



Client:

J Walker Homes Limited
Joshua House
35 Joshua Lane
Middleton
Manchester
M24 2AY

Architect/Consultant

Remediation Strategy & Deployment Plan

Development at Greenhill Road, Middleton

Nov 2024

Site Ref: 6127/VGH-RSDP v1.00

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Appendices

- A1. Site Plan & Exploratory Hole Locations
- A2. Proposed Remediation Plan Extents

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Remediation Strategy and Deployment Plan

1. Introduction

This report contains the details of the Remediation Strategy and Deployment Plan to be undertaken across the Development at Greenhill Road, Middleton. The work was commissioned following acceptance of the quotation and an instruction to proceed issued by the Client J Walker Homes Limited on 09/08/2023.

The purpose of this report is to provide adequate detail to ensure that the Site is remediated to an appropriate level for the intended land use following the conclusions of a Phase II Contaminated Land Risk Assessment report and Ground Gas Risk Assessment referenced 6127/VGH PCLRA v1.0 0 July 2023 and 6127/VGH CLRA v1.00 Sept 2023 respectively.

The approximate grid reference for the centre of the site is 388610, 405180 and the total area of the site is approximately 6,200m². The approximate area of the Site is outlined with a solid red line on the Site plan in Appendix A1. The positions of exploratory holes are also indicated on the plan.

2. Description of the Site

2.1 Present

The site is located directly to the south of the Greenhill Road in the Middleton Junction area of Oldham, Greater Manchester. The site forms an irregular L shape and can be accessed from Greenhill Road and Smethurst Street. The topography of the site is relatively level.

At the time of the site visit the site was sub divided into three distinct plots.

1. Area one is the former junction vehicle refuelling garage and associated repair work shop to the rear. There are numerous visual indications refuelling infrastructure including vapour vents, interceptors drains and manholes at Underground Storage Tanks. Four bunded above ground diesel tanks were noted to the rear of the former forecourt building. It was noted that the pump island and any forecourt canopy had been long since decommissioned and the ground cover at the forecourt had been disturbed in places. The building to the rear of the forecourt building had been used for general maintenance and repair work and there were several parts from vehicles noted across the external area including wheels and panels. A large area of open scrubland incorporating brambles and other self establishing undergrowth species is present to the rear.
2. Area two has until recently been used as a plant nursery and consequently there are several poly/mesh tunnels for horticultural purposes and a pair of shipping containers for storage. There was no evidence of the use of pesticides or herbicides and there were no obvious visual or olfactory observations of contaminants noted during the site walkover of this area.
3. Area three is used as a storage yard for an interior decorator/builder and there was evidence of a bonfire and a general builders waste in a skip at the site. Used paint containers had been bagged in special blue Dulux trade waste scheme disposal bags ready for recycling. Storage containers were noted to contain ceramic tiles and other decorating and building materials. Asides from the afore mentioned bonfire and surface waste. There were no other obvious visual or olfactory observations of contaminants noted during the site walkover in this area.

2.2 Proposed

The proposal is to develop the site with 24 residential dwelling houses with associated private gardens and off road residents parking as well as an access road.

3. Review Of Previous Reports

The following site investigation reports and advice notes are known to have been produced for this site and have been referenced where considered appropriate. A brief description of the information contained within is also provided.

Author	Date	Ref	Title / description
GeoAssist Ltd	July2023	6127/VGH PCLRA v1.00	Phase I Preliminary Contaminated Land Risk Assessment & Desk Based Study to inform intrusive works
GeoAssist Ltd	Sept 2023	6127/VGH CLRA v1.00	Phase II Contaminated Land Risk Assessment.
GeoAssist Ltd	Oct 2023	6127/VGH GRA v1.00	Ground Gas Risk Assessment.

4. Conceptual Model

The conceptual model as originally presented within the GeoAssist Ltd Phase II Report Referenced 6127/VGH CLRA v1.00 and dated Sept 2023 is presented in table 1.0 below:

Table 1.0 Conceptual Site Model.

Potential Source /Hazard	Nature of Hazard (Risk Level to site given a Residential end use)	Contaminants Associated with Source	Potential Pathway	Potential Receptor
<i>Previous ON SITE Land uses:</i>				
1. Garage Vehicle Refuelling & Repair UST petrol AST Diesel Oils	Ground contamination Moderate Risk	Arsenic Lead TPH	Dermal Contact Ingestion Inhalation	Site Users Construction workers Future Buildings & Services Groundwater
	Gas from in-filled ground NHBC Amber 2 from Ciria C665	Methane <20 following HC correction. Carbon Dioxide>10%v/v	Vertical and Lateral Migration	Site Users Future Buildings & Services
2. Builders Merchant Allotment gardens	Ground contamination Moderate Risk	Arsenic Lead Asbestos Fibres	Dermal Contact Ingestion Inhalation	Site Users Construction workers Future Buildings & Services Groundwater
	Gas from in-filled ground NHBC Amber 2 from Ciria C665	Carbon Dioxide>10%v/v	Vertical and Lateral Migration	Site Users Future Buildings & Services
3. Railway Land	Ground contamination Moderate Risk	Arsenic Lead Asbestos Fibres	Dermal Contact Ingestion Inhalation	Site Users Construction workers Future Buildings & Services Groundwater
	Gas from in-filled ground NHBC Amber 2 from Ciria C665	Carbon Dioxide>10%v/v	Vertical and Lateral Migration	Site Users Future Buildings & Services
<i>Previous OFF SITE land uses within 250m as indicated by Historical Plans Including:</i>				
4. Cotton Mills Associated Chimneys Boilers	Ground contamination Low Risk	None Identified	Inhalation of soil dust	Site Users Construction workers
	Gas from in-filled ground Low Risk	None	Vertical and Lateral Migration	Site Users Future Buildings & Services
5. works / warehouse	Ground contamination Low Risk	None Identified	Dermal Contact Ingestion Inhalation	Site Users Construction workers
	Gas from in-filled ground Low Risk	None	None	Site Users Future Buildings & Services

Potential Source /Hazard	Nature of Hazard (Risk Level to site given a Residential end use)	Contaminants Associated with Source	Potential Pathway	Potential Receptor
6. Coal Workings	Geotechnical Hazard Low Risk	None	Ground Collapse Subsidence	Humans (site users) Future Buildings & Services
	Ground contamination Low Risk	None	None	Site Users Services
	Mine Gas Low Risk	None	None	Humans (site users) Future Buildings & Services

5. Remediation Strategy

5.1 Objectives

The Phase II Contaminated Land Risk Assessment and Ground Gas Risk Assessment have identified potentially unacceptable risks to human health associated with Elevated levels of Arsenic, Lead, Benzo(a)Pyrene found to be present within the made ground at the site. Elsewhere, elevated levels of Total Petroleum Hydrocarbon Compounds were noted in WS2 at 3.90m at the base level of nearby decommissioned Underground Storage Tanks. The magnitude of the exceedance and the limited geographical extent of the exceedance indicate, at present, that the source is not likely to be from a significant tank breach or spill and does not appear to represent a wider plume. The depth of the TPH source indicates that the only viable pathway is vapour generation affecting indoor inhalation.

Levels of Ground Gas were noted to fit those described in the NHBC Amber 2 category.

The risks were identified using the C4SLs “minimum or tolerable” risk generic assessment criteria approach for residential with home grown produce with plant uptake. Where samples were found to exceed the assessment criteria and a potential pollutant linkage identified, a decision to manage the risk through appropriate remedial measures has been taken.

The objective of the proposed remediation strategy is to ensure that unacceptable risks associated with the identified elevated contaminants are mitigated to a negligible level or managed to an acceptable level post development. The type and nature of the contamination can thus be summarized as follows.

Occurrence of elevated levels of Arsenic, Lead, Benzo(a)Pyrene and Total Petroleum Hydrocarbon Compounds exceeding the Assessment Criteria for Residential with home grown produce uptake within the made ground across the site and ground gas levels that fit NHBC Amber 2 Category.

5.2 Details of Proposed Works

5.2.1 Soils & Capping in Landscaped Areas

The site specific remediation methodology selected for this site is based on the most effective, practicable and durable solution available not entailing excessive cost and also takes account of the current position on site and proposed construction program for the site moving forward. The remediation methodology to be used is one of a simple engineered approach by restricting access to the source of the contaminants of concern by utilizing a clean capping layer in gardens and soft landscaped areas. This will be achieved through the groundworks phase of the construction as a simple controlled earthworks operation and will remove the top 600mm of made ground from the soft landscaped areas of the site and replace to a minimum depth of 600mm with a suitable subsoil and topsoil material. This approach will also prevent end user access to the contaminants of concern by means capping with a suitable clean inert material. The clean soils for soft landscaped areas can be a combination of 1st generation aggregate used as a capillary break layer topped with a suitably clean subsoil and capped with a topsoil growth medium. The proposed remediation treatment needs to be applied to the landscaped areas of the site highlighted in green hatching in the plan which forms appendix A2 to this report. It should be noted that if the proposed plans for the site significantly change then the remediation proposals will need to be reviewed to confirm that they are still applicable. The area of the site covered by the proposed soils remedial treatment is approximately 2200 to 2400m² and covers the soft landscape scheme across site. Remediation will be achieved using standard 360 backhoe excavation plant. Deposits will be excavated, stockpiled and loaded into 8 wheel tippers with dust covers and taken off site to an appropriate materials handling facility. Foundation arisings in made ground will be treated in the same manner as the earthworks for remediation and should not be reused on site. The disposal operation will be conducted under a subcontract with a registered waste carrier and all documentation regarding both the removal of waste soils from site and importation of inert capping materials to site should be retained by the developer.

5.2.2 Removal of Refuelling Infrastructure.

All above ground and below ground fuel tanks and associated delivery and breather lines should be removed and certified by an appropriately qualified contractor.

5.2.3 Ground Gas Mitigation Measures

The required ground gas mitigation measures and subsequent validation methods for this site are covered in the ground risk assessment report referenced 6127 VGH Greenhill Road GRA v1.00 Oct 23. The report should be read in conjunction with this report and the recommendations contained within should be fully adopted and fitted and verified by independent specialists.

5.3 Details of Type and Form of Contamination to be Remediated

The elevated levels of contamination identified were found to be present in the relatively shallow made ground strata typically within the top 1.00m. The type and nature of the contamination can thus be summarized as such;

Table 5.0 Summary of Type and form of contamination to be remediated.

Determinand	GAC (mg/kg) Res	Total No. of tests / No. of tests in impacted strata (Made Ground)	No of samples exceeding SGV/GAC/ C4SL	Max Value (mg/kg)	Locations and depths of exceeding samples (m)		Soil Type	Further action required
Arsenic	27	16/3	3	90	WS04 WS10 WS12	0.80 0.50 0.50	Variable Made Ground	Yes – See Remediation Plan
Lead	200	16/7	7	520	WS03 WS05 WS06 WS07 WS08 WS11 WS12	0.80 0.30 0.40 0.60 0.80 0.50 0.50	Variable Made Ground	Yes – See Remediation Plan
B[a]P	5	16/1	1	5.7	WS11	0.50	Variable Made Ground	Yes – See Remediation Plan
TPH Compounds	na	7/1	1	na	WS02	3.90	Tank Base	Yes - Hydrocarbon vapour Membrane beneath foundations See Remediation Plan

Full details of the present ground conditions on the site are provided in the exploratory hole logs within the Phase II risk assessment as referenced in section 3.0 of this report.

6. Site Management Procedures

6.1 Details of Consents & Licenses

All contractors engaged by client in relation to remediation will have appropriate licenses in place where required.

At present the following contracts have been let:

WASTE PRODUCER			WASTE CARRIER			DISPOSAL SITE		
Contractor	Waste Stream (Generated)	(Permitted) EWC Code (s)	Name	Registration No.	Registration Expiry Date	Disposer Name	Licence No.	Disposal Facility (Transfer / Recycling / Landfill / Exempt Site)
Principal Contractor	<u>General Waste</u> <u>Skip</u> (Mixed Construction Waste)	15 01 06/ 17 01 07/ 17 02 01/ 17 02 02/ 17 02 03/ 17 04 07/ 17 05 04/ 17 06 04/ 17 08 02/ 17 09 04/		TBC			TBC	
Principal Contractor	<u>General Waste</u> <u>Soils</u>	17 02 01/ 17 02 02/ 17 02 03/ 17 04 07/ 17 05 04/ 17 06 04/ 17 08 02/ 17 09 04/		TBC			TBC	

6.2 Site Waste Management Plan

A range of measures will be adhered to during the construction process to mitigate against commonly encountered risks on construction sites. These mitigation measures centre on the standard requirements for construction contractors with regard to the protection of site operatives, the general public and wider environment when developing sites.

A single source (mixed variable made ground) of potential contamination has been identified by the ground investigation that could have an impact on human receptors. Impacts are likely to be restricted to direct contact only with a low risk to the wider environment and off-site receptors as a consequence of the limited volume of the identified source material, the marginal nature of the exceedances and the limited mobility of the contaminants identified.

Standard measures, which are typically applied on construction sites, will be employed during construction to prevent and minimise the release of potentially contaminated materials into the environment from their original source location.

Such measures will include the following:

- The use of personal protective equipment and respiratory protective equipment for construction workers where necessary.
- Dust suppression measures where necessary, in order to prevent the generation of dust on, and migration of dust off-site. This is likely to take the form of damping down using road sweeping plant or hoses.
- Bunded containment of fuel for construction plant if on site and appropriately controlled refuelling areas with drip mats / trays where applicable
- The provision of emergency spill kits for fuel and oils
- The provision of environmental awareness training for site workers including awareness of the findings of the Phase II ground investigation and this remediation strategy, in the form of onsite “tool box talks”

6.3 Watching Brief

Careful observations should be made during foundation and landscaping works and the developer must keep a photographic record as the site progresses to confirm the current assessment of site conditions. Any evidence of additional contamination not previously identified and reported will be brought to the attention of the LPA as soon as is practicably possible.

6.4 Variations/Deviations from the Deployment Plan

Any variation from the approved remediation strategy shall be reported in writing to the LPA as soon as is practicably possible, by an appropriately qualified person detailing what, if any, actions have been taken along with a justification for the decisions taken. Where actions have not yet been taken a method to deal with the variation will be provided. Where appropriate, photographic and or written evidence supporting such decisions should be provided within the verification report.

7. Validation & Verification of Remedial Measures

7.1 Objectives

To provide evidence to demonstrate that the remediation deployment plan has been implemented as per the methods of the remediation strategy and deployment plan and thereby the remediation has been successful, and the risks managed to the desired level or mitigated in the whole.

Validation & verification methods for the ground gas mitigation measures are discussed in the GeoAssist Ground Gas Risk Assessment Report referenced 6127 VGH Greenhill Road GRA v1.00 Oct 23.

7.2 Sampling Strategy & Lines of Evidence

In this instance, a soil sampling strategy will be required to demonstrate that the objectives of the remediation strategy have been met and that soils remaining on site are suitable for use. Waste Transfer Notes for all soils waste leaving site will be included within the verification report and will be retained in accordance with the law. Elsewhere the use of site notes and photographs from the site engineer and watching brief site visits during the earthworks and foundation installation will be utilised where appropriate.

Certification of removal and disposal for both above and below ground fuel tanks and associated refuelling infrastructure.

Certification of completed gas membrane installation will be provided by the third party installation contractor. Certification should include the type of membrane used, the date of installation and a photographic record.

7.3 Post Remediation Analysis and Targets

Across the affected areas of the site, areas of landscaping will need to conform to the specification indicated in Figure 7.0.

Imported none 1st generation materials must be tested at a rate of not less than 1 sample per 50m³, a minimum of 3 samples per source will be tested to ensure they meet assessment criteria provided in Table 7.0.

For the most part the “Clean Up” criteria is based on EA Soil Guideline Values (SGVs), The Category 4 Screening Levels (C4SL) and Suitable for Use (S4U) assessment criteria published by Land Quality Management. These are considered to be appropriately protective of human health for the residential land use with home grown produce. The values are based on a sandy loam soil with a 6% soil organic matter (6%SOM) content. Soil Organic Matter content will be confirmed for the imported soils and where significant deviation from the 6% SOM occurs then GAC may be adjusted if the analysis is pertinent to the assessment ie levels are at, or very close to the upper limits and likely to impact the outcome.

Where LQM criteria are not available other equally health protective criteria derived using the UK methodology have been utilised from sources as indicated within Table 7.0.

Capping Material Specifications

Formation Level - Required Remediation Specification for Soft Landscaped Areas / Residential Gardens

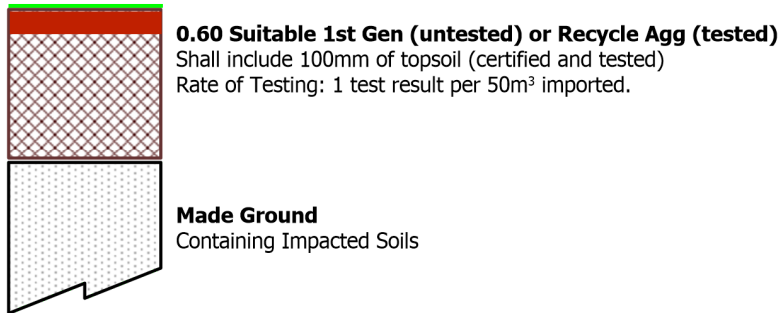


Figure 7.0 Material Import Specifications

Delivery notes for imported soil materials must be retained and incorporated into the verification and validation report. Photographic evidence of the insitu soils must also be provided clearly showing the depth of removal and depth of placement of imported materials.

Table 7.0 Material Import "Clean Up" Criteria

i2 Reference Customer Sample Ref:	Residential HGP C4SL / S4UL SOM 6% GAC LQM II
Determinand	
Arsenic	27
Boron (water-soluble)	290
Cadmium	22
Chromium*	910
Chromium VI	21
Copper	2400
Cyanide(Total)	-
Cyanide(free)**	34
Lead	200
Mercury	1.2
Nickel	130
pH	-
Phenols(Mono)	1100
Selenium	250
SO4(Total)	-
Sulphide	-
Sulphur(Free)	-
Thiocyanate	-
Zinc	3700
Acenaphthene	1100
Acenaphthylene	920
Anthracene	11000
Benzo(a)Anthracene	-
Benzo(a)Pyrene SM	5
Benzo(b)Fluoranthene	-
Benzo(ghi)Perylene	-
Benzo(k)Fluoranthene	-
Chrysene	-
Dibenzo(ah)Anthracene	-
Fluoranthene	890
Fluorene	860
Indeno(123-cd)Pyrene	-
Naphthalene	13
Phenanthrene	440
Pyrene	2000
PAH(total)	500
Asbestos	Not-detected
SOM	-

*Criteria Assumes Chromium III

**Criteria is derived considering acute effects on 1-2yo Female Receptor ingesting a single dose of 3g of soil

7.4 Verification Report

Upon substantial completion of the project a verification report containing the lines of evidence and test results discussed in Section 7.2 and 7.3 herein, shall be submitted to the LPA along with a completion statement confirming that the development has been subjected to the remediation strategy detailed herein and has met the stated objectives. It is the duty of the developer to maintain adequate lines of evidence that work has been completed in accordance with this remediation strategy and failure to provide the necessary evidential information such as waste transfer notes, photographs, delivery notes for imported soils and specialist membrane installation certification will lead to planning delays and cost increases in the final completion stages of the development for which the developer will be responsible.



Matthew Benson MSc GMICE
Geotechnical/Environmental Engineer



Mark Richardson MSc CEng MICE
Technical Director

Field investigations have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions are, and can be, variable and have only been tested at isolated locations across the Site. Therefore the potential exists for ground conditions to be encountered which are different to those considered in this report. Chemical analysis was conducted for a number of parameters based on an expert understanding of the historical and operational data available at the time and it should not be inferred or otherwise, that other chemical species are not present.

This report has been prepared by GeoAssist Limited with all reasonable professional skill, care and diligence within the terms of the contract with J Walker Homes Limited. The report is confidential to J Walker Homes Limited, their/the named persons advisors and bankers, and GeoAssist Limited accepts no responsibility of whatever nature to third parties to whom this report may be divulged. GeoAssist Limited owns the copyright in this report. All rights are reserved, and unauthorised use is prohibited. J Walker Homes Limited may use the report for their/her/his own purposes.

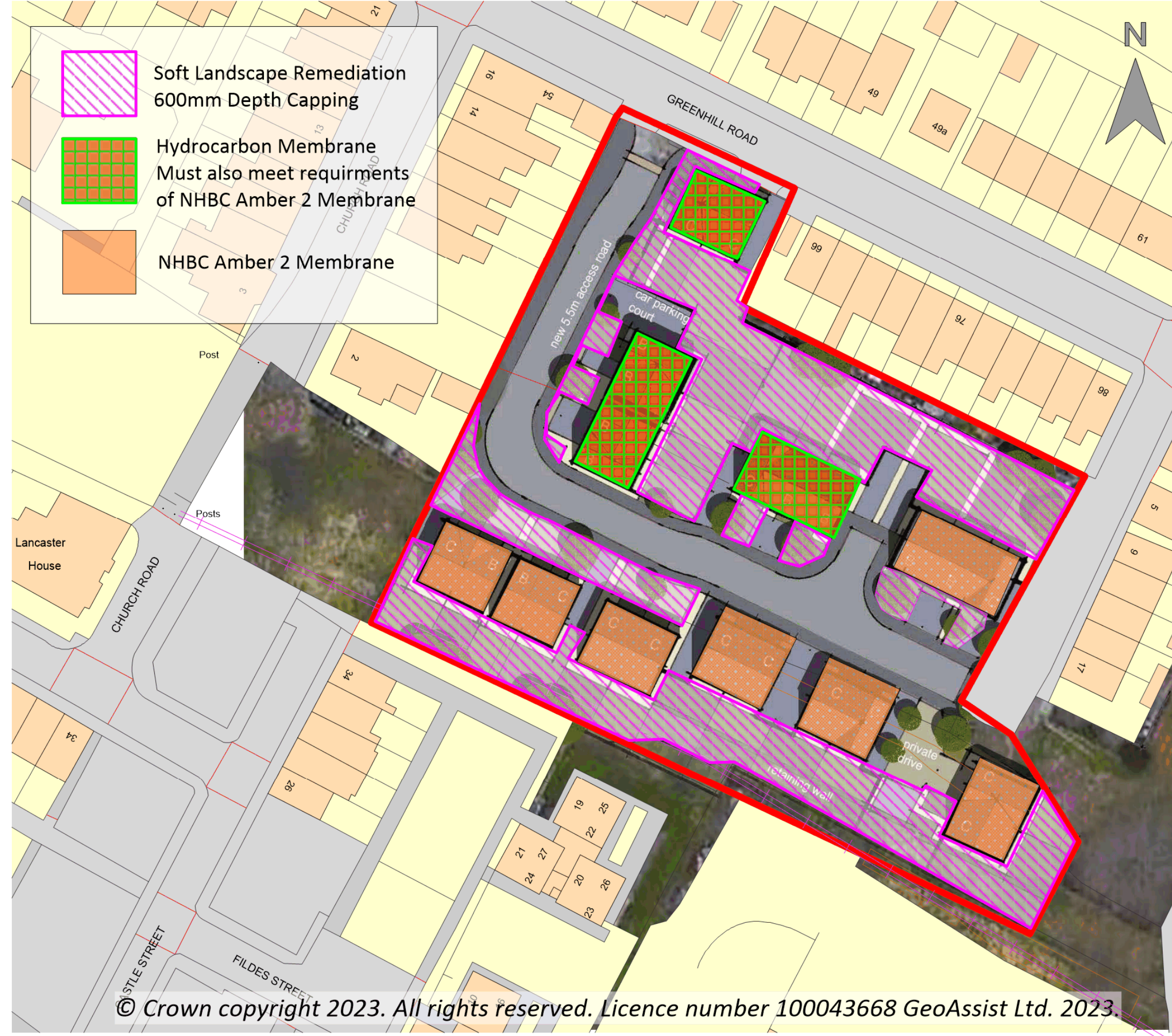
A1 Site Plan

Site Name	Development at Greenhill Road
Location	Middleton
GeoAssist Ref	6127VGH
Client	J Walker Homes Limited
	Joshua House 35 Joshua Lane Middleton Manchester M24 2AY
Planning Consultant	Trevena Blake & Associates
NGR (centre of site)	388610,405180
Production Date	Nov 2024
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

Notes:



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A2 Remediation Area

Site Name	Development at Greenhill Road
Location	Middleton
GeoAssist Ref	6127VGH
Client	J Walker Homes Limited
	Joshua House 35 Joshua Lane Middleton Manchester M24 2AY
Planning Consultant	Trevena Blake & Associates
NGR (centre of site)	388610,405180
Production Date	Nov 2024
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

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