



REMEDIATION METHOD STATEMENT

**102 NORTHUMBERLAND PARK
LONDON
N17 0TS**

**Reference Number 2293/Rpt 2v1
June 2019**

Prepared for

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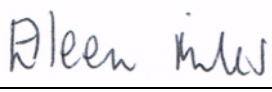
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1 INTRODUCTION

1.1 Background

Brown 2 Green Associates Ltd have been commissioned by Billericay Electrical Ltd to prepare a Remediation Method Statement for the development 102 Northumberland Park, Tottenham, London, N17 0TS. The site is located at National Grid Reference 534320, 191400. The site location is presented in Figure 1.

A Phase 1 Desk Study was previously completed by Lister Consulting Ltd. Based on the findings of the Desk Study, a Phase 2 Geo-environmental Site Investigation was undertaken by Brown 2 Green Associates Ltd. The investigation identified a requirement for remediation. This report presents the remediation strategy to be adopted at the site.

1.2 Proposed Development

It is proposed to convert the existing public house to residential and to construct a new residential building containing six apartments and two houses to the rear. The proposed development is shown on drawing number FPT-12 prepared by BB Partnership. The proposed development layout is presented in Figure 2.

1.3 Objectives

This document provides details of the requirements for remediation. The objectives of the remediation are to:

- Break the pollutant linkages that were identified as being active during the site investigation works.
- Render the site suitable for the intended end use as a residential development with private gardens.
- Render the site incapable of determination as contaminated land under Part 2A

1.4 Scope of Work

In order to achieve the objectives of the remediation the following works will be undertaken:

- Provision of a capping layer and/or removal of contaminated soil by excavation and removal of contaminated soils from areas to be developed as soft landscaping;
- Backfilling resultant voids with chemically and geotechnically suitable materials;
- Verification and validation testing of the works undertaken.

1.5 Sources of Information

Background information relating to the site was acquired and referenced from the following sources:

- Prepared by Lister Consulting Ltd, Phase 1 Desk Study Report, L102 Northumberland Park, London, dated January 2019; Ref 2475_FP01.0-2019.

- Geo-environmental Site Investigation Report, Geo-environmental Site Investigation Report: 102 Northumberland Park, London, N17 0TS; dated June 2019; Report Reference: 2293/Rpt 1 v1.

During the preparation of this report consideration has been made with regard to the findings of the previous work. These reports should be read in conjunction with this report.

1.6 Limitations and Constraints of the Study

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2 SITE LOCATION AND SETTING

This section presents a summary of the site location and setting. A detailed description can be found in the previous report. Where changes have been identified, these have been noted.

2.1 Site Location

The site is located in a residential area on the corner of Northumberland Park and Turlock Road. The site location is presented in Figure 1.

The site, rectangular in shape, comprised a public house at the northern site boundary, occupying approximately 50% of the overall site area. At the time of the site work, refurbishment of the building had commenced. This building comprised two floors and a basement and was built from standard masonry construction.

The remaining 50% of the site area was formed by an associated open garden area which also comprised two wooden bars / shelters. The ground cover of the external areas of the site was recorded as mixed tarmacadam / asphalt and paving slabs with a concrete access path extending from the garden to the rear entrance of the building.

The topography of the site was generally undulating with a slight downwards slope to the centre of the site.

2.2 Historic Land Use

The Desk Study identified that by 1867, the northern half of site was developed and contained a large building with an associated garden area in the south. Two small structures were identified attached to the rear (south) of the main building from 1886. The 1896 mapping record identifies the building as a public house and small structures, likely greenhouses, were present within the garden area. The southern part of the site had been cleared including greenhouse structures by 1935. No other significant changes were identified until present.

2.3 Geology and Hydrogeology

The British Geological Survey website indicates that the site is underlain by the following geology:

Drift/Solid	Geological Unit	Description	Aquifer Classification
Drift/Superficial	Enfield Silt member	Clay and silt	Unproductive
	Kempton Park Gravel Formation	Sand and Gravel	Secondary A
Solid	London Clay Formation	Stiff grey clay	Unproductive

Geological logs for boreholes drilled within the local area indicate the London Clay Formation to be 27m thick. The London Clay Formation is underlain by the Lambeth Group, Thanet Sand and Chalk. The top of the chalk is approximately 47m below ground level.

The nearest active licensed groundwater abstraction is located 665m from the site. A groundwater abstraction well for the potable water supply is located 840m to the south east. Groundwater will be abstracted from the chalk. The site is located in a Zone 2 Source Protection Zone. The presence of the London Clay Formation will provide protection to the deeper aquifers with the Thanet Sand Formation and the chalk.

2.4 Hydrology

The nearest surface water feature is a drainage ditch located 780m to the west.

There are no licensed surface water abstraction points within 500m radius of the site.

The database indicates that the site does not lie in a fluvial or tidal floodplain.

3 SUMMARY OF RESULTS OF INVESTIGATION

3.1 Ground Conditions

Made Ground

The boreholes indicate that the site is underlain by up to 0.8m of made ground. The made ground generally consists of asphalt or paving slab hand standing over a dark brown very clayey fine grained sand with occasional gravels of flint, concrete, brick, ash, coal and tile.

Natural Strata

The made ground is underlain by between 0.2 and 0.95m of light orange brown, very slightly silty clay. The silt is underlain by very dense, light brown and light grey very sandy gravel.

Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was noted.

Groundwater Conditions

During the drilling groundwater was struck in WS2 at 2.8m in the sandy gravel. On the 14th May 219, groundwater was recorded at 1.89m bgl.

3.2 Contamination Assessment

The Phase 2 Site Investigation identified:

Concentrations of lead and polycyclic aromatic hydrocarbons (PAHs) were identified within the made ground at levels significantly above the generic assessment criteria. Statistical assessment shows that the 95th percentile upper confidence levels (of the measured mean) for the concentrations of lead (490 mg/kg) , benzo(b)fluoranthene (3.3mg/kg), benzo(a)pyrene (3.1 mg/kg) and dibenzo(a,h)anthracene (0.47 mg/kg) exceed the relevant GAC of 200mg/kg for lead, , 2.7mg/kg for benzo(a)pyrene and 0.28 mg/kg for dibenzo(a,h)anthracene. The concentration of benzo(b)fluoranthene is the same as the GAC. At the concentrations present it is considered the concentrations of lead and individual PAH's that are present within the made ground are at levels that may pose a significant risk to human health where active pollution pathways are created. These will be created within parts of the site that are developed as soft landscaping within and private gardens.

Within the natural soils all concentrations were below the generic assessment criteria.

The Tier I Controlled Water Risk Assessment has determined that there are no unacceptable concentrations of potential contaminants within the underlying soils that would pose a potential risk to controlled waters.

The risk assessment for bio-genic ground gas concluded that there is no risk from ground gas.

The risk assessment in respect to the future planting and towards sensitive ecological receptors identified that the determinants at the site would pose a potential risk.

The risk assessment in respect to water supply infrastructure identified that the determinants at the

site would not pose a potential risk to the integrity of PE or PVC pipework.

In light of the results of the site investigation and the Risk Screening Assessment a Conceptual Model developed has been updated. The Conceptual Model is presented below.

Source	Potential migration pathway	Potential Receptors	Discussion, Remedial or Precautionary Measures and Mitigating Factors
Lead, PAHs within the made ground	Ingestion of contaminated soil and dust by direct contact and soil attached to home grown vegetables. Inhalation of dust (indoor and outdoor).	Future site users	Active pollution linkages present within areas to be developed as gardens and soft landscaping. Removal of made ground and provision of capping material

4 REMEDIATION STRATEGY

The results of the site investigation have confirmed that the level of contamination at the site has the potential to pose a risk to end users and the environment and that there are active pollution linkages present. Remediation will be required to render the site suitable for the intended end use. The aim of the remediation is to break pollutant linkages that are present and thus mitigate the identified risks to acceptable levels. An appraisal of the remediation options concludes that source removal and pathway interruption are the most appropriate techniques to be adopted.

Following the consideration of the remedial options and objectives it is considered that remediation can be achieved by implementation of the following key elements:

- Removal of contaminated made ground from parts of the site to be developed as soft landscaping with private gardens;
- Backfilling of excavated gardens and areas of soft landscaping with chemically and geotechnically suitable soils;
- Verification and validation testing of the works undertaken.

4.1 Remediation Action

4.1.1 Source Removal

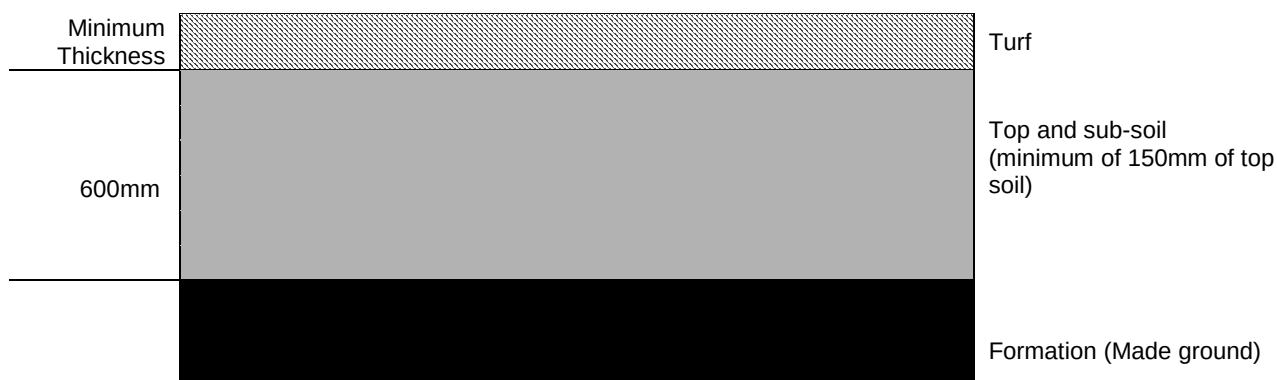
The site investigation identified that the made ground beneath the site varied in thickness from between 300mm and 800mm.

Within areas that will become soft landscaping in private gardens the made ground will be excavated and removed. The excavation will be taken to either the base of the made ground where the thickness of made ground is less than 600mm below finished garden level, or, to a maximum depth of 600mm below finished garden level where the made ground extends to a depth greater than 600mm below finished garden levels.

The extent of the area that requires excavation is presented in Figure 3.

All excavated soil generated by the remediation will be classified as waste. The soil will be disposed of to a suitable waste disposal facility, treatment facility or other suitable route to enable the soil to be re-used.

Following the completion of the excavation, the cover system will be placed. Details of the cover system are presented below:



4.2 Re-instatement

Following the excavation of the made ground all areas will be backfilled with suitable clean top and subsoil.

The soils that are used must be of a standard suitable for a residential end use. The soils must be physically suitable for the intended use and be free from deleterious materials such as glass, plastic, wood, paper etc. It is recommended that topsoil should generally comply with the requirements of the specification for multigrade topsoil as given in BS 3882: 2015 or to the satisfaction of the landscape architect. All top and sub-soil that is used for the capping layer must conform to the chemical specification detailed in Appendix I.

4.3 Validation

Within the area that required remediation the following validation and verification will be undertaken after the completion of the remediation:

- Within each private garden a trial pit will be to the base of the imported soil to confirm sufficient depth of removal has been undertaken.
- Where the thickness of the placed top and sub soil is less than 600mm in private gardens a sample of the soil immediately beneath the imported soil will be obtained and analysed for speciated polycyclic aromatic hydrocarbons and lead to ensure the concentrations conform to the chemical specification detailed in Appendix I.
- Validation samples of the imported soil will be obtained for laboratory analysis. A minimum of three samples will be obtained. Should top and sub-soil be placed a sample will be obtained from each type of material.
- Samples will be submitted to a UKAS accredited laboratory and analysed for the determinants presented in Appendix I.

4.4 Reporting

On completion of the remediation a validation report will be prepared. The validation report will present the following information:

- Site observations and photographs, including plan showing the location of all photographs.
- Chemical analysis of validation samples and imported soils.
- Waste transfer notes.

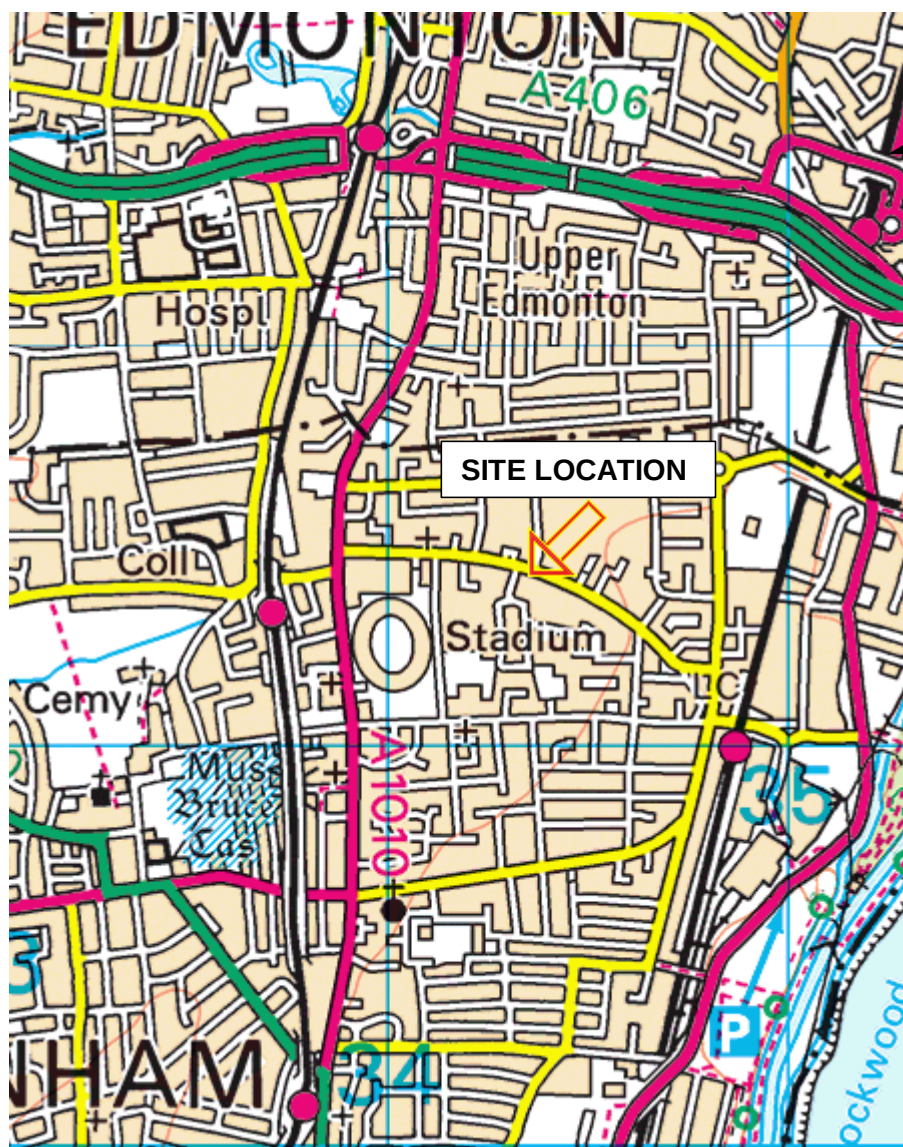
4.5 Unforeseen Contamination

During the construction works, should any evidence of unforeseen visual or olfactory contamination not revealed during the site investigation, underground storage tanks or other underground structures be identified, contact should be made with a suitable qualified Geo-environmental Consultant. Following inspection, suitable action will be taken to assess any risk from contamination. This may include additional investigation or sampling. If contamination is identified contact will be made with the Contaminated Land Officer at the local council and all relevant information submitted.

4.6 Post Development Maintenance/Monitoring

No post development maintenance or monitoring of the remediation measures are required.

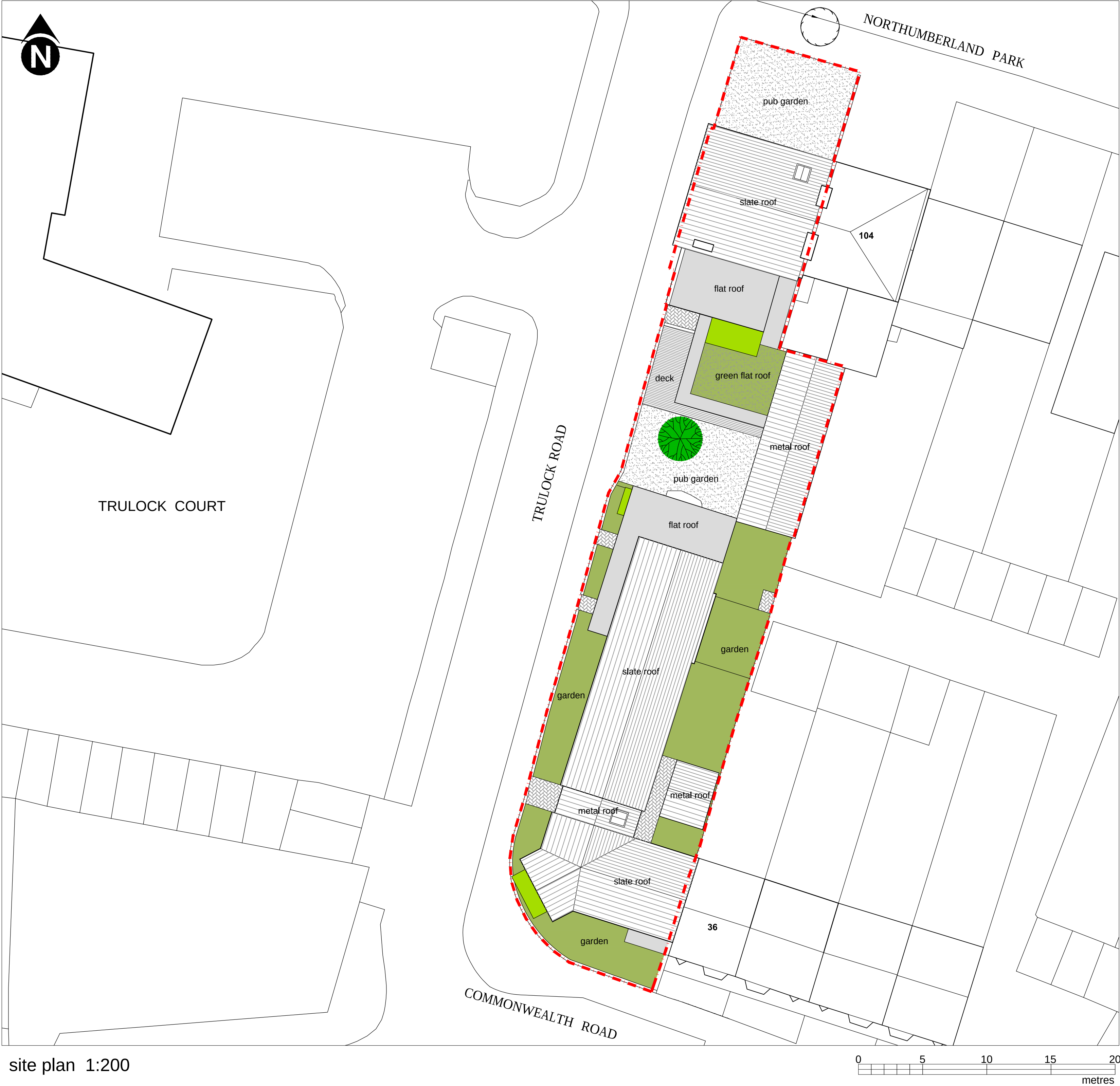
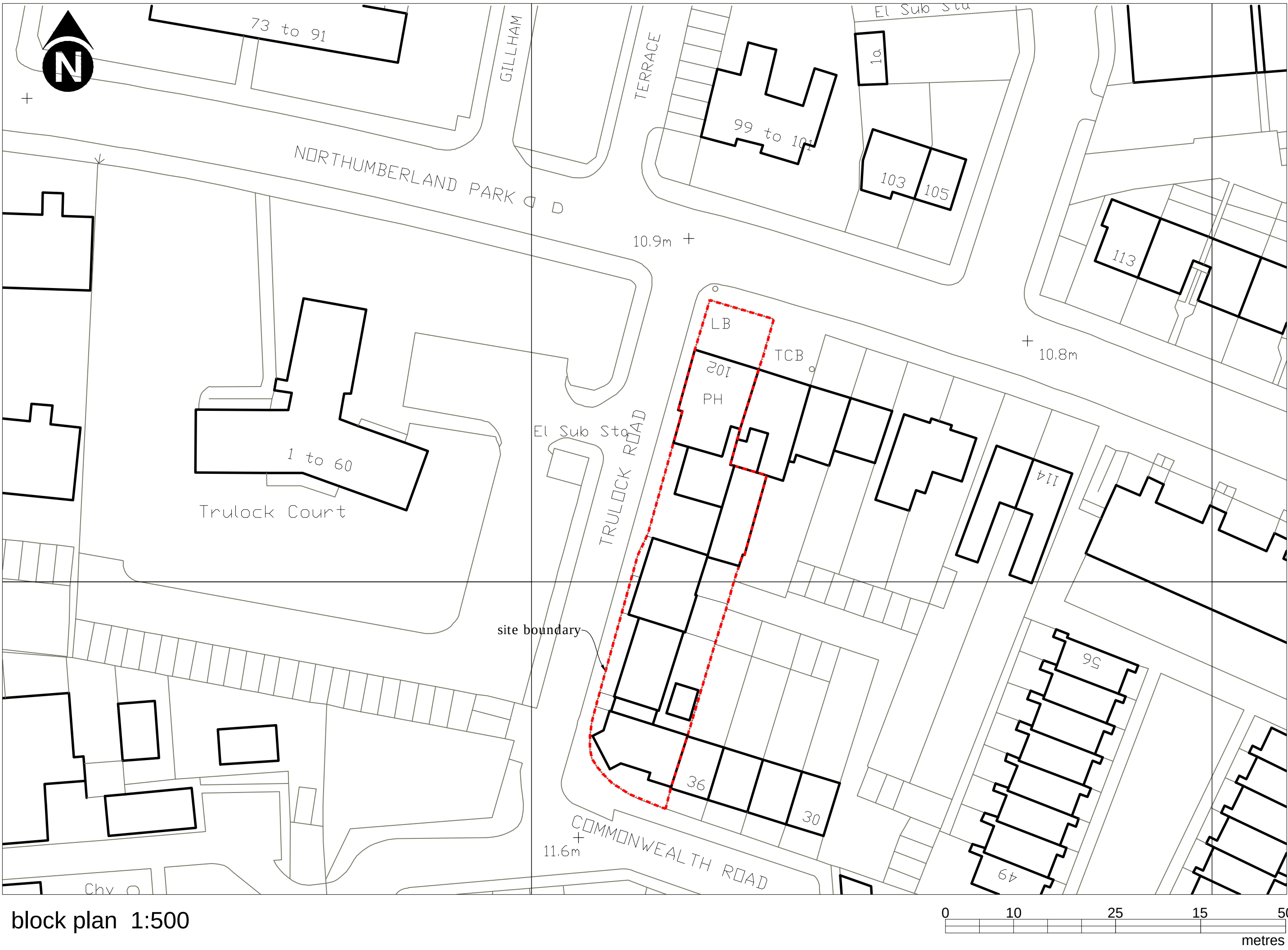
FIGURES



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Project Number: 2293	Project: 102 Northumberland Park, London	Scale: NTS
Figure 1	Site Location Plan	

FIGURE 2
PROPOSED DEVELOPMENT LAYOUT



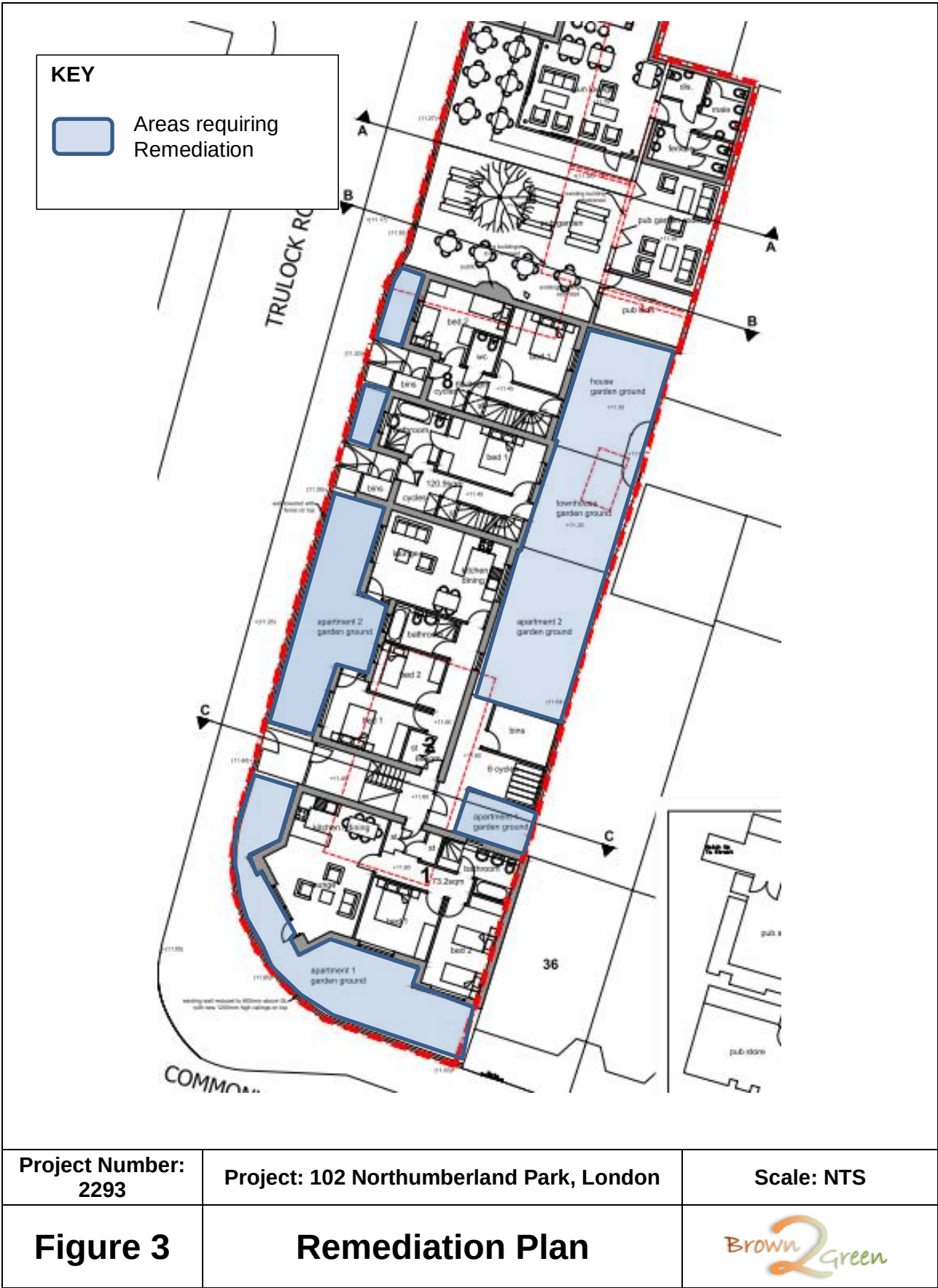
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drawing As Proposed Block and Site Plans		
date Aug'17	scale As noted@A1	drawn by JS
drg.no. FPT_11	revision	



APPENDICES

APPENDIX I

CHEMICAL SPECIFICATION FOR TOP AND SUB SOIL

Determinant	Maximum Concentration (mg/kg)		
Arsenic **	37		
Cadmium**	11		
Chromium**	910		
Lead***	200		
Mercury**	40		
Nickel****	75		
Selenium**	250		
Copper ****	130		
Zinc ****	200		
Asbestos	None detected		
pH	5 - 10		
	1% Soil Organic Matter	2.5% Soil Organic Matter	6% Soil Organic Matter
Polycyclic Aromatic Hydrocarbons			
Naphthalene**	2.3	5.6	13
Acenaphthylene **	170	420	920
Acenaphthene **	210	510	1100
Fluorene **	170	400	860
Phenanthrene **	95	220	440
Anthracene**	2400	5400	11000
Fluoranthene**	280	560	890
Pyrene**	620	1200	2000
Benz(a)anthracene**	7.2	11	13
Chrysene**	15	22	27
Benzo(b)fluoranthene**	2.6	3.3	3.7
Benzo(k)fluoranthene**	77	93	100
Benzo(a)pyrene**	2.2	2.7	3.0
Indeno(123-cd)pyrene**	27	36	41
Dibenzo(a,h)anthracene**	0.24	0.28	0.3
Benzo(ghi)perylene**	320	340	350
Total Petroleum Hydrocarbons			
TPH C ₅ -C ₆ **	42	78	160
TPH C ₆ -C ₈ **	100	230	500
TPH C ₈ -C ₁₀ **	27	65	150
TPH C ₁₀ -C ₁₂ **	74	180	380
TPH C ₁₂ -C ₁₆ **	140	330	500
TPH C ₁₆ -C ₂₁ ****	260	500	500
TPH C ₂₁ -C ₃₅ ****	500	500	500
Total TPH C ₅ -C ₃₅ ****	500	500	500

Source of Values

* Soil guideline value, DEFRA/Environment Agency

** Tier 1 GAC are based on Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. **Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3086.**

*** - Category 4 Screening Level.

**** BS 3882 British Standards Specification for Top Soil.

***** B2G level to ensure no visible or olfactory evidence.

The soils must be physically suitable for the intended use and be free from deleterious materials such as glass, plastic, wood, paper etc. It is recommended that topsoil should generally comply with the requirements of the specification for multigrade topsoil as given in BS 3882: 2015 or to the satisfaction of the landscape architect.