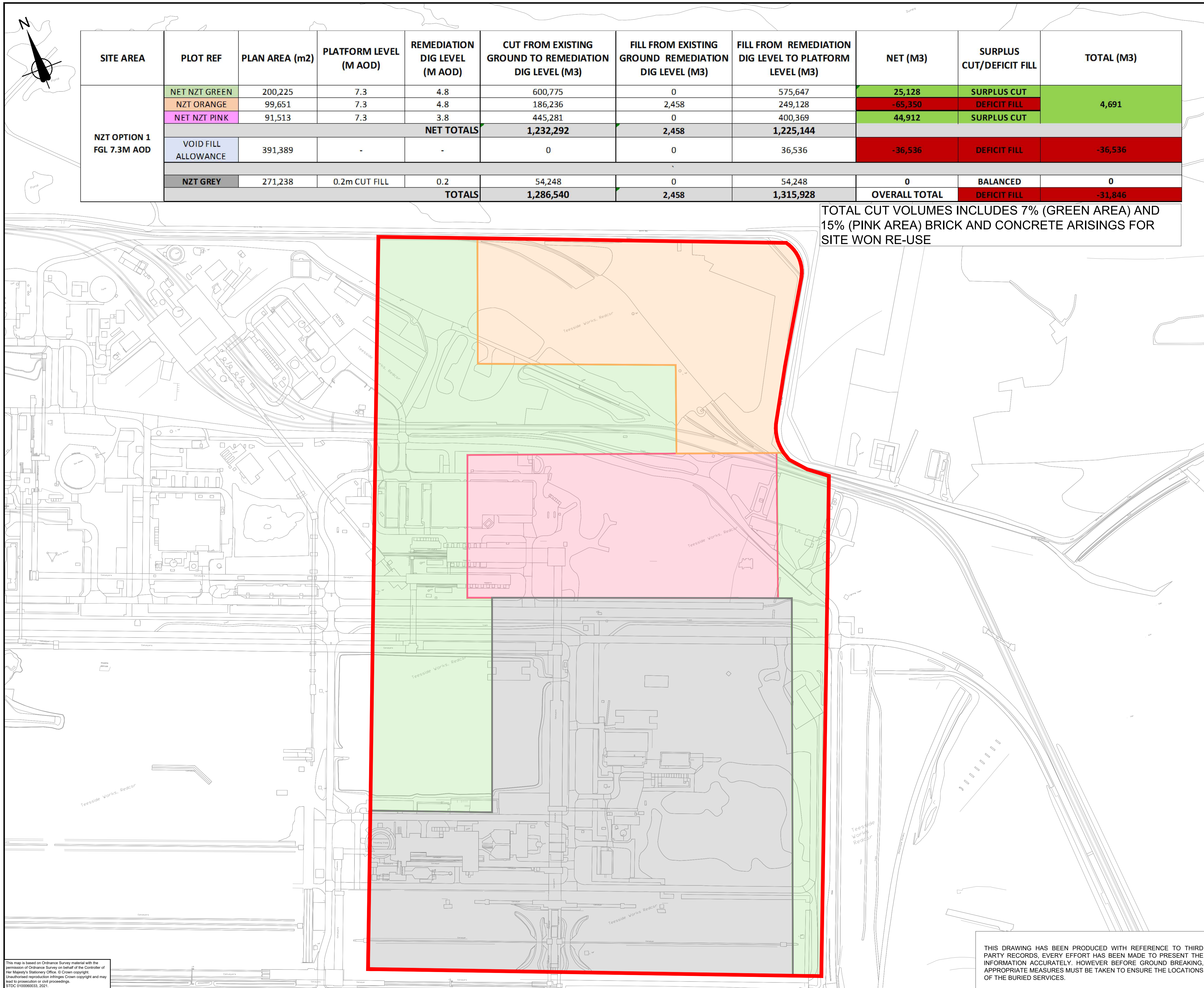
DO NOT SCALE

Millimetres



SITE AREA	PLOT REF	PLAN AREA (m2)	PLATFORM LEVEL (M AOD)	REMEDIATION DIG LEVEL (M AOD)	CUT FROM EXISTING GROUND TO REMEDIATION DIG LEVEL (M3)	FILL FROM EXISTING GROUND REMEDIATION DIG LEVEL (M3)	FILL FROM REMEDIATION DIG LEVEL TO PLATFORM LEVEL (M3)	NET (M3)	SURPLUS CUT/DEFICIT FILL	TOTAL (M3)	
NZT OPTION 1 FGL 7.3M AOD	NET NZT GREEN	200,225	7.3	4.8	600,775	0	575,647	25,128	SURPLUS CUT	4,691	
	NZT ORANGE	99,651	7.3	4.8	186,236	2,458	249,128	-65,350	DEFICIT FILL		
	NET NZT PINK	91,513	7.3	3.8	445,281	0	400,369	44,912	SURPLUS CUT		
	NET TOTALS					1,232,292	2,458	1,225,144			
	VOID FILL ALLOWANCE	391,389	-	-	0	0	36,536	-36,536	DEFICIT FILL	-36,536	
NZT GREY	271,238	0.2m CUT FILL	0.2	54,248	0	54,248	0	BALANCED	0		
TOTALS					1,286,540	2,458	1,315,928	OVERALL TOTAL	DEFICIT FILL	-31,846	

TOTAL CUT VOLUMES INCLUDES 7% (GREEN AREA) AND 15% (PINK AREA) BRICK AND CONCRETE ARISING FOR SITE WON RE-USE



NOTES

- DO NOT SCALE FROM THIS DRAWING
- IN ALL AREAS, PARTICULARLY THE GREEN AND PINK SHADED AREAS, THERE IS A FIRM LIKELIHOOD THAT EXCAVATION WILL NEED TO BE ADVANCED TO GREATER DEPTHS LOCALLY TO REMOVE CERTAIN BURIED STRUCTURES/FEATURES AND/OR TO ADDRESS THE REMOVAL OF CONTAMINATED SOILS

KEY

- NZT SITE DEVELOPMENT BOUNDARY, INCLUSIVE OF TEMPORARY CONSTRUCTION LAYDOWN AREA.
- THIS FORMS THE ENVELOPE OF THE REMEDIATION WORKS CONTRACT, EXCLUSIVE OF NOMINAL OVER DIG AT ONE OR MORE OF THE BOUNDARIES AND AREAS EXTERNAL TO THIS SITE THAT MAY BE ASSIGNED FOR MATERIALS PROCESSING
- THE PROPOSED FINISHED GROUND LEVEL FOR THE REMEDIATION WORKS IS 7.3 AOD
- REQUIRED MINIMUM EXCAVATION DEPTH IS 2.5m BELOW THE PROPOSED FINISHED REMEDIATION WORKS LEVEL, i.e., 4.8m AOD
- REQUIRED MINIMUM EXCAVATION DEPTH IS 3.5m BELOW THE PROPOSED FINISHED REMEDIATION WORKS LEVEL, i.e., 3.8m AOD
- REQUIRED GROUND REMEDIATION WORKS WILL TYPICALLY INVOLVE A LIMITED PROGRAMME OF EXCAVATION AND FILLING (TO SHALLOWER DEPTHS THAN THE AREAS SHADED GREEN AND PINK), WITH THE NEED TO REMOVE BURIED RELIC FOUNDATIONS AND SIMILAR BEING MORE SELECTIVE.
- WORKS TO THIS AREA MAY ALSO INCLUDE FILLING UTILISING RESIDUAL MATERIALS FROM THE GREEN, PINK AND GREY SHADED AREAS.
- THIS IS THE PROPOSED CONSTRUCTION LAYDOWN AREA FOR THE FOLLOW-ON NZT PROJECT, THAT WILL BE ACCESSED, IN PART, POTENTIALLY FROM JULY 2023, WITH OCCUPANCY INCREASING TO THE END OF 2023.
- THE REQUIRED GROUND REMEDIATION WORKS WILL LARGELY BE CONTAINED TO SITE CLEARANCE, A SURFACE SCRAPER, AND A GENERAL, RELATIVELY MINOR CUT/FILL LEVELING OF THE AREA, FOLLOWING WHICH, THE AREA MAY BE CAPPED WITH GRANULAR FINISHING LAYER.

FOR INFORMATION

Rev.	Date	Description	By	Chk'd	App'd
C	29.04.22	VOLUMES UPDATED	LCD	LCD	JMC
B	21.02.22	VOLUMES UPDATED	LCD	LCD	JMC
A	15.02.22	FIRST ISSUE	KW	LCD	JMC

STDC
Teesside Management Offices,
Redcar, TS10 5QW
www.southteesdc.com

Project Title: **TEESWORKS**
The UK's largest industrial zone

Drawing Name:
**NET ZERO TEESIDE
OUTPUT FOR REMEDIATION
STRATEGY/MMP**

Drawn by: KW Date: FEB 2022
Checked by: LCD Date: FEB 2022
Approved by: JMC Date: FEB 2022

Drawing Number: TSWK-STDC-NZT-ZZ-DR-C-0005 Revision: **C**

Drawing Scale: 1:2000 Page Size: A1

THIS DRAWING HAS BEEN PRODUCED WITH REFERENCE TO THIRD PARTY RECORDS. EVERY EFFORT HAS BEEN MADE TO PRESENT THE INFORMATION ACCURATELY. HOWEVER BEFORE GROUND BREAKING, APPROPRIATE MEASURES MUST BE TAKEN TO ENSURE THE LOCATIONS OF THE BURIED SERVICES.

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Appendix 4 - Suggested Draft Planning Conditions

Briefing Note

Our ref 63262/01/AGR/rdo

Date 5 May 2022

To Redcar and Cleveland Borough Council and Environment Agency

Subject **Draft Planning Conditions for Planning Application Ref: R/2021/1048/FFM - 'Engineering operations associated with ground remediation and preparation of the site'**

Conditions applicable to the 'Blue' areas

1. No development hereby approved shall commence within the areas outlined in blue on the submitted 'Net Zero Data Gaps' plan (Plan Ref. No. 10035117-AUK-XX-XX-DR-ZZ-0508-01-Net_Zero_Plot_Data_Gaps) until a report of findings arising from Phase II intrusive site investigations including a risk assessment (generic or detailed quantitative assessment as required), and if required by the risk assessment an updated Remediation Strategy have been submitted to and approved in writing by the Local Planning Authority (the submitted information shall consider the areas within the blue lines shown on the aforementioned plan only). The Assessment shall include measures and timescales for Remediation, Monitoring and Verification Reports include mitigation measures.

Reason: To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors, in accordance with the Local Plan and the National Planning Policy Framework.

Reason for pre commencement condition: To ensure that contamination and remediation measures are identified prior to commencement of the development hereby permitted to ensure risks to future users of the land are minimised. The Local Planning Authority is satisfied that this information is so fundamental to the development permitted that it would have been otherwise necessary to refuse the whole permission.

2. Where required, the remediation and monitoring measures approved under Condition 1 shall be implemented in accordance with the timescales approved and in full accordance with the approved details.

Reason: To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers and other offsite receptors, in accordance with the Local Plan and the National Planning Policy Framework.

Conditions applicable to the application site (excluding the 'Blue' areas)

3. The development within the application boundary (with the exception of the areas outlined in Blue on the submitted 'Net Zero Data Gaps' plan - Plan Ref. No. 10035117-AUK-XX-XX-DR-ZZ-0508-01-Net_Zero_Plot_Data_Gaps) shall be implemented in accordance with the measures set out in the submitted Enabling Earthworks and Remediation Strategy Report (Report Ref: 10035117-AUK-XX-XX-RP-ZZ-0417-03).

Reason To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers and other offsite receptors, in accordance with the Local Plan and the National Planning Policy Framework.

Conditions applicable to the entire site

4. Following completion of the approved remediation and monitoring measures, a verification report that demonstrates the effectiveness of the remediation carried shall be submitted to and approved in writing by the Local Planning Authority.

Reason To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors, in accordance with policies of the Local Plan and the National Planning Policy Framework.

Unexpected contamination

5. Any undesirable material observed during excavation of the existing ground shall be screened and removed. If any areas of odorous, abnormally coloured or suspected contaminated ground are encountered during development works, then operations shall cease and the exposed material shall be chemically tested. The works shall not continue until an amended Risk Assessment and, if required, amended remediation and monitoring measures have been and submitted to and approved in writing by the Local Planning Authority.

Reason To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors, in accordance with policies of the Local Plan and the National Planning Policy Framework.

6. The amended remediation and monitoring measures approved under condition 5 shall be implemented in accordance with the approved details prior to any further works (other than those required for remediation).

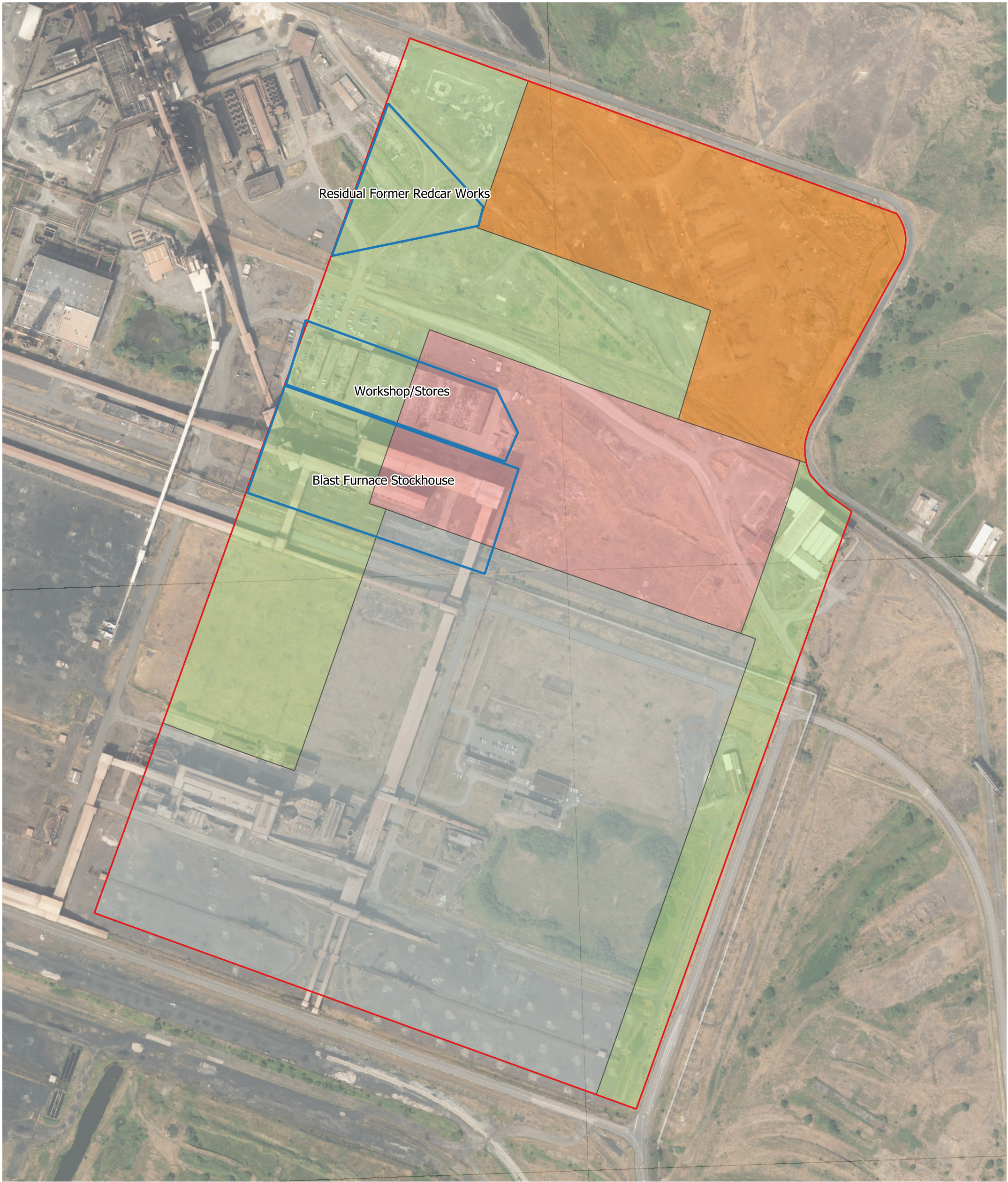
Reason To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers,

neighbours and other offsite receptors, in accordance with the Local Plan and the National Planning Policy Framework.

7. Where additional remediation is required, following completion of the approved remediation and monitoring measures, the development hereby approved shall not be occupied until a verification report that demonstrates the effectiveness of the remediation carried out has been submitted to and approved in writing by the Local Planning Authority.

Reason To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors, in accordance with policies of the Local Plan and the National Planning Policy Framework.

Appendix 5 - Net Zero Data Gaps plan



Legend

PAOC

Merged

Area subject to condition

Drawings

BP Defined Layout_Construction_Areas

- Green Areas – Remediation to 2.5m below FGL
- Grey Area - Construction Laydown Only
- Pink Area - Remediation to 3.5m below FGL
- Orange Area - Capping at FGL

Bing

Red Line



Title: Net Zero Data Gaps

Site: Teesworks - Potential Net Zero Site

Client:
South Tees Development Corporation

Project:
37774100

Date: 31/03/2022
Drawn By: JALM
DRG No: 10035117-AUK-XX-XX-DR-ZZ-0508-01-
Net_Zero_Plot_Data_Gaps

Notes:

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Appendix 6 - Enabling Earthworks and Remediation Strategy Report


LAND WEST OF WARRENBY, TEESWORKS, REDCAR

Enabling Earthworks and Remediation Strategy Report

South Tees Development Corporation

REPORT NO. 10035117-AUK-XX-XX-RP-ZZ-0417-03-Rem_Strat_LWoW

MAY 2022



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Land West of Warrenby, Teesworks, Redcar
Enabling Earthworks and Remediation Strategy Report

Author Ben Le Grice

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Approver Chris Piddington

Report No 10035117-AUK-XX-XX-RP-ZZ-0417-03-Rem_Strat_LWoW

Date MAY 2022

VERSION CONTROL

Version	Date	Author	Changes
01	November 2021	BLG	First Draft
02	February 2022	JM	Minor changes to DoWCoP discussion and updates to cut and fill drawing, text clarifications.
03	May 2022	JM	Title change and response to EA letter NA/2021/115684/02-L01

This report dated 06 May 2022 has been prepared for South Tees Development Corporation (the “Client”) in accordance with the terms and conditions of appointment dated 17 April 2020(the “Appointment”) between the Client and **Arcadis (UK) Limited** (“Arcadis”) for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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Study Limitations

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1 INTRODUCTION

1.1 Project Aims and Objectives

The Land West of Warrenby plot (the Site) is a land parcel situated within the wider Teesworks area located across the Redcar, Lackenby, Grangetown and South Bank conurbations of the Borough of Redcar & Cleveland, set in the industrial area generally known as 'South Tees'.

The South Tees Regeneration Masterplan has been developed detailing the industrial-led regeneration of the Former Redcar Steelworks into a world class employment-generating zone and economic growth enabler for the Tees Valley.

The Masterplan has identified the Site as being located within the North Industrial Zone. The site is a priority development area.

This document is intended to support planning application R/2021/1048/FFM: **ENGINEERING OPERATIONS ASSOCIATED WITH GROUND REMEDIATION AND PREPARATION OF THE SITE (AMENDED PLANS SUBMITTED 10.02.2022) FORMER REDCAR STEELWORKS (TEESWORKS) LAND TO WEST OF WARRENBY REDCAR.**

The site is under consideration as a potential location for the Teesside Net Zero carbon capture and storage facility, this facility is to be constructed by a third party under a Development Consent Order (DCO). Although some documentation pertinent to the DCO has been used to produce this report the two projects are not formerly linked and should be assessed separately and in isolation within their respective planning frameworks.

The overarching aim of the works is to deliver a sustainable ground remediation strategy for the contract site which is compliant with regulatory needs (Local Authority and Environment Agency) and has their approval in principle. The specific objectives of this phase of works is to review the output of the environmental and geotechnical site investigation and risk assessment works and identify an applicable remediation strategy for the site.

This document is intended to support the discharge of planning conditions associated with remediation at the plot.

1.2 Contract Details

Arcadis (UK) Limited (Arcadis) were appointed by South Tees Development Corporation (STDC) to develop a remediation strategy to address environmental constraints relating to ground conditions identified by the physical ground investigation works conducted at the Site.

The work was carried out in accordance with the proposal "Teesworks, Net Zero Teesside Plot – Planning and design technical Support" dated 20th October 2020.

The Site area, as provided by STDC is presented in the below Figure 1 and included in Appendix A.

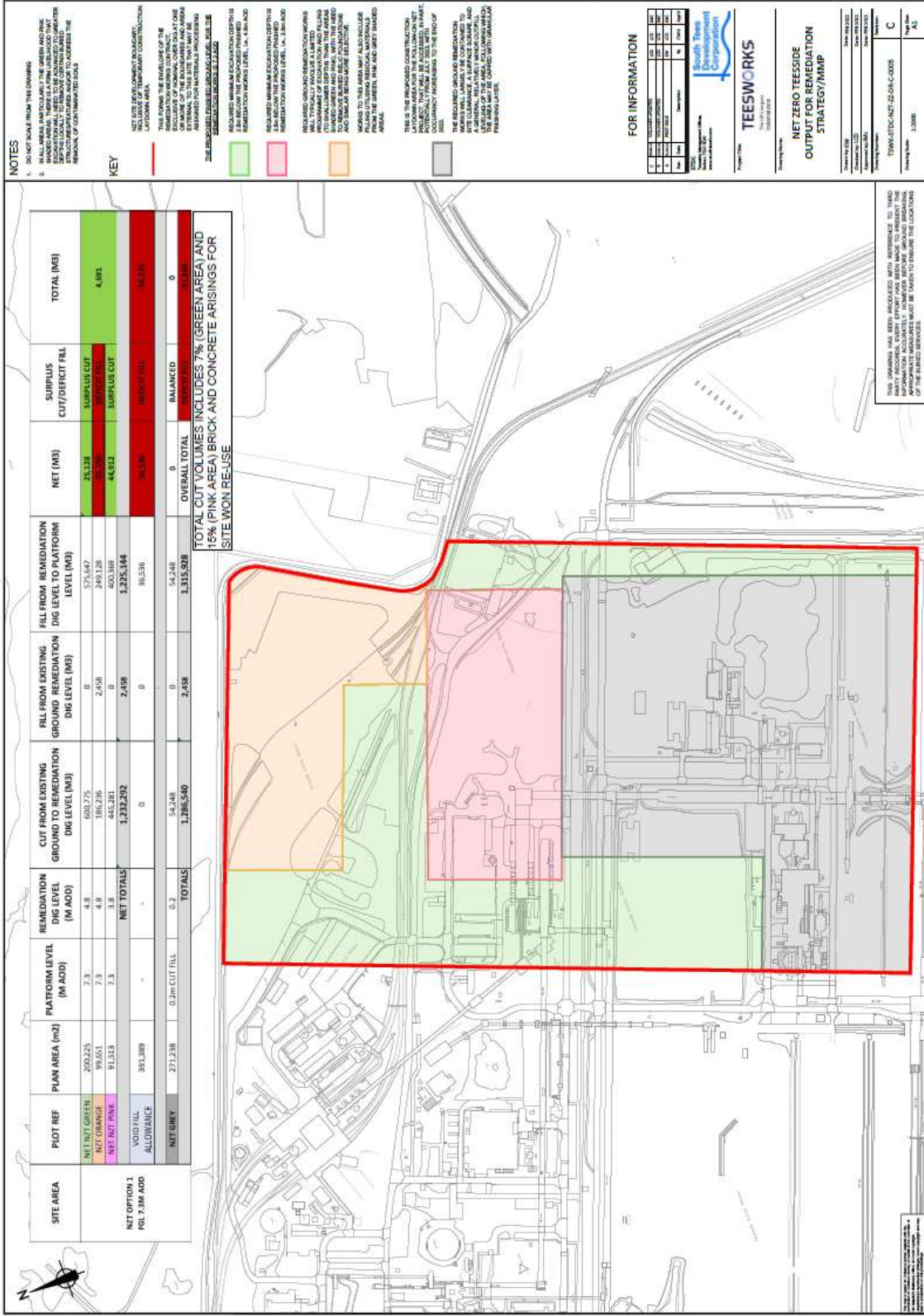


Figure 1- Site Area

1.3 Report Aims

The aim of this remediation strategy document is to use the available information to assess feasible remediation strategies to address the active source-pathway-receptor linkages identified by the site conceptual site model (CSM) for the contract area in order to develop the final remediation technology selection and design.

1.4 Previous Information

The following reports have been prepared for or include the Net Zero plot:

- *Phase 1 Environmental Assessment, Land West of Warrenby, 10035117-AUK-XX-XX-RP-ZZ-0520-01-Land West of Warrenby Redcar Preliminary Risk Assessment*, prepared by Arcadis for South Tees Development Corporation, dated April 2022
- *Land West of Warrenby, Teesworks, Site Condition Report, Generic Quantitative Risk Assessment and Detailed Quantitative Risk Assessment, 10035117-AUK-XX-XX-RP-ZZ-0428-02-LWoW_DQRA*, prepared by Arcadis for South Tees Development Corporation, dated May 2022 [Arcadis 2022a].
- *Earthworks Specification Land West of Warrenby, Redcar, 10035117-AUK-XX-XX-RP-ZZ-0420-04-Net_Zero_Earthworks*, prepared by Arcadis for South Tees Development Corporation, dated April 2022 [Arcadis 2022b].
- *4153 & 4154 Area A Former Steelworks Redcar Contract 1 & 2 (Area A) (Final report)*, prepared by Allied Exploration and Geotechnics Limited (AEG) for South Tees Site Company Ltd, dated June 2018 [AEG 2018].
- *The Former SSSI Steelworks, Redcar: Priority Areas Within SSI Landholdings Contract, Contracts 1 and 2 (Area A): Environmental Risk Assessment Report*, Redcar Steelworks-AUK-XX-XX-RP-GE-0001-P1-SSI1_SSI2A_GI_ERA_Final, prepared by Arcadis for South Tees Site Company Ltd, dated June 2018 [Arcadis 2018a].
- *The Former SSSI Steelworks, Redcar: Priority Areas Within SSI Landholdings Contract, Contract 1 and 2A Site Condition Report*, Redcar Steelworks-AUK-XX-XX-RP-GE-0001-02-SSI1_SSI2A_GI_SC, prepared by Arcadis for South Tees Site Company Ltd, dated August 2018 [Arcadis 2018b].
- *The Former SSSI Steelworks, Redcar: Priority Areas Within SSI Landholdings Contract, Contracts 1 and 2A: Geotechnical Risk Assessment Report*, Redcar Steelworks-AUK-XX-XX-RP-GE-0001-P1-SSI1_SSI2A_GI_GRA, prepared by Arcadis for South Tees Site Company Ltd, dated November 2018 [Arcadis 2018c].
- *The Former SSSI Steelworks, Redcar: Priority Areas Within SSI Landholdings Contract, Contract 1 and 2A: Ground Remediation Options Appraisal Report*, Redcar Steelworks-AUK-XX-XX-RP-GE-0001-01-SSI1_SSI2A_GI_ROA, prepared by Arcadis for South Tees Site Company Ltd, dated December 2018 [Arcadis 2018d].
- *SSI Redcar – SSI1, Factual Report – Initial Trial Pitting*, prepared by CH2M for South Tees Site Company Ltd, dated November 2017 [CH2M 2017a].
- *SSI Redcar – SSI2, Factual Report – Initial Trial Pitting*, prepared by CH2M for South Tees Site Company Ltd, dated November 2017 [CH2M 2017b].
- *SSI1 Redcar Works – Phase 1 Geo-Environmental Desk Study, 678079_SSI1_001* prepared by CH2M, dated August 2017 [CH2M 2017c]
- *SSI2 Redcar Works – Phase 1 Geo-Environmental Desk Study, 678079_SSI1_001* prepared by CH2M, dated August 2017 [CH2M 2017d]
- *Former SSI Steelworks, Redcar – Initial Ground Investigation Works*, Geoenvironmental Summary, prepared by CH2M for South Tees Site Company Ltd, dated May 2018 [CH2M 2018].

- *Soil and Groundwater Baseline Characterisation Study*, Teesside Works, prepared by Enviros for Corus UK Ltd [Enviros 2004], comprising:
 - Volume 1 – Factual Report, Ref. Rlp250604corusteessidefactual.Doc dated 25th June 2004 and marked Final;
 - Volume 2 – Interpretive Report Ref. Mwicorusdraftinterpretivemmdv#2.Doc dated 25th June 2004 and marked Final; and,
 - Volume 3 – Summary Report dated June 2004

Arcadis have also been provided with the following report pertaining to the Site:

- *Preliminary Onshore Ground Investigation For Net Zero Teesside (NZE) – South Tees Development Corporation (STDC) ‘Main Site’ And Onshore CO2 Export Pipeline Corridor Final factual Report*, prepared by AEG for AECOM, dated January 2022 [AEG 2021a].
- *Net Zero Teesside – Environmental Statement Volume III – Appendices*, EN010103-001064-NZE DCO 6.4.11 ES Vol III Appendix 9C WFD Assessment, Prepared by AECOM for BP [AECOM 2021b].
- *Net Zero Teesside – Environmental Statement Volume I Chapter 10*, EN010103-000902-NZE DCO 6.2.10 ES Vol I Chapter 10 Geology and Contaminated Land, Prepared by AECOM for BP [AECOM 2021c].
- *Former Steelworks Land, South Tees Outline Remedial Strategy*, Prepared for South Tees Development Corporation by Wood, ref 41825-wood-XX-XX-RP-OC-0001_S0_P01 dated 25th June 2019 [Wood 2019].
- *Onshore Unexploded Ordnance Threat and Risk Assessment with Risk Mitigation Strategy: Net Zero Teesside*, Prepared for BP Plc by AECOM and 6 Alpha, NS051-CV-REP-000-00001 dated March 2021.

This Strategy document should be read in conjunction with the aforementioned reports.

1.5 Reliability / Limitations of Information

A complete list of Arcadis’ Study Limitations is presented in Appendix B.

It should be noted that ground conditions between exploratory holes may vary from those identified during the ground investigations that this report is based upon; any design should take this into consideration. It should also be noted that groundwater levels may be subject to diurnal, tidal, seasonal, climatic variations and those recorded in this report are solely dependent on the time the ground investigation were carried out and the weather before and during the investigation work.

2 Environmental Setting and Development Constraints

This section incorporates a review of the above reports listed in Section 1.4.

2.1 Site Description and Setting

The site is dominated by large expanses of relatively flat artificial topography at between 6 - 8m above Ordnance Datum (AOD), lower platforms are present north of the Sinter Plant and to the north east around the former Iron Ponds. The region is divided by roads, steelworks structures; including the Teesside Management Office (TMO), Coal Blending Plant and RDL Stores, Sinter Plant, D. Jones Construction and Haulage Limited compound (former Tube City). Railway lines and the Blue Main Road form the southern boundary of the site, the former Hot Metal Route railway bisects the northern half of the site. Tunnels associated with the former Pellet Plant may also be present on site.

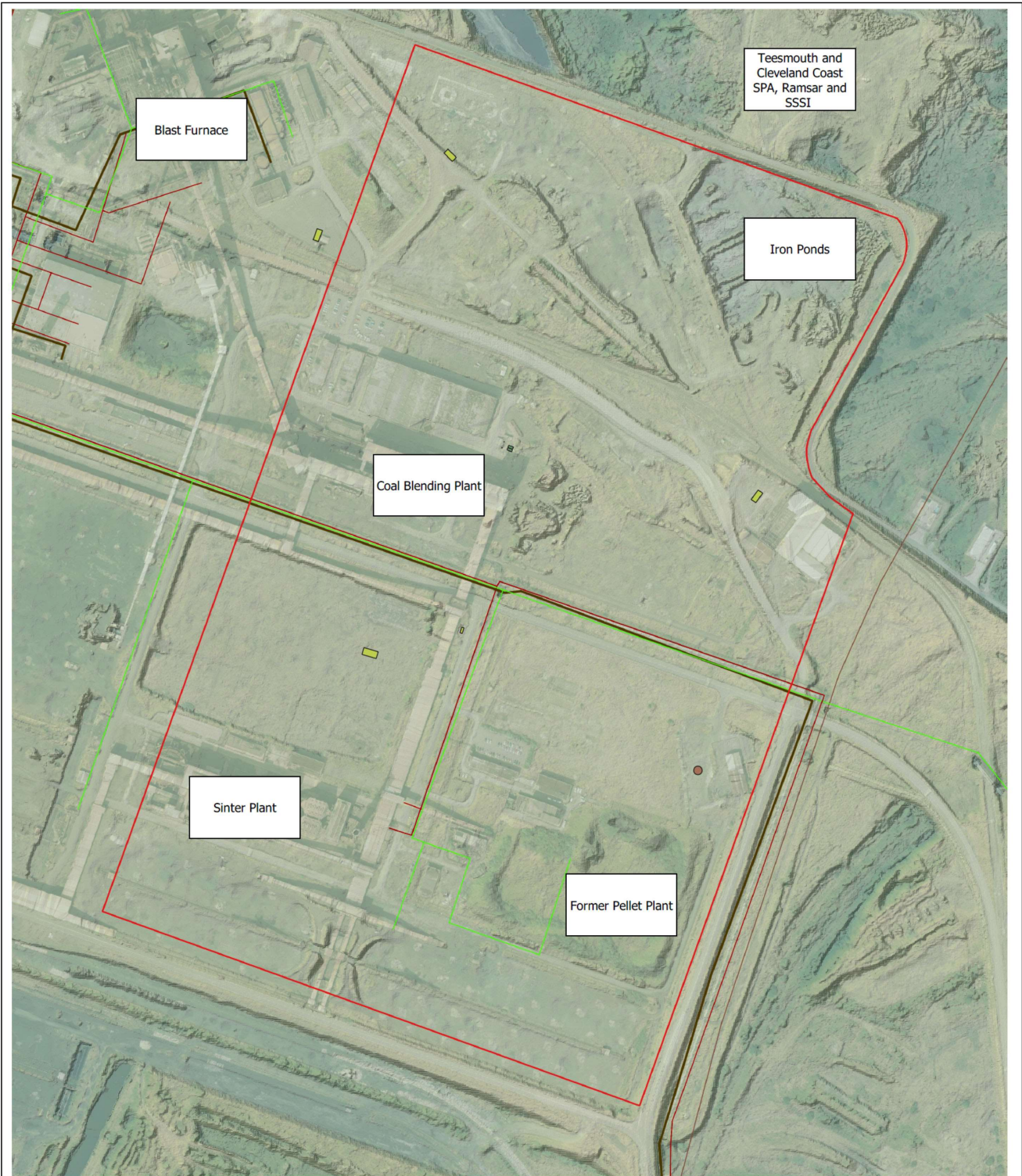
In general, the roadways are level with the surrounding land, however, the roads running along the eastern and southern boundaries of the site are approximately 3-4m higher, with steep slopes leading onto the site. Mounds and stockpiles are present across parts of the site primarily in the Iron Ponds area, around the Former Pellet Plant.

The ground around the TMO and north of the sinter building is primarily of soft landscaping with areas of gravel. The southern, central and western portions of the site are formed with compacted gravel comprising sinter where the former coal, ore and sinter stocks were located. These stocking yards are traversed by covered conveyor belts which transported the materials northwards to the blast furnace and coke ovens located within the adjacent Teesworks Foundry site.

The site infrastructure was undergoing demolition at the time of writing.

CATS Pipeline - The Central Area Transmission System pipeline, is a 36" (91cm) diameter gas pipeline running from the North Sea and making landfall northeast of the site. The pipeline runs in a south-southwest direction, parallel to and within 50 metres of the site's eastern boundary. The pipeline started operating in 1993. While unlikely to be contaminative, it's an extremely sensitive asset and poses a significant constraint to be considered during the development of the plot.

The site setting and layout are shown on Figure 2 and in Appendix A.



Legend

Utilities STDC Data	CokeOvenGasAboveGround	Lidar Data
TSWK-STDC-ZZZ-ZZ-M2-CU-0004	Drawings	-2.5
CokeOvenGasAboveGround_Cleaned	Net Zero	7.0
RWLFoul_FormerCessPit	STDC_Remediation_Boundary	16
Industry water	Bing Mapping	25
AreaWorkshops_GasOilTank		35
FuelOil		
CATPipeline		
RWLFoul_CessPit_SepticTank		

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 Not all utilities shown

Title: Net Zero Site Setting	
Site: Teesworks - Net Zero Site	
Client: South Tees Development Corporation	
Project: 37774100	Figure 2
Date: 15/11/2021 Drawn By: JALM DRG No: 110035117-AUK-XX-XX-DR-ZZ-0421-01- Net_Zero_Setting	



Figure 2 Site Setting

2.2 Geology

The ground investigation data [CH2M 2017a & 2017b, Arcadis 2018a & 2018b, and AEG 2021] indicates a substantial thickness of Made Ground at the site overlying the natural deposits. Made Ground was encountered at all locations and ranged in thickness from 0.9m in MS\BH04 to 8.9m in S1-BH14, with the deepest Made Ground identified in the south of the site.

Natural deposits comprising Tidal Flat Deposits were identified immediately underlying the Made Ground, these were hard to distinguish from Blown Sand deposits which are also indicated as being present on geological mapping. Glacial Till or occasionally Glaciolacustrine Deposits of varying thicknesses was identified below the Tidal Flat Deposits, where present the Glaciolacustrine Deposits were underlain by Glacial Till.

The Redcar Mudstone was proven to underly the Superficial Deposits across the majority of the site and was recovered as an extremely weak to weak grey mudstone. Mudstones of the Penarth Group were found to outcrop directly beneath superficial deposits in the north west corner of the Site, and were underlain by rocks of the Mercia Mudstone Group. Arcadis 2018a identified that no Glaciolacustrine Deposits or Glacial Till are present overlying the bedrock to the east of the site.

Depth of bedrock below ordnance datum generally increased towards the north.

Two principal types of Made Ground were noted:

- **Slag-dominant material:** Generally ranging from gravel to boulder size fragments and intermixed with other types of manmade fragments including brick, concrete, coal, sandstone, and clinker. The slag material generally ranged from light grey to dark grey/black in colour, but a wide range of other colours were also noted including grey brown, red brown and orange brown. Discolouration of the slag surface was also noted with white crystallisation/discolouration often noted on the outer surface.
- **Granular Made Ground:** Generally described as a sandy gravel with varying amounts of clay, cobbles and gravel. Gravel and cobbles include brick, concrete and other demolition materials, slag was not the dominant constituent although often still present within the soil matrix.

In addition, the following Made Ground Types were encountered

- **Cohesive Made Ground:** Generally described as soft to very stiff clay containing minor constituents of sand, gravel and cobbles. Gravel and cobbles include brick, concrete and other demolition materials, slag was not the dominant constituent although often still present within the soil matrix.
- **Sinter:** Widely identified as a surfacing material across the southern area of the site by CH2M and generally described as black fine gravel.
- **Waste:** Comprised significant amounts of waste materials including metal, wood, and plastic in addition to the Made Ground deposits.

2.3 Hydrogeology

The south of the site was reclaimed from the Tees Estuary or low lying areas Tidal Flat Deposits immediately above high water by the placement of biproducts from the steel making process. Resting water level in wells installed at the site is noted to generally be within the Made Ground (resting at between 1 and 6m below ground level (bgl)) unit suggesting a continuity between the two units. Groundwater flow was noted to be towards the north within the Tidal Flat Deposits and the northeast within the Redcar Mudstone Formation, this flow direction is towards the coast.

Although Unproductive Strata, the site data indicates the potential for horizontal and vertical migration of groundwater within more permeable horizons of the Glaciolacustrine Deposits and Glacial Till. In areas where Glaciolacustrine Deposits and Glacial Till are absent to the east of the site and Tidal Flat Deposits are present overlying the bedrock continuity between the aquifers is likely. The hydrogeology is summarised in the table below, these classifications are in agreement with Wood 2019 and AECOM 2021c:

Geology	Aquifer Classification	Groundwater flow
Tidal Flat Deposits	Secondary (A) Aquifer	North
Glaciolacustrine Deposits (GLLDD-XCZ)	Unproductive Strata	Flow dictated by localised preferential pathways
Glacial Till	Secondary (undifferentiated) Aquifer	
Redcar Mudstone Formation	Secondary (undifferentiated) Aquifer	North to north east
Penarth Group (northern corner of site only)	Secondary (B) Aquifer	Unknown based on site data locally expected to the north
Mercia Mudstone (northern corner of site only)	Secondary (B) Aquifer	Unknown based on site data locally expected to the north

Blown Sands (Secondary A Aquifer) are indicated by geological mapping of the site however these have not been conclusively identified by ground investigation. The Mercia Mudstone is underlain by the Sherwood Sandstone (Principal Aquifer) although this is understood to be at significant depth (estimated at 200m bgl from geological mapping) and was not present at 40m bgl during AEG 2021 works.

2.4 Hydrology

The South Gare and Coatham Coastline is present approximately 500m to the north of the site boundary. The South Gare and Coatham Sands is designated as a Site of Special Scientific Interest (SSSI), and the Teesmouth and Cleveland Coast is designated as a Special Protection Area (SPA).

In addition, a number of ponds (closest within 20m of the site) were formerly present between the site and South Gare and Coatham Dunes within an area of off site made ground. It is understood that these ponds were fed from surface runoff from operation of the Redcar Blast Furnace and have reduced significantly since termination of operations at the Steelworks. The Water Framework Directive Assessment for the site [AECOM 2021] identify the ponds to:

“Appear to have formed in depressions in the relatively impermeable historic slag deposits that lie between the PCC Site and the more natural sand dunes that have evolved adjacent to the Tees Bay shoreline. Based on site visits between October 2020 and January 2021, they appear to be predominantly rainwater fed with little influence from tidal variation and groundwater.”

Given the significant reduction in the site of the ponds since cessation of production at the site and given a longer term trend of dune slack succession identified by AECOM [2021], there is not considered to be a significant pathway between the ponds and on site groundwater.

2.5 Data Gaps

Arcadis have reviewed the distribution of historical investigation at the site, including available soil and groundwater sampling. A potential data gap has been identified in the vicinity of the former blast furnace stock house. This area is understood to currently be inaccessible owing to ongoing demolition works.

The findings of a historical investigation [Enviros 2004] have also been reviewed for this report however it is recognised that these may not represent current conditions.

2.6 Conceptual Site Model

2.6.1 Environmental

An Environmental Risk Assessment (ERA) was completed in 2018 for the Site as part of a wider landholding and is documented in Arcadis [2018a]. As part of this study a conceptual site model (CSM) was developed based on ground investigation findings. The CSM identified a number of potentially

active source-pathway-receptor (SPR) linkages the significance of which was assessed by comparison to appropriate Generic Assessment Criteria (GAC).

Arcadis have reviewed environmental data collected on behalf of BP, by AEG and documented in AEG [2021] as part of the DQRA [Arcadis 2022aa].

The aim of this report is to provide a remedial strategy for the site based on the mitigation of potential risks to identified human health receptors. It is assumed for the purpose of this document that remediation is not required for Controlled Waters. The risk to water resources (including exceedances of generic WQS values) is assessed in the DQRA [Arcadis 2022a].

The identified SPR linkages for the site are shown within the CSM presented below as Figure 3 and is also included in Appendix A.

Outline Conceptual Site Model - Commercial Industrial End Use

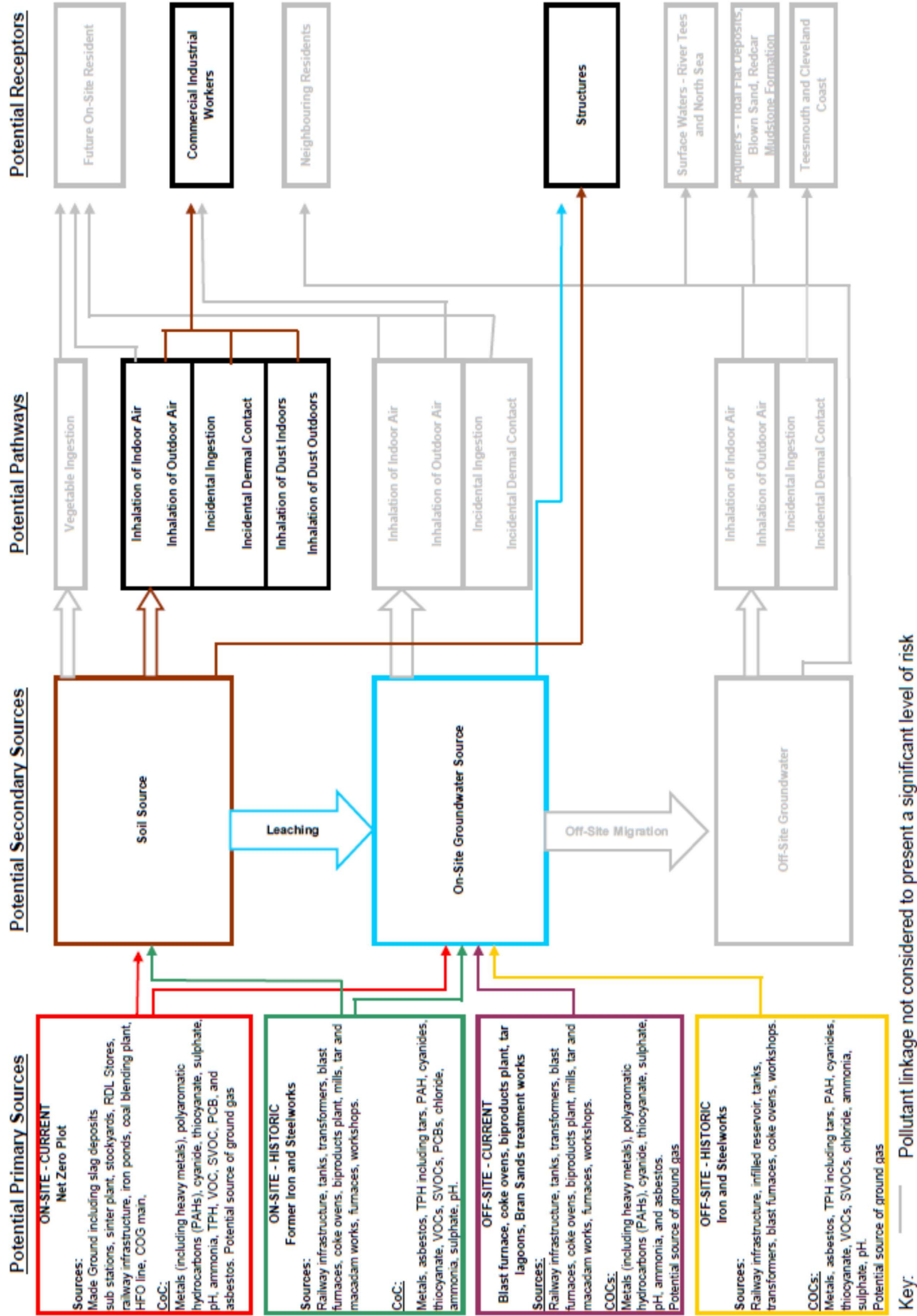


Figure 3 - Conceptual Site Model

2.6.2 Ground Gas

The ERA for Areas SSI1 and SSI2A [Arcadis 2018a] did not identify an unacceptable risk to human health or built receptors from the accumulation of ground gas. However, as the ground investigation was not designed with a particular redevelopment scenario in mind, the gas data monitoring was limited and may not be representative of the entire extent of the site under a particular redevelopment.

Additional ground gas monitoring at greater density is recommended prior to any specific redevelopment to determine the risk from ground gases at the site. The scope of this investigation and any subsequent remedial requirements would depend on the proposed redevelopment scenario. Arcadis understand from STDC that it is expected this would be the responsibility of the developer.

2.6.3 Geotechnical

It is not the specific intention of this Remediation Strategy to address geotechnical risks however these works have identified the following factors which may present significant development constraints at the site:

- Expansive slag deposits and refractory bricks may lead to disruption and damage of structures, hardstanding etc.;
- Due to long term creep settlement, the Made Ground and underlying Tidal Flat Deposits may possess inadequate bearing capacity to support proposed structures;
- Lateral and vertical changes in ground conditions;
- Anticipated total and differential settlement / heave in excess of the tolerable limits may occur due to changes in loading or groundwater regime;
- Sulphate attack on subsurface concrete; and,
- Obstructions within the made ground (boulder size fragments of slag and buried underground structures).

2.7 Requirement for Remediation

The results of contamination testing at the site has identified the following contaminants of concern above the screening criteria which pose a risk to Human Health based on an active SPR linkage. These are detailed within the DQRA [Arcadis 2022a] and summarised below.

2.7.1 Human Health

Asbestos in Soils

Asbestos fibres are present in shallow soils and pose a risk to Human Health receptors via the inhalation pathway.

Organic and Inorganic Contaminants

Levels of PAH were measured above the screening criteria in three locations, the SPL linkage for these contaminants is direct contact and dust inhalation. The majority of the exceedances were at depth (>0.5m bgl) and therefore the SPR linkage is not considered active for these detections, remediation is required for shallow detections as the SPL linkage is considered active.

Total cyanide was measured by CH2M above the screening criteria for free cyanide in one location, no free cyanide testing was conducted on the sample in question. Significant amounts of free cyanide testing across the Site conducted by later investigations did not identify free cyanide levels in excess of the criteria. Further, it is noted that the highest levels of free cyanide identified were two orders of magnitude below the total cyanide detection discussed above and one order of magnitude below the screening criteria. As such the detection of total cyanide is not considered to represent an active SPR linkage.

2.7.2 Materials Impacted with Non-Aqueous Phase Liquids

Evidence of non-aqueous phase liquids (NAPL) and Tar have been identified primarily within the Made Ground and associated with subsurface or former above ground structures and plant. Further

consideration of the NAPL with respect to the risk to human health will be needed as part of the remedial strategy.

Materials impacted with NAPL and tar should not be reinstated due to being a primary source of contamination. The impacted materials will be required to be consigned to a treatment process to remove the NAPL element or disposed of at an appropriate waste facility under duty of care.

Review of previous investigations identified evidence of potential NAPL contamination on soils in the following locations during the ground investigation.

Location	Geology	Description	Source
S1-TPH07	Made Ground	Waste materials, oil contamination.	CH2M [2017a]
S2-TPA53	Made Ground	Possible tar pockets	CH2M [2017b]
S2-TPA61	Made Ground	Slight hydrocarbon sheen	CH2M [2017b]
S2-TPA62	Made Ground	Slight oil sheen at water level	CH2M [2017b]
MS\BH07 4.2-4.85m bgl	Made Ground	Tar coating on slag and tar odour	AEG [2021]
MS\TP06A	Made Ground	Sheen noted Potential solidified tar cladding on buried pipe	AEG [2021]
MS\TP10	Made Ground	Sheen noted	AEG [2021]

2.8 Unexploded Ordnance and Magnetic Anomalies

The AECOM Unexploded Ordnance (UXO) assessment [*Onshore Unexploded Ordnance Threat and Risk Assessment with Risk Mitigation Strategy: Net Zero Teesside*] completed for the potential Net Zero Teesside development boundary indicates a High risk from UXO for excavations.

In addition, a magnetic anomaly was identified in location S2-BHA05 in the north of the site at a depth of approximately 11m bgl. Given the depth of the anomaly, further inspection was not possible, and on the advice of the ordnance engineer, the borehole was terminated at this depth.

While this magnetic anomaly cannot categorically be identified as UXO, the presence of UXO is one possibility and as such the anomaly needs to be treated as if ordnance was present. Should redevelopment require the installation of piled foundations or deep ground improvement, clearance of locations for potential UXO is recommended.

2.9 Archaeology

Archaeological surveys and assessment have not been made available to Arcadis at the time of writing this document. These documents should be reviewed when available to develop an appropriate mitigation and management strategy.

2.10 Ecology

The NZT site is bounded to the north by the Teesmouth and Cleveland Coast SPA, Ramsar and SSSI site.

A Habitats Risk Assessment (HRA) is being completed by a third party for the site [*INCA Report 2021-81 NZT Remediation Shadow Habitats Regulations Assessment: Stage 1 Screening and Stage 2 Appropriate Assessment*].

2.11 Invasive Species

Invasive species have been identified within the wider Teesworks site.

It is a requirement to prevent invasive species on your land from spreading into the wild and causing a nuisance including contaminated soil or plant material from any waste you transfer being spread into the wild.

2.12 Flood Risk

The risk of flooding from rivers and the sea has been assessed by reviewing Environment Agency flood maps for the area which indicate the risk of flooding is “Very Low” with a less than 0.1% chance of flooding in any year.

A Flood Risk Assessment is being completed by a third party for the site.

2.13 Proposed Redevelopment and Enabling Works

Arcadis understand STDC are to complete enabling works to create an environmentally suitable development platform for future redevelopment. These works will include turnover of the Made Ground within the subsurface to a depth of up to 3.5 m Below Finished Level (bfl) depending on location as shown on Figure 1.

The finished level for the site is currently set at 7.3mAOD and the turnover of the Made Ground is to be conducted down to the depths (bfl) indicated in Figure 1, including removal and crushing of relic structures and obstructions, removal and treatment of environmental contamination as required and reinstatement with suitable fill material to formation levels for development.

In all areas, particularly the green and pink shaded areas as shown in Figure 1, there is a potential requirement that excavations will need to be advanced to greater depths locally to remove certain buried structures/features and/or to address the removal of contaminated soils. Any requirement for deeper excavation works will be assessed on a case specific basis following consultation with stakeholders.

In light of the above and to provide maximum flexibility under planning the anticipated maximum depths of excavation from the existing site levels are shown on the below Figure 4 and included within Appendix A (excavation to these depths will be allowed under planning but may not be required during the remediation). It should be noted that these are depths from existing site levels.



Legend
 Remediation Excavations Bing Mapping
 Maximum Depth (mbgl)
 3.5
 5
Drawings
 STDC Remediation Boundary

Notes:
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 GD 100024393.
 CONTACT ARCADIS IN CASE OF ANY QUERIES.
 Dig depths are calculated to give maximum flexibility under
 planning and should not be considered part of the STDC
 landlord specification, or to infer any contractual requirement.

**Title: Net Zero Site Maximum Excavation Depth
 Plan (Current Site Levels)**
Site: Teesworks - Net Zero Site
Client: South Tees Development Corporation
Project: 37774100 **Figure 4**
 Date: 15/11/2021
 Drawn By: JALM
 DRG No: 10035117-AUK-XX-XX-DR-
 ZZ-0422-03-Net_Zero_Rem_Ex



Figure 4 Anticipated maximum depth of excavation from current site levels (Yellow 3.5m bgl, red 5m bgl)

It is not STDC's intention to remove piles to depths below those defined by Figure 1 to the 7.3m AOD development level or address the potential for future slag expansion. If deemed necessary, specific engineering controls will be installed by a future developer.

It is understood that the site is proposed to be redeveloped as a carbon capture and storage facility, however no detailed redevelopment design is currently available for the site. As such, this strategy has been produced on the assumption that any redevelopment of the site will be for a generic commercial industrial end use. Remediation technologies have been selected based on Arcadis' professional judgement and experience of large-scale redevelopments of brownfield sites. The site is part of a wider STDC landholding and Arcadis recommends the remediation approach is considered holistically with the wider redevelopment of the Teesworks Site.

2.14 Materials Management

There are several different waste regulatory options available to manage the movement and re-use of construction soils during the remediation works, the suitability of which is dependent upon the complexity of the site and the quantity/composition of the material to be reused. Based on the complexity of the site Teesworks with their consultant Atkins will produce a Material Management Plan in accordance with CL:AIRE guidance 'Definition of Waste: Development Industry Code of Practice' (DoWCoP).

2.14.1 Definition of Waste: Development Industry Code of Practice

The Environment Agency (EA) has worked with industry through CL:AIRE to prepare the DoWCoP the purpose of which is to allow industry to regulate itself with respect to determining whether excavated materials have achieved non-waste status. The EA states that 'When a signed Declaration is sent to us (the EA) by a Qualified Person (QP) showing that excavated materials are to be dealt with as set out in the DoWCoP, we (the EA) will take the view that the materials on the site where they are to be used will not be waste.'

If materials are dealt within in accordance with the DoWCoP then the materials are unlikely to be waste. According to DoWCoP, there is no single factor that can be used to determine if something is a waste or when it ceases to be waste. However in the context of excavated materials used on sites undergoing development the following factors are considered to be of particular relevance.

- Factor 1 – Protection of human health and the environment – in all cases measures to protect the environment and prevent harm to human health have to be assessed and found to be adequate given the proposed use of the materials.
- Factor 2 – Suitability for use without further treatment - chemical and geotechnical properties have to be demonstrated to be suitable, and the relevant specification for its use must be met.
- Factor 3 - Certainty of use – The holder of the material must be able to demonstrate that the material will actually be used and that the use is not just a probability, but a certainty. In the case of Teesworks this will likely be via planning permission.
- Factor 4 – Quantity of material - Materials should only be used in the quantities necessary for that use, and no more. The use of an excessive amount of material will indicate that it is being disposed of and is waste.

In order to demonstrate that the four factors have been fulfilled will require preparation of various reports including:

- Site investigation report (Site Condition Report / Environmental Site Assessment).
- Quantitative Risk Assessment (QRA);
- Remediation Strategy or Design Statement;
- Earthworks Strategy;
- Materials Management Plan (MMP); and,
- Verification Report (on completion of the works).

In addition to the risk assessment, an MMP will be required detailing where soils will be moved to and how they will be tracked. Consultation will also need to be sought from the Local Authority and the Environment Agency with respect to the movement of material. Planning permission will also be necessary to provide evidence of certainty of use.

Once this documentation is in place a QP will review the MMP and associated documents and ensure that everything is in place prior to submitting a formal declaration to CL:AIRE (the scheme administrators) who will forward a receipt to the Environment Agency (waste team). On completion of the work a verification report will need to be completed and submitted to CL:AIRE.

2.14.2 Materials Management Plan

An MMP shall be prepared in accordance with CL:AIRE DoWCoP and authorised by a QP registered with CL:AIRE. The MMP will refer to the EA position on the reuse of slag rich Made Ground as per EA correspondence DoWCoP/2020 dated 15th December 2020. Excavated materials will be segregated and sorted into the following categories:

- Materials suitable for re-use on site including slag rich Made Ground (without needing additional treatment);
- Materials that require treatment in order to be suitable for re-use on site;
- Soils that require off-site disposal/treatment (not treatable);
- Soils containing asbestos for treatment and reuse or for off-site disposal;
- Excavated hard materials (such as concrete and brick) that may be crushed to produce suitable material for use as infill in the Work; and
- Other materials that require off-site disposal (household waste, electrical goods, vegetation etc).

Where appropriate, existing oversize slag rich Made Ground, concrete, brick and other suitable building materials will be crushed (under the MMP) to an acceptable material as specified in the Earthworks Specification for reuse on-site in accordance with the MMP or other suitable end of waste quality protocol. Materials destined for re-use must meet the criteria proposed within the MMP or other relevant document.

2.14.2.1 Records to be made

The contractor will be required to maintain records of material excavation and movement in support of the MMP, these shall include but not be limited to

Records whilst excavating	Records whilst backfilling
Date	Date
Grid square of origin	Excavation area or stockpile of origin
Depth of origin	Volume
Type of material (Made Ground, Concrete, slag etc.)	Placement grid square(s)
Volume excavated	Depth placed
Material destination (if direct to processing and backfill the backfill area, stockpile, or treatment area)	Material type
Evidence of contamination	

3 Remediation and Excavation Objectives

The aim of the remediation works at the site is to address the identified development constraints pertaining to environmental ground conditions and to facilitate redevelopment for a generic future commercial / industrial end use.

The remediation works will be undertaken at the same time as enabling earthworks (detailed in Section 2.13) to create a suitable formation level, and therefore should be considered holistically with these works.

3.1 Remediation Objectives

The remediation objectives will be achieved by controlling or breaking the identified SPR linkage in order to mitigate identified risks to the identified environmental receptors. The remediation objectives are to:

- Manage the contamination in excess of screening levels including NAPL containing soils.
- Manage the identified pollutant linkage between potential asbestos containing materials that are anticipated to be within shallow Made Ground such that the exposure pathways for on-site commercial workers are inactive.
- Maximise the reuse of excavated soils by making them suitable for use under DoWCoP.
- To develop an unexpected contamination strategy in order to manage and mitigate the risks due to encountering additional materials as is commonplace during the preparation and reclamation of historical brownfield land.

3.2 Excavation Objectives

As the enabling earthworks are to be conducted alongside the environmental remediation it is considered prudent to incorporate the objective of the earthworks into the remediation strategy. The enabling earthworks objectives are to:

- Remove sub-surface obstructions within the Made Ground to a depth (bfl) as defined in Figure 1. Where obstructions extend below this depth their removal will be conducted on a case by case basis following consultation with stakeholders;
- Creation of a formation layer suitable (at 7.3 mAOD) for a generic commercial / industrial redevelopment;
- Manage perched and confined groundwater within the Made Ground encountered during excavations;
- Management of risk to external hardstanding, culverted waterways and utilities; and,
- Development of a UXO mitigation strategy.

Arcadis recommends the following excavation objectives are considered as part of the earthworks strategy and therefore require consideration as part of the Earthworks Specification and development plans:

- Consideration of the management and placement of slag and refractory materials excavated as part of the enabling earthworks; and,
- Protection of sub surface structures and utilities from attack due to aggressive ground conditions.

It is not the intention of this Remediation Strategy to fully address geotechnical development constraints at the site as these are the responsibility of the developer and dependent on a specific redevelopment scenario. It is anticipated that appropriate engineering controls will be developed by future site users at detailed design stage.

4 Enabling Earthworks and Remediation Strategy

The strategy for the enabling earthworks and remediation of the Site should be considered within the wider context of the Teesworks reclamation and remediation. The excavated materials identified as not suitable for direct reuse will be consigned to a remediation process in order to meet the criteria for reuse after treatment. The exact technology is dependent on the volume and availability of the material and the timescale required to complete the remediation. It is currently envisaged that the treatment of materials could be undertaken on the Lackenby Treatment Area as a single location or potentially as part of a hub and cluster arrangement should one be established for the wider Teesworks site.

4.1 Aim

The aim of the works is to:

- Remove underground relic structures and foundations in line with Figure 1;
- Processing Made Ground materials in order to make them suitable for use as backfill materials,
- Make the site suitable for future commercial / industrial end-use through SPR linkage breaks from materials impacted with asbestos, and PAHs; and,
- Reduce the geotechnical risks from slags and refractory materials removed as a consequence of the excavation works.

4.2 Overview of Required Works

In overview the enabling earthworks and remediation will comprise the following activities.

Enabling Earthworks

- Removal and processing of relic underground structures and foundations for reuse, to a depth of 2.5 to 3.5 m below finished level (bfl) to 7.3m AOD. The requirement to remove areas of deeper structures or foundations, if encountered, will be assessed on a case-by-case basis;
- Screening and crushing of Made Ground materials in order to make them suitable for reuse;
- Treatment of soils impacted with NAPL in order to make them suitable for reuse;
- Segregation of soils with ACM for treatment and reuse;
- Segregation and processing of refractory materials as far as practicable;
- Dewatering of below ground structures and excavations with management, treatment and disposal of water; and,
- Backfill of excavations to leave the site safe and level, with validated made ground, certified demolition arising, crushed concrete or imported fill.

Remediation

- Remediation of soils impacted with contaminants above target levels through capping of materials to manage SPR linkages driven by direct contact and dust inhalation pathways;
- Removal of NAPL and tar impacted soils to address risks to Human Health.

4.3 Works Approach

4.3.1 Enabling works

Prior to mobilisation and commencing the enabling earthworks and remediation the following documentation, notifications, permits and approvals shall be obtained and put in place:

- Approved Schedule;
- Construction Phase Health and Safety Plan;
- Method Statements and Risk Assessments;
- Occupational Health Plan;

- Environmental Permit;
- Trade Effluent Discharge Consent / Water Discharge Activity Environmental Permit;
- Traffic Management Plan;
- Construction Environmental Management Plan;
- Materials Management Plan;
- Emergency Response Plan; and,
- Surface Water Management Plan.

A site compound, including welfare facilities and parking will be required to be established in a suitable area on site. Temporary buildings, structures, equipment and facilities shall be properly maintained for so long as it is in use, and the compound, welfare and parking facilities cleared away on completion. Appropriate site fencing, signage and security shall be implemented to protect the works.

4.3.2 Environmental Permit

An Environmental Permit (EP) Mobile Treatment Licence is likely to be required in order to conduct works comprising the treatment and reuse of site won material identified as requiring remediation and the treatment of any contaminated waters recovered during the works. This is typically held and deployed by the party responsible for designing and managing the execution of the remediation who are responsible and accountable for compliance with regulatory requirements.

An EP deployment form will need to be submitted to and approved by the EA (Environmental Permit Team) detailing the remedial approach and associated engineering controls, prior to treatment being undertaken.

The processing of site won materials which do not require treatment for environmental purposes does not need to be conducted under an EP. If uncontaminated made ground is to be processed and an EP for mobile plant is not in place then an EA Standard Rules Permit for the low risk crushing and screening of materials will also be required.

4.3.3 Discharge Consent / Water Discharge Activity Environmental Permit

All accumulated, perched or ground water encountered within the Made Ground shall be collected in a holding tank or lined lagoon prior to any treatment and subsequent discharge. The incidental water shall either be:

- a) discharged to foul sewer under a trade effluent consent agreed with the local sewerage undertaker and/or;
- b) discharged to surface water under a Water Discharge Activity Environmental Permit ("WDA-EP") from the EA.

The Contractor shall make arrangements to identify the most sustainable, compliant and cost-effective discharge method and ensure that relevant permissions and consents are received prior to discharging.

4.3.4 Materials Management

Remediation measures will involve the movement of materials.

As discussed in Section 2.14, the works will be managed via the CL:AIRE guidance 'Definition of Waste: Development Industry Code of Practice' (DoWCoP). Please refer to section 2.14 for further details on this use of the DoWCoP.

4.3.4.1 Use of slag under the DoWCoP

Engagement with the Environment Agency was previously undertaken on the proposal to re-use iron & steel slag rich made ground under CL:AIRE DoWCoP on the Site of Origin at the Metals Recovery Area, South Bank.

The Environment Agency's position following this engagement is that the steel and iron slag that makes up the made ground located outside of designated former and current landfills is not waste and can be re-used under CL:AIRE DoWCoP based on the following parameters;

- *the developer/operator can demonstrate that the steel and iron slag was used for an intended purpose, i.e. to heighten and extend the marshy low-lying ground for the purpose to use and develop that land.*
- *the developer/operator can demonstrate that the steel and iron slag was deposited pre-Control of Pollution Act (1974). This is in line with our approach not to bring areas of land no longer regulated back into regulation unless not doing so would undermine our existing legislative regime.*
- *Should the re-development area incorporate areas of land that have clearly been designated 'landfill' (both under current permit and historical prior to waste legislation) then if this waste is excavated at any point, current waste regulations will apply for the treatment and/or disposal, recovery and re-deposit of the waste.*

4.3.4.2 Materials Management Plan

An MMP shall be prepared in accordance with CL:AIRE DoWCoP and authorised and declared by a QP registered with CL:AIRE. Excavated materials will be segregated and sorted into categories as defined in Section 2.13.3

4.3.5 Soil Sampling

Soil sampling will be undertaken by an STDC appointed representative and at the frequency proposed in Section 4.3.8 and in line with the requirements set out in the Earthworks Specification.

Where samples are required to be taken from the excavation (representative of materials left in-situ or materials reused as backfill) locations shall be machine scraped across the validation sample location and a representative soil sample collected for analysis. Sample locations shall be defined on a predefined grid basis to ensure appropriate coverage and frequency.

Where samples are required to be taken from stockpiles of materials, composite sampling from stockpiles will be undertaken in order to collect a representative sample.

Further information on the proposed sampling strategy, including sampling frequency and testing schedule will be provided within the Earthworks Specification and the Materials Management Plan.

4.3.6 Excavations

4.3.6.1 General Excavations

The scope of the excavation works is outlined in Section 2.13. Where practicable obstructions will be removed and crushed for re-use on site. Materials which are impacted with contaminants to levels above the defined reuse criteria shall be treated using the remediation strategy or if treatment is not considered possible disposed of offsite under full duty of care.

Made Ground materials will require size screening and crushing to enable reuse. Any deleterious materials not suitable for incorporation into the fill material, such as scrap, wood, plastic, putrescible materials etc will be segregated and stored separately on site. Such materials will then be disposed offsite under full duty of care.

4.3.6.2 Slags and Refractory Materials

Ground conditions at the site present a number of potential geotechnical constraints. It is anticipated that the majority of these can be dealt with by adopting appropriate engineering controls at the development phase.

However, Arcadis recommend where potentially expansive refractory materials are excavated as part of the enabling excavations these be managed by Excavation, Separation, and Reuse in low risk areas of the site as defined by STDC. Treatment may also be undertaken if this is identified as feasible for the materials in the given timescale.

The above is intended to reduce rather than eliminate the risks from these materials. Additional management through the use of engineering controls are likely to be required depending on the final redevelopment, these are to be the responsibility of the developer.

4.3.6.3 Segregation and Stockpiling

Excavated materials identified by laboratory analysis as chemically unsuitable for direct reuse will be stockpiled for treatment. Stockpiled soils for treatment will be required to be placed on impermeable surfaces with covers and suitable drainage to collect and dispose of waters. Validation testing of these areas will be undertaken to prove the land quality pre- and post-remediation.

4.3.6.4 Surveying

All excavations shall be surveyed by the appointed Remediation Contractor to allow for accurate measurement of excavation extents and to establish remedial verification sample locations.

4.3.6.5 Relic Underground Structures and Services

The following shall be implemented with respect to relic structures:

- Relic structures shall be removed where encountered within the required excavation depth (Figure 1) in the Made Ground. Where relic structures are encountered within the dig profile (bfl) as defined by Figure 1 but continue below this level confirmation on the requirement to remove them below this depth shall be obtained from STDC. If removal is not required a record of the residual foundation or obstruction shall be made, recording the topographical coordinates, size and type.
- Where encountered, piled foundations shall be removed to the extent defined by Figure 1. A record of the residual foundation shall be made recording the topographical coordinates, size and type.
- Redundant pipework is likely to be encountered within the excavations which may act as preferential pathways for the migration of contamination. Where encountered redundant pipework will be removed from the excavations. Should complete removal not be possible or feasible then residual pipework will be sealed at the edges of excavations and the location recorded on an as-built survey.

The Site is to be remediated to create a leased development platform for commercial industrial end use, Arcadis understand that currently the most likely Tennent would be the Net Zero Teesside carbon capture and storage facility. No specific detailed development plans have been made available at the time of writing this remediation strategy and any future development plans may need to account for structures remaining *in-situ* or partially removed following these works depending on the specific redevelopment.

4.3.6.6 Boreholes

There are existing borehole installations across the Site. Where possible boreholes within defined excavation areas should be protected, however if this is not practicable, they are required to be decommissioned in accordance with the relevant British Standards and EA guidance.

4.3.6.7 UXO

A desktop UXO assessment has been completed for the STDC boundary. The outcome of the assessment indicates a Medium risk from UXO for borehole and excavation activities. In addition, and

magnetic anomaly was detected in one location at 11m bgl. Further mitigation activities such as detailed risk assessment or site mitigations are considered essential to reduce the UXO risk on the site to As Low As is Reasonably Practicable (ALARP). These additional mitigating factors should be defined within the Principal Contractors Construction Phase Plan (CPP).

4.3.6.8 Utilities and Services

A review of the available data sources provided to Arcadis has highlighted a number of live services and utilities that cross and bound the site: These services include;

- Coke Oven Gas main;
- Oxygen pipeline;
- HFO line;
- Below ground electric;
- CATS Pipeline;
- Industrial Water Supply; and
- Railway and railway network infrastructure.

Arcadis understand some of these services are in the process of being decommissioned. The remediation contractor should confirm the status of all utilities before works commence. There is the potential for other utilities to be crossing the site including redundant gas pipes, water pipes and electrical cables as well as live 3rd party utilities.

At the time of writing a constraints plan is not available which would identify which site services and 3rd party utilities are required to remain and be protected during the remediation and reclamation works. The constraints plan will be reviewed and accounted for within the Remediation Contractor's CPP.

4.3.7 Groundwater Management

Perched groundwater and accumulated water are anticipated to be encountered within excavations and subsurface structures. Where present this will require removal to facilitate excavation and backfilling works. Excavations should be managed to maintain perched groundwater in the immediate vicinity it is encountered and not allow it to spread within the wider excavation.

The Contractor shall minimise the quantity of water requiring pumping through backfilling excavations as soon as practicable and avoiding the potential for accumulation of rainwater in open excavations.

The Contractor shall ensure that recovered groundwater is sampled and classified to allow appropriate disposal, either via direct disposal to public foul drainage under discharge consent, *via* on site treatment and discharge to public foul drainage under consent, or by tankerage and disposal from site.

Any temporary storage of groundwater or accumulated water shall be within storage vessels, which are to be banded and equipped with drain-down and sampling valves.

4.3.7.1 Removal of NAPL on Groundwater

If free phase NAPL is encountered on the groundwater during excavation works, the Contractor shall undertake recovery prior to groundwater discharge. The Contractor shall continue the NAPL recovery process until no visible NAPL is observed or further recovery is not reasonably practicable (evidenced by diminishing recovery quantities i.e. base of asymptotic curve).

Where there is evidence of the presence of NAPL in the unsaturated zone, excavations will be extended to expose the groundwater table and identify if it is impacted by the above material and if groundwater treatment is required. The contractor shall ensure soils in the unsaturated zone visibly contaminated with NAPL are managed to limit vertical and lateral migration to surrounding unimpacted areas during the works. This should include measures to minimise run off and infiltration especially in inclement weather, and prevention of the formation of preferential pathways.

4.3.8 Remediation Criteria

The following Remediation Criteria have been developed for Human Health receptors at the Site (in order of priority):

- LQM/CIEH Suitable for Use Levels (S4UL) (LQM / CIEH, 2015),
- Department of Environment Food and Rural Affairs (DEFRA) Category 4 Screening Levels (C4SL) (DEFRA, 2012),
- Arcadis derived generic assessment criteria based on CLEA v1.07,
- United States Environmental Protection Agency (U.S. EPA) Regional Screening Levels (RSLs)

Wood derived GAC based on CLEA v1.07 were presented in the Wood 2019 [which considered the adjacent Teesworks Long Acres site] report for benzo(a)pyrene and naphthalene. It is understood that these values and the use of the LQM S4ULs were acceptable to the regulator for areas considered by Wood and therefore are considered by Arcadis to be also applicable to the Site.

The Remediation Criteria are presented in Appendix C

4.3.8.1 Compliance Sampling Frequency

Remediation Criteria Point	Remediation Objective	Compliance Criteria ¹
	Ensure that concentrations of asbestos within soils within the uppermost 0.2m of materials do not exceed the defined risk-based thresholds	<p>Composite soil samples do not exceed the Remediation Criteria. Samples collected at the following frequency</p> <ul style="list-style-type: none"> • One sample per 50 linear metres of excavation from within the top 0.6m
Excavation Extents in areas without NAPL	Ensure that soils remaining in-situ do not contain contaminant concentrations in excess of the remediation and reclamation criteria	<p>Composite soil samples do not exceed the Remediation Criteria. Samples collected at the following frequency</p> <ul style="list-style-type: none"> • One sample per 50 linear metres of excavation; and, • One sample per stratum or at 2.5m vertical intervals (whichever is the greater) • One sample per 100x100m extent of excavation base • One sample per 2,000m³ of stockpiled slag rich deposits. • One sample per 1,000m³ of stockpiled excavated Made Ground. • One sample per 2,000m³ of stockpiled crushed site aggregate

¹ Sampling frequency to be formalised and agreed as part of the Earthworks Specification and MMP

Remediation Criteria Point	Remediation Objective	Compliance Criteria ¹
Excavation Extents in areas with NAPL	Ensure that concentrations of asbestos within soils within the uppermost 0.2m of materials do not exceed the defined risk-based thresholds	Composite soil samples do not exceed the Remediation Criteria. Samples collected at the following frequency <ul style="list-style-type: none"> • One sample per 25 linear metres of excavation from within the top 0.6m
	Ensure that soils remaining in-situ do not contain contaminant concentrations in excess of the remediation and reclamation criteria	Composite soil samples do not exceed the Remediation Criteria. Samples collected at the following frequency <ul style="list-style-type: none"> • One sample per 25 linear metres of excavation; and, • One sample per stratum or at 1.0m vertical intervals (whichever is the greater) • One sample per 50x50m extent of excavation base • One sample per 625m³ of stockpiled excavated Made Ground. • One sample per 625m³ of stockpiled crushed site aggregate
Imported Materials (Imported materials are <i>not expected to be required but included for completeness</i>)	Ensure that materials imported and used at the site do not introduce environmental or human health risks	Soil samples collected at a frequency of one sample per 2,000 m ³ of imported material (with a minimum of three samples per source) do not exceed the Remediation Criteria or hazardous waste threshold limits.

Remediation Criteria Point	Remediation Objective	Compliance Criteria ¹
Accumulated NAPL	Ensure that no NAPL is present on groundwater as far as is reasonably practicable	No visible NAPL to be recorded on groundwater or accumulated water as far as reasonably practicable ²

4.3.8.2 Suitability for Use Criteria

For excavated materials the following reuse criteria will apply:

Reuse Criteria Point	Objective	Compliance Criteria ³
Reuse below capping layer	Soil reused below capping layer does not contain visible ACM. Soil reused below capping layer does not contain NAPL. To ensure that concentrations of contaminants within materials proposed for reuse do not exceed agreed reuse criteria.	Composite soil samples collected at a frequency of one sample per 1,000 to 2,000m ³ of material (type dependent) proposed for re-use. Human Health - Laboratory analysis confirms concentrations of contaminants are below the criteria set out in Appendix C.
Reuse as capping materials	To ensure that concentrations of contaminants within materials proposed for reuse do not exceed agreed reuse criteria.	Geotechnical – Backfill in line with Highways Specification. Exact specification to be confirmed in Earthworks Specification. NAPL – Negative NAPL test by Sudan IV field screening kit.

The Criteria are presented in Appendix C

4.3.9 Management of Contaminated Soils

4.3.9.1 Temporary Clean Cover System

In order to facilitate development the top 200mm of backfill up to the finished level of +7.3m OD, will be constructed of material validated to contain levels of contaminants below the remediation criteria.

This clean cover system will be suitable as a temporary surface layer based on the remediation criteria and will be used to break the pathway to the underlying soils for a period of up to four years with minimal ongoing maintenance (light weed control, etc) requirements.

The 200mm surface layer will be resistant, as far as practicable, to erosion from vegetation and weather activity. Light maintenance of the clean cover system will be the responsibility of the Tenant once the site is handed over for construction of the development. The final, permanent clean cover system or systems will be the responsibility of the tenant and incorporated within the design of the development.

4.3.9.2 Contingency Arrangements

² To consider that further free phase recovery is not reasonably practicable, it should be demonstrated that free phase recovery rates have diminished to asymptotic conditions.

³ Sampling frequency to be formalised and agreed as part of the Earthworks Specification and MMP

Where contaminants other than asbestos or NAPL (such as PAH and the pollutant linkage identified in section 2.7.1) are identified in excavated and processed soils above the reuse criteria further assessment of the impacted soils will be undertaken. Where assessment indicates the exceedance of the reuse criteria indicates a localised hotspot of contamination this material will be either treated or removed from site. Where assessment indicates the exceedance is sporadic, localised, not representative of, and not practical to separate from the bulk material these soils will be reused within the permanent works as bulk fill below the clean cover system. The location of the placed soils will be recorded on as built records for the works.

4.3.9.3 Developer Led Remedial Requirements

As part of the future developer led re-development works, a permanent cover system should be incorporated into the design and construction works. Areas of hardstanding will act as a suitable cover system however in areas of soft standing and landscaping the following permanent cover system should be incorporated into the design and installed:

- Geotextile marker layer over soils containing exceedance of the reuse criteria; and
- 450-600 mm thickness of suitable imported materials.
- Suitable Engineering controls in structures as required (e.g. ground gas and vapour, concrete design).

4.3.9.4 NAPL Impacted Materials

Materials impacted with NAPL are likely to be excavated as part of the enabling earthworks. The most sustainable use of these materials is to facilitate their reuse on site and as such treatment is required to make them suitable for use such that they do not represent a potential ongoing source of contamination. The volumes of materials for treatment have been estimated at between 5-10% of the predicted soil arisings, however due to the discrete nature of these impacts, materials will potentially be generated throughout the works and in variable amounts.

The exact approach to treatment of materials impacted with NAPL will be influenced by a number of variables including volume of material, contaminant loading, contaminant properties and timescales. A number of remediation technologies are available that could technically, operationally and commercially be employed to meet the remediation objectives and make the NAPL impacted soils suitable for re use at the site, these include;

- Ex situ bioremediation;
- Stabilisation;
- Soil Washing;
- Ex situ thermal remediation (smouldering combustion or thermopile); and,
- Excavation and disposal.

Where soils are visibly impacted with NAPL or olfactory observations / onsite screening with a photoionization detector and testing with a Sudan IV NAPL screening kit indicates the presence of NAPL they shall be consigned for treatment either on site or within a wider project treatment hub until testing as defined above indicates the NAPL is no longer present. Treated soils will be validated against the remediation criteria as suitable for use prior to backfill as bulk fill.

4.3.9.5 Management of Asbestos Containing Materials

It is anticipated that there is a potential for asbestos fibres to be identified within materials excavated from the Site however, only a limited number of the historical ground investigation works have scheduled asbestos analysis and therefore it cannot be determined at this point how frequently materials are expected to contain asbestos containing materials.

During excavation works to remove underground structures there is the potential for ACM to be encountered. In the event that suspected ACM materials are observed associated with excavations, sampling will be undertaken to confirm the asbestos type and quantification. Where ACM has to be removed to facilitate removal of structures it shall be separately stockpiled and covered to control potential dust generation.

Soils containing asbestos in excess of the reuse criteria will not be subject to mechanical screening where free fibres have been detected or are suspected. All soils containing asbestos will be managed by maintaining mist sprays to keep the soils wet whilst handled and covered when stockpiled.

Soils which have been identified as containing asbestos (or suspected to) will be stockpiled separately from all other excavated materials. These materials will be characterised by sampling and laboratory analysis.

In the event that materials are impacted with visible fragments of ACM, the ACM materials shall be handpicked by a suitably licenced asbestos contractor with additional control measures implemented based on the sampling results. Soil with visible ACMs will not be reused.

Material with a quantifiable laboratory testing results of <0.1% will be deemed suitable for re-use.

Where asbestos is identified in excavated and processed soils in laboratory testing above the reuse criteria further assessment of the impacted soils will be undertaken. Where assessment of the exceedance of the reuse criteria indicates a localised hotspot of contamination this material will be either treated or removed from site. Where assessment indicates the exceedance is sporadic, localised, not representative of, and not practical to separate from the bulk material these soils will be reused within the permanent works as bulk fill below the placement of a protective cover layer. The location of the placed soils will be recorded on as built records for the works.

4.3.9.6 Management of Potentially Expansive Refractory Materials

If these materials are excavated as part of the enabling earthworks and are not comingled with other materials, they should be separated from other materials as far as practicable and stockpiled. Material should be crushed to an acceptable material as specified in the Earthworks Specification [Arcadis 2022b] and reused in areas identified by STDC as low risk from the effects of expansive properties.

The above is intended to reduce rather than eliminate the risks from these materials. Additional management through the use of engineering controls are likely to be required depending on the final redevelopment, these are to be the responsibility of the developer.

4.3.10 Unexpected Contamination

At present, data gaps exist in areas of the site occupied by structures associated with the former Steelworks, no detailed characterisation has been undertaken in these areas of the site.

Additionally, changes to the remediation strategy may be required during the remediation works, as a result of encountering unexpected contamination⁴. Should unexpected contamination be encountered, then further characterisation and risk assessment will be undertaken as required. In this situation an addendum to the strategy will be prepared detailing how this contamination will be dealt with. Written agreement with the regulators will be required prior to implementation of any amendments to the agreed strategy. Any such amendments shall be required to be fully documented within the Verification Report.

4.3.11 Anticipated Enabling Earthworks and Remediation Extents Quantities

The extent of the enabling earthworks and remediation have been estimated based on current site information. Anticipated excavation extents are presented on Figure 1 in Section 2.13 and in Appendix A. It should be noted that these are depths from existing site levels and therefore account for land raises, stockpiles and surface features.

4.3.12 Verification of Excavations and Materials for Reuse

Materials identified for reuse will be required to be tested prior to placement to demonstrate compliance with the reuse criteria. Testing will be undertaken on a proposed frequency identified in Section 4.3.8.

4.3.13 Backfill

All Made Ground will be excavated and screened to remove oversize or deleterious material. Oversize material will be crushed for reuse, while deleterious material will be removed from site. All remaining

⁴ This is defined as any contamination source which is distinct in its chemical or physical composition from the type of source material considered within the conceptual site model.

material will be placed into stockpiles and subjected to testing and grading to ensure suitability as defined in series 600 of the Specification for Highways. Where the material does not meet the suitability criteria, it may be subjected to physical treatment, modification or stabilisation as required to achieve the necessary degree of compaction.

No detailed redevelopment design is currently available for the site, STDC have completed a cut and fill model with development levels set at 7.3m AOD. The model [drawing TSWK-STDC-NZT-ZZ-DR-C-0005 Net Zero Teesside - Remediation Zones - Rev B] presented as Figure 1 indicates a surplus of 22,402m³ of material following completion of the earthworks. The model is presented in Appendix A.

The Earthworks Specification should be consulted for further details 10035117-AUK-XX-XX-RP-ZZ-0420-01-Net_Zero_Earthworks.

Where required, imported materials from outside the Teesworks site shall be used to fulfil any materials deficit. Imported material must be suitable for use under the MMP and this document. For each source of imported material for backfill, a material statement shall be provided detailing the chemical testing results, geotechnical testing material classification, destination of material reuse on site and proposed method of compaction. Site won materials that are re-used on site must be demonstrated as suitable for use in accordance with the MMP. Prior to backfill, excavations will be dewatered. Excavations will be backfilled in layers in accordance with the Highway Specifications.

4.3.14 Environmental Controls and Management

The Contractor shall prepare and submit a Construction Phase Environmental Management Plan (CEMP) for the Works and shall consider the following environmental aspects.

4.3.14.1 Surface Water Management

The Contractor shall develop and implement a surface water management plan as a component of the CEMP to provide temporary drainage facilities and protection measures (such as silt fences) as necessary to ensure the site, the Remediation Works, the adjacent land and existing facilities are adequately drained and run-off managed during the course of the Work.

The Contractor shall ensure that surface water and other water generated as part of the Works shall be monitored and treated via an appropriate water treatment system in order to meet the requirements of the Environmental Permit or Trade Effluent Discharge Consent.

This may include;

- Settlement tanks, lamella filters, sand filters or similar, to remove solids and fines from water.
- Granular Activated Carbon filtration.
- pH adjustment.
- Any further treatment necessary to effect compliance with the consent limits.

4.3.14.2 Dust, Noise and Vibration

Air Quality and Dust Management Plan

An Air Quality and Dust Management Plan (AQDMP) will be prepared as a component of the CEMP. Baseline data will be collected as part of this plan to allow the impact of the works on the surrounding environment to be determined and allow the success of control measures undertaken to protect the site workforce and neighbouring receptors to be assessed. Trigger levels for remedial action will be defined within this plan.

Dust control measures will be implemented through the works including the use of damping down, sealing of stockpiles and vehicle wash facilities to prevent the transport of mud and debris from the site onto public roads.

Asbestos

A reassurance monitoring plan and program shall be developed and implemented for asbestos air monitoring as part of the CEMP. Baseline data will be collected as part of this plan to allow the impact of the works on the surrounding environment to be determined and allow the success of control measures undertaken to protect the site workforce and neighbouring receptors to be assessed.

Noise

Prior to commencement of works on site noise data will be taken to establish baseline conditions. Trigger levels to prevent unacceptable impacts to receptors shall be identified within the CEMP and agreed with the Regulators. Noise monitoring stations will be implemented to monitor the impact of the Works against background levels and allow measures to be implemented to ensure noise levels remain below these limits.

Vibration

Prior to commencement of works on site vibration levels will be taken to establish baseline conditions. Trigger levels to prevent unacceptable impacts to receptors shall be identified within the CEMP and agreed with the regulators. The Contractor shall implement vibration monitoring stations to monitor the impact of the Works against background level and these limits.

4.3.14.3 Ecology

As discussed in Section 2.10 following the completion of the ecological surveys and review of the findings of the HRA, any control and mitigation measures identified within it shall be adopted in relations to the remediation and restoration works and future development.

5 Reporting

5.1 Pre-commencement

5.1.1 Materials Management Plans

An MMP, as detailed in Section 2.14 shall be prepared by the appointed Contractor in accordance with CL:AIRE DoWCoP and authorised by a QP registered with CL:AIRE.

5.1.2 Construction Phase Environmental Management Plan

The appointed Contractor will prepare a CEMP for the works. This will consider the potential impacts that the works will have on the environment and include any monitoring and control measures required.

The plan will set out the monitoring and recording process for the management and minimisation of waste, including the storage and transport of waste on-site. This will include a recording mechanism for required waste documentation such as Waste Transfer or Consignment Notes (dependent on the waste stream) in order to confirm the assessment of the waste impact and to implement embedded mitigation measures.

The CEMP will include their methodologies for controlling and monitoring the following aspects of the works:

- Waste Management Procedures
- Noise and vibration
- Air quality and dust management
- Any ecological mitigations required
- Surface water drainage
- Spills and environmental releases
- Monitoring and measuring procedures
- Relevant policies, legal requirements and key stakeholders

5.2 Implementation

During remediation implementation, regular meetings will be held and minuted by the remediation contractor to provide robust control of the work. Meetings are proposed to include:

- Pre-start Meeting
- Daily Site Briefings
- Weekly Site Progress Meetings
- Fortnightly Contract Review meetings
- Risk Reduction/Change Management Meetings
- Project Close Out Meeting

Data types to be collected and reviewed during the remediation implementation period are described in Section 5.3 below. Records will be produced to detail progress of the works. Should site conditions vary from those currently known, resulting in a change to the proposed remediation strategy, this will be communicated to relevant stakeholders at the earliest opportunity to allow for an amended approach to be developed and approved.

5.3 Remediation Works Verification Report

Verification of remediation will be based on a number of lines of evidence collected by the remediation contractor during the works and tracked through the implementation phase. These will be documented within the final Verification Report as follows:

5.3.1 Field records

Field records to verify the works may include the following;

- Excavation extents and depths supported by topographic survey data;
- Volumetric measures of materials excavated and removed from site;
- Field screening / onsite analysis of soil samples (delegated to validating consultant);
- Records of required backfilling and compaction processes;
- In situ geotechnical testing of reinstated material to ensure compliance with Earthworks Specification;
- Volumetric records of water and free phase hydrocarbons recovered from excavations; and,
- Photographic records (delegated to validating consultant).

5.3.2 Laboratory Results

Soil and water sampling and accredited laboratory analysis data will be provided to confirm that:

- On completion of excavations contaminant concentrations within remaining in situ soil meets the reuse criteria, as far as is reasonably practicable (laboratory results);
- Contaminant concentrations within excavated soil that may be re-used onsite as infill to excavations, meet the reuse criteria;
- Laboratory analysis of recovered groundwater / treated groundwater to support off-site disposal, re-infiltration or disposal under consent to foul drainage network;
- Laboratory analysis results of material imported onto site as backfill will be obtained to demonstrate material meets the reuse criteria;
- Geotechnical testing of reinstated material to ensure compliance with Earthworks Specification. Laboratory analysis will be undertaken by a UKAS accredited laboratory; and
- Petrology and slag expansion testing to provide indicative site conditions.

5.3.3 Topographic Survey Records and Drawings

Site drawings and topographic plans will be developed by the remediation contractor to demonstrate that:

- Source areas have been removed (if identified) and provide records of excavation extents during the Works;
- Records of below ground obstructions left in-situ following the works;
- Site levels have been restored to the agreed formation levels;
- Thickness and extent of capping layer placed on the site; and,
- Re-used materials have been located in the correct place through as-built drawings showing locations of remedial works and records of residual hazards.

5.3.4 Materials Audit Trail Records & Environmental Monitoring

The results of the monitoring and testing set out in the CEMP, including details of any spills or emergency response measures employed, will be included together with evidence to demonstrate that:

- Re-used material has been deposited in the correct location in compliance with the materials management plan;
- Waste materials have been properly quantified and have been accepted by an appropriately licenced facility include completed waste transfer documentation; and that
- Imported materials are of correct quality and volume for use on site and free of asbestos.

APPENDIX A

Figures

NOTES

- DO NOT SCALE FROM THIS DRAWING
- IN ALL AREAS PARTICULARLY OF THE GREEN AND PINK EXCAVATION WILL NEED TO BE ADVANCED TO GREATER DEPTHS LOCALLY TO REMOVE CERTAIN BURIED STRUCTURES/FEATURES AND/OR TO ADDRESS THE REMOVAL OF CONTAMINATED SOILS

KEY

- NZT SITE DEVELOPMENT BOUNDARY INCLUSIVE OF TEMPORARY CONSTRUCTION LAYDOWN AREA
- THIS FORMS THE ENVELOPE OF THE REMEDIATION WORKS CONTRACT. AS ONE OF MORE OF THE BOUNDARIES AND AREAS EXTERNAL TO THIS SITE THAT MAY BE ASSIGNED FOR MATERIALS PROCESSING THE PROPOSED FINISHED GROUND LEVEL FOR THE REMEDIATION WORKS IS 3.00D
- REQUIRED MINIMUM EXCAVATION DEPTH IS 2.5m BELOW THE PROPOSED FINISHED REMEDIATION WORKS LEVEL. i.e. -4.8m AOD
- REQUIRED MINIMUM EXCAVATION DEPTH IS 3.5m BELOW THE PROPOSED FINISHED REMEDIATION WORKS LEVEL. i.e. -5.8m AOD
- REQUIRED GROUND REMEDIATION WORKS WILL INVOLVE LIMITED FILLING TO SMALL OVER DEPTHS THAN THE AREAS SHADDED GREEN AND PINK, WITH THE NEED FOR REMEDIATION WORKS TO BE LIMITED AND SIMILAR BEING MORE SELECTIVE
- WORKS TO THIS AREA MAY ALSO INCLUDE FILLING USING RESIDUAL MATERIALS FROM THE GREEN, PINK AND GREY SHADED AREAS.

THIS IS THE PROPOSED CONSTRUCTION LAYDOWN AREA FOR THE FOLLOW-ON NZT PROJECT THAT WILL BE ACCESSED, IN PART, BY THE PROPOSED NZT OCCUPANCY INCREASING TO THE END OF 2023.

THE REQUIRED GROUND REMEDIATION WORKS WILL LARGELY BE CONTAINED TO SITE CLEARANCE, A SURFACE SCRAPE, AND LEVELING OF THE AREA FOLLOWING WHICH THE AREA MAY BE CARPED WITH GRANULAR FINISHING LAYER.

FOR INFORMATION

Code	Volume Category	LOD 1	LOD 2	LOD 3	LOD 4	LOD 5	LOD 6	LOD 7	LOD 8
C	3.00-2.25	VOLUMES EXCAVATED	LOD 1	LOD 2	LOD 3	LOD 4	LOD 5	LOD 6	LOD 7
B	2.25-1.50	VOLUMES SPREAD	LOD 1	LOD 2	LOD 3	LOD 4	LOD 5	LOD 6	LOD 7
A	1.50-0.75	FIRST SOIL	LOD 1	LOD 2	LOD 3	LOD 4	LOD 5	LOD 6	LOD 7
Rev	Date	Description	By	Check	App'd				

STDC Measurement Office
 Ref: 1310 200
 www.stdc.co.nz

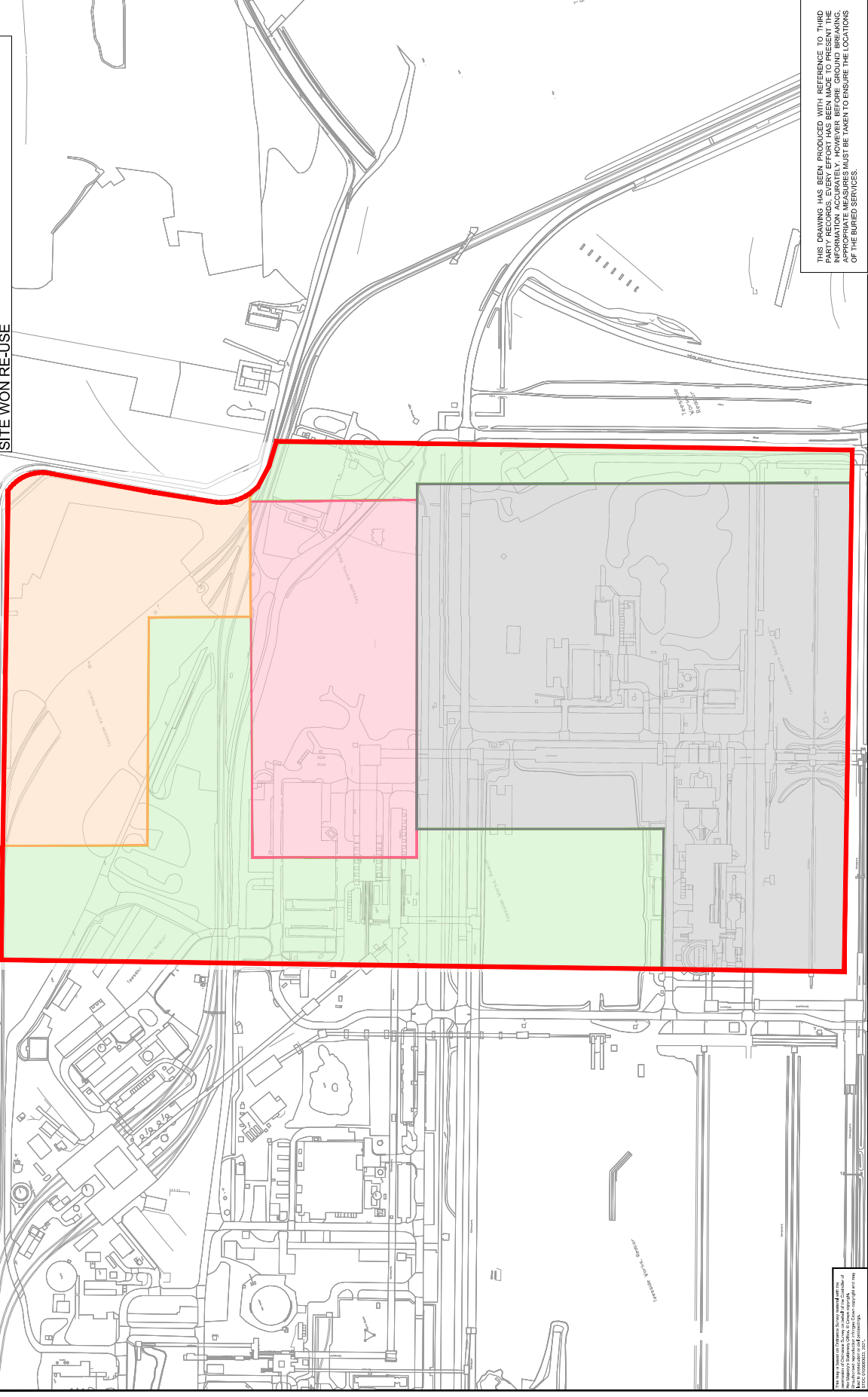


**NET ZERO TEESIDE
 OUTPUT FOR REMEDIATION
 STRATEGY/MMP**

Drawn By: RW	Date: 18/03/23
Checked By: LCD	Date: 18/03/23
Approved By: JAC	Date: 18/03/23

Drawing Number:	TSWK-STDC-NZT-ZZ-DR-C-0005
Revision:	C
Drawing Scale:	1:2000
Page Size:	A1

SITE AREA	PLOT REF	PLAN AREA (m2)	PLATFORM LEVEL (M AOD)	REMEDICATION DIG LEVEL (M AOD)	CUT FROM EXISTING GROUND TO REMEDIATION DIG LEVEL (M3)	FILL FROM EXISTING GROUND REMEDIATION DIG LEVEL (M3)	NET (M3)	SURPLUS CUT/DEFICIT FILL CUT/DEFICIT FILL	TOTAL (M3)
NET NZT GREEN		200,225	7.3	4.8	600,775	575,647	25,128	SURPLUS CUT	4,691
	NZT ORANGE	99,651	7.3	4.8	186,236	249,128	-65,350	DEFICIT FILL	
	NET NZT PINK	91,513	7.3	3.8	445,281	400,369	44,912	SURPLUS CUT	
NET TOTALS					1,232,292	1,225,144			
VOID FILL ALLOWANCE		391,389			0	36,536	-36,536	DEFICIT FILL	-36,536
NZT OPTION 1 FGL 7.3M AOD									
	NZT GREY	271,238	0.2m CUT FILL	0.2	54,248	54,248	0	BALANCED	0
TOTALS					1,286,540	1,315,928	0	DEFICIT FILL	-31,846

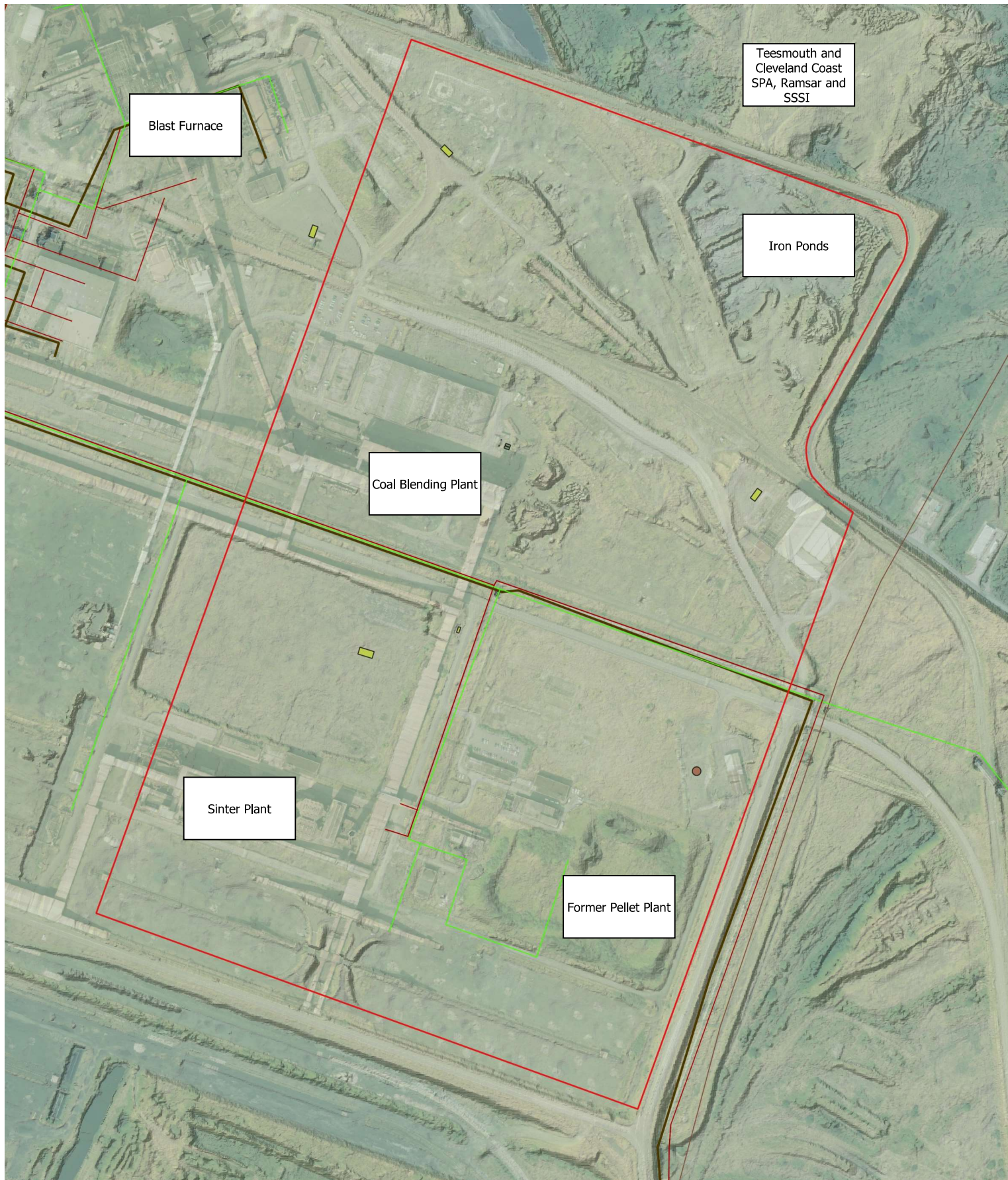


TOTAL CUT VOLUMES INCLUDES 7% (GREEN AREA) AND 15% (PINK AREA) BRICK AND CONCRETE ARISING FOR SITE WON RE-USE

THIS DRAWING HAS BEEN PRODUCED WITH REFERENCE TO THIRD PARTY RECORDS. EVERY EFFORT HAS BEEN MADE TO PRESENT THE INFORMATION AS ACCURATE AS POSSIBLE. HOWEVER, APPROPRIATE MEASURES MUST BE TAKEN TO ENSURE THE LOCATIONS OF THE BURIED SERVICES.

DO NOT SCALE

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Legend

Utilities STDC Data	— CokeOvenGasAboveGround	Lidar Data
TSWK-STDC-ZZZ-ZZ-M2-CU-0004	Drawings	— -2.5
— CokeOvenGasAboveGround_Cleaned	Net Zero	— 7.0
■ RWLFoul_FormerCessPit	STDC_Remediation_Boundary	— 16
— Industry water	Bing Mapping	— 25
■ AreaWorkshops_GasOilTank		— 35
— FuelOil		
— CATPipeline		
■ RWLFoul_CessPit_SepticTank		

Notes:
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 GD 100024393.

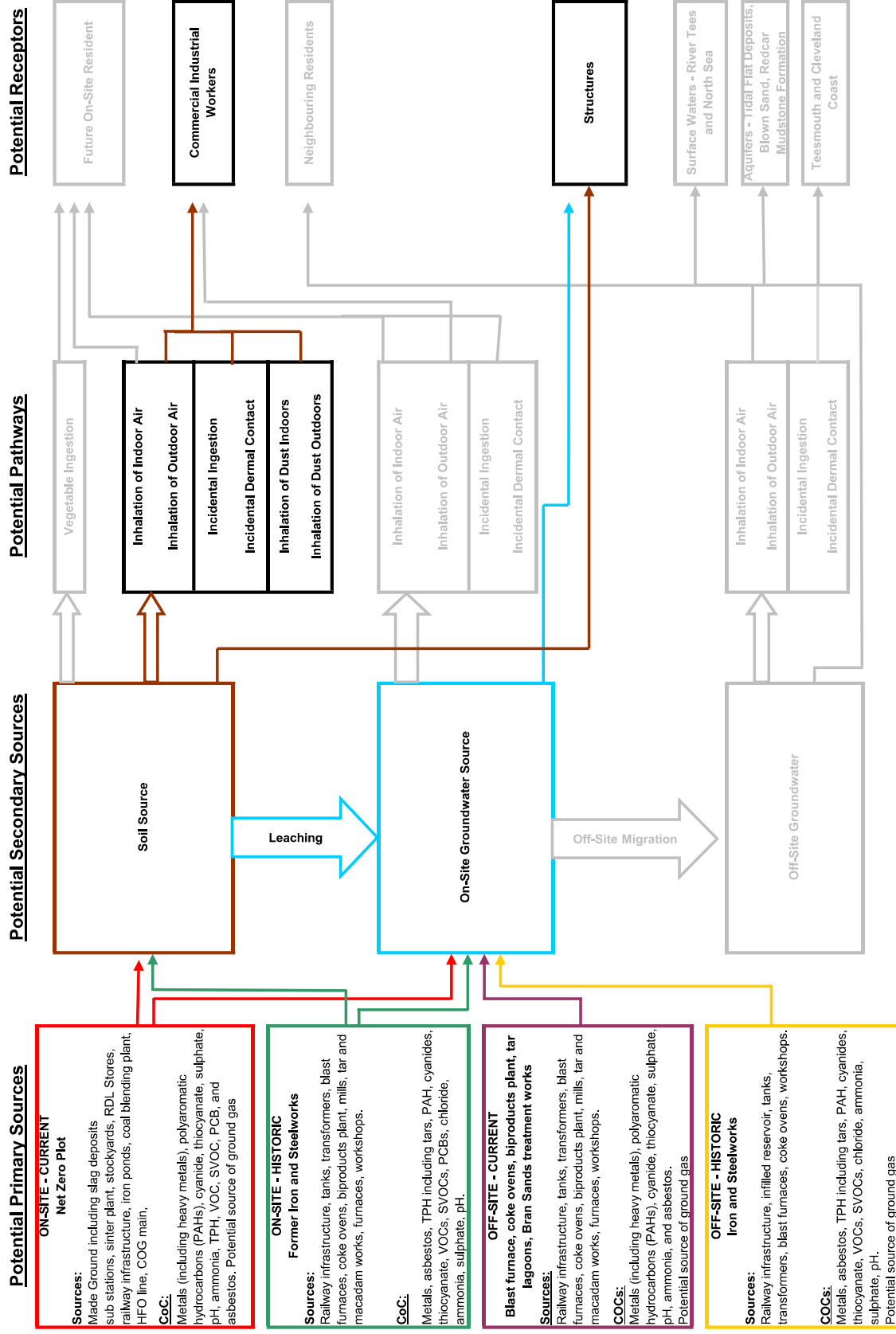
CONTACT ARCADIS IN CASE OF ANY QUERIES.

Not all utilities shown

Title: Net Zero Site Setting	
Site: Teesworks - Net Zero Site	
Client: South Tees Development Corporation	
Project: 37774100	Figure 2
Date: 15/11/2021 Drawn By: JALM DRG No: 110035117-AUK-XX-XX-DR-ZZ-0421-01- Net_Zero_Setting	



Outline Conceptual Site Model - Commercial Industrial End Use



Key: ——— Pollutant linkage not considered to present a significant level of risk



Legend
Remediation Excavations Bing Mapping

Maximum Depth (mbgl)

- 3.5
- 5

Drawings

- STDC_Remediation_Boundary

Notes:

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CONTACT ARCADIS IN CASE OF ANY QUERIES.

Dig depths are calculated to give maximum flexibility under planning and should not be considered part of the STDC landlord specification, or to infer any contractual requirement.

Title: Net Zero Site Maximum Excavation Depth Plan (Current Site Levels)

Site: Teesworks - Net Zero Site

Client: South Tees Development Corporation

Project: 37774100

Figure 4

Date: 15/11/2021
 Drawn By: JALM
 DRG No: 10035117-AUK-XX-XX-DR-ZZ-0422-03-Net_Zero_Rem_Ex



APPENDIX B

Study Limitations

IMPORTANT: This section should be read before reliance is placed on any of the information, opinions, advice, recommendations or conclusions contained in this report.

1. This report has been prepared by Arcadis UK Ltd (Arcadis), with all reasonable skill, care and diligence within the terms of the Appointment and with the resources and manpower agreed with **STDC** (the 'Client'). Arcadis does not accept responsibility for any matters outside the agreed scope.
2. This report has been prepared for the sole benefit of the Client unless agreed otherwise in writing.
3. Unless stated otherwise, no consultations with authorities or funders or other interested third parties have been carried out. Arcadis are unable to give categorical assurance that the findings will be accepted by these third parties as such bodies may have unpublished, more stringent objectives. Further work may be required by these parties.
4. All work carried out in preparing this report has used, and is based on, Arcadis' professional knowledge and understanding of current relevant legislation. Changes in legislation or regulatory guidance may cause the opinion or advice contained in this report to become inappropriate or incorrect. In giving opinions and advice, pending changes in legislation, of which Arcadis is aware, have been considered. Following delivery of the report, Arcadis have no obligation to advise the Client or any other party of such changes or their repercussions.
5. This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report.
6. Whilst this report and the opinions made are correct to the best of Arcadis' belief, Arcadis cannot guarantee the accuracy or completeness of any information provided by third parties.
7. This report has been prepared based on the information reasonably available during the project programme. All information relevant to the scope may not have been received.
8. This report refers, within the limitations stated, to the condition of the Site at the time of the inspections. No warranty is given as to the possibility of changes in the condition of the Site since the time of the investigation.
9. The content of this report represents the professional opinion of experienced environmental consultants. Arcadis does not provide specialist legal or other professional advice. The advice of other professionals may be required.
10. Where intrusive investigation techniques have been employed they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature of sampling, no investigation technique is capable of identifying all conditions present in all areas. In some cases the investigation is further limited by site operations, underground obstructions and above ground structures. Unless otherwise stated, areas beyond the boundary of the site have not been investigated.
11. If below ground intrusive investigations have been conducted as part of the scope, service tracing for safe location of exploratory holes has been carried out. The location of underground services shown on any drawing in this report has been determined by visual observations and electromagnetic techniques. No guarantee can be given that all services have been identified. Additional services, structures or other below ground obstructions, not indicated on the drawing, may be present on Site.
12. Unless otherwise stated the report provides no comment on the nature of building materials, operational integrity of the facility or on any regulatory compliance issue

APPENDIX C

Screening Criteria

STDC Land West of Warrenby Screening Criteria

Contaminant of Concern	Units	Human Health (Commercial Worker)	Source
Metals			
Arsenic	mg/kg	640	S4UL
Boron, Water Soluble	mg/kg	240,000	S4UL
Cadmium	mg/kg	190	S4UL
Chromium	mg/kg	8,600	S4UL
Chromium, Hexavalent	mg/kg	33	S4UL
Copper	mg/kg	68,000	S4UL
Lead	mg/kg	2,300	C4SL
Mercury	mg/kg	58*	S4UL
Nickel	mg/kg	980	S4UL
Vanadium	mg/kg	9,000	S4UL
Zinc	mg/kg	730,000	S4UL
Cyanide, Free	mg/kg	66	DQRA
Thiocyanate	mg/kg	230	USEPA
Phenol - Monohydric	mg/kg	760	S4UL
PAHs			
Naphthalene	mg/kg	1,900	Wood
Acenaphthylene	mg/kg	83000**	S4UL
Acenaphthene	mg/kg	84000**	S4UL
Fluorene	mg/kg	63000**	S4UL
Phenanthrene	mg/kg	22,000	S4UL
Anthracene	mg/kg	520,000	S4UL
Fluoranthene	mg/kg	23,000	S4UL
Pyrene	mg/kg	54,000	S4UL
Benzo(a)anthracene	mg/kg	170	S4UL
Chrysene	mg/kg	350	S4UL
Benzo(b)fluoranthene	mg/kg	44	S4UL
Benzo(k)fluoranthene	mg/kg	1,200	S4UL
Benzo(a)pyrene	mg/kg	77	Wood
Indeno(1,2,3-c,d)pyrene	mg/kg	500	S4UL
Dibenzo(a,h)anthracene	mg/kg	3.5	S4UL
Benzo(g,h,i)perylene	mg/kg	3,900	S4UL
PAH - USEPA 16, Total	mg/kg	na	
Petroleum Hydrocarbons			
Aromatic C5-C7	mg/kg	26000**	S4UL
Aromatic C7-C8	mg/kg	56000**	S4UL
Aromatic C8-C10	mg/kg	3500**	S4UL
Aromatic C10-C12	mg/kg	16000**	S4UL
Aromatic C12-C16	mg/kg	36000**	S4UL
Aromatic C16-C21	mg/kg	28,000	S4UL
Aromatic C21-C35	mg/kg	28,000	S4UL
Aromatic C35-C44	mg/kg	na	
Aliphatic C5-C6	mg/kg	3200**	S4UL
Aliphatic C6-C8	mg/kg	7800**	S4UL
Aliphatic C8-C10	mg/kg	2000**	S4UL
Aliphatic C10-C12	mg/kg	9700**	S4UL
Aliphatic C12-C16	mg/kg	59000**	S4UL
Aliphatic C16-C35	mg/kg	1,600,000	S4UL
Aliphatic C35-C44	mg/kg	1,600,000	S4UL
Asbestos			
Asbestos	n/a	0.001% (capping layer) Visible ACM (bulk fill)	Arcadis

The following GACs have been used in order of availability:

S4UL: (Commercial End Use, 1% SOM) LQM / CIEH (2015) The LQM / CIEH S4ULs for Human Health Risk Assessment. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3223. All rights reserved.

C4SL: (Commercial End Use) Department for Environment, Food and Rural Affairs (DEFRA) (2014) SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document, December 2014

Arcadis Where published criteria above are not available, Arcadis has derived GAC based on EA guidance and assumptions in line with current industry standards and standard CLEA inputs for a commercial land use.

USEPA GAC based on US Environmental Protection Agency (USEPA) Regional Screening Levels (RSL).

Wood derived GAC based on CLÉA v1.07 were presented in the Wood 2019 report for benzo(a)pyrene and naphthalene. It is understood that these values were acceptable to the regulator for this site and as such they have been retained here.

na Comprises multiple contaminant, no applicable GAC

123* S4UL exceeds the vapour saturation limit

123** S4UL exceeds the solubility saturation limit

STDC Land West of Warrenby Screening Criteria

Contaminant of Concern	Units	Human Health (Commercial Worker)	Source
Volatiles			
MTBE	mg/kg	210	USEPA
Benzene	mg/kg	27	S4UL
Toluene	mg/kg	56,000	S4UL
Ethylbenzene	mg/kg	5,700	S4UL
m & p-Xylene	mg/kg	5,900	S4UL
o-Xylene	mg/kg	6,600	S4UL
Vinyl chloride	mg/kg	0.059	S4UL
1,1-Dichloroethene	mg/kg	1,000	USEPA
Trans-1,2-Dichloroethene	mg/kg	23,000	USEPA
1,1-Dichloroethane	mg/kg	16	USEPA
Cis-1,2-Dichloroethene	mg/kg	2,300	USEPA
Bromochloromethane	mg/kg	630	USEPA
Chloroform	mg/kg	99	S4UL
1,1,1-Trichloroethane	mg/kg	660	S4UL
Carbon tetrachloride	mg/kg	2.9	S4UL
1,2-Dichloroethane	mg/kg	0.67	S4UL
Trichloroethene	mg/kg	1.2	S4UL
1,2-Dichloropropane	mg/kg	11	USEPA
Dibromomethane	mg/kg	99	USEPA
Bromodichloromethane	mg/kg	1.3	USEPA
cis-1,3-Dichloro-1-propene	mg/kg	8.2	USEPA
trans-1,3-Dichloro-1-propene	mg/kg	8.2	USEPA
1,1,2-Trichloroethane	mg/kg	5	USEPA
Tetrachloroethene	mg/kg	19	S4UL
1,3-Dichloropropane	mg/kg	23,000	USEPA
Dibromochloromethane	mg/kg	39	USEPA
1,2-Dibromoethane	mg/kg	0.16	USEPA
Chlorobenzene	mg/kg	56	S4UL
1,1,1,2-Tetrachloroethane	mg/kg	110	S4UL
Styrene	mg/kg	35,000	USEPA
Tribromomethane	mg/kg	86	USEPA
Bromobenzene	mg/kg	1,800	USEPA
1,1,1,2,2-Tetrachloroethane	mg/kg	270	S4UL
1,2,3-Trichloropropane	mg/kg	0.11	USEPA
2-Chlorotoluene	mg/kg	23,000	USEPA
4-Chlorotoluene	mg/kg	23,000	USEPA
1,3,5-Trimethylbenzene	mg/kg	1,500	USEPA
tert-Butylbenzene	mg/kg	120,000	USEPA
1,2,4-Trimethylbenzene	mg/kg	1,800	USEPA
sec-Butylbenzene	mg/kg	120,000	USEPA
1,3-Dichlorobenzene	mg/kg	30	S4UL
1,4-Dichlorobenzene	mg/kg	4,400	S4UL
1,2-Dichlorobenzene	mg/kg	2,000	S4UL
Butylbenzene	mg/kg	58,000	USEPA
1,2-Dibromo-3-chloropropane	mg/kg	0.064	USEPA
1,2,4-Trichlorobenzene	mg/kg	220	S4UL
Hexachloro-1,3-butadiene	mg/kg	31	S4UL
1,2,3-Trichlorobenzene	mg/kg	102	S4UL

STDC Land West of Warrenby Screening Criteria

Contaminant of Concern	Units	Human Health (Commercial Worker)	Source
Semi-volatiles			
Phenol	mg/kg	760	S4UL
1,3-Dichlorobenzene	mg/kg	30	S4UL
1,4-Dichlorobenzene	mg/kg	4400 (224) ^{vap}	S4UL
1,2-Dichlorobenzene	mg/kg	2000 (571) ^{sol}	S4UL
3&4-Methylphenol	mg/kg	82,000	USEPA
2,4-Dimethylphenol	mg/kg	16,000	USEPA
2,4-Dichlorophenol	mg/kg	2,500	USEPA
1,2,4-Trichlorobenzene	mg/kg	110	USEPA
4-Chloro-3-methylphenol	mg/kg	82,000	USEPA
2-Methylnaphthalene	mg/kg	3,000	USEPA
Hexachlorocyclopentadiene	mg/kg	7.5	USEPA
2,4,6-Trichlorophenol	mg/kg	210	USEPA
2,4,5-Trichlorophenol	mg/kg	82,000	USEPA
2-Chloronaphthalene	mg/kg	60,000	USEPA
2-Nitroaniline	mg/kg	8,000	USEPA
2,6-Dinitrotoluene	mg/kg	1.5	USEPA
2,4-Dinitrotoluene	mg/kg	7.4	USEPA
Dibenzofuran	mg/kg	1,000	USEPA
Diethyl phthalate	mg/kg	660,000	USEPA
4-Nitroaniline	mg/kg	110	USEPA
Azobenzene	mg/kg	26	USEPA
Hexachlorobenzene	mg/kg	110	S4UL
Pentachlorophenol	mg/kg	400	S4UL
Butylbenzyl phthalate	mg/kg	1,200	USEPA
Bis(2-ethylhexyl)phthalate	mg/kg	160	USEPA
Di-n-octyl phthalate	mg/kg	8,200	USEPA

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