ARUP

BAM Nuttall Ltd.

Victoria North: Phase 2 – St. Catherine's Wood

Remediation Implementation and Verification Plan

Reference: VNIF-ARP-ZZ-YYY-RP-CG-0020

P03 | 31 May 2024



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1. Introduction

1.1 Commission

Following ground investigation and interpretative reporting, BAM Nuttall Ltd commissioned a remediation strategy from LK Group Ltd [10] for the Victoria North Infrastructure and Enabling Works planning phase 2.

Arup has subsequently been commissioned by BAM Nuttall Ltd to produce a remediation implementation and verification plan (RIP) based on the LK remediation strategy, to discharge the relevant planning condition.

The planning phase 2 infrastructure works that this RIP relates to comprise a programme of landscaping and associated works to enable the creation of an area of formal public open space in the area of the Victoria North site. The planning phase 2 area is also referred to as St. Catherine's Wood.

1.2 Planning context

Planning consent 137079/JO/2023 enables a number of relevant planning conditions for the Victoria North site to be discharged in discrete phases. This DQRA is relevant to works associated with planning phase 2 only.

Condition 7 relates to ground contamination. The amended Condition 7a of the above planning consent addresses issues associated with ground contamination. The full text of condition 7a is as follows:

"Notwithstanding the Ground Investigation Interpretative Report, Victoria North Infrastructure Works, ARUP, Reference: VNIF-ARP-ZZ-YYY-RP-CG-0009, Dated: 31 January 2022 and Ground Investigation Interpretative Report, Victoria North Infrastructure Works, ARUP, Reference: VNIF-ARP-ZZ-YYY-RP-CG-0009, Dated 23 February 2022., (a) before the development hereby approved commences (excluding vegetation clearance and tree removal), the following information shall be submitted for approval in writing by the City Council, as Local Planning Authority:

- Submission of the further Site Investigation and Risk Assessment Reports
- Submission of a detailed Remediation Strategy
- Submission of a Remediation Implementation Plan and verification plan.

The development shall then be carried out in accordance with the approved details."

The further "Site Investigation and Risk Assessment Reports" that condition 7a refers to have been submitted by Arup [8][9].

The remediation strategy that condition 7a refers to has been submitted by LK Group [10].

This report aims to present sufficient information to discharge the final part of Condition 7a of planning consent 137079/JO/2023, namely the submission of a remediation implementation plan and verification plan for planning phase 2 of Victoria North. Vegetation clearance and tree removal is outside the scope of the relevant planning condition and is not considered further in this document.

Condition 7b of the relevant planning consent sets out requirements for demonstrating that the objectives of remediation work have been achieved. The full text of condition 7b is as follows:

"(b) When each phase of earthworks commences, the development shall be carried out in accordance with the previously agreed Remediation Strategy and a Completion/Verification Report for that phase shall be submitted to and approved in writing by the City Council as local planning authority prior to the first use of the development.

In the event that ground contamination, groundwater contamination and/or ground gas, not previously identified, are found to be present on the site at any time before the development is occupied, then development shall cease and/or the development shall not be occupied until, a report outlining what

measures, if any, are required to remediate the land (the Revised Remediation Strategy) is submitted to and approved in writing by the City Council as local planning authority and the development shall be carried out in accordance with the Revised Remediation Strategy, which shall take precedence over any Remediation Strategy or earlier Revised Remediation Strategy."

This document includes a verification plan detailing the information that shall be collected during the works and subsequently presented in the verification report. It also includes a discovery strategy to address any contamination encountered during the works that has not previously been identified.

1.3 Purpose of Report

The purpose of this report is to provide the additional information required by condition 7a; namely a remediation implementation and verification plan (RIP) for the planning phase 2 works. This RIP indicates how the LK remediation strategy will be implemented on site and identifies the verification data that will be collected to demonstrate that the requirements of the remediation strategy have been met.

1.4 Structure of this report

The structure of this RIP is as follows:

- Section 2 Summary of the remediation strategy.
- Section 3 An outline of the planning phase 2 scope of works.
- Section 4 Management and regulatory requirements.
- Section 5 Site clearance and preliminaries.
- Section 6 Earthworks.
- Section 7 Verification plan.
- Section 8 Post-completion requirements within planning phase 2.

1.5 Previous assessments

This RIP is based on a number of previous assessments and reports, as discussed below.

A preliminary ground investigation report (GIR) [2], which addressed the wider Victoria North site and included a generic controlled waters risk assessment, prepared using the results of 2019 and 2021 AEG ground investigations [3][4]. The report used desk study information and ground investigation data to review the site history, uses of the site that might have caused ground contamination, the environmental sensitivity of the site and the risks that contaminants of concern might present to the development and to controlled waters. The preliminary GIR provided the first stage of assessment of contamination as required by the planning process.

A third phase of ground investigation was subsequently completed in 2022 across the wider site by BAM, which was reported in a BAM factual report [5]. The results of this investigation were used to prepare an updated version of the GIR [1], together with a detailed controlled waters risk assessment [6].

A draft conceptual site model report was subsequently produced for the Victoria North site, which focused on emerging water that had been encountered during site clearance in early 2022 [7]. The conceptual site model was the subject of detailed discussions with the Environment Agency and Manchester City Council Environmental Health Department and informed further ground investigations, focused on PFAS. The results of this further ground investigation together with a detailed quantitative assessment of risks from PFAS and other contaminants of concern, was presented in a PFAS human health risk assessment [9] and an updated detailed controlled waters quantitative risk assessment report produced by Arup [8].

The above-referenced reports were drafted before the decision was taken to split the Victoria North site into a number of planning phases and therefore address the entire Victoria North site. In preparation for the phase 2 planning application, risks to human health and controlled waters associated only with the proposed planning phase 2 works have been assessed in a DQRA addendum [45] which has informed a remediation strategy for the planning phase 2 works produced by LK Group [10], followed by a planning phase 2 remedial implementation and verification plan (RIP - this document).

1.6 Relevant legislation and guidance

This remediation implementation and verification plan (RIP) has been written in general compliance with relevant legislation and guidance including the following:

- Part IIA of the Environment Protection Act, 1990 [11].
- The Contaminated Land (England) (Amendment) Regulations 2012 [12].
- Contaminated Land Statutory Guidance (DEFRA, April 2012) [13].
- BS10175: 2011 +A2:2017, Investigation of Potentially Contaminated Sites - Code of Practice [14].
- British Standards, BS 5930:2015. Code of practice for ground investigations [15].
- Land Contamination: Risk Management (LCRM) [15].
- CIRIA C665 Assessing risks posed by hazardous ground gases to buildings [17].
- BRE SD1 Concrete in aggressive ground [18].
- Environment Agency Technical Guidance WM3 Guidance on the Classification and Assessment of Waste [19].
- The Water Environment (Water Framework Directive) Regulations [20].
- CL:AIRE TB 19 Managing Risks and Liabilities associated with Per- and Polyfluoroalkyl Substances [21].
- CL:AIRE, Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies [22].
- Environment Agency, Identify and classify waste containing persistent organic pollutants [23].

1.7 Relevant parties

The principal organisations involved with delivering the redevelopment of the site and their roles are summarised below:

- Manchester City Council (MCC) – Employer and promoter of the site.
- Far East Consortium International (FEC) – landowner and developer.
- BAM Nuttall Ltd (BAM)– Principal Contractor and Principal Designer.
- Ove Arup and Partners Ltd (Arup) – Design consultant to BAM.
- LK Group Ltd (LK) – Design consultants to BAM.
- Turner & Townsend Ltd (T&T) – Employer's agent.
- Pell Frischman Ltd – Technical advisor and NEC site supervisor.

1.8 Early works

A number of preparatory activities have been undertaken on site ahead of the discharge of condition 7a for the planning phase 2 area. These early works activities have been limited to the following:

1. Removal of fly-tipped material from the surface of the site.
2. Treatment of invasive species by spraying. No excavation works have been undertaken as part of this treatment process.
3. Removal of selected trees in accordance with an agreed Tree Replacement, Ecology and Biodiversity Net Gain Mitigation Strategy for the entire Victoria North site [42]. This tree removal has not involved any disturbance of existing soils and currently, the base of the selected trees and the root balls await removal. a

1.9 Use of report and limitations

This report was prepared by Arup on behalf of BAM Nuttall Ltd. It takes into account our client's particular instructions and requirements. This report was not intended for, and should not be relied on by, any third party and no responsibility is undertaken to any third party in relation to it.

All reasonable skill, care and diligence have been exercised within the timescale available and in accordance with the technical requirements of the brief. Notwithstanding the efforts made by the professional team in preparing the report, it is possible that other ground contamination or ground conditions as yet undetected, may exist and consequently reliance on this report must be limited accordingly.

2. Summary of Remediation Strategy

2.1 The Site

The extent of the planning phase 2 infrastructure works is shown outlined in blue on **Figure 1**.

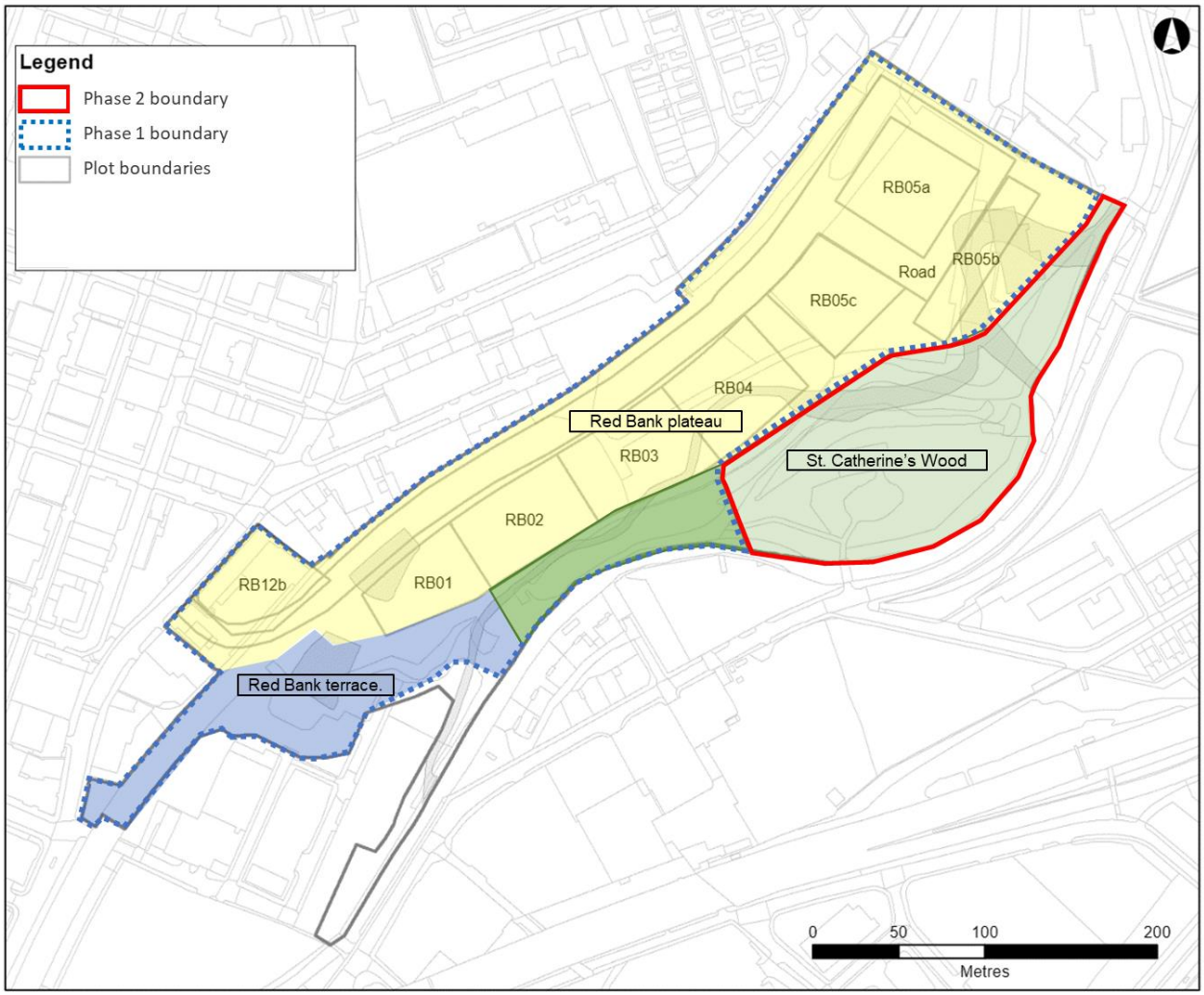


Figure 1: Victoria North phase 2, indicative planning boundary

For the purpose of this RIP, planning phase 2 has been divided into two areas (**Figure 2**):

- Area a: represents the majority of planning phase 2, which will deliver a programme of landscaping and an area of formal public open space. After localised regrading works to provide the required landform, the area will be planted and serviced by a series of footpaths which link to:
  - Adjacent parts of the Victoria North site.
  - Adjacent public highways and associated footpaths.
- Area b: consists of parts of the St. Catherine's Wood site that are characterised by existing trees and established habitats, with areas of steep existing gradients. Given the ecological value of these areas of established vegetation and habitat, disturbance of these areas is to be kept to a minimum throughout the proposed works.

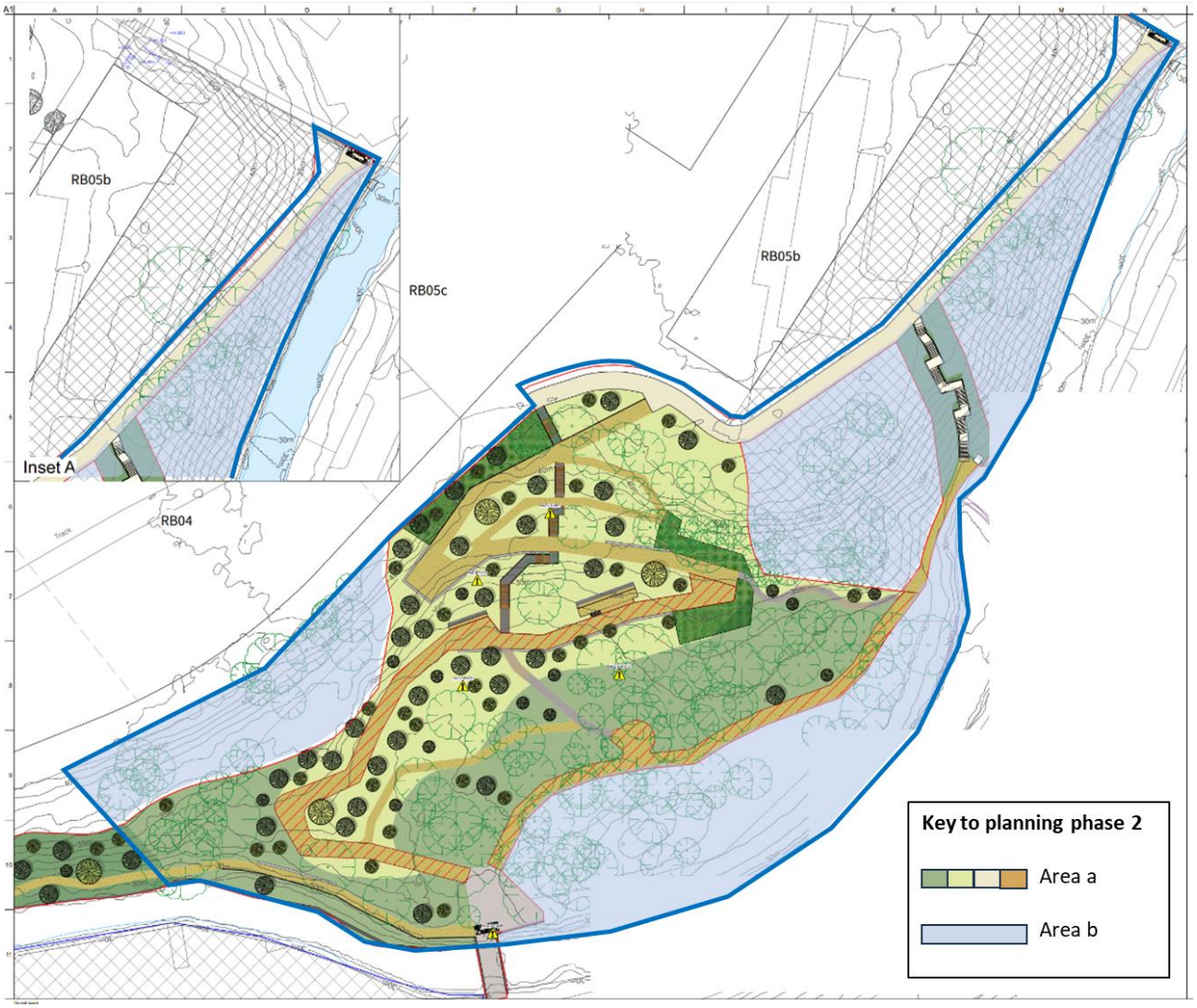


Figure 2: Phase 2 development proposals

2.2 Phase 2 contaminant linkages

The St. Catherine's Wood DQRA addendum [45] presents an assessment of the risks to controlled waters and human health associated with ground contamination associated with the planning phase 2 area of the Victoria North scheme. The DQRA addendum has identified no demonstrable contaminant linkages in the planning phase 2 area. On this basis, no requirements for specific and targeted remediation works are proposed as part of the planning phase 2 works.

Should contamination be identified during the phase 2 infrastructure works, that has not been identified by previous assessments, this will be managed under a contamination discovery strategy (**Section 4.11**).

Although the DQRA addendum did not identify the need for specific remedial measures, a number of precautionary measures are recommended to address potential human health risks and to safeguard controlled waters. These are discussed below. By undertaking the proposed development of planning phase 2 in accordance with this RIP, all relevant contaminant linkages will be broken and consequently, potential statutory environmental risks associated with the proposed planning phase 2 development will be addressed.

2.2.1 Area a

The DQRA addendum concluded that retention or re-use of existing made ground soils within Area a will introduce no new source-pathway-target linkages and will not therefore, present any additional controlled waters risks.

When compared with relevant generic assessment criteria for human health (public open space end-use), no elevated concentrations have been identified in Area a of the planning phase 2 site (see DQRA addendum [45]).

Any fill materials imported to the site, may introduce additional sources of contamination that may impact controlled waters and/or human health. These issues are addressed in **Section 6.5**

2.2.2 Area b

To preserve the existing trees and established habitats as fully as possible, no development works are proposed in Area b of the planning phase 2 site. The DQRA addendum concluded that the proposed retention of existing made ground soils within Area b will introduce no new source-pathway-target linkages and will not therefore, present any additional controlled waters risks.

2.3 Remediation objectives

The objectives of the planning phase 2 infrastructure works are to provide a site appropriate for the proposed development and in doing so, to mitigate statutory liabilities.

Works to address the relevant source-pathway-target linkages at the site will be undertaken in accordance with the DQRA Addendum and the LK Group remediation strategy [10], which can be summarised as follows:

a. Complete the formation of the proposed landform (Drg. VNIF-PLA-ZZ-YYY-DR-L-1002). Risks associated with any imported fill required for this landscaping (including clean cover soils – see b. below) will be controlled by applying import criteria that have been specifically derived for use in Area a, given its proximity to the River Irk [45] and will prevent the introduction of additional risks to controlled waters.
b. Provide suitable growing media for proposed planting. As detailed on Drgs. VNIF-PLA-ZZ-YYY-DR-L-1302, these clean soils will be either 100mm thick or 600mm thick, depending on the specific planting requirements within Area a, as determined in the landscape specification [39].

3. Proposed works

The proposed phase 2 works include two elements that are relevant for this remediation implementation and verification plan: site clearance and earthworks.

3.1 Site clearance

The site clearance works tasks (Section 5) are to:

- Removal of fly-tipped material from the surface of the site.
- Treatment of invasive species by spraying.
- Removal of selected trees in accordance with an agreed Tree Replacement, Ecology and Biodiversity Net Gain Mitigation Strategy for the entire Victoria North site [42].
- Mark out areas on site requiring ecological protection/tree protection in accordance with an agreed Tree Replacement, Ecology and Biodiversity Net Gain Mitigation Strategy.
- Decommissioning of existing borehole installations (Section 5.2).

Material produced during the site clearance works will be managed under a material management plan (MMP) following the CL:AIRE code of Practice (DoWCoP) with the aim of re-using materials on site wherever possible and minimising offsite disposal (**Section 4.10**).

3.2 Earthworks

Minor earthworks activities are required as part of the planning phase 2 works. These earthworks are required to re-grade part of the existing St. Catherine's Wood to facilitate the provision of pedestrian footpaths and cycleways between adjacent areas of Dantzic Street and the Red Bank plateau.

All soils excavated as part of the proposed planning phase 2 earthworks operations will be managed under a material management plan following the CL:AIRE code of practice (DoWCoP) with the aim of re-using materials within planning phase 2 where possible and minimising offsite disposal (**Section 4.10**). The suitability of materials for re-use in the remediation works will be assessed in accordance with the Victoria North HIF Infrastructure & Enabling Works, Specification for Highway Works – Civil Infrastructure (the specification) [24], as supplemented by the requirements of this RIP.

The only specific works required to address potential ground contamination issues within planning phase 2 are the control of imported fill (to protect controlled waters).

Appropriate records relating to the re-use of site won materials and the import of fill will be maintained during the works and provided in the verification report (**Section 7**).

4. Management and Regulatory Requirements

4.1 Project management

The planning phase 2 infrastructure works will be entirely carried out by BAM Nuttall Ltd (BAM). A project execution plan (PEP) has been prepared by BAM.[30] This PEP has been prepared in lieu of a construction environment management plan (CEMP). Specialist support services (e.g. in-situ and laboratory testing) will be subcontracted to specialist companies selected from BAM's approved supply chain.

BAM have appointed a project manager for the works. As detailed in the PEP, BAM will hold frequent project meetings with other members of the design team to ensure that the works are progressing in accordance with this remediation implementation and verification plan and that any deviations from the RIP that are required in response to unexpected site conditions, are identified and addressed promptly.

4.2 Sequence of works

As project managers, BAM have produced a programme of works [40] and will regularly monitor activities on site against this programme.

The anticipated sequence of activities is as follows:

1. Site clearance (Section 5).
2. Undertake required earthworks using either:
    a. Suitable site won material recovered from within Area a, that meets the geotechnical requirements of the Specification [24].
    b. Imported material from off- site (i.e. not imported from other parts of the Victoria North site), provided that it meets the requirements of the Specification and the relevant import criteria (**Table 2**).
3. Import of clean imported subsoil and topsoil to provide suitable growing media for proposed planting, (Area a only).
4. Provision of footpaths, retaining structures and other street furniture (Area a only).
5. Production of a remediation verification report (**Section 7**).

4.3 Contract

BAM have been appointed by Manchester City Council under an NEC 3 Option A contract.

4.4 Resources

BAM will provide and maintain adequate resources to complete the works within the agreed programme (as modified if necessary to reflect unexpected ground conditions that may be encountered during the works).

4.5 Health and safety and quality

Details of the proposed health and safety and quality management procedures that BAM will implement on site are provided in the project execution plan (PEP) [30].

Health and Safety will be managed in accordance with the current requirements of Construction, Design and Management (CDM) Regulations [25].

BAM operate a third-party accredited quality management system, in accordance with ISO 10005.

4.6 UXO risk management

The area surrounding the HIF Infrastructure site is known to have been a bombing target during the Second World War. During previous phases of ground investigation, specialist advice has been obtained to determine the risk from unexploded ordnance (UXO) at the site [41] and further specialist advice will be obtained for the HIF Infrastructure works by the contractor with appropriate measures incorporated into the health and safety risk assessment and methods statements adopted for the works.

4.7 Adjacent properties and boundary features

The proposed planning phase 2 infrastructure works will not have any potential impact on adjacent properties and therefore, no consultation with neighbouring landowners or associated approvals are considered necessary. No issues have been identified which will adversely impact existing boundary features.

4.8 Environmental protection

BAM's core delivery team on site have all undergone training under the Site Environmental Awareness Training Scheme (SEATS) and hold the relevant qualification [38]. As set out in the PEP, the HIF Infrastructure works will adopt a robust management structure which includes experienced environmental engineers who will have a thorough understanding of the specific environmental risks identified at the site.

BAM have produced the following management plans, technical notes and method statements required to support the remediation activities to be undertaken on site:

- A project execution plan (PEP)/construction environmental management plan (CEMP) [30], which includes:
  - A traffic management plan.
  - A spill response plan.
  - An environmental management plan.
  - A site waste management plan.
  - A noise and vibration monitoring plan.
- An asbestos management plan [31].
- A transport routes plan [32].
- A bulk earthworks activity plan [33].
- A stockpile management plan [34].
- A plan for managing surface water run-off and safeguarding the River Irk [35].

4.9 Environmental permitting

BAM have a mobile plant permit (MPP) for crushing operations [36] and will obtain approval to deploy this plant if required as part of the planning phase 2 works, together with all other necessary permits required.

4.10 Materials management

The re-use of excavated materials on-site and the removal/disposal of surplus/unsuitable materials undertaken as part of the planning phase 2 works will be managed in accordance with the specification [24].

The CL:AIRE definition of waste: code of practice (DoWCoP) [26] provides a voluntary framework by which suitable site won materials can be re-used without being considered unlawful deposit of waste. DoWCoP requires the preparation of a materials management plan (MMP) which specifies the materials that are proposed for use on site in accordance with a remediation strategy and/or remediation implementation and verification plan.

As required under DoWCoP, all materials that are excavated, treated, re-used and/or disposed of are to be tracked throughout the works and information maintained to provide a fully auditable record which demonstrates the ultimate fate of the material (**Section 4.12**).

An MMP verification report will be required on completion of the works (**Section 7**) to demonstrate that materials were used in accordance with the MMP.

The MMP will be reviewed by a Qualified Person (QP). Once satisfied with the MMP, the QP will issue an online declaration via the CL:AIRE website. Only material re-use is covered by DoWCoP and therefore activities including site set-up, site clearance, service removal and removal of existing hardstanding can proceed before approval of the MMP. Earthworks will only start after QP declaration.

4.11 Discovery strategy

A BAM geoenvironmental engineer will be present on site during the HIF Infrastructure works to assess any unexpected contamination or ground conditions. The BAM geoenvironmental engineer will be supported by Arup.

If unexpected contamination or ground conditions are encountered during the works, the suspect material will be left in-situ and works in the relevant part of the site will be suspended. If it is not possible to leave unexpected contaminated material in-situ, it will be wholly or partly transferred to a designated earthworks processing area (**Section 6.4**).

The resulting quarantined area and any associated material in the designated earthworks processing area will be managed in accordance with the following strategy:

- A suitably experienced geoenvironmental specialist will inspect the ground conditions (using a photo ionisation detector (PID) if appropriate) and direct a programme of investigation to determine the extent of the area of concern. It is likely that this will involve the recovery of suitable samples for laboratory analysis.
- If required the quarantined area and/or stockpiled material will be covered until associated risks are understood.
- The results of the geoenvironmental assessment together with laboratory analysis results will be used to determine relevant actions (**Section 6**).

4.12 Waste disposal

Disposal of surplus and/or unsuitable materials will be undertaken in full accordance with current waste management regulations and guidance [19], to allow waste classification and to confirm the most appropriate disposal route. All necessary testing and waste characterisation/classification will be undertaken before removal from site.

All materials removed from site will be accompanied by appropriate Consignment Note/Duty of Care paperwork, copies of which will be maintained and made available for inspection by appropriate third parties on request and will be included in the verification report (**Section 7**).

4.13 Record keeping

Comprehensive daily records will be kept by BAM throughout the phase 2 infrastructure works. The results of all in-situ testing, sampling and laboratory analysis will be collated on site as the works progress. The testing records will be made available for inspection by appropriate third parties on request.

The following records will be maintained as a minimum throughout works:

- Daily test and inspection records including daily notes, field tests and laboratory results.
- Records summarising imported fill (general fill, subsoil or topsoil).
- Records summarising earthworks and materials management operations, from which the fate of excavated materials can be determined.
- Duty of care paperwork for all material removed from site whether surplus or unsuitable. This shall indicate the weight of material transferred in each load, the relevant analysis and material descriptions, the details of the relevant waste holders and the destination of the wastes.
- All in-situ test results.
- The results of all laboratory analysis.

On completion of the works, all records will be presented in a remediation verification report (**Section 7**).

5. Site Clearance and Preliminaries

The required site clearance scope is outlined in Section 3.1.

5.1 Initial preparation

5.1.1 Site preparation tasks completed

A number of activities required to prepare the site for remediation and development have already been completed. These include:

- Asbestos surveys of the entire planning phase 2 area and removal of all identified asbestos containing material (ACM) in accordance with current legislation.
- Removal of flytipped material.
- Identification of routes of underground and/or overhead utilities and confirmation of their status (i.e. live or redundant). Disconnection and/or diversion of live underground and/or overhead utilities has been completed as necessary to enable earthworks, remediation and subsequent development activities to progress. Protection has also been provided to live utilities that remain within the site.

5.1.2 Welfare

A site compound has been established by BAM. This existing compound includes appropriate welfare facilities for the proposed works [30].

5.1.3 Security

BAM have already installed security fencing around the site perimeter to prevent unauthorised access.

5.1.4 Traffic management

All site access points are controlled by BAM. A traffic management plan has been prepared by BAM to control pedestrian, vehicle and plant movements within the site.

The traffic management plan is included in the project execution plan [30] and includes a works transport plan, identifies points of access for site deliveries with appropriate wheel washing/wheel cleaning facilities, identifies areas for vehicle and plant parking and provides protocols for plant refuelling and maintenance, all of which are located within the secure site perimeter. In addition, authorised routes for vehicle and pedestrian movement are indicated both in the traffic management plan and on site.

Plant refuelling and scheduled/routine vehicle maintenance will only be undertaken within the areas of the site designated for that purpose. These designated areas incorporate measures to protect against spills including hardstanding and emergency spill response equipment.

In cases of unscheduled plant breakdown on site, the spill response plan will be implemented as a contingency during repairs [30].

5.1.5 Areas of ecological protection

A Tree Replacement, Ecology and Biodiversity Net Gain Mitigation Strategy [42] was submitted as part of the relevant planning application for the phase 1 infrastructure works. A number of trees have been identified that require protection and these will be clearly identified on site. Issues associated with invasive species are outside the scope of this document and are addressed within the BAM invasive species management plan [43]. As necessary, BAM will establish protection zones for areas of existing habitat that are to be preserved, including trees.

5.2 Environmental monitoring

5.2.1 Scope

Environmental monitoring (noise and vibration monitoring) will be undertaken during the phase 2 infrastructure works in accordance with the requirements of relevant management plans (**Section 4.8**) and as required by the relevant mobile plant permit requirements (**Section 4.9**). For the specific requirements please refer to the relevant documents.

5.2.2 Existing monitoring installations

A range of monitoring installations are present within planning phase 2 from previous phases of ground investigation (Drg. VNIF-ARP-00-YYY-DR-CE-0008). None of these installations are required for ongoing monitoring and they are therefore to be decommissioned, along with any unrecorded boreholes and/or borehole installations encountered during the works.

Decommissioning shall be undertaken to prevent contamination of aquifers underlying the site and shall be carried out in accordance with current EA guidelines [28].

5.3 Surface hardstanding and near-surface structures

Known areas of surface hardstandings and surface obstruction within the site will be removed to the underside of the surface feature. A watching brief will be in place to identify any unexpected contamination exposed during these works (**Section 4.11**).

All masonry, concrete and other materials removed during these operations will be segregated for potential re-use in accordance with **Section 6.4** and the specification [24]. All materials that fail to meet the requirements of the specification or surplus materials will be removed off-site to a suitable recovery/disposal facility.

5.4 Buried utilities

Live services and utilities have been disconnected where possible. All remaining live utilities are clearly marked on site for their protection.

Any unrecorded redundant drainage infrastructure or other utilities encountered during the works will be decommissioned.

If redundant utilities are to be removed, they will undergo a controlled programme of emptying and cleaning prior to removal to prevent the risk of spillage. All fluids produced shall be managed in accordance with **Section 6.3**.

6. Earthworks

6.1 Introduction

The approach set out below is based on the methods adopted in planning phase 1, for which the relevant planning conditions (condition 7a) have been discharged.

6.2 Earthworks design

The earthworks scope is outlined in Section 3.2. The area of proposed earthworks within planning phase 2 is shown on drawing VNIF-PLA-ZZ-YYY-DR-L-1002. Excavated soils will be re-used under a material management plan following the CL:AIRE Definition of Waste code of practice with the aim of re-using materials on site and minimising offsite disposal (**Section 4.10**). All earthworks are to be undertaken in accordance with the specification [24] as supplemented by this RIP.

6.3 Groundwater management

It is not anticipated that groundwater will be encountered during earthworks. If groundwater is encountered during excavations, it will be managed by means of sump pumping. Either it will be discharged to sewer in accordance with the existing temporary discharge consent issued by United Utilities (**Section** Error! Reference source not found.) or will be removed from site by tanker for treatment/disposal.

6.4 Management of excavated materials

6.4.1 Stockpile management

Due to working space limitations within planning phase 2, any stockpiling of materials required to complete planning phase 2 will be undertaken within a dedicated earthworks processing area located in planning phase 1. A no-stockpile zone has been identified within the planning phase 1 area (Drg. VNIF-ARP-00-YYY-DR-CE-0011) to ensure that stockpiles of excavated or imported soils are located a suitable distance from the River Irk. This zone will be clearly identified on site.

Except for grossly contaminated material which is to be removed directly from site, excavated material will be managed by placing it to form a series of stable stockpiles which will be shaped and constructed so as to minimise rainfall infiltration. Stockpiled material will be segregated by type and source, with the source of each stockpile recorded.

The potential for nuisance associated with stockpiled material will be addressed by monitoring and if necessary, the adoption of suitable mitigation measures. As an additional measure to control dust and/or odour, stockpiles may also be provided with temporary cover.

To reflect the various scenarios that will occur during the remediation works, the following strategies are to be implemented for material management during the planning phase 2 works:

6.4.2 Material management strategy A

Material management strategy A was derived for the planning phase 1 works and is not relevant to planning phase 2, as no remedial excavations are necessary as part of the planning phase 2 works.

6.4.3 Material management strategy B

This strategy applies to suspected contaminated material, identified on the basis of the discovery strategy (**Section 4.11**). Suspected contaminated material may be left in-situ awaiting assessment or stockpiled in the planning phase 1 earthworks processing area, awaiting the results of laboratory analysis. Grossly contaminated material will be removed directly offsite.

Material transferred to an earthworks processing area will be segregated on the basis of source area and material type (i.e. cohesive or granular). This material will undergo appropriate testing to allow suitability for re-use to be determined in accordance with the requirements of the specification and this RIP. Sampling

frequencies to demonstrate suitability for re-use as required by the specification, are summarised in **Section 6.4.5**. The geochemical requirements of the specification are summarised in **Section 6.5**.

Material that fails to meet the requirements for re-use that are set out in the specification will be removed from site for treatment/disposal (**Section 4.12**). Material that meets the requirements for re-use will be retained on site and used in filling operations (**Section 6.5**).

6.4.4 Material management strategy C

This material is anticipated to be predominantly hard material removed as part of the early works (**Section 1.8**) that is proposed for re-use within the planning phase 2 works.

This material will be stockpiled in planning phase 1earthworks processing area and will be segregated by area and by material type. This material will undergo appropriate testing to allow suitability for re-use to be determined in accordance with the requirements of the specification and this RIP. Sampling frequencies to demonstrate suitability for re-use as required by the specification, are summarised in **Section 6.4.5**. The geochemical requirements of the specification are summarised in **Section 6.5**.

Material that fails to meet the requirements for re-use will be removed from site for treatment/disposal (**Section 4.12**). Material that meets the requirements for re-use will be retained on site and used in filling operations (**Section 6.5**).

6.4.5 Material management strategy D

This strategy is relevant to material to be moved within Area a as part of the landscaping works.

Given that material excavated under materials management strategy D will be typical of the made ground present across St. Catherine's Wood, it will not be necessary to stockpile excavated material in the designated earthworks processing area or for it to be screened against re-use criteria. This material will however, require appropriate geotechnical validation testing to allow suitability for re-use to be determined in accordance with the requirements of the specification [24].

6.4.6 Sampling frequencies

The required geotechnical and geochemical sampling and testing frequencies for material proposed for re-use within the site are given in Appendix 1/5 of the specification [24].

The specified geo-chemical sampling frequencies for site won material, as set out in specification are summarised as follows:

Objective	Sample/analysis frequency
Validation of general fill recovered for re-use within the site.	1 per 500m^3. Minimum of 3.
Validation of capping fill recovered for re-use within the site.	1 per 500m^3. Minimum of 3.
Validation of fill to structures recovered for re-use within the site.	1 per 500m^3. Minimum of 3.
Validation of imported topsoil and subsoil.	1 per 100m^3 for brownfield or unknown sources. 1 per 500m^3 for greenfield sources. With a minimum of 3 samples per source.

Table 1: Required sampling frequencies

6.5 General fill for use in planning phase 2 earthworks

Depending on the earthworks balance for the planning phase 2 works, any shortfall in site-won material may need to be made good by importing material from sources outside the Victoria North site. An assessment of all sites used for the supply of imported fill will be undertaken to determine site history and any implications this may have for the general suite of acceptability criteria proposed below.

Imported suitable general fill for the planning phase 2 works is to be handled, placed and compacted in accordance with the specification [24]. Suitability of material is to be determined on the basis of both the geotechnical criteria presented in the specification and the geo-environmental criteria presented in this RIP.

Suitability for use will be established by screening of imported fill materials against a range of determinands, as set out in **Table 2.** For contaminants of concern, that have been assessed by detailed quantitative risk assessment, [45] the relevant site-specific criteria are included in **Table 2.** For other determinands, generic assessment are proposed, based on residential end-use without private gardens, adjusted on the basis of professional judgment to ensure that potentially hazardous material is not imported to the site. The rationale used to select the proposed import criteria is set out in Appendix A. All imported general fill is to meet the acceptability criteria set out in **Table 2**.

Contaminant	Generic acceptability criteria (mg/kg)	RTM-calculated acceptability criteria (mg/kg)	RTM-calculated leachable acceptability criteria (mg/l)[5]
Antimony	500	-	-
Arsenic	40	-	-
Beryllium	1.7	-	-
Cadmium	85	-	-
Total chromium (including trivalent and hexavalent chromium)	6[4]	-	-
Copper	200	-	-
Lead	310	-	-
Mercury	10	-	-
Nickel	-	26.5[5]	0.05
Selenium	430	-	-
Vanadium	500	-	-
Zinc	-	191[5]	0.4
Cyanide	24	-	-
Cyanide (free)	24	-	-
Boron	500	-	-
Phenol (Monohydric)	50	-	-
Asbestos	No visible asbestos <0.01%	-	-
TPH C8-C35	-	1000[1,2]	-
TPH – Aromatic C8-C10	-	153[5]	1.64
TPH – Aromatic C10-C12	-	76[5]	0.53
TPH – Aromatic C12-C16	-	208[5]	0.72
TPH – Aromatic C16-C21	-	323[5]	0.35

Contaminant	Generic acceptability criteria (mg/kg)	RTM-calculated acceptability criteria (mg/kg)	RTM-calculated leachable acceptability criteria (mg/l)[5]
Acenaphthene	50	-	-
Dibenz-a-h-anthracene	0.32	-	-
Fluoranthene	-	0.04[5]	0.00003
Fluorene	50	-	-
Indeno(1,2,3-cd)pyrene	46	-	-
Phenanthrene	50	-	-
Pyrene	50	-	-
Naphthalene	13	-	-
Acenaphthylene	50	-	-
Anthracene	-	0.15[5]	0.0005
Benzo(a)anthracene	15	-	-
Benzo (g,h,i) perylene	50	-	-
Benzo(a)pyrene	-	0.4[5]	0.00006
Benzo(b)fluoranthene	4.1	-	-
Benzo(k)fluoranthene	50	-	-
Chrysene	32	-	-

Notes

1. RTM-calculated remediation criteria for several of the TPH fractions are far in exceedance of any soil concentrations. Any soils exceeding these criteria would be visibly grossly contaminated. Therefore, it was considered appropriate to set a soil remediation target for TPH C8-C35.
2. If exceedance is noted, the risk-derived criteria for individual carbon bands detailed in this table shall be applied.
3. Not used.
4. If total chromium exceeds 6mg/kg, the results will be assessed further to identify the nature and hazard associated with the presence of chromium in the relevant samples.
5. Routine leachability testing is not required. Leachability testing will be undertaken only if solid analysis concentrations exceed the RTM calculated acceptability criteria. The results of leachability testing will be compared with the RTM-calculated leachable acceptability criteria specified.
6. Visibly contaminated or odorous material must not be imported to site.

Table 2: Criteria for imported general fill used in planning phase 2.

6.6 Subsoil and topsoil requirements

An assessment of all sites used for the supply of imported subsoil and topsoil will be undertaken to determine site history and any implications this may have for the general suite of acceptability criteria proposed below.

Imported, sub-soil and topsoil required for the delivery of the landscaping works undertaken within planning phase 2 is to be handled and placed in accordance with the relevant sections of the specification [24], the landscape architects specification [39] and the requirements of this RIP. Imported topsoil and subsoil shall meet the acceptability criteria set out in **Table 2** together with the requirements of the relevant British Standards (BS BS3882:2015, BS8601:2013). The rationale used to select the proposed import criteria is set out in Appendix A. Sampling of topsoil and subsoil for chemical validation will be undertaken in accordance with the requirements of the specification [24]:

- 1 per 100m^3 for brownfield or unknown sources.
- 1 per 500m^3 for greenfield sources.

With a minimum of 3 samples per source.

7. Verification Plan

7.1 Scope of verification report

On completion of the planning phase 2 works, BAM will be responsible for producing a completion verification report for all the works discussed in this remediation implementation and verification plan. This verification report will include a description of final site conditions, to demonstrate that the site does not pose unacceptable risks to controlled waters, human health or other receptors in its post-remediation state.

The verification report will be submitted to the client, the local planning authority and the Environment Agency for approval. It is anticipated it will address both the verification requirements for the DoWCoP materials management plan and planning condition 7b (**Section 1.2**).

The verification report will document the source of materials used within the site, any processing or treatment undertaken to render them suitable for use and indicate the areas where material types have been deposited.

The verification report will identify any deviations from the remediation implementation and verification plan that were required on site during the works and any measures taken to address unexpected contamination.

7.2 Content of the verification report

The verification report will include the following:

- A description of the works.
- A comprehensive photographic record of the works.
- Locations of monitoring infrastructure that was decommissioned during the works.
- As-built drawings, which demonstrate:
  - Areas of ecological protection.
  - Existing utilities.
  - Utility diversions.
  - Redundant utilities abandoned by grouting.
  - Obstructions not removed during the works.
  - Finished ground levels.
  - Areas of cut and fill.
  - Cut and fill isopachytes.
  - Locations of in-situ geotechnical testing.
  - Locations of samples taken for laboratory geotechnical testing.
  - Locations of verification sampling.
  - Locations of hardstanding/paving installed.
  - Locations and thickness of clean cover soils placed.
  - Location of hydroseeded areas.
  - Locations and descriptions of other measures used to address relevant contamination linkages.
- Records of test results, including:
  - In-situ geotechnical tests.
  - Laboratory geotechnical tests.
  - Laboratory analysis results.
- A summary of the volumes of material imported, excavated, processed and screened.
- A demonstration that all fill materials have been managed in accordance with the RIP.
- A demonstration that the number and type of samples undertaken during the works has been in accordance with the RIP.
- A demonstration that the testing and analysis undertaken during the works has been in accordance with requirements of both the RIP and the specification.
- Records of quantity and fill classes re-used and where each were placed.
- Comparison of geochemical verification testing with verification targets.
- Comparison of geotechnical testing with speciation requirements.

- Copies of any correspondence with regulators.
- A copy of the CL:AIRE MMP qualified persons' declaration.
- A copy of the MMP verification report.
- Records of unexpected contamination encountered and the results of investigation, assessment and remediation.
- Environmental monitoring data (e.g. asbestos fibre monitoring, noise, odour, etc.).
- Records of disposal of perched water and any groundwater including volumes and test results

A CDM Health and Safety File will also be produced by BAM on completion of the works. The verification report and an updated utility tracker will form part of that file.

References

[1] Arup (2022) Ground Investigation Report VNIF-ARP-XX-XXX-RP-CG-0012, November 2023.

[2] Arup (2022) Preliminary GIR Report VNIF-ARP-XX-XXX-RP-CG-0007, January 2022

[3] AEG (2019) Northern Gateway Final Factual Report. Ref. NW1580, March 2019

[4] AEG (2021) Northern Gateway Phase 2 Final Factual Report. Ref. NW1604, October 2021

[5] BAM Ritchies (2022) Victoria North HIF Infrastructure & Enabling Works – Phase 3 GI. Ground Investigation Report – Factual Account. Project Reference: BAX.326R. October 2022

[6] Arup (2022) Controlled Waters Detailed Quantitative Risk Assessment VNIF-ARP-ZZ-YYY-RP-CG-0011, November 2022.

[7] Arup (2023) Conceptual Site Model and Ground Investigation Rationale VNIF-ARP-ZZ-YYY-RP-CG-0013 P02, March 2023.

[8] Arup (2023) Controlled Waters Detailed Quantitative Risk Assessment VNIF-ARP-ZZ-YYY-RP-CG-1000, 21 August 2023.

[9] Arup (2023) PFAS Human Health Risk Assessment VNIF-ARP-ZZ-YYY-RP-CG-0014, June 2023.

[10] LK Group Ltd. (2024), St Catherines Wood, Phase 2 Victoria North Remediation Strategy, Ref LKC 22 1587, May 2023.

[11] https://www.legislation.gov.uk/ukpga/1990/43/part/IIA, accessed 28 September 2023.

[12] https://www.legislation.gov.uk/uksi/2012/263/made#:~:text=The%20Contaminated%20Land%20(England)%20(Amendment)%20Regulations%202012,-Made&text=The%20Secretary%20of%20State%20makes,Protection%20Act%201990(1), accessed 28 September 2023.

[13] https://www.gov.uk/government/publications/contaminated-land-statutory-guidance accessed 28 September 2023.

[14] BS 10175 (2011+A2:2017) Investigation of potentially contaminated sites. Code of practice.

[15] British Standards (2015), BS 5930. Code of practice for ground investigations

[16] https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm, accessed 28 September 2023.

[17] Construction Industry Research and Information Association (2007) Report C665 Assessing risks posed by hazardous ground gases to buildings.

[18] BRE, 2005. Special Digest 1:2005, Concrete in aggressive ground. Third Edition.

[19] Environment Agency, 2015. Technical Guidance WM3 Guidance on the Classification and Assessment of Waste. https://www.gov.uk/government/publications/waste-classification-technical-guidance, accessed 28 September 2023.

[20] UKSI (2017) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, https://www.legislation.gov.uk/uksi/2017/407/contents/made, accessed 28 September 2023.

[21] CL:AIRE (2019) TB 19 “Managing Risks and Liabilities associated with Per- and Polyfluoroalkyl Substances (PFASs)”

[22] CL:AIRE (2017). Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies. CL:AIRE, London

[23] Environment Agency (2022) Identify and classify waste containing persistent organic pollutants (POPs) https://www.gov.uk/guidance/identify-and-classify-waste-containing-persistent-organic-pollutants-pops, accessed 28 September 2023.

[24] Arup (2023) Victoria North HIF Infrastructure & Enabling Works, Specification for Highway Works – Civil Infrastructure, VNIF-ARP-ZZ-YYY-SP-C-001, November 2022.

[25] HSE (2015) The Construction (Design and Management) Regulations 2015 https://www.hse.gov.uk/construction/cdm/2015/index.htm, accessed 28 September 2023.

[26] CL:AIRE (2011) Definition of Waste: Code of Practice https://www.claire.co.uk/projects-and-initiatives/dow-cop, accessed 28 September 2023.

[27] HSE (2012) Control of Asbestos Regulations.

[28] Environment Agency (1996). “Decommissioning Redundant Boreholes and Wells”. National Groundwater and Contaminated Land Centre.

[29] CIRIA C665, Assessing risks posed by hazardous ground gases to buildings, dated 2007.

[30] BAM Nuttall Ltd. (2022) MT19:Project Execution Plan, VNIF-BNL-ZZ-YYY-MA-W-0001.

[31] LK Group (2023) Victoria North Infrastructure Works, Asbestos Management Plan

[32] BAM Nuttall Ltd. (2023). Works Transport Plan, VNIF-BNL-ZZ-YYY-FM-CG-0001

[33] BAM Nuttall Ltd. (2023). Activity plan: Bulk earthworks

[34] BAM Nuttall Ltd. (2023). Activity plan: Stockpile management plan

[35] BAM Nuttall Ltd. (2023). Site Water Management Plan, VNIF-BNL-ZZ-YYY-RP-CD-0001.

[36] Preston City Council (2022) Permit reference PCC110/2022.

[37] SRL (2023) Air quality and dust management plan, ref 80823-SRL-RP-YQ-01-S2-P2.

[38] https://www.csttraining.co.uk/seats/?utm_term=site%20environmental%20awareness%20training%20scheme&utm_source=adwords&utm_medium=ppc&utm_campaign=CITB+Seats+Course&hsa_cam=19484790934&hsa_grp=148801621670&hsa_mt=e&hsa_src=g&hsa_ad=643928909936&hsa_acc=3319471715&hsa_net=adwords&hsa_kw=site%20environmental%20awareness%20training%20scheme&hsa_tgt=kwd-313167198465&hsa_ver=3&gad_source=1&gclid=EAIaIQobChMIorK6u4nrgQMVA_DtCh1MsgejEAAYASAAEgJrr_D_BwE accessed 10 Oct 2023

[39] Planit (2024) Landscape NBS Specification, VNIF-PLA-ZZ-YYY-SP-L-0001CO2, 30th April 2024.

[40] BAM Nuttall Ltd. (2023). VNIF-BNL-ZZ-YYY-PR-WP-0134.

[41] Zetica (2018) Northern Gateway, Manchester, UXO Desk Study and Risk Assessment, ref P8135-18-R1.

[42] Avison Young (2022) Tree Replacement, Ecology and Biodiversity Net Gain Mitigation Strategy.

[43] BAM Nuttall Ltd. (2023), Invasive Species Management Plan, VNIF-BNL-ZZ-YYY-MS-W-0003.

[44] Arup (2023), Victoria North HIF Infrastructure Works – Phase 1, Remediation Implementation and Verification Plan, VNIF-ARP-ZZ-YYY-RP-CG-0017, 27th October 2023.

[45] Arup (2024), Victoria North: Phase 2 – St. Catherine's Wood, DQRA Addendum, VNIF-ARP-ZZ-YYY-RP-CG-0019, 3rd May 2024.

Appendix A

Rationale behind selection of soil import criteria

Rationale behind selection of soil import criteria - St. Catherine's Wood

The residential without plant uptake GACs have been used as basic import criteria for soils to be placed within the POS at St Catherine's Wood. This is because the GAC for POS are generally very high values, and import of material at those values could allow the import of hazardous waste/contaminated soils. Some of the residential GACs however, are also very high numbers that would potentially permit the import of contaminated materials. In these cases, professional judgement has been applied to moderate the higher GAC numbers to concentrations that would be more typical of uncontaminated made ground. Contaminated soils should not be imported to site.

Some of the contaminants have RTM values, which take precedence over the human health GAC as they are lower. It is important to protect the quality of controlled waters within St Catherines Wood as it is next to the River Irk.

The import criteria for copper is based on the British Standards for topsoil and subsoil.

For TPH, only the aromatic RTM targets are quoted in the table below. Note that the DQRA assessed both aliphatic and aromatic TPH fractions, and came up with criteria for both that are protective of controlled waters. However, the aliphatic fraction criteria were generally very large (>1000mg/kg) so a simplified approach is taken here, where an overall threshold of 1000mg/kg TPH and if this is exceeded, some of the lower aromatic TPH fractions are checked against the RTM targets to ensure there is no risk to controlled waters.

The criteria chosen for imported material to St Catherine's Wood are as follows:

Contaminant	Generic acceptability criteria (mg/kg)	RTM-calculated acceptability criteria (mg/kg)	RTM-calculated leachable acceptability criteria (mg/l)[5]	Rationale
Antimony	500	-	-	Residential without plant uptake GAC is 618mg/kg. Rounded to 500mg/kg.
Arsenic	40	-	-	Residential w/o plant uptake GAC
Beryllium	1.7	-	-	Residential w/o plant uptake GAC
Cadmium	85	-	-	Residential w/o plant uptake GAC
Total chromium (including trivalent and hexavalent chromium)[4]	6	-	-	Residential w/o plant uptake GAC for hexavalent chromium. Used to assess total chromium, with the requirement that if total Cr exceeds 6mg/kg, it will trigger a need for more testing to determine the species of Cr present.
Copper	200	-	-	Residential w/o plant uptake GAC is 7130mg/kg. 200mg/kg is based on the British Standard requirement for topsoil and subsoil, which will be protective of health and planting.

Contaminant	Generic acceptability criteria (mg/kg)	RTM-calculated acceptability criteria (mg/kg)	RTM-calculated leachable acceptability criteria (mg/l)[5]	Rationale
Lead	310	-	-	Residential w/o plant uptake GAC
Mercury	10	-	-	Residential w/o plant uptake GAC is 56mg/kg. This has been reduced to 10mg/kg, based on professional judgement. Soils containing 50mg/kg mercury are likely to indicate a contaminated source.
Nickel	-	26.5[5]	0.05	Residential w/o plant uptake GAC is 181mg/kg. The RTM value is lower, so is used as the import criteria for Ni.
Selenium	430	-	-	Residential w/o plant uptake GAC
Vanadium	500	-	-	Residential w/o plant uptake GAC is 1200mg/kg. Reduced to 500mg/kg soil containing 1200mg/kg Vn likely to indicate a contaminated source.
Zinc	-	191[5]	0.4	Resi w/o plant uptake GAC is 40,000mg/kg. RTM is lower, so used as the import criteria for Zn.
Cyanide	24	-	-	Residential w/o plant uptake GAC
Cyanide (free)	24	-	-	Residential w/o plant uptake GAC
Boron	500	-	-	Residential w/o plant uptake GAC for Boron is 10,775mg/kg. Reduced to 500mg/kg as soils with >10,000mg/kg boron likely to indicate a contaminated source.
Phenol (Monohydric)	50	-	-	Residential w/o plant uptake GAC is 1200mg/kg. Reduced to 50mg/kg as import of materials containing >1000mg/kg phenol likely to indicate contaminated source. Phenol is not usually present >50mg/kg in made ground soils.
Asbestos	No visible asbestos <0.01%	-	-	No GAC available. Based on professional judgement.
TPH C8-C35	-	1000[1,2]	-	Agreed with EA as threshold for TPH. If exceeded, triggers the need to check speciated TPH against individual criteria

Contaminant	Generic acceptability criteria (mg/kg)	RTM-calculated acceptability criteria (mg/kg)	RTM-calculated leachable acceptability criteria (mg/l)[5]	Rationale
TPH – Aromatic C8-C10	-	153[5]	1.64	Residential w/o plant uptake GAC is 269mg/kg. RTM value is lower, so adopted for import criteria.
TPH – Aromatic C10-C12	-	76[5]	0.53	Residential w/o plant uptake GAC is 1240mg/kg. RTM value is lower, so adopted for import criteria.
TPH – Aromatic C12-C16	-	208[5]	0.72	Residential w/o plant uptake GAC is 2480mg/kg. RTM value is lower, so adopted for import criteria.
TPH – Aromatic C16-C21	-	323[5]	0.35	Residential w/o plant uptake GAC is 1817mg/kg. RTM value is lower, so adopted for import criteria.
Acenaphthene	50	-	-	Residential w/o plant uptake GAC is 336mg/kg. Reduced based on professional judgement as concentrations of 300mg/kg would indicate contamination of source.
Dibenz-a-h-anthracene	0.32	-	-	Residential w/o plant uptake GAC
Fluoranthene	-	0.04[5]	0.00003	Residential w/o plant uptake GAC is 1580mg/kg. RTM value is lower, so adopted for import criteria.
Fluorene	50	-	-	Residential w/o plant uptake GAC is 183mg/kg. Reduced to 50mg/kg as >100mg/kg would indicate contaminated source.
Indeno(1,2,3-cd)pyrene	46	-	-	Residential w/o plant uptake GAC
Phenanthrene	50	-	-	Residential w/o plant uptake GAC is 1520mg/kg. Reduced to 50mg/kg as GAC would indicate contaminated source and likely be hazardous waste.
Pyrene	50	-	-	Residential w/o plant uptake GAC is 3790mg/kg. Reduced to 50mg/kg as GAC would indicate contaminated source and likely be hazardous waste.
Naphthalene	13	-	-	Residential w/o plant uptake GAC
Acenaphthylene	50	-	-	Residential w/o plant uptake GAC is 506mg/kg. Reduced to

Contaminant	Generic acceptability criteria (mg/kg)	RTM-calculated acceptability criteria (mg/kg)	RTM-calculated leachable acceptability criteria (mg/l)[5]	Rationale
				50mg/kg as GAC would indicate contaminated source.
Anthracene	-	0.15[5]	0.0005	Residential w/o plant uptake GAC is 36,600mg/kg. RTM value is lower, so used as import criteria.
Benzo(a)anthracene	15	-	-	Residential w/o plant uptake GAC
Benzo (g,h,i) perylene	50	-	-	Residential w/o plant uptake GAC is 359mg/kg. Reduced to 50mg/kg as GAC would indicate contaminated source.
Benzo(a)pyrene	-	0.4[5]	0.00006	Residential w/o plant uptake GAC is 3.2mg/kg. RTM value is lower, so used as import criteria
Benzo(b)fluoranthene	4.1	-	-	Residential w/o plant uptake GAC
Benzo(k)fluoranthene	50	-	-	Residential w/o plant uptake GAC is 107mg/kg. Reduced to 50mg/kg as GAC could indicate contaminated source.
Chrysene	32	-	-	Residential w/o plant uptake GAC

Notes

1. RTM-calculated remediation criteria for several of the TPH fractions are far in exceedance of any soil concentrations. Any soils exceeding these criteria would be visibly grossly contaminated. Therefore, it was considered appropriate to set a soil remediation target for TPH C8-C35.

2. If exceedance is noted, the risk-derived criteria for individual carbon bands detailed in this table shall be applied.

3. Not used.

4. If total chromium exceeds 6mg/kg, the results will be assessed further to identify the nature and hazard associated with the presence of chromium in the relevant samples.

5. Routine leachability testing is not required. Leachability testing will be undertaken only if solid analysis concentrations exceed the RTM calculated acceptability criteria. The results of leachability testing will be compared with the RTM-calculated leachable acceptability criteria specified.

6. Visibly contaminated or odorous material must not be imported to site.