
Project:	Huddersfield Royal Infirmary New Accident & Emergency Department		
Our reference:	100102983	Your reference:	2021/62/92488/W
Prepared by:	S Blackman BSc, MSc, C.WEM Principal Contaminated Land Consultant	Date:	07/10/21
Approved by:	Yasmeen Harrison Associate	Checked by:	D Giordanelli BSc, MSc, CEnv, MIEnvSc, SiLC Associate
Subject:	Huddersfield Royal Infirmary: Remediation Strategy Technical Note		

1 Introduction

A planning application (reference 2021/62/92488/W) was submitted to Kirklees Council for the redevelopment of Huddersfield Royal Infirmary, involving the construction of a new Accident and Emergency department (A&E) with associated vehicular access, car and cycle parking spaces, plant and landscaping.

1.1 The proposed development

The proposed new A&E comprises a single storey building and plant room located on the site of the existing nurses' accommodation. In order to construct the building, it is proposed to demolish the accommodation and excavate the top 0.3m to 1m of Made Ground to expose the underlying natural clay soils. From this level additional ground of varying depths will be excavated to expose underlying rock which will then be mass filled with concrete, with engineering fill to the underside of the new ground slab.

In areas of car parking, excavations will be shallower (approximately 0.2m depth), exposing the existing sub-base and then reinstating with new macadam surface. A thin strip of the existing planted area along the southern and western boundaries will be retained. Additional planted area in the south east of the new building will be constructed in tree pits.

1.2 Summary of previous risk assessments

A desk study¹ for the site was conducted by Mott MacDonald which identified potentially contaminative uses on and adjacent to the site which could impact the development and the environment. Intrusive investigation with associated geo-environmental sampling was recommended.

Following investigation works, undertaken 9-12 November 2020, a quantitative risk assessment report² was prepared by Mott MacDonald. This following the procedures in Land Contamination Risk Management (LCRM, Environment Agency 2021), including an update to the conceptual site model (CSM) and a generic

¹ Mott MacDonald (2020) Geo-Environmental and Geotechnical Desk Study, reference:416955|001|P01.

² Mott MacDonald (2021) Land contamination - generic quantitative risk assessment, reference HG0052-MMD-ED-XX-RP-C-000001 P02.

quantitative risk assessment (GQRA) undertaken for the site based on sample data collected during the intrusive investigation. The report concluded:

- Ground conditions were as anticipated based on the published geological maps; comprising the Carboniferous Soft Bed Flags. A thin cover of Made Ground was recorded across the site which typically extended to between 0.2m and 1.1m depth although reached 1.7m at its maximum thickness.
- Of 18 soil samples analysed, only one soil sample (MMBH101 at 0.5m) recorded organic contaminants above the commercial screening value (6.6mg/kg of dibenz-a-h-anthracene in comparison with a GAC of 3.6mg/kg). Dibenz-a-h-anthracene is not regarded as volatile (ie would only pose a risk through ingestion, dermal contact and dust inhalation) and the location was under the proposed building. No other organic contaminants were recorded against either screening value. No inorganic contaminants were found to be elevated above the chosen generic screening values. On the basis that potential contact with soils on the finished development would be limited to contact with the proposed soft landscaping at the southern and western boundaries of the site, it was concluded that risks to human health were low.
- For groundwater, whilst some exceedances of the respective screening values were identified, the concentrations of inorganic contaminants recorded may be regarded as low, and, with the possible exception of mercury, are likely to represent natural background conditions in the aquifer rather than indicating sources of contamination beneath the site. No organic contamination was recorded in groundwater. It was concluded that that risk to groundwater is low.
- Monitored ground gas levels were generally very low and no significant flow rates were recorded. Significant land gas sources are also absent at the site. No specific precautions were judged to be required in respect of ground gas ingress into the proposed building.
- Waste soil materials would predominantly be classified as non-hazardous, with one hotspot being classified as hazardous due to high TPH concentration which resulted in hazard properties (HP) 3(i) (flammability), HP7 (carcinogenic) and HP11 (mutagenic) being applied.

Overall risks to all receptors were considered to be low to very low. With the exception of some additional topsoil testing along the retained soft landscaping boundaries, no further ground investigation was considered to be necessary given the desk study information, the ground conditions encountered during the recent GI, and the nature of the proposed development. No remediation was proposed.

1.3 Regulatory review and comment

Comments from the Environmental Health Team at Kirklees Council were submitted to the Planning Team in response to a consultation request on the information submitted supporting the application. In summary, the Environmental Health Team concluded: *“the contaminated land reports provide are considered satisfactory. We now expect a remediation report to be provided, that must include details of the additional sampling for the existing shallow topsoil, the clean cover proposals for the soft-landscaping area and the imported soil assessment criteria. Contaminated land conditions are therefore necessary.”*

Based on this recommendation, three conditions were placed on the application:

- **Condition 3: Submission of Remediation Strategy -**
Prior to development commencing, a Remediation Strategy by a suitably competent person shall be submitted to, and approved in writing by, the Local Planning Authority. The Remediation Strategy shall include a timetable for the implementation and completion of the approved remediation measures.
- **Condition 4: Implementation of the Remediation Strategy -**
Remediation of the site shall be carried out and completed in accordance with the Remediation Strategy approved pursuant to Condition 3. In the event that remediation is unable to proceed in accordance with the approved Remediation Strategy or contamination not previously considered in either the Preliminary Risk Assessment or the Phase II Intrusive Site Investigation Report is identified or encountered on site, all groundworks in the affected area (except for site investigation works) shall cease immediately and the Local Planning Authority shall be notified in writing within 2 working days. Works shall not recommence until proposed revisions to the Remediation Strategy have been submitted to and approved in writing by

the Local Planning Authority. Remediation of the site shall thereafter be carried out in accordance with the approved revised Remediation Strategy.

- **Condition 5: Submission of a Validation Report**

Following completion of any measures identified in the approved Remediation Strategy or any approved revised Remediation Strategy a Validation Report shall be submitted to the Local Planning Authority. No part of the site shall be brought into use until such time as the remediation measures have been completed for the site in accordance with the approved Remediation Strategy or the approved revised Remediation Strategy and a Validation Report in respect of those remediation measures has been approved in writing by the Local Planning Authority. Where validation has been submitted and approved in stages for different areas of the whole site, a Final Validation Summary Report shall be submitted to and approved in writing by the Local Planning Authority.

1.4 Aim of this note

This note aims to satisfy the requirements of condition 3 to submit a remediation strategy, in order to allow the pre-commencement condition for the development to be lifted.

2 Remediation proposals

2.1 Scope of remediation

Based on the GQRA, risks to human health from ground gas and risks to groundwater were considered to be very low and low respectively. Consequently, no further groundwater testing is considered to be needed, and no further ground gas monitoring or protection measures are required for the buildings. Remediation proposals are limited to ensuring there is not a viable contaminant linkage from any contamination in the soils of the soft-landscaping areas to future site users. A remediation options appraisal in accordance with LCRM is therefore not required.

2.2 Undertaking the remediation

To break any potentially active contaminant linkages, the following actions will be undertaken.

Additional testing of soils in the area of the soft-landscaping will be undertaken to identify the suitability of the existing soils. A total of five samples will be collected from the existing topsoil that is proposed to be retained on the site (equating to a sampling rate of 1 sample at 30m intervals of landscaping), and sent to an MECRTS/UKAS accredited laboratory for analysis. Samples will be collected in accordance with BS10175³ and BS 5930⁴ to ensure sufficient quality to inform the requirement for remediation to be undertaken. Proposed sample locations are shown on the plan in Appendix A.

Samples will be tested for the following solid suites of contaminants (based on the potential contaminants of concern highlighted by the desk study and detectable results of the previous sample analysis): common heavy metals and semi-metals, sulphate, hexavalent chromium, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), speciated phenols, pH, fraction of organic carbon, asbestos screen and identification.

The results of the sample analysis will be compared to current generic assessment criteria (GAC) for a commercial/industrial land use⁵ and a soil organic matter (SOM) content of 2.5% (based on average SOM

³ BS10175:2011+A2:2017 "Investigation of potentially contaminated sites: Code of practice"

⁴ BS 5930:2015 "Code of practice for site investigations"

⁵ There are no published generic assessment criteria directly applicable to a hospital land use scenario. Commercial/light industrial land use are the closest in terms of building design and amount of soft landscaped amenity space. This assumes the critical receptor is a full-time adult employee. The modelling assumptions in the derivation of the generic assessment criteria acknowledge that young children and adults are likely to be present together. However, in many workplaces children are permitted and where they are regular visitors (such as shops or leisure facilities), both duration and frequency of exposure are likely to be much lower compared to a full time employee. GAC for commercial land use scenario are considered suitably protective and will therefore be used to screen the results of the soils chemical analysis.

content identified during previous site sampling, with consideration that this is a conservative value for topsoil which is likely to contain more organic matter). The adopted guideline values are the LQM/CIEH Suitable for Use Levels (S4ULs) for Human Health Risk Assessment. Where S4ULs are not available, DEFRA Category 4 Screening Levels (C4SLs) or CL:AIRE guidance values will be used. These limiting criteria are summarised in Table 2-1.

Table 2-1: Soil contamination limiting criteria for human health

Parameter	Limiting criteria (mg/kg)	Parameter	Limiting criteria (mg/kg)
Inorganic parameters			
pH	6-9	Sulphate as SO ₄	N/A
Fraction of organic carbon	N/A	Asbestos	None detected
Heavy metals and semi-metals			
Arsenic	640	Lead	2,300
Barium	22,000	Mercury	33
Beryllium	12	Molybdenum	18,000
Boron	240,000	Nickel	980
Cadmium	190	Selenium	12,000
Chromium III	8,600	Vanadium	9,000
Chromium VI	33	Zinc	730,000
Copper	68,000		
TPH			
Aliphatic >C5-C6	5,900	Aromatic >C5-C7	46,000
Aliphatic >C6-C8	17,000	Aromatic >C7-C8	110,000
Aliphatic >C8-C10	4,800	Aromatic >C8-C10	8,100
Aliphatic >C10-C12	23,000	Aromatic >C10-C12	28,000
Aliphatic >C12-C16	82,000	Aromatic >C12-C16	37,000
Aliphatic >C16-C35	1,700,000	Aromatic >C16-C21	28,000
		Aromatic >C21-C35	28,000
Naphthalene	460	Benzo[a]anthracene	170
Acenaphthylene	97,000	Chrysene	350
Acenaphthene	97,000	Benzo[b]fluoranthene	44
Fluorene	68,000	Benzo[k]fluoranthene	1,200
Phenanthrene	22,000	Benzo[a]pyrene	35
Anthracene	540,000	Indeno(1,2,3-c,d)Pyrene	510
Fluoranthene	23,000	Dibenz(a,h)anthracene	3.6
Pyrene	54,000	Benzo[g,h,i]perylene	4,000
Phenols			
Phenol	690	2,4-Dimethylphenol	24,000
Chlorophenols	4000	Total Cresols	180,000
Pentachlorophenol	400		

Based upon the assessment criteria, a soil can be classified as acceptable for re-use on the site where the criteria for individual chemicals are not exceeded. In this situation, the soils may all remain in the soft-landscaping area of the proposed development. No further action is required other than recording and presenting this in the validation report at the end of the project.

Where any of the criteria are exceeded, the soils may be regarded as unsuitable and should either be removed from site or should be isolated beneath a cover of suitable soils. Where site conditions allow, the

uppermost 300mm should be removed and replaced with suitable soils. It is noted that the boundary comprises existing mature vegetation and the advice of a horticulturalist or arboriculturist should be sought with respect to root protection. Where excavation to 300mm is considered detrimental to planting then a reduced cover of 150mm of soils underlain by a geotextile is advised.

It is noted that the light industrial commercial screening values given in Table 2-1 allow for some relatively high levels of certain hydrocarbons and phytotoxic metals which may not be suitable for plant growth. Any topsoil for planting should also comply with BS3882⁶ and the notes below relating to visual and olfactory evidence of contamination.

Phytotoxic elements copper, nickel and zinc from BS3882 are provided in Table 2-2.

Table 2-2: Maximum phytotoxic metals from BS3882

Element	Soil pH <6	Soil pH 6 to 7	Soil pH >7
Zinc	<200	<200	<300
Copper	<100	<135	<200
Nickel	<60	<75	<110

Notes: all value in mg/kg

The topsoil should also be present in sufficient thickness (150mm-300mm) to maintain the planting.

Any material which exhibits gross visual evidence of contamination (e.g. visible evidence of hydrocarbons such as free product, is tarry, oily fibrous or odorous) is also considered unacceptable, specifically:

- Asbestos and material presenting unacceptable asbestos risk (risks to be determined by others);
- Material exhibiting evidence of non-aqueous phase hydrocarbons and VOCs;
- Coal tar materials (including road pavement blacktop materials);
- Material exhibiting evidence of sewage contamination;
- Material exhibiting visual and olfactory evidence of contamination;
- Material containing sharps;
- Refuse, putrescible, and biodegradable materials including timber, plastic, glass, and metal.

Any soils removed from the site should be taken to an appropriate disposal or treatment site as agreed with the waste contractor, under chain of custody procedures.

Any topsoil being imported to the site (in the contingency case of existing topsoil being unsuitable to remain) must be chemically tested to demonstrate suitability for use at a frequency of one test per 250m³, subject to a minimum of three, for each material from a distinct source⁷. These soils must not exceed the limiting values presented in Table 2-1 and Table 2-2.

The 'Standard for Excavated Material' produced and to be adhered to by the construction contractors, Vinci Construction UK, is available in Appendix B.

The works will be implemented following the approval of all pre-commencement planning conditions, when the groundworks begin at the site.

⁶ BS3882:2015 "Specification for topsoil"

⁷ Yorkshire and Lincolnshire Pollution Advisory Group (2021) Verification Requirements for Cover Systems: Technical Guidance for Developers, Landowners and Consultants v4.1

2.3 Unexpected contamination

The following information detailed protocols regarding what must be done if potentially contaminated or hazardous materials are identified during construction activities.

An unexpected find could include the following:

- Discoloured or hydrocarbon impacted soils
- Olfactory evidence of contamination
- Buried wastes
- Underground obstructions
- Buried containers / drums
- Asbestos

If potentially contaminated or hazardous materials are encountered:

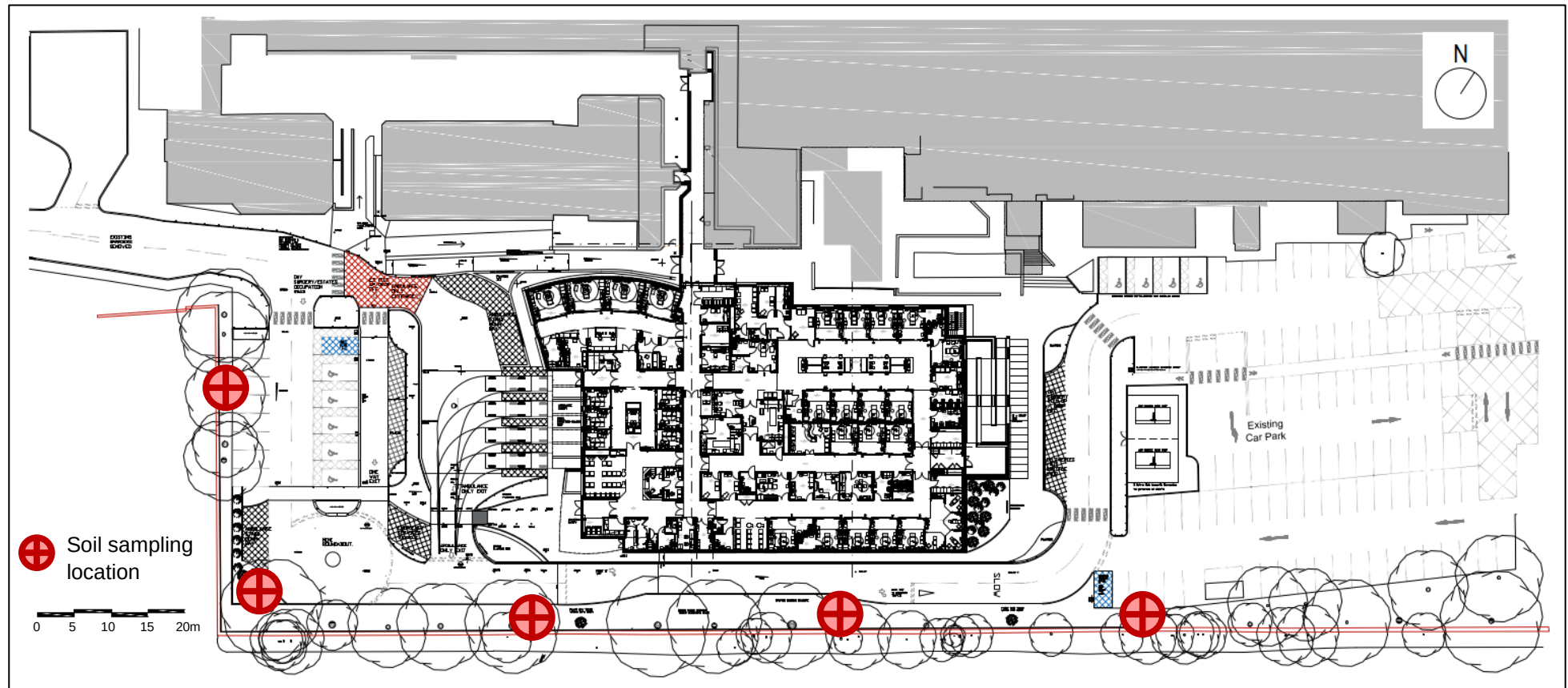
- Cease and make safe all excavations in this location and report observations to the Site Manager.
- The Site Manager is to notify the Engineer.
- Under guidance of the Engineer take representative samples of the suspect materials and forward to a suitably accredited laboratory for analysis.
- Await Engineers instructions with respect to re-commencement of the works and/or removal of suspect material to a suitably licensed disposal facility.
- Kirklees Council Environmental Protection Team and if relevant the Environment Agency are to be kept fully informed of any site such occurrences.

2.4 Validating the completion of the work

Following completion of the works detailed within this note, a validation note will be prepared to confirm that the works were completed in line with the approved strategy, and that no contamination not previously considered was identified or encountered on site.

If any soils were imported to the site, the note will also summarise the nature and volume of this material, with evidence of its compliance with the criteria in Table 2-1. Additionally, it will contain a summary of the nature, volumes, transfer notes and destination of any waste removed from site.

Appendix A – Sampling plan



Appendix B – Standard for Excavated Material

Revision Information

2. Annual Review – Layout changed

3. Reformatted to align with other standards and to reflect “Guide to HSEQ Management on Site”.

1. Purpose

The Managing Director of VINCI Construction UK, Building Division mandates this standard and all associated procedures and guidance for use across the division.

The purpose of this Standard is to identify VINCI Construction UK, Building Divisions key requirements for the effective management of excavated materials, soils and demolition materials.

2. Scope

This Standard applies to all work under the control of VINCI Construction UK, Building Division.

3. Principles/Definitions

Excavated Materials:

‘refers to waste consisting of mainly rock and earth excavated during construction.’

‘which are contaminated and/or not naturally occurring, which we have no defined use for are classified as waste.’

The Waste Framework Directive excludes certain materials including:

‘uncontaminated soil and other naturally occurring material excavated during construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated. This applies whether the use is immediate or whether the material is stored temporarily before use.’

Demolition Waste:

‘arises from activities such as total or partial demolition of buildings and civil infrastructure, road planning and maintenance. It accounts for approximately 25% - 30% of all waste generated and consists of numerous materials, including concrete, bricks, gypsum, wood, glass, metals, plastic, solvents, asbestos and excavated soil, many of which can be recycled.’

4. Our Approach

We take a risk-based approach, with all excavated material risks detailed in the Environmental Assessment and Risk Register (EARR) for the project and task-specific Risk Assessments and Method Statements (RAMS).

5. Mandatory Requirements

The Senior Site Representative (SSR) is responsible for

Appointing an Environmental and Waste Champion who will be named in the Project Execution Plan (PEP) and Environmental Management Plan (EMP - where required on a project).

Ensuring that, before work is started on site, sampling, chemical analyses at a UKAS accredited laboratory, risk assessment (in the EARR) and Hazardous Property Assessment (HPA) is carried out on any excavated material (unless it has previously been confirmed as free from contamination) to identify and

characterise contamination and suitability for reuse, determine the classification of waste (inert, hazardous or non-hazardous) and the LoW Code. This process will classify the waste and determine the most appropriate way to manage it, either through reuse, disposal, storage, or treatment. Note that constraints on the maximum time and amount of material allowed apply to some options.

5.1. Reuse of excavated material on site

Where possible, and if allowable under the risk assessment, the project should look to re-use excavated materials on site.

5.1.1. Naturally Occurring Materials

If the excavated material is “uncontaminated natural soil” and does not need to be treated (e.g. crushed) before re-use it can be re-used on site without the need for additional permits/paperwork. However, demonstration of ‘certainty of use’ is needed (for example with a statement on the design drawings).

If the uncontaminated excavated material needs to be treated (e.g. crushed) before use, a [T5 Waste Exemption](#)* from the Environment Agency is required before re-using the material.

5.1.2. Made ground, previously used aggregates (including demolition material), contaminated or hazardous materials

A Materials Management Plan should be completed (in accordance with “Route A” of the CL:AIRE [Definition of Waste: Code of Practice](#)) OR a [U1 Exemption](#) (from the Environment Agency) should be obtained before re-using the material.

If treatment of this material is required a [T5 Waste Exemption](#)* (from the Environment Agency) or a [T7 Waste Exemption](#)** (from the local authority) should be obtained (depending on what is being treating) before re-using the material.

5.2. Removing excavated material from site

5.2.1. Removing excavated material from site as non-waste

If material cannot be re-used on site, the project should look to send the material off site as ‘non-waste’. This means sending the material to another site/location to be re-used. A Materials Management Plan (in accordance with “Route A or Route B” of the CL:AIRE [Definition of Waste: Code of Practice](#) as applicable) should be produced or the waste should be managed under the [Quality Protocol](#).

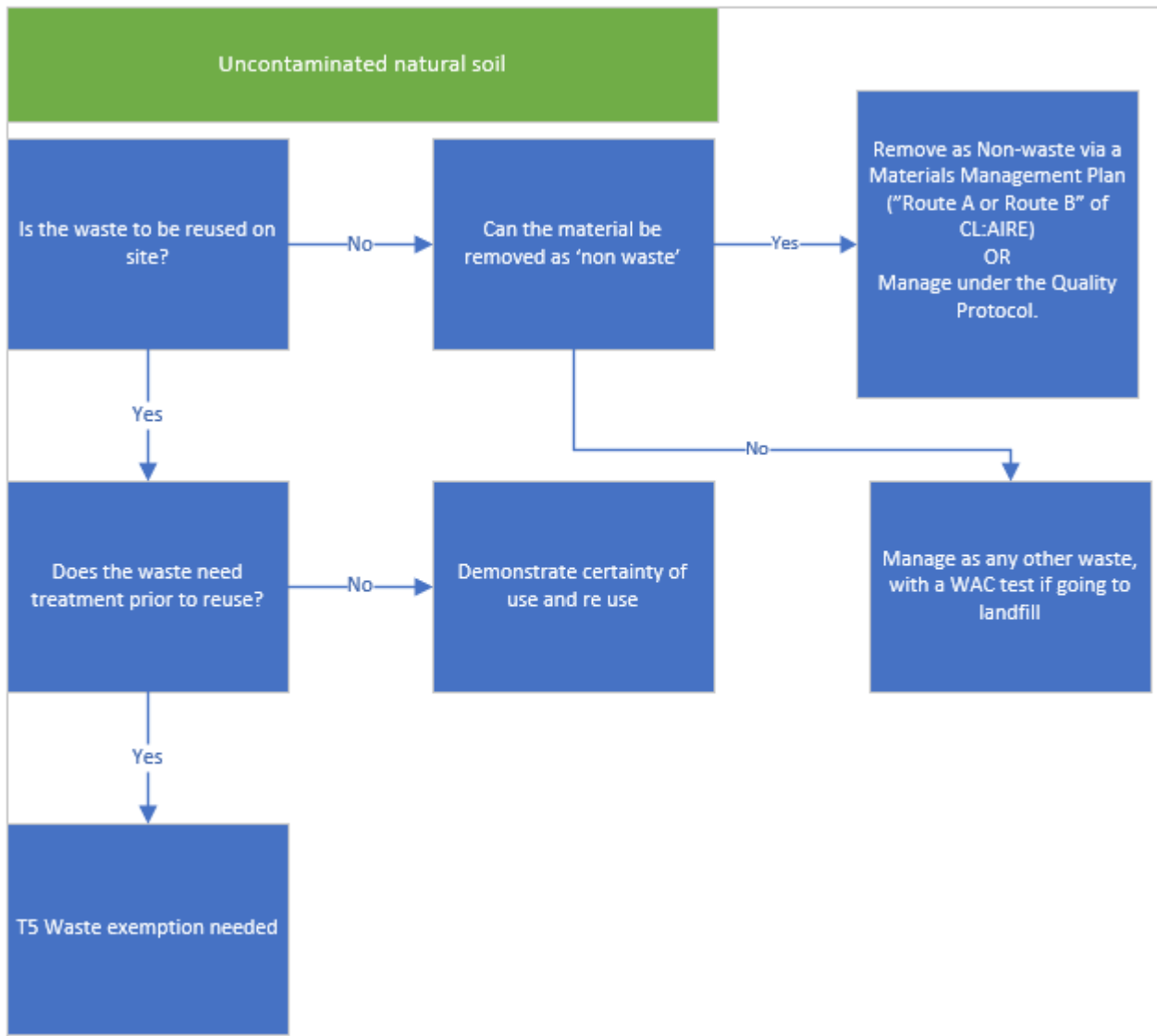
5.2.2. Removing material from site as waste

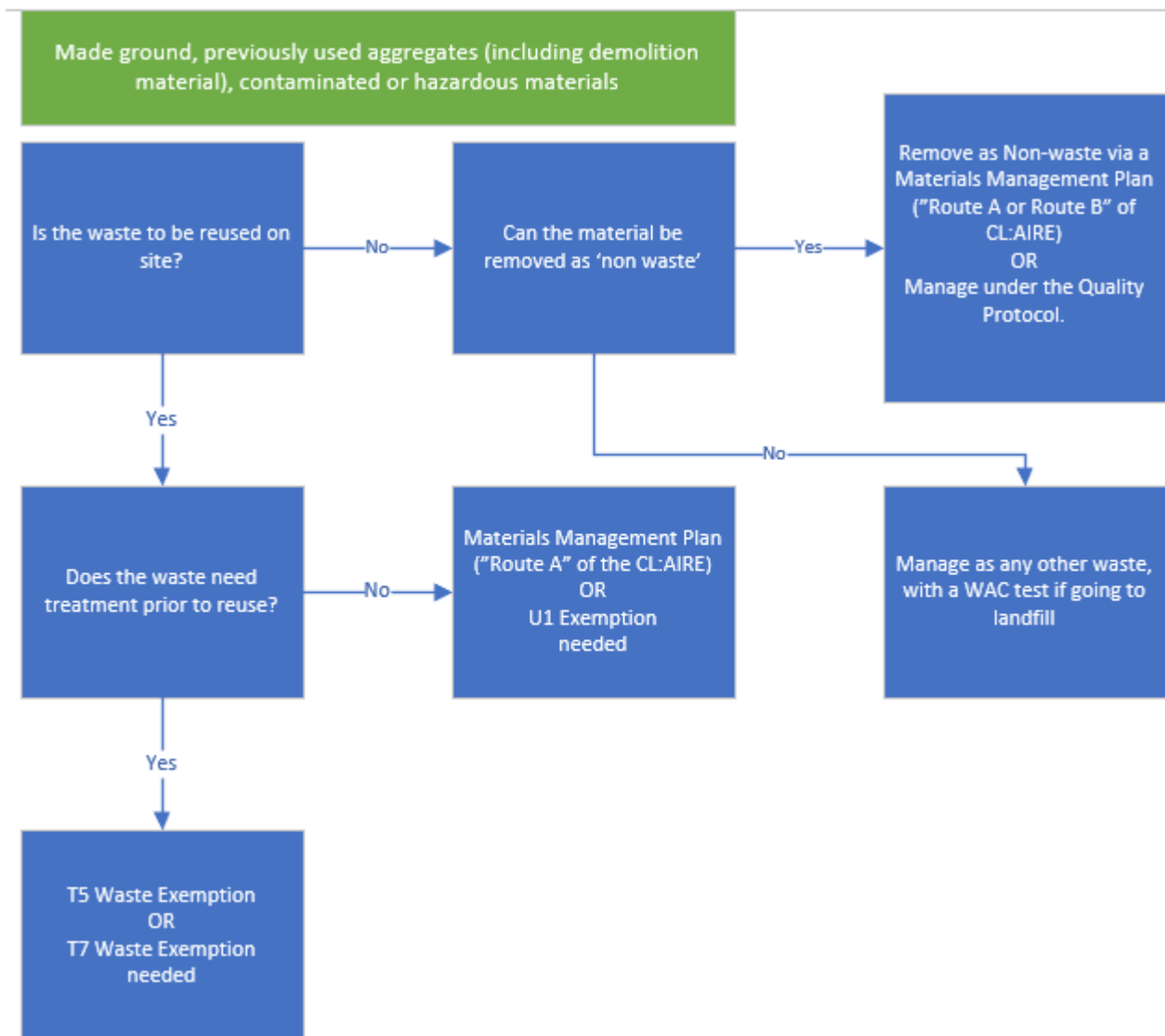
Excavated material that is removed from site as waste, should be managed in the same manner as any other waste (refer to DES 3). If landfill disposal is required then a Waste Acceptance Criteria (WAC) test should be completed, which identifies if a material will be accepted at hazardous or inert landfills.

*The T5 Waste Exemption gives you the ability to “temporarily treat waste on a small scale to produce aggregate or soil at a particular location, such as a construction or demolition site”.

**The T7 Waste Exemption allows the “treatment of waste bricks, tiles and concrete by crushing, grinding or reducing in size”.

5.3. Summary Flow Charts





6. References

6.1. External

U1: www.gov.uk/guidance/waste-exemptions-using-waste Waste exemption: U1 use of waste in construction

T5: <https://www.gov.uk/guidance/waste-exemption-t5-screening-and-blending-waste>

T7: <https://www.gov.uk/government/collections/waste-exemptions-treating-waste>

CL:AIRE: www.claire.co.uk/projects-and-initiatives/dow-cop CL:AIRE Definition of Waste Code of Practice

Quality Protocol:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/296499/LIT_8709_c60600.pdf

6.2. Internal

Environmental Management Plan (EMP)	VB-ENV-PL-0001-0001
Environmental Assessment & Risk Register (EARR)	VB-ENV-FR-0001-0002
Ecology Mitigation Guidance Note	VB-ENV-GN-0005-0002
Task Briefing Sheet	VC-HAS-FR-0009-0006
IMS Incidence Response and Reporting	VB-IMS-ST-XXXX-0004
Project Execution Plan	VB-PMG-PL-XXXX-0007
Environmental Management Plan	VB-ENV-PL-0001-0001
CL:AIRE – Definition of Waste Guidance Note	VB-ENV-GN-0002-0001