

Phase 3 Remediation Options Appraisal

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Noss Pearl

Land west of 55 Shelley Road, Prestwich, Manchester, M25 9GH

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1. Introduction

The following document is a Phase 3 Remediation Options Appraisal carried out by Oakshire Environmental, and includes details of the site, environmental setting, contaminant linkages and an evaluation of risk.

1.1 Project Overview

The client's proposed project involves the erection of 1 no. 4 bed dwelling with associated landscaping on land west of 55 Shelley Road, Prestwich, Manchester, M25 9GH. Following the identification of contaminant linkages at the site, remediation has been recommended. Oakshire Environmental will carry out a Phase 3 Remediation Options Appraisal & Strategy, as described below.

1.2 Purpose of Investigation

The objectives of the Phase 3 Remediation Options Appraisal & Strategy will be to:

- Assess the nature and extent of contamination risk at the site.
- Identify suitable remediation option(s).
- Outline a strategy for the implementation of suitable remediation option(s).
- Determine the scope of required verification work.

1.3 Scope of Work

- Assess the nature and extent of contamination risk, identified as part of previous investigations.
- Identify initial feasible options for remediation at the site, including assessment of potential constraints and generic remediation objectives, based on the costs involved and the practicality of their application. Remediation methods to be considered include civil engineering, biological, chemical, physical and thermal methods.
- Conduct a detailed evaluation of remediation options, including development of site-specific remediation objectives, in order to determine which option(s) are most appropriate for the site.
- Outline a strategy for the implementation of suitable remediation option(s).
- Recommended remediation option(s) will be assessed to determine the scope of required verification work at the site.
- Supporting appendix to include photographs, maps and plans of the site.

1.4 Limitations

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This report excludes consideration of potential hazards arising from any activities at the site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities. Oakshire Environmental does not warrant or guarantee that the site is free of hazardous or potentially hazardous materials or conditions. It should be noted that this report has been produced for environmental purposes only.

2. Site

The following section provides a description of the site, location and previous investigations, utilising information obtained from the client and publicly available sources.

2.1 Site Description and Location

The site is located on land west of 55 Shelley Road, Prestwich, Manchester, M25 9GH and comprises a disused plot of land. At time of site visit, on 29th January 2025, the site was overgrown and included demolition rubble, domestic waste materials and concrete slabs associated with the former garages

National Grid Reference: 551461 187628

2.2 Previous Investigations

The site currently comprises parkland adjacent to residential properties and an electrical substation. Records held by the Council indicate that the parkland, including land within the proposal boundary, is a known landfill site. It is understood that the site was subject to landfilling comprising domestic and commercial waste from c1953 until c1984 with the landfill licence surrendered c1991. Gas venting was installed following c1994 planning approval to the north, east and SE boundary. Due to the sensitivity of the proposed land use and potential contaminant linkages, it was recommended that a contaminated land investigation is undertaken.

Following an initial review of the site, Oakshire Environmental carried out a Phase 2 Intrusive Site Investigation, including sampling of soil at the site, which was tested for a comprehensive suite of contaminants including Metals, Chromium (III & VI), Phenols, Polycyclic Aromatic Hydrocarbons (PAHs), BTEX & MTBE, Total Petroleum Hydrocarbons (TPHs) CWG (Aliphatic/ Aromatic), pH, Organic Matter and Asbestos (Qualitative).

Based on laboratory testing of soil samples from the site, the updated conceptual site model and the currently proposed development plan, the risk to residential end users and construction workers from lead, petroleum hydrocarbon and polycyclic aromatic hydrocarbons contamination in made ground at the site was considered to be moderate, in addition, while the risk from ground gases was considered to likely be low, in the absence of ground gas monitoring, it was recommended that pre-emptive gas mitigation measures are incorporated into the proposed dwelling as a precautionary measure, therefore, it was recommended that a Phase 3 Remediation Options Appraisal & Strategy is produced, to include analysis of feasible remediation options to address contamination risk at the site.

3. Remediation Options

The Environment Agency’s Land Contamination: Risk Management guidance for the development of an options appraisal requires the initial identification of feasible options for remediation at a site, based on the costs involved and the practicality of their application. There are a number of remediation methods available including civil engineering, biological, chemical, physical and thermal methods. Some methods may not be appropriate to a particular site as some can only be used on certain types of media and some may not be cost effective. Other site-specific constraints such as time and access can also determine the feasibility of a particular remediation option. The following section outlines the generic remediation objectives for the site, taking into account potential constraints, and includes a selection of feasible remediation options.

3.1 Site Context and Objectives

The client’s proposed development involves the construction of 1 no. 4 bed dwelling with associated landscaping. This report, therefore, considers the feasibility of redeveloping the site for residential use.

3.2 Potential Constraints

Given the size of the site and open access from St Anns Road, there is not considered to be limitations with regards to space for machinery required to carry out remediation work, however, the site was significantly overgrown at time of site visit and includes trees, mature shrubs, demolition rubble and the concrete slabs from the former on-site structures, which present minor constraints to be taken into consideration during initial site preparation work.

The site is bordered by an electrical substation, therefore, underground cables may be present underneath or near the site, presenting a potential constraint to remediation options requiring excavation at the site, therefore, the location of underground cables should be established prior to commencement of work, to ensure they would not prevent remediation being fully implemented.

There are sensitive human receptors bordering the site, however, the site is not currently in use so there are not considered to be sensitive human receptors on the site, in addition, the on-site contamination is not expected to be ongoing so there are no specific time constraints with regards the implementation of remediation.

3.3 Generic Remediation Objectives

The following table outlines the generic objectives of remediation at the site.

Table 1: Summary of Generic Objectives

Remediation Objective	Objective Type
Enable the site to be redeveloped for residential end use	General
Enable development of a remediation strategy that meets regulatory requirements	Management
Enable development of a remediation strategy that meets the developers’ requirements	Management
Avoid unacceptable environmental impacts from implementation of remediation strategy	Management
Avoid long term monitoring requirements	Management

3.4 Feasible Remediation Options

Contamination risk from lead, petroleum hydrocarbon and polycyclic aromatic hydrocarbons has been identified in made ground at the site, in addition, to potential ground gas risk from an historical landfill, therefore, a number of remediation options have been discounted as they are inappropriate for the site and the identified contamination risk.

Soil flushing, soil washing, and hydraulic binders are likely to be too costly and unnecessarily extensive for the site given the relatively localised contamination and quantity of material expected to require remediation.

The following remediation options are considered appropriate for the site and will be subject to a more detailed evaluation in the following section.

Table 2: Summary of Feasible Remediation Options

Remediation Option	Method	Linkage Element Addressed
Excavation and Disposal	Civil Engineering	Source Management
Containment - Cover System	Civil Engineering	Pathway Interruption
Membrane	Barriers (in buildings)	Pathway Interruption
Passive Venting	Dilution and Dispersion	Pathway Interruption

4. Evaluation of Remediation Options

Following the identification of feasible remediation options, a detailed evaluation of options, including development of site-specific remediation objectives, is required to determine which option(s) are most appropriate for the site.

Table 3: Summary of Site-Specific Objectives

Remediation Objective	Objective Type	Evaluation Criteria
Enable the site to be redeveloped for residential end use without risk to human health	General/Technical	Contaminant concentrations in shallow soils on site to be below relevant screening values after remediation and ground gas protection measures to be installed as required to prevent permeation into the proposed dwelling
Enable development of a remediation strategy that meets regulatory requirements	Management	Remediation strategy to be agreed with Local Authority and carried out in accordance with relevant regulations
Enable development of a remediation strategy that meets the developers' requirements	Management	Remediation strategy to be agreed with developer
Avoid unacceptable environmental impacts from implementation of remediation strategy	Management	Compliance with regulations on the control of noise, dust odour, traffic and generation of waste
Utilise remediation option with a proven track record	Management	Selected option to have proven success on sites with similar contamination issues
Avoid long term monitoring requirements	Management	No site-specific evaluation criteria

4.1 Excavation and Off-Site Disposal and Containment

Excavation and off-site disposal of all made ground, down to natural strata, in areas of proposed soft landscaping should be carried out, to remove the source of contamination and enable the site to be redeveloped for residential use without risk to human health. The Phase 2 Intrusive Site Investigation found the depth of made ground to be between approximately 300mm and 900mm across the site, however, depths were found to be between 300mm and 500mm in the area marked on proposed plans as 'amenity garden', assumed to be the primary area of proposed soft landscaping.

Following this, placement of imported clean material is likely to be required to re-instate site levels, however, there is no minimum requirement for the depth of clean cover provided that it allows for an adequate depth for growth of plants.

Site-won material will not likely be suitable for use in proposed soft landscaping, due to the extent of potentially contaminated made ground across the site, however, where site-won soil is appropriately verified and found to be free of contamination it can be considered suitable for re-use.

This remediation option meets all the relevant objectives outlined in this report and is appropriate for the site. Excavation and off-site disposal is likely to be the most cost-effective feasible remediation option and would be most cost effective if conducted alongside the proposed development at the site. There are not likely to be excessive environmental nuisances, such as noise and dust, assuming groundwork best practices are followed, in addition, excavation and off-site disposal is a very common remediation techniques, successfully used on multiple sites with similar contamination issues, and is not likely to need extensive post-remediation verification work.

4.2 Membrane and Passive Venting

Based on council records, historical land filling took place more than 34 years ago and gas venting has subsequently been installed following planning approval for the adjacent housing development, therefore, the site is unlikely to exceed Characteristic Situation 2 (Amber 1). The proposed development includes a private dwelling (Type A building), therefore, in order to protect the development from the ingress of ground gases 3.5 points of protection measures must be achieved. This can be provided with a suitable sub floor ventilation layer along with the installation of a sufficiently impervious membrane.

The ventilation layer will provide good protection against ground gas ingress and when designed and constructed correctly it will dilute any gas being emitted from the ground to acceptable levels and will provide a minimum of 1.5 points of protection.

The membrane must be sufficiently impervious to the transmission of gas and durable enough to withstand the installation process and, if installed appropriately, it will provide a further 2 points of protection which will provide the required score of 3.5.

The floor and substructure design can also provide protection from the ingress of ground gases (e.g. a reinforced cast in situ suspended floor slab with minimal penetrations would provide a score of 1), however, this will not provide an essential element of the gas protection design.

It should be noted that, regardless of any other remediation options selected, gas mitigation measures will need to be incorporated into the development.

5. Recommendations

Based on the detailed evaluation of feasible remediation options in this report, the most appropriate remediation options are considered to be via source management by way of excavation and off-site disposal of contaminated made ground and barriers (in buildings) and dilution and dispersion by way of membrane and passive venting. The details regarding this remediation are outlined below.

5.1 Remediation Strategy

Excavation and off-site disposal of all made ground, down to natural strata, in areas of proposed soft landscaping should be carried out. Excavations should be carried out by a suitability qualified groundworks contractor, in addition, photographic evidence of the base and faces of each excavation will be required to verify that all made ground has been removed. If unforeseen visible or olfactory evidence of contamination is identified during excavations at the site, work should cease in order to allow further investigation to be carried out.

Placement of imported clean material is likely to be required to re-instate site levels and provide a suitable growing medium in proposed soft landscaping areas, however, there is no minimum requirement for the depth of clean cover provided that it allows for an adequate depth for growth of plants. Imported soil to be utilised in soft landscaping must be shown to be uncontaminated and compliant with British Standard 8601:2013 for subsoil and British Standard 3882:2015 for topsoil. It is important that cover soil is appropriately quarantined prior to placement or placed in its intended area straight away to ensure that cross-contamination does not occur.

To mitigate the potential risk of ground gas permeation into the proposed dwelling, a passive sub floor ventilation layer comprising a clear void with a minimum thickness of 150mm should be provided. The ventilation layer should provide a minimum ventilation to the void of 1500mm²/m of wall on two opposite sides to provide adequate dilution of gas. This will be provided through periscope vents and/or straight through vents in the external walls with airbricks positioned at 2m maximum centres along all the external walls and not more than 450mm from the corners.

In order to further mitigate the risk of ground gas ingress into the dwellings, a gas resistant membrane should be installed. The membrane must be made from a virgin polymer such as polyethylene, LDPE or modified bitumen/LDPE and must have a methane transmission rate of less than 40ml/day/m²/atm (average). The membrane should have lapped and taped joints and 'top hats' around service penetrations in accordance with the manufacturer's specification (typically 150mm laps with double sided tape). The membrane must also be sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions as well as being sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc) and to withstand in-service stresses (e.g. settlement if placed below a floor slab).

Any screed and insulation should then be laid on top of the membrane.

5.2 Verification

Following the implementation of remediation, verification will be required, to ensure remediation has been successful and the site is safe for its proposed use and should include the following.

Imported soil to be used as cover will be classified as 'greenfield' or 'manufactured' soil.

In order to identify contamination of imported cover soil, samples should be taken and analysed for Metals (As,Cd,Cr,Cu,Pb,Hg,Ni,Se,Zn), Chromium (III & VI), PAHs (16 USEPA speciation), pH, Organic Matter and Asbestos in a UKAS accredited laboratory, as per the recommendations in YALPAG Technical Guidance.

Samples can be collected from stockpiled soil prior to placement or in-situ cover soil after placement. If cover soil is to be stockpiled prior to placement, it should be appropriately quarantined on a polythene sheet or similar protective membrane to avoid contamination prior to placement. Cover soil may be delivered in bags and these are considered to be an appropriate means of quarantine. Alternatively, cover soil can be placed immediately upon arrival at the site.

Ground conditions encountered at the site during the sampling process should be noted, with photographic evidence taken throughout. This information will be used to inform recommendations and conclusions. Results of laboratory testing should be assessed with reference to LQM/CIEH Suitable 4 Use Levels (S4ULs) and CL:AIRE Category 4 Screening Levels (C4SLs), to assess the risk to human health and the environment.

A supporting appendix should be produced, including photographic evidence of the depth of excavation and clean cover using a tape measure or staff, to verify that all made ground has been removed from proposed soft landscaping areas, in addition to, copies of waste transfer notes and certificates for imported material.

The installation of the subfloor void and ground gas membrane should be verified in accordance with CIRIA C735.

The findings of this validation assessment should be used to update the Conceptual Site Model, produced as part of the Phase 2 Intrusive Site Investigation, to identify contaminant linkages at the site, in order to determine the efficacy of remediation and the requirement for any further investigations or remediation work.

6. References

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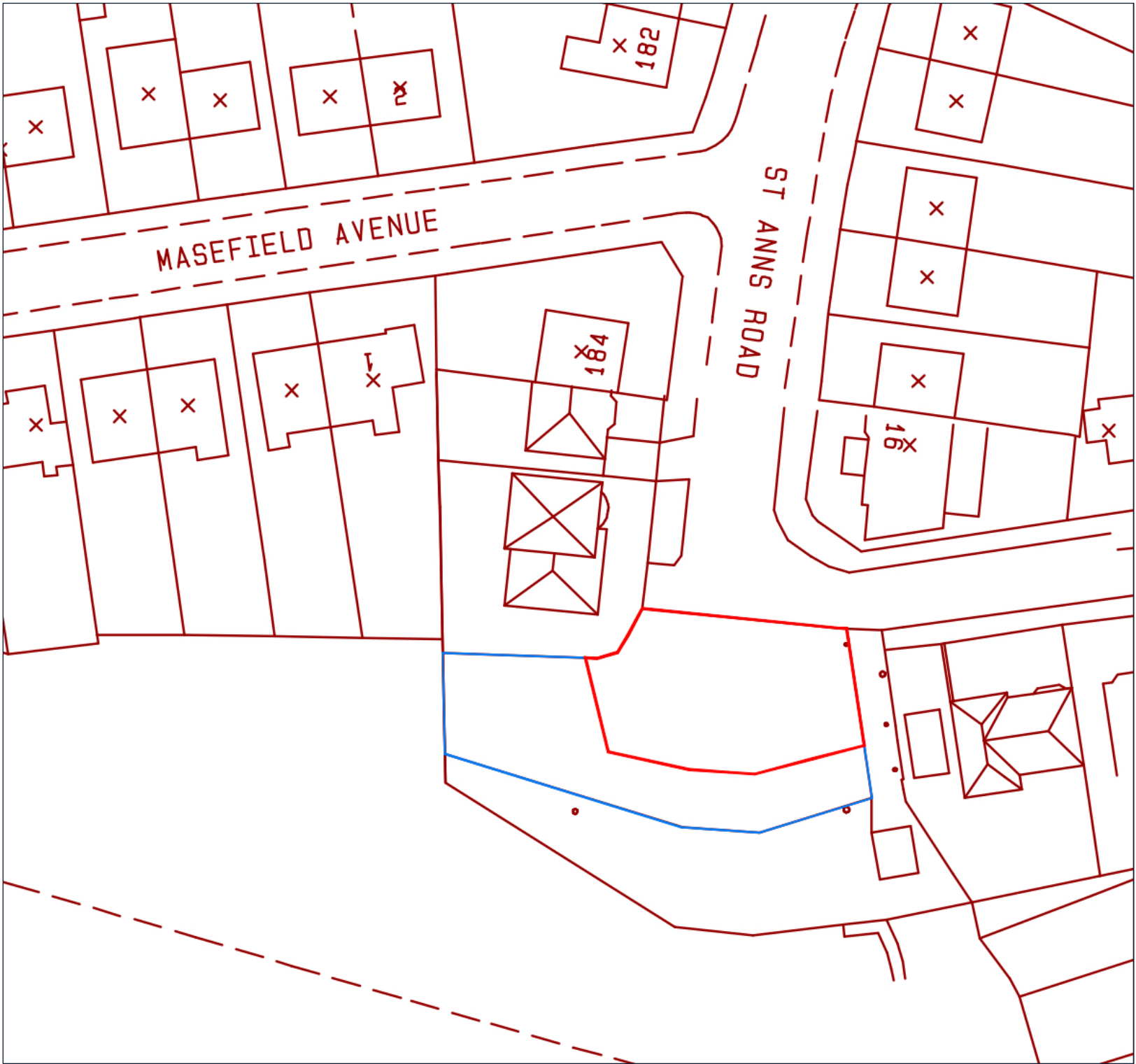
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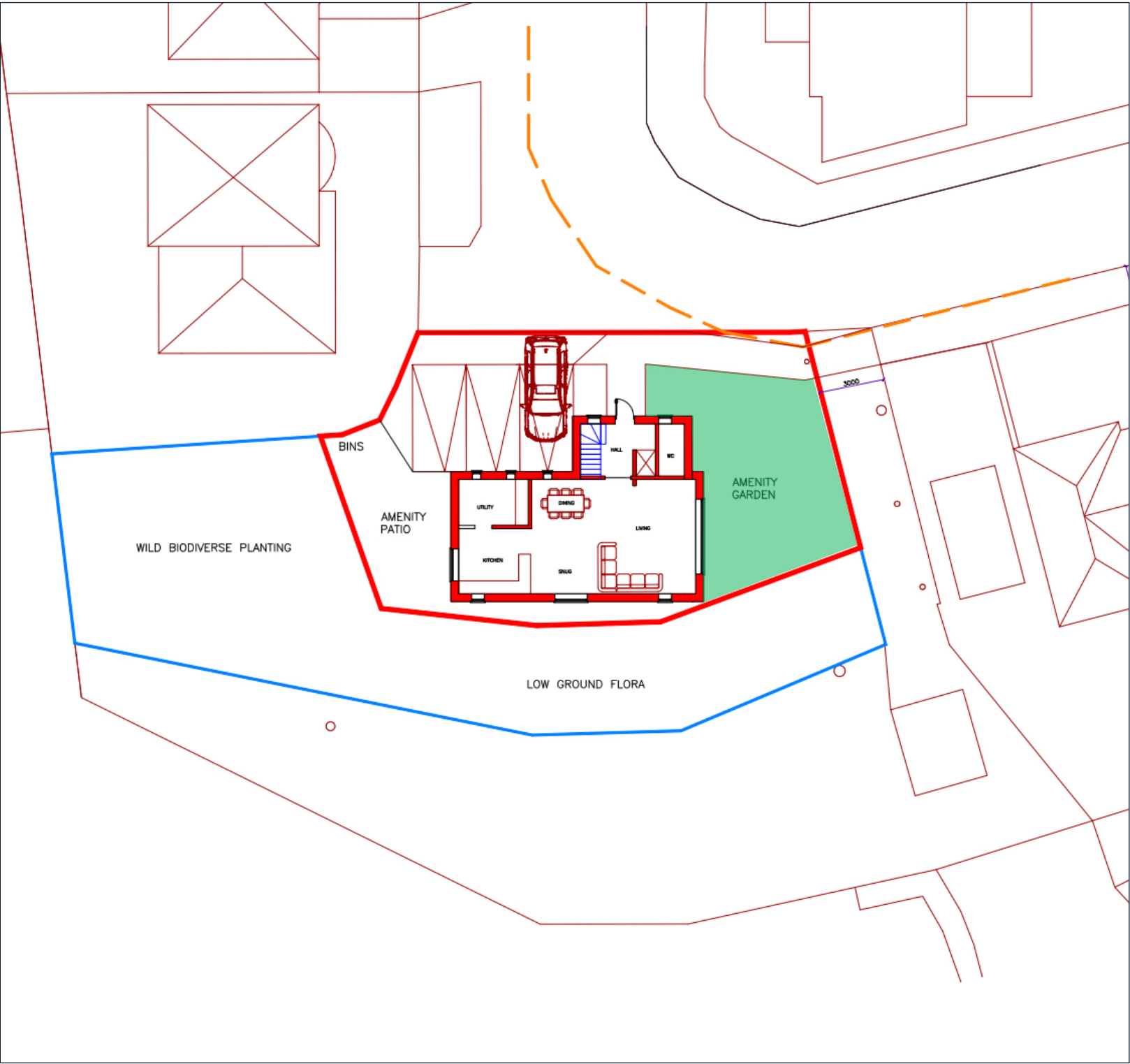
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Appendix - Site Maps & Plans

Description	
Site location plan	
Sources	
Contains OS data © Crown copyright and database rights	
Key	
	Site boundary
	Other land owned by the client
	North



Appendix - Site Maps & Plans	
Description	
Proposed site plan showing the approximate extent of required made ground excavations.	
<i>It should be noted that any areas not marked on this plan that are proposed to be soft landscaping will also be subject to made ground excavation and off-site disposal.</i>	
Sources	
J Gaunt Architecture Ltd	
Key	
	Site boundary
	Other land owned by the client
	Approximate extent of required made ground excavations
	North