



Resilience and
Flood Risk

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2 Midcroft, Ruislip, HA4 8ES

FLOOD RISK ASSESSMENT

14/07/2020

Version 1.0

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1.0	14/07/2020		Iqbal Deooray

Quality Control

Action	Signature	Date
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Checked	Alexandros Tsavdaris	13/07/2020
Approved	Alexandros Tsavdaris	13/07/2020

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Contents

1.0	INTRODUCTION.....	1
2.0	SITE DETAILS	1
2.1	Site location	1
2.2	Site description	2
2.3	Development proposal	2
3.0	FLOOD RISK	2
3.1	Sequential test	2
3.2	Flooding history.....	3
3.3	Fluvial (Rivers).....	3
3.4	Flood defence breach or overtopping.....	3
3.4.1.	Breach risk.....	3
3.4.2.	Overtopping risk.....	3
3.5	Coastal/tidal	3
3.6	Pluvial (Surface water)	3
3.7	Artificial water bodies	6
3.8	Groundwater	6
3.9	Sewers.....	6
4.0	MITIGATION MEASURES	7
4.1	Risk to buildings.....	7
4.1.1.	Finished floor levels	7
4.1.2.	Flood resistance.....	7
4.1.3.	Flood resilience	7
4.2	Risk to occupiers.....	7
4.2.1.	Safe access/egress	7
4.2.2.	Flood warning and evacuation plan.....	7
4.3	Risk to others	7
4.3.1.	Floodplain compensation	7
4.4	SuDS feasibility.....	7
5.0	CONCLUSION	9
6.0	RECOMMENDATIONS	9
	APPENDIX A – DEVELOPMENT PROPOSALS	10
	APPENDIX B – 2014 SYNTEGRA CONSULTING PHASE 1 GEO-ENVIRONMENTAL REPORT	11



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1.0 Introduction

RAB Consultants has prepared this Flood Risk Assessment (FRA) in support of the proposed residential development at 2 Midcroft, Ruislip, HA4 8ES.

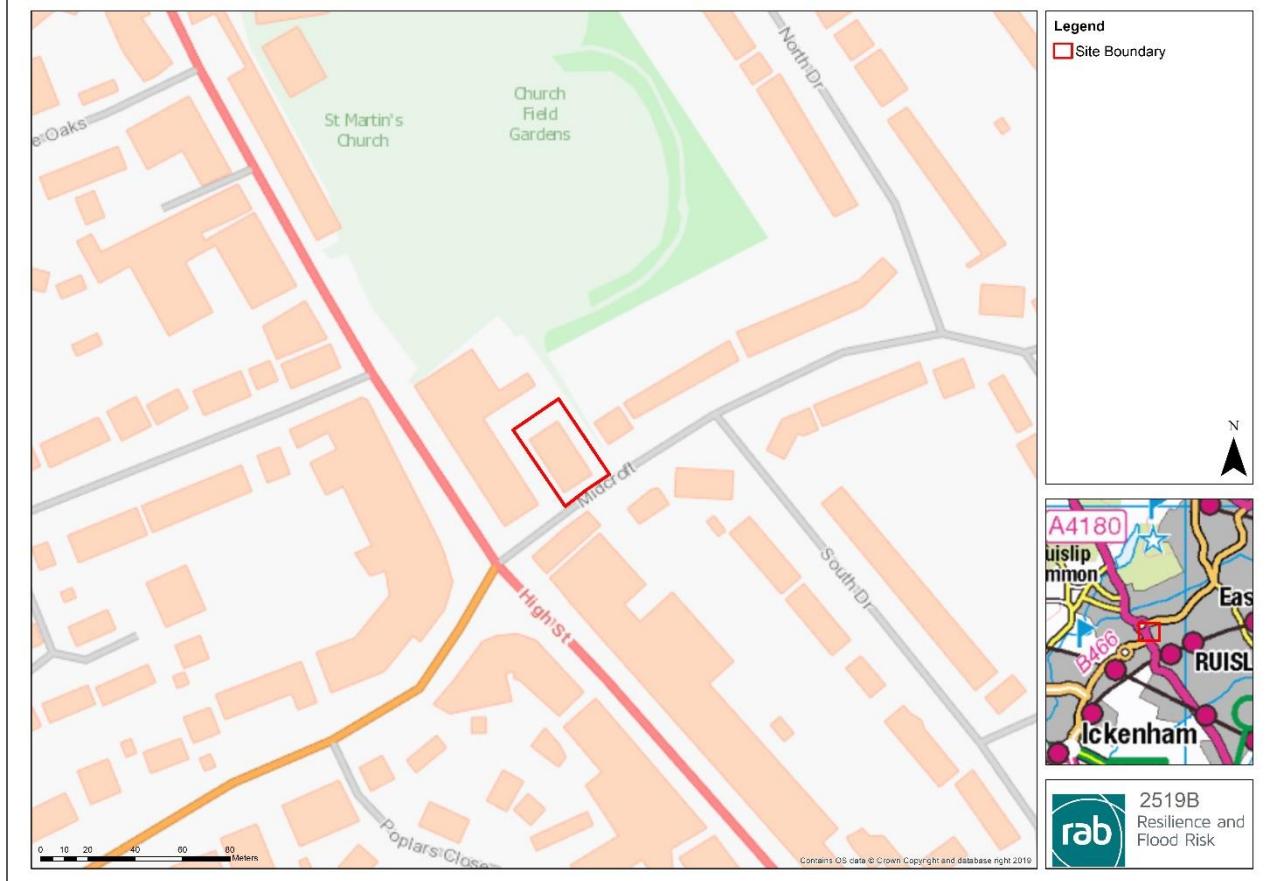
The development site is located in Flood Zone 1 according to the Environment Agency's Flood Map for Planning (Rivers and Sea). A Flood Risk Assessment for this site is required as it was requested from the London Borough of Hillingdon. The site-specific FRA is required to ensure that the development is safe from flooding and will not increase the risk of flooding elsewhere.

2.0 Site details

2.1 Site location

TABLE 1: SITE LOCATION

Site address:	2 Midcroft, Ruislip, HA4 8ES
Site area:	619.6 m ²
Existing land use:	Car wash
OS NGR:	TQ 09252 87392
Local Planning Authority:	London Borough of Hillingdon



2.2 Site description

The site is located within the town of Ruislip in the London Borough of Hillingdon. The site is accessed from Midcroft and is bounded by a densely urbanised, mostly commercial, area to the west and a residential area to the east. The site is currently a car wash and is comprised of 100% hardstanding area.

2.3 Development proposal

Permission is sought for the demolition of the existing petrol station and the construction of a four storey building to create 2 x 1-bed, 3 x 2-bed, and 4 x 3-bed self-contained flats. This will include a basement utilised for parking and associated amenity space, refuse and cycle storage.

3.0 Flood Risk

3.1 Sequential test

According to the Environment Agency's Flood Map for Planning the site lies in Flood Zone 1, which is described in the NPPF as land having a less than 1 in 1,000 annual probability of river or sea flooding (less than 0.1% AEP).

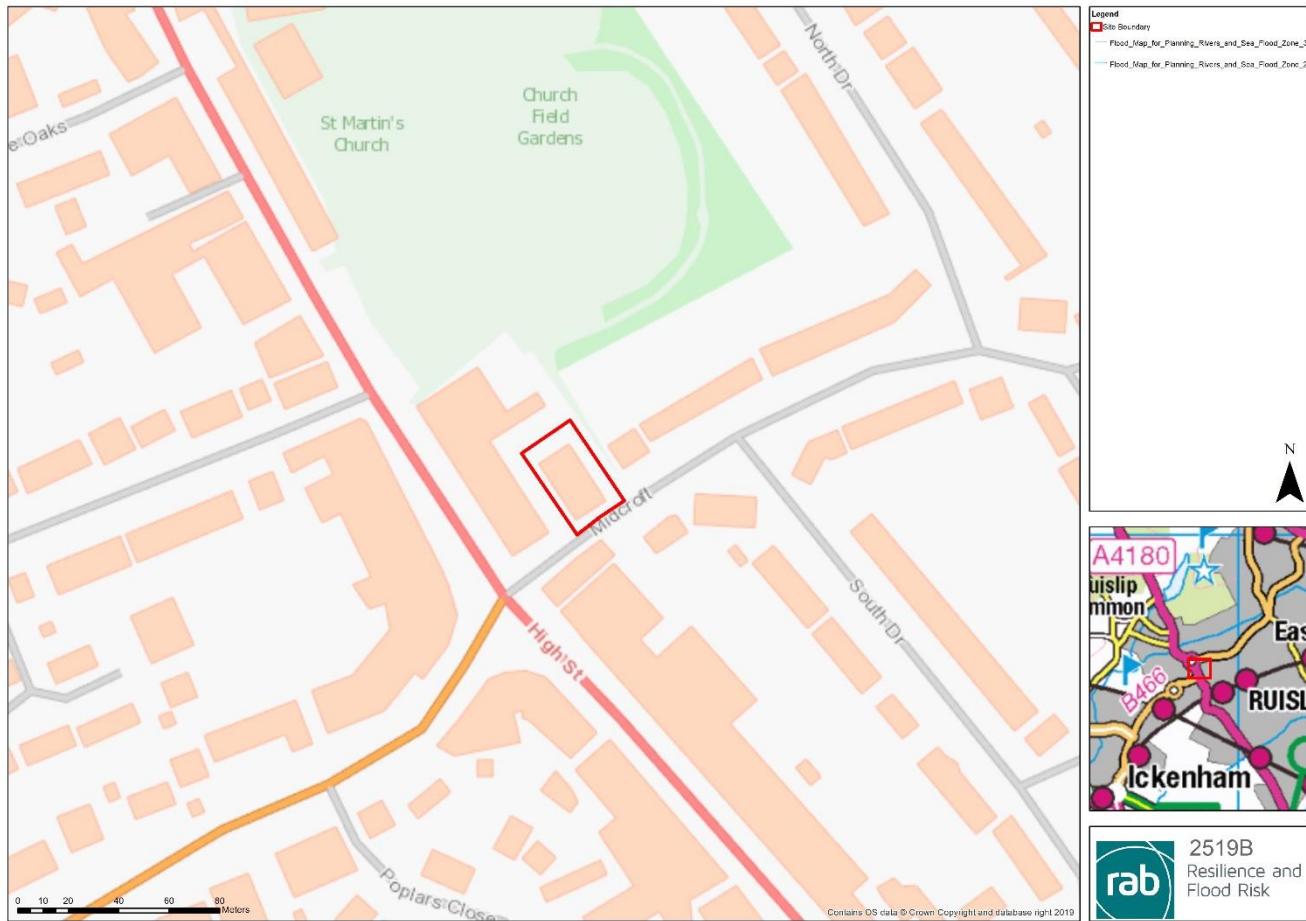


FIGURE 1: ENVIRONMENT AGENCY FLOOD MAP FOR PLANNING

The NPPF follows a sequential risk-based approach in determining the suitability of land for development in flood risk areas, with the intention of steering all new development to the lowest flood risk areas. NPPF Planning Practice Guidance (PPG) Table 2 confirms the 'Flood risk vulnerability classification' of a site,

depending upon the proposed usage. This classification is subsequently applied to Table 3 'Flood risk vulnerability and flood zone compatibility' to determine whether:

- The proposed development is suitable for the flood zone in which it is located; and
- Whether an Exception Test is required for the proposed development

The proposed development is classed as a 'more vulnerable' development in accordance with NPPF PPG. The development is therefore appropriate for the Flood Zone.

3.2 Flooding history

According to the 2018 West London Strategic Flood Risk Assessment (SFRA) mapping tool the site is shown to be located outside the historic fluvial flood outline.

The 2013 London Borough of Hillingdon Surface Water Management Plan (SWMP) shows there have been no historic surface water incidences at the site with the nearest event at Ruislip Tube Station located approximately 420m south.

3.3 Fluvial (Rivers)

According to the Environment Agency Flood Map for Planning, the site is located in Flood Zone 1 therefore has less than 0.1% AEP risk of flooding from this source.

3.4 Flood defence breach or overtopping

3.4.1. Breach risk

The site is not protected by any formal defences therefore is not at risk from a breach.

3.4.2. Overtopping risk

The site is not protected by any formal defences therefore is not at risk from overtopping.

3.5 Coastal/tidal

The site is located at a considerable distance from the sea and is not at risk of coastal or tidal flooding.

3.6 Pluvial (Surface water)

When the infiltration capacity of land or the drainage capacity of a local sewer network is exceeded, excess rainwater flows overland. This water will collect in topographic depressions and at obstructions, which can inundate development in low lying areas. The severity of the rainfall event, the degree of saturation of the soil before the event, the permeability of soils and geology, and the gradient of the surrounding land and its use; all contribute to and affect the severity of overland flow.

The Environment Agency Flood Map for Surface Water (Figure 2), can be used to see the approximate areas that would experience surface water flooding from a range of AEPs, which is used to categorise the risk (Table 2).

The site and access are shown to be at very low risk from surface water flooding.

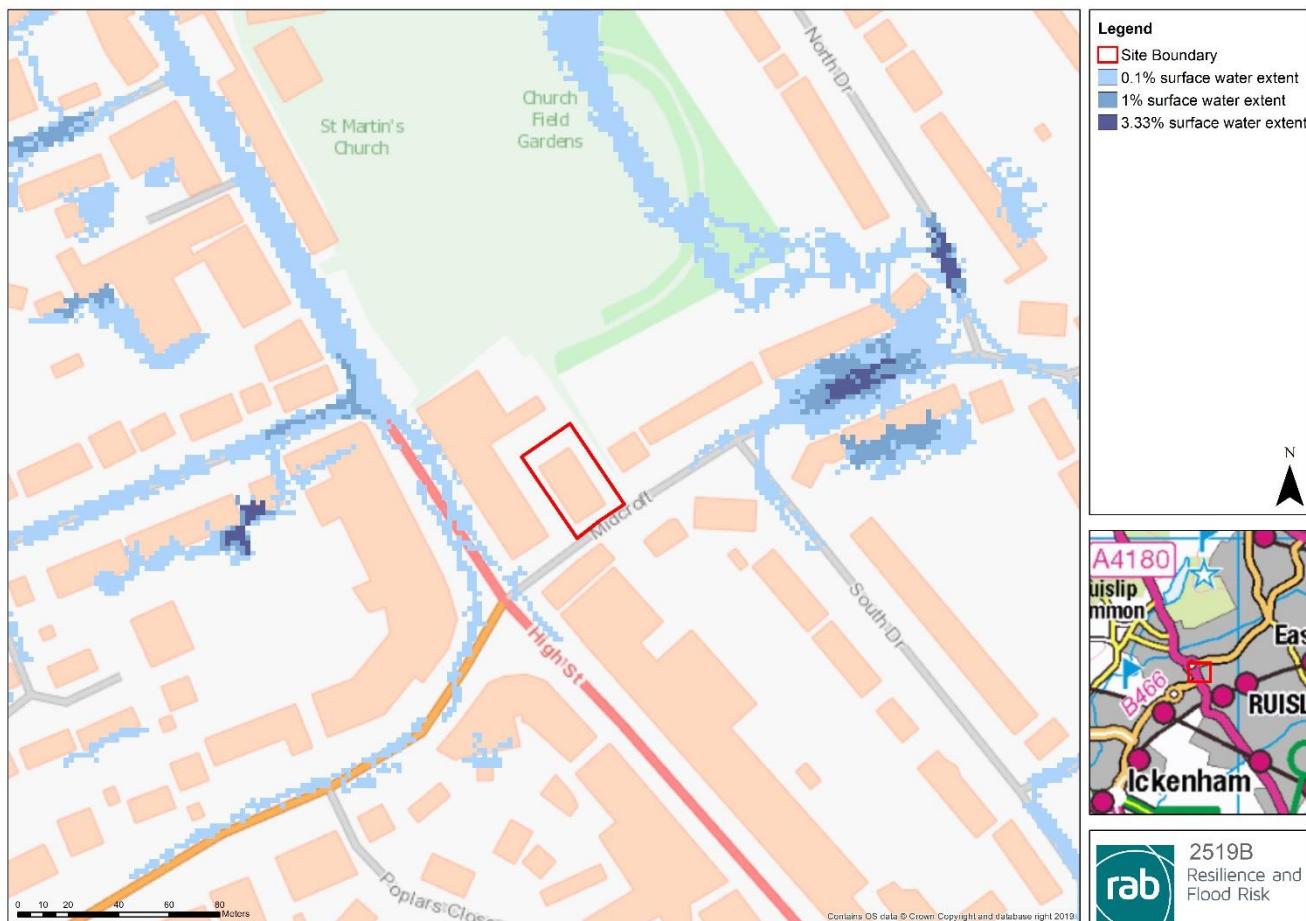


FIGURE 2: ENVIRONMENT AGENCY FLOOD RISK FROM SURFACE WATER

TABLE 2: ENVIRONMENT AGENCY SURFACE WATER RISK CATEGORIES

Surface Water Risk Category	Surface water flooding Annual Exceedance Probability
Very Low	< 0.1%
Low	Between 1% and 0.1% (1 in 100 years and 1 in 1000 years)
Medium	Between 1% and 3.3% (1 in 100 years and 1 in 30 years)
High	> 3.3% (1 in 30 years)

During the 3.33% AEP, 1% AEP and 0.1% AEP surface water events the site is shown not to flood (Table 3).

TABLE 3: SURFACE WATER FLOOD DEPTHS FOR A RANGE OF AEP'S



3.7 Artificial water bodies

According to the Environment Agency extent of flooding from reservoirs the site is not at risk from reservoir flooding.

According to the Canal and River Trust there are four waterways within 10 miles of the site which include Grand Union Canal, London Docklands, Paddington Arm and Slough Arm.

3.8 Groundwater

Groundwater flooding is water originating from sub-surface permeable strata which emerges from the ground, either at a specific point or over a wide diffuse location and inundates low lying areas. A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface and inundate low lying land.

British Geological Survey (BGS) records indicate that the site overlies bedrock composed of London Clay Formation - clay, silt and sand. There are no recorded superficial deposits recorded.

Borehole TQ08NE119 located approximately 105m north west of the site supports the above findings with a dominance of clay and no struck water.

The Magic Map tool suggests the site is not located within a bedrock or superficial aquifer and is in an unproductive area for groundwater vulnerability.

According to the 2018 SFRA mapping tool the site is located within an area of <25% susceptibility to groundwater flooding and is shown to be located outside an increased potential for elevated groundwater area and source protection zone.

It should be noted that monitoring ground water level is not reasonable in this instance as the London Clay is of very low permeability and therefore, unlikely to record a phreatic water level. Any water encountered would be perched within the Made Ground.

A Phase 1 Geo-Environmental Report has been prepared by Syntegra Consulting in 2014 (Appendix B) and it should be ensured that the report recommendations are implemented where applicable.

As there is a high degree of variability when considering groundwater flooding, using historic flooding is not a robust measure of the risk of flooding in future years.

3.9 Sewers

Thames Water is responsible for the adopted surface and foul sewer networks within the area and maintain a DG5 register of sites affected by sewer flood incidents on a post code basis. According to the 2018 SFRA mapping tool there have 1-21 historic incidences in the postcode area.

It is important to note that previous sewer flood incidents, or the lack thereof, do not indicate the current or future risk to the site. Upgrade work could have been carried out to alleviate any issues or conversely, in areas that have not experienced sewer flooding incidents, the local drainage infrastructure could deteriorate leading to future flooding.

4.0 Mitigation measures

4.1 Risk to buildings

4.1.1. Finished floor levels

In accordance with BS8533:2017 '*Assessing and managing flood risk in development –code of practice*', in order to afford a level of protection against flooding it is recommended that finished floor levels should be set at a nominal 300mm above either the 1% AEP of fluvial flooding or the 0.5% AEP of tidal flooding depending on which is greater (both including climate change).

The site is at very low risk from fluvial flooding therefore, it is industry best practice that the ground floor finished level is set 150mm above local ground level.

4.1.2. Flood resistance

Flood resistance measures are not required in this instance.

4.1.3. Flood resilience

Flood resilience measures are not required in this instance.

4.2 Risk to occupiers

4.2.1. Safe access/egress

The site is at very low risk from fluvial and surface water flooding therefore safe access/egress is achievable.

4.2.2. Flood warning and evacuation plan

The site falls outside a flood warning area and as such an evacuation plan is not applicable.

4.3 Risk to others

4.3.1. Floodplain compensation

The site is not shown to flood during the design fluvial event therefore, there will be no loss of floodplain storage as a result of development.

4.4 SuDS feasibility

The SuDS Manual (2015), discusses the SuDS approach to managing surface water runoff which is intended to mimic the natural catchment process as closely as is possible. The approach sets out the design objectives in respect of SuDS:

- Use of surface water runoff as a resource;
- Manage rainwater close to where it falls (at source);
- Manage runoff on the surface (above ground);
- Allow rainwater to soak into the ground (infiltration);
- Promote evapotranspiration;

- Slow and store runoff to mimic natural runoff rates and volumes;
- Reduce contamination of runoff through pollution prevention and by controlling the runoff at source; and
- Treat runoff to reduce the risk of urban contaminants causing environmental pollution.

Depending on the characteristics of the site and local requirements, these may be used in conjunction and to varying degrees. Table 4 presents the functions of the SuDS components (from which a management train can be created) and their feasibility in respect of the site.

TABLE 4: FEASIBILITY OF SuDS TECHNIQUES AT THE DEVELOPMENT SITE

Technique	Description	Feasibility Y / N / M (Maybe)
Good building design and rainwater harvesting	Components that capture rainwater and facilitate its use within the building or local environment.	Maybe – a rainwater harvesting tank or water butts could be incorporated into the final design.
Porous and pervious surface materials	Structural surfaces that allow water to penetrate, thus reducing the proportion of runoff that is conveyed to the drainage system (green roofs, pervious paving).	Yes – the area around the property could use permeable paving.
Infiltration Systems	Components that facilitate the infiltration of water into the ground. These often include temporary storage zones to accommodate runoff volumes before slow release to the soil.	No – due to the underlying geology and lack of space on site infiltration systems are not possible.
Conveyance Systems	Components that convey flows to downstream storage systems (e.g. swales, watercourses).	No – conveyance systems are not possible on site due to the lack of space.
Storage Systems	Components that control the flows and, where possible, volumes of runoff being discharged from the site, by storing water and releasing it slowly (attenuation). These systems may also provide further treatment of the runoff (e.g. ponds, wetlands, and detention basins).	Yes – the use of the sub-base of the permeable pavement or the installation of a cellular storage tank could offer storage benefits.
Treatment Systems	Components that remove or facilitate the degradation of contaminants present in the runoff.	Yes – treatment systems could be incorporated into the above SuDS features.

5.0 Conclusion

The proposed development at 2 Midcroft, Ruislip, HA4 8ES is located in Flood Zone 1 as defined in the NPPF. The proposal includes the demolition of an existing petrol station and construction of a four storey building.

On the basis of the available information from the Environment Agency and London Borough of Hillingdon the site is at very low risk from surface water and fluvial flooding. The site is showed to be located within an area of <25% susceptibility to groundwater flooding with 1-21 historic sewer flooding incidences.

The proposed development can provide safe access and egress. SuDS should be incorporated into the final design to provide a level of betterment, as discussed in section 4.4.

It can be concluded that the proposed development can be deemed appropriate, provided that the recommendations in this report are adhered to, it will not increase the flood risk to other people.

6.0 Recommendations

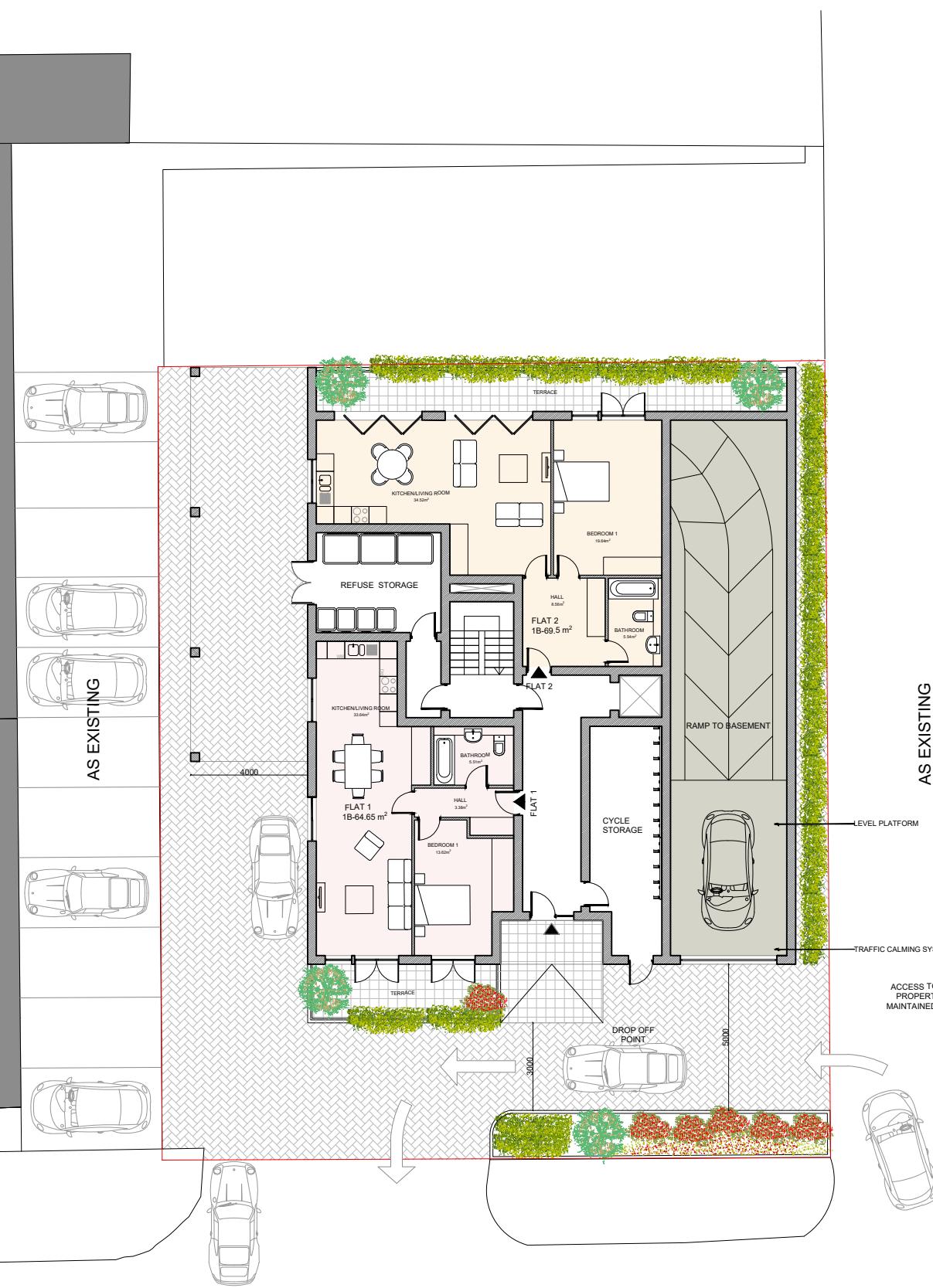
- It is recommended that finished ground floor levels are set 150mm above local ground level.
- The development presents an opportunity to manage surface water more sustainably and SuDS should be incorporated into the final design. Such measures should be confirmed by a site-specific surface water management strategy, during the detailed design stage.
- The recommendations of the Phase 1 Geo-Environmental report, prepared by Syntegra Consulting, should be applied where appropriate.
- The basement design should be undertaken by a qualified structural engineer ensuring latest insulation approaches are adopted.



Appendix A – Development Proposals

53 - 55

19



NOTES
Drawings for sketch purposes only
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Ground floor
7 Progress Business Centre
Whittle Parkway
Bunham SL1 6DQ
England
usl@uslarchitects.co.uk

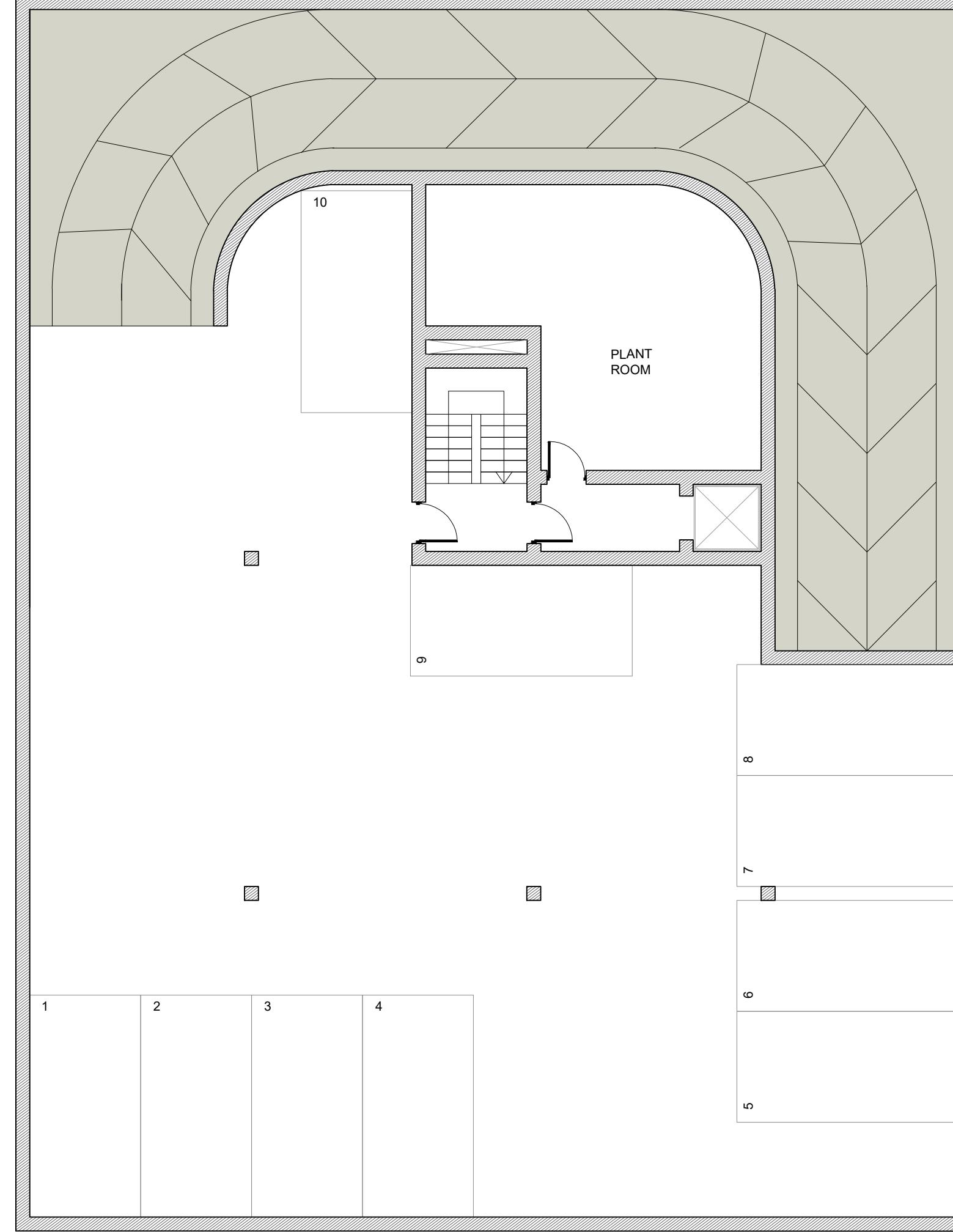
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19/ MRH	MIDCROFT 2 Midcroft HA4 8ES - Ruislip England	PROPOSED SITE PLAN	MRH/PL/106	Dm Chk												
Date	17/01/2020		CDG	BK												



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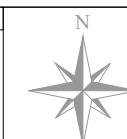


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Ground floor
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Whittle Parkway
Bunham SL1 6DQ
England
usl@uslarchitects.co.uk

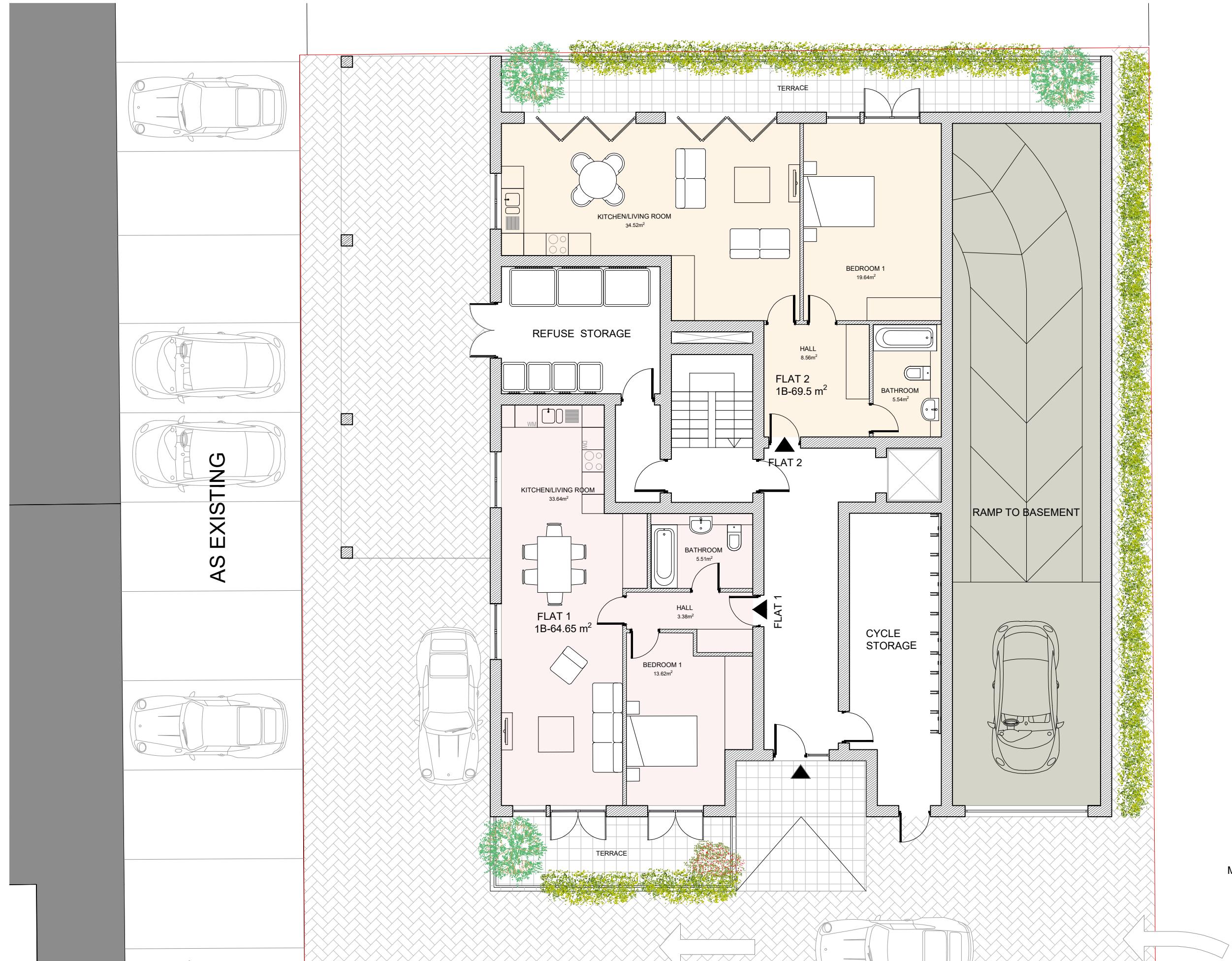
Job No.	Job	Drawing	Drawing No.	Revision	N	0m	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m
19/ MRH	MIDCROFT 2 Midcroft HA4 8ES - Ruislip England	PROPOSED BASEMENT	MRH/PL/100	Dm Chk												
17/01/2020			CDG	BK												



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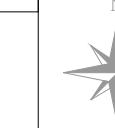
Ground floor
7 Progress Business Centre
Whittle Parkway
Bunham SL1 6DQ
England
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Job No.
19/ MRH
Date
17/01/2020

MIDCROFT
2 Midcroft
HA4 8ES - Ruislip
England

PROPOSED GROUND FLOOR

Drawing No.
MRH/PL/101
Dm Chk
CDG BK

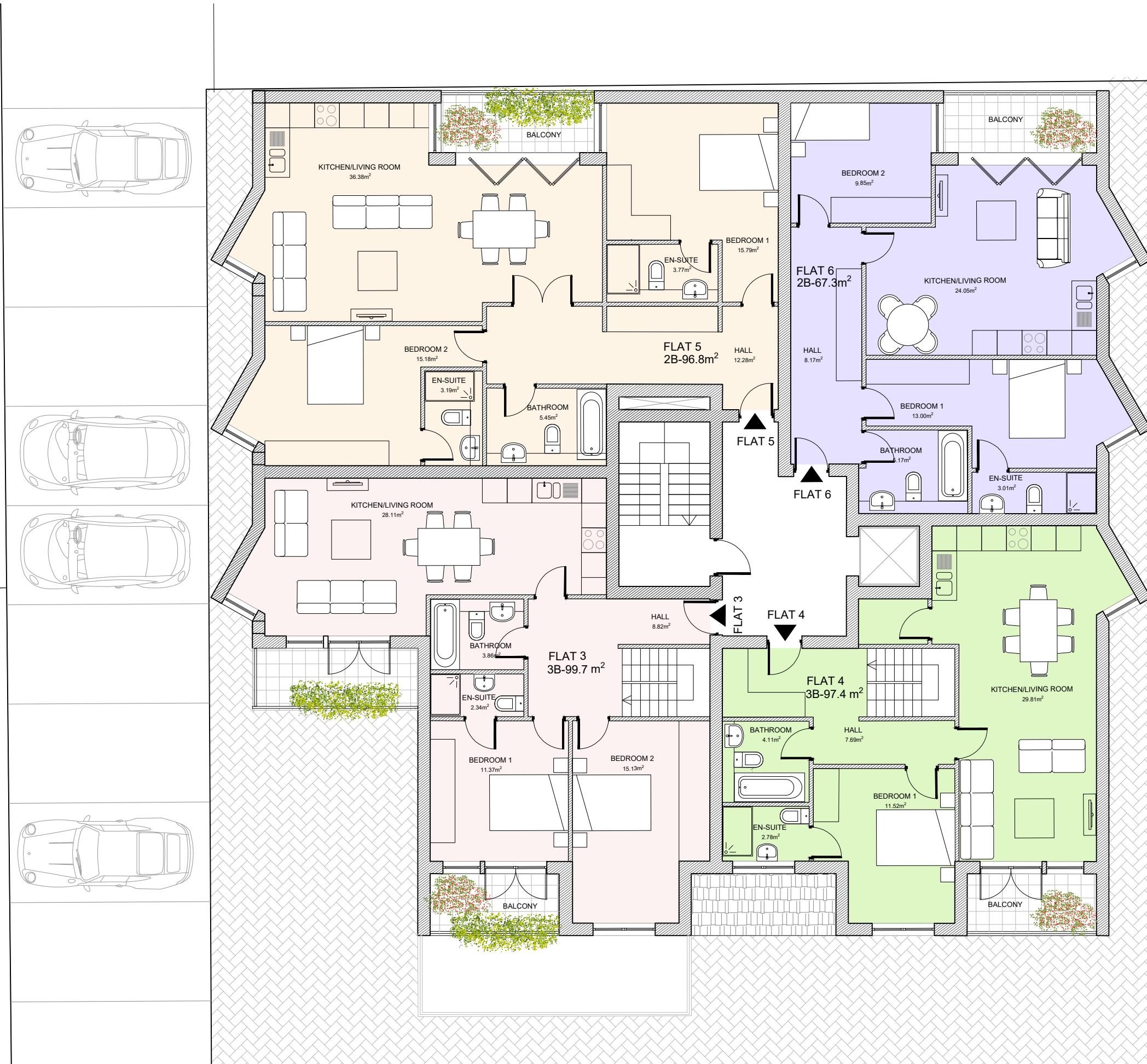


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NOTES

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Appendix B – 2014 Syntegra Consulting Phase 1 Geo-Environmental Report



Phase I
Geo-
Environmental
Report

May 2014

2 Midcroft, Ruislip, HA4 8ES

QUALITY ASSURANCE

Issue/revision	Issue 1	Revision 1	Revision 2
Remarks			
Date	May 2014		
Prepared by	W.Spraggs		
Qualifications	BSc (Hons), MSc		
Signature			
Checked by	P. Dennis		
Qualifications	BEng (Hons), CGeol, EurGeol, FGS		
Signature			
Authorised by	P. Dennis		
Qualifications	BEng (Hons), CGeol, EurGeol, FGS		
Signature			
Project number	80462		
Doc. Ref – QR1-4		Issued – August 2013	By – A Edgar

EXECUTIVE SUMMARY

Site Address	Former service station, 2 Midcroft, Ruislip, HA4 8ES
Grid Reference	509270, 187406
Site Area	0.07 hectares (ha)
Current Site Use	The subject site comprises a disused petrol service station with areas of hard standing and associated fuel storage tanks. A car wash business is currently in operation on the site. Storage of motor vehicles also currently takes place on site as well.
Adjacent Site Use	Residential dwellings, commercial properties and a recreation ground.
Environmental Setting	Geology – Bedrock of London Clay Formation, no overlying superficial deposits. Aquifers – Unproductive Aquifer. Sensitive Land Uses – Residential dwellings within close proximity. Hydrology – There are no surface watercourses within influencing distance of the site.
Site History	Historical maps indicate that the site was developed in the 1960s for use as a garage and records suggest that petrol filling activities took place on site from 1972 onwards. The site has remained unchanged since.
Utility Locations	A site walkover identified surface water drainage presumed to link into existing drainage infrastructure in Midcroft.
Landfill Sites & Ground Gases	The potential for the deposition of Made Ground and fuel leakage are considered to be the only on-site sources of hazardous ground gas and vapour generation.
Radon	Unaffected – no special precautions required.
Coal Mining / Land Stability	Site is unaffected by coal mining. No special precautions required.
Initial Conceptual Site Model (CSM)	On-site The Made Ground materials generated during construction of the site, the AST and USTs and the historic use of the site as a petrol filling station have the potential to have impacted the site by toxic heavy metals, sulphates, ACM, PAH and TPH from the deposition of ash or lead pipework and from fuel leakage. Given the type and nature of the historical development the likelihood of the site being affected by the presence of any on-site contamination is considered to be moderate to high. Off-site The nearby electricity substation and graveyard are not considered to present significant risks to the proposed development due to the limited mobility of the contaminants associated with these potential sources and the assumed presence

	<p>of cohesive near surface deposits. The risk from off site sources of contamination is therefore considered to be low.</p>
<p>Preliminary Geotechnical Assessment</p>	<p>Ground Conditions</p> <p>The underlying clay deposits may be subject to heave or swell based upon the close proximity of the mature trees to the proposed development.</p> <p>Ground Instability</p> <p>The site is not situated in an area affected by coal mining.</p> <p>Indicative Foundation Solutions</p> <p>Based on the information reviewed as part of the Phase I Assessment, it may be feasible to construct the proposed development using strip foundations if the site investigation encountered suitable bearing capacities within the strata.</p>
<p>Recommendations</p>	<p>A detailed Phase II intrusive Geo-Environmental ground investigation should be undertaken in order to confirm the findings of the initial conceptual site model, to determine foundation design and to assess the underlying clay for its susceptibility to heave / swell.</p> <p>A Remediation Strategy (RS) for the site will be required. The degree of remediation required will be governed by the contamination impact encountered during the Phase II ground investigation. In addition a Material Management Plan (MMP) should be developed to ensure a cost effective and regulatory compliant approach to enabling works.</p> <p>A full set of service drawings should be obtained for the site prior to any intrusive works being undertaken. The intrusive works will return site investigation information with a higher degree of confidence if unobstructed access to the whole site area can be obtained (free of parked vehicles) prior to the Phase II intrusive works being undertaken.</p>

TABLE OF CONTENTS

QUALITY ASSURANCE.....	1
EXECUTIVE SUMMARY	2
1.0 INTRODUCTION.....	7
1.1 Background.....	7
1.2 Proposed Development.....	7
1.3 Objectives	7
1.4 Sources of Information.....	8
1.5 Risk Classification.....	8
1.6 Limitations of the Study	9
2.0 SITE SETTING.....	10
2.1 Site Details	10
2.2 Current Site Use.....	10
2.3 Surrounding Area	11
3.0 SITE HISTORY	12
3.1 On-Site Historical Development.....	12
3.2 Off-Site Historical Development	13
3.3 Planning History	13
4.0 ENVIRONMENTAL SETTING.....	14
4.1 Geology & Hydrogeology	14
4.2 Geotechnical Data	14
4.3 Coal Mining	14
4.4 Hydrology.....	15
4.5 Radon Risk Potential.....	15
4.6 Industrial Land Uses.....	15
4.7 Sensitive Land Uses.....	15
4.8 Site Sensitivity Assessment	15
4.9 Geotechnical Assessment	16

5.0 CONSULTATIONS.....	17
5.1 Contaminated Land Officer	17
5.2 Landfill Sites and Waste Treatment Sites	17
5.3 Regulatory Database	17
6.0 CONCEPTUAL SITE MODEL (CSM).....	19
6.1 Initial CSM	19
6.2 Contaminant Sources.....	19
6.3 Potential Pathways	19
6.4 Potential Receptors	19
7.0 CONCLUSIONS & RECOMMENDATIONS	23

APPENDICES

Appendix I Limitations

Appendix II Drawings

Drawing No 80462p1r0/001 – Site Location Plan

SCP Architects Ltd Drawing No. S201, Rev F - Proposed Development Plan

Appendix III Photographs

Appendix IV Historical Mapping

1.0 INTRODUCTION

1.1 Background

Syntegra Consulting Ltd. have been appointed by **Mr. Jag Singh** to undertake a Phase I Geo-Environmental Site Assessment at the site of the former fuel service station, 2 Midcroft, Ruislip.

This report is required to determine potential contaminated land and geotechnical liabilities associated with the acquisition of the land for residential development.

1.2 Proposed Development

The client intends to redevelop the site for a residential end use, comprising of a new residential building arranged over four floors with 14 flats, two commercial units at the ground floor level and underground car parking. The works will include the demolition of existing petrol station and removal of underground fuel storage tanks. A proposed layout plan for the site is presented within Appendix II, as SCP Architects Ltd drawing no. S201, Rev F.

1.3 Objectives

The objectives of the desk based study are to:

- Undertake a site inspection to identify any current areas of potential environmental concern;
- Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors; and,
- Provide a factual and interpretative report relating to the desk study and provide preliminary recommendations on any potential development issues.

1.4 Sources of Information

Background information was sought from the following sources:

- Groundsure Database Search;
- Historical mapping dated 1865 to 2012. A selection of historical maps are reproduced in Appendix IV;
- On-line planning records held by London Borough of Hillingdon;
- Consultations with representatives of the London Borough of Hillingdon;
- Environment Agency Groundwater Vulnerability Map (www.environment-agency.gov.uk/wiyby);
- Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007); and,
- British Geological Survey (BGS) Geological Map (Sheet 256, 1:50,000, North London, Solid & Drift edition).

1.5 Risk Classification

REC Ltd has utilised the available data to classify the site on the basis of its likely contaminated land liability and potential for geotechnical constraints in relation to the property development. The risk classification definitions are summarised below:

Risk	Definition
Low	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property.
Low-Moderate	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property with regard to the proposed use. However, minor issues may require further consideration in the event of a future redevelopment of the site etc.
Moderate	Some potential contaminated land liabilities/geotechnical constraints are likely to affect the property as a result of historical and/or current activities. The risks identified are unlikely to pose an immediate significant issue but the purchaser/developer may wish to make further enquiries of the vendor or undertake further environmental improvements. Redevelopment of the site will likely require further site investigation.
Moderate-High	Some potentially significant contaminated land liabilities/geotechnical constraints have been identified at the property that requires further assessment including intrusive ground investigations.
High	Significant potential contaminated land liabilities/geotechnical constraints have been identified at the property. Further assessment including intrusive ground investigation will be required to determine the level of risk and associated liability.

1.6 Limitations of the Study

The limitations of this report are presented in Appendix I.

2.0 SITE SETTING

2.1 Site Details

Site Address	Former fuel service station, 2 Midcroft, Ruislip, HA4 8ES
National Grid Reference	509270, 187406
Site Area	0.07 ha

A site location plan is presented in Appendix II as Drawing No 80462p1r0/001.

2.2 Current Site Use

Site Description

The subject site is roughly square in shape and is located on Midcroft, Ruislip. A site walkover was undertaken by Syntegra Consulting on 13th May 2014.

The site comprises a former petrol filling station, which is now disused. A car wash business is currently being run from the site, with vehicle storage also taking place over much of the site area. The petrol station canopy is still in place and it is understood from the Client that the underground petrol tanks are believed to still be *in situ*, located beneath the petrol station canopy as well. Anecdotal evidence suggests that the petrol station was converted to its current use around twelve months ago. The petrol station building itself is of single storey brick construction, estimated to have been built in the 1980s.

The site is covered in concrete hardstanding which was noted to be heavily worn in some areas which may have allowed surface water run-off and infiltration into shallow made ground beneath the site. A drainage gully was noted on site to collect surface water run off and four manhole covers associated with an oil water interceptor were noted on the western central section of the site as well.

The topography of the site slopes slightly from west to east.

The main site features are shown on Drawing No 80462p1r0/001 in Appendix II and selected photographs are presented in Appendix III.

Hazardous Materials Storage

A single above ground storage tank (AST) was noted at the rear of the site, in the north-west corner. This was an 11,000 litre metal diesel tank and fed a filling point located on the western side of the petrol station building. Evidence of hydrocarbon spillage on the surface of this site and into the surface water drainage was observed.

Two underground storage tanks (USTs) are thought to be located beneath the hardstanding at the site. As indicated above, information from the Client suggests that these tanks, of unknown volume, are located beneath the existing petrol station canopy.

The chemicals used for the washing of cars on site may also be hazardous in nature. A full inventory of these materials was not undertaken by REC as the car wash was in operation at the time of the site walkover.

Polychlorinated Biphenyls (PCBs)

No equipment that may potentially contain PCBs was observed at the site.

Asbestos Containing Material (ACM)

Although no ACMs were identified during the site walkover and the estimated age of the building, the presence of ACM cannot be entirely discounted. REC also recommends that the contractor working on the scheme satisfy themselves that ACMs are not present prior to undertaking any demolition works

Waste Storage

No potential waste streams were identified to be generated at the site.

Drainage Issues

A formal drainage survey has not been completed for the site but surface water drainage was observed and appeared to drain south from the site through oil/water interceptors to join up with drainage infrastructure in Midcroft.

2.3 Surrounding Area

The surrounding land uses are summarised below:

Direction	Land Use
North	Recreation Ground and church
East	Residential dwellings and associated garden areas
South	Commercial premises (banks and shops on High Street) and residential dwellings and associated garden areas
West	Commercial premises (banks and shops on High Street) and residential dwellings and associated garden areas

3.0 SITE HISTORY

3.1 On-Site Historical Development

A review of historical maps pertinent to the site is summarised in Table 3.1 below.

Table 3.1 Summary of Potentially Contaminative Historical Land Uses

Map Edition	Historical Land Use	
	On Site	Off Site
1865 (1:2,500)	The site is part of an open field that may be part of Wilkins Farm.	20m south-west of the site is a road. A church marked as St Martins is located 150m north-west of the site, a graveyard is also located in church. A 120m south-west is Wilkins Farm.
1896 (1:2,500)	No significant change in land use.	A smithy is now located 270m north-west of the subject site. A police station is located 175m north-west.
1914 (1:2,500)	No significant change in land use.	The graveyard associated with St Martins Church has extended southwards and is now located 50m from site. Residential properties have appeared 100m east of site.
1935 (1:2,500)	The western area of the site is now occupied by two separate buildings, appearing to be split into four sites.	Smithy no longer present. Residential properties are now present on north, east, south and west of site.
1961 (1:2,500)	The site now is part of two sites. One detailed as a garage on north-western corner. The south-western to south-eastern corner is residential property.	Graveyard no longer present on mapping, area is marked war memorial. A car park is located 250m south of the site. Otherwise no significant change in land use.
1972-1974 (1:2,500)	Part of the garage on western side of site, building has been cut back. The same has happened within residential property. The site now appears to be within two separate sites.	No significant change in land use.
1982 (1:2,500)	The garage building on western corner is no longer present. The site now appears in current configuration, the mapping classes the site as a garage.	An electrical substation is located 49m north-west of the site. Electrical substation is located 100m west of the site. Otherwise no significant change in land use.

1992 (1:2,500)	No significant change in land use.	No significant change in land use.
2012 (1:2,500)	No significant change in land use.	No significant change in land use.

3.2 Off-Site Historical Development

A review of potentially contaminative land uses identified on historical Ordnance Survey maps within a 250m radius of the site is summarised below in Table 3.2.

Table 3.2 Summary of Potentially Contaminative Off-Site Historical Land Uses

Surrounding Feature	Distance	Dates	Direction
Historical Graveyard	50m	Pre 1865 to 1961	North-west
Smithy	270m	1896 to 1935	North-west
Electrical substations	49m and 100m	1982 to present	North-west and West

3.3 Planning History

Syntegra Consulting has undertaken a review of on-line planning records held by London Borough of Hillingdon Council and no environmentally pertinent information has been obtained for the site. Some discussion of planning records with respect to the underground fuel tanks is made in Section 5 of this report.

4.0 ENVIRONMENTAL SETTING

4.1 Geology & Hydrogeology

The BGS geological map for the site, (Sheet 256, 1:50,000, North London, Solid & Drift edition) indicates that the site is underlain by the following geological sequence:

Geological Unit	Classification	Description	Aquifer Classification	Sensitivity
Bedrock	London Clay Formation	Clay, Silt and Sand	Unproductive	Low

The Groundsure report indicates there are no groundwater or potable water abstractions within 1.0 km radius of the site. An Environment agency Source Protection Zone 3 – Total Catchment is located 27m north of the site, whilst a Secondary (A) Aquifer within bedrock is located 300m north of the subject site. The site is not considered susceptible to groundwater flooding.

4.2 Geotechnical Data

Geotechnical Data presented within the Groundsure report identifies the following ground conditions:

Hazard	Designation
Shrink-Swell Clay	Low.
Landslides	Very Low.
Ground Dissolution	Null - Negligible.
Compressible Ground	Negligible.
Collapsible Deposits	Very Low.
Running Sand	Very Low.

4.3 Coal Mining

The site is in an area which is not affected by coal mining and therefore no Coal Authority Coal Mining Report was obtained for the purposes of this report.

4.4 Hydrology

No surface water features or abstractions within 250m of the subject site. The site is not located within a currently defined flood risk zone.

4.5 Radon Risk Potential

The UK radon website indicates the site is situated in an area where less than 1% of homes are above the Action Level and that the BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.

4.6 Industrial Land Uses

The closest being the on-site former fuel service station, which is also registered as petrol and fuel site which is currently closed. A total of eighteen (18 no.) industrial uses are located within 250m of the subject site, nearest 15.0m south-west and is classed as furniture store. A number of electricity sub-stations are located within 250m, closest 49m north-west.

4.7 Sensitive Land Uses

The closest residential properties are located adjacent to the subject site. No other environmentally sensitive land uses have been identified within close proximity to the subject site.

4.8 Site Sensitivity Assessment

The site is considered to be located within a moderate to high sensitivity setting due to the following reasons:

- Residential properties are located in close proximity;
- Drift is absent over the majority of the site;
- The underlying solid geology is classified as an Unproductive aquifer;
- The site is located 27m south of a Groundwater Source Protection Zone 3;
- There are no surface watercourses within influencing distance of the site; and
- Fuel storage and filling of vehicles has previously taken place at the site.

4.9 Geotechnical Assessment

The following potential geotechnical constraints have been identified:

- Unknown depth of Made Ground generated during the construction of the current buildings;
- Potential locally deep excavations following the removal of the former below ground structures; and,
- As mature and semi-mature trees are located to the north-east and south-west of the site, consideration should be given to the assessment of the clay soil plasticity and the locations of trees.

5.0 CONSULTATIONS

5.1 Contaminated Land Officer

The Contaminated Land Officer at the London Borough of Hillingdon Council was contacted on 8th May 2014 regarding any specific reports of pollution or nuisance at the subject site.

A response was given and stated that in September 2013 after closure of service station, there was concerns from residents regarding petrol station decommissioning. As far as the environmental health officer is aware the storage tanks are still on site. The planning records on the tanks are 2001 (above ground storage tank) and 1994 (one underground fuel storage tank).

The EHO informed us that a number of years ago, when the site was operational as a petrol filling station, there was an incident involving the leakage of petrol, with petrol migrating via drain conduits and the hydrocarbon vapours affecting the nearby housing in Midcroft. An investigation was undertaken by Environment Agency and the Health Protection Agency and a few of the nearby residents were temporarily housed in hotel accommodation. According to EHO, there were no further complaints and the matter was resolved. It is understood that the Environment Agency has the site investigation reports pertaining to the incident at the site.

5.2 Landfill Sites and Waste Treatment Sites

No historical landfills were identified within 500m of the subject site. The closest waste site is a waste transfer station located 943m south-west of the subject site.

5.3 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table only includes records not otherwise detailed in the report. A full copy of the database report is provided on the CD at the rear of this report.

Table 5.1 Summary of Groundsure Data

	0- 249m	250- 500m	Details
Contaminated Land Register Entries and Notices	0	0	Not Applicable (N/A).
Authorised industrial processes (IPC/IPPC/LAPPC).	3	0	80m south-west, dry cleaners with a part B permit. No enforcements notified for processes.
Fuel Stations Entries	0	0	N/A
Licensed radioactive substances	0	0	N/A.
Enforcements, prohibitions or prosecutions	0	0	N/A.
Discharge Consents	0	0	N/A.
Pollution Incidents	0	0	N/A.
Consents issued under the Planning (Hazardous Substances) Act 1990	0	0	N/A.
Control of Major Accident Hazard (COMAH) sites	0	0	N/A.

6.0 CONCEPTUAL SITE MODEL (CSM)

6.1 Initial CSM

In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), REC Ltd have developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area.

6.2 Contaminant Sources

On-site Potential Sources

- Historic made ground associated with current development and demolished buildings;
- An above ground storage tank (AST) and underground storage tanks (UST) located on site and;
- Previous historical garage on site (1972 – 1982).

Off-site Potential Sources

- Electrical substation (49m north-west); and;
- Historical graveyard (50m north-west).

6.3 Potential Pathways

- Inhalation of vapours, dust and fibres;
- Ingestion of contaminated soil;
- Direct contact with contaminated soil;
- Migration of ground gas; and;
- Vertical and lateral migration via preferential pathway (drainage or sand lenses within London Clay).

6.4 Potential Receptors

- Future site users;
- Neighbouring residential site users;
- Source Protection Zone 3 – Total Catchment (27m north); and;
- Secondary (A) Aquifer (300m north).

Construction workers are not considered to be a plausible receptor as exposure will be managed through the use of appropriate PPE and hygienic working practices as required under HSE / CDM regulations. Furthermore, the length of any exposure is likely to be for a short duration.

An Initial Conceptual Site Model has been prepared for the site and is presented within Table 6.1

Table 6.1 Initial Conceptual Site Model

Source	Contaminant	Potential migration pathways	Potential Receptors	Likelihood of Occurrence On site	Magnitude of Occurrence	Overall Risk Rating	Active/Inactive
On site							
Historic Made Ground associated with current development and previously demolished buildings	Metals (As, Cd, Cr, Pb, Hg, Se, Ni)	Ingestion and dermal contact of contaminated soils	Future Site Users	Likely	Medium	Moderate	Potentially Active – Further Investigation
	Polycyclic Aromatic Hydrocarbons (PAH)	Ingestion and dermal contact of contaminated soils	Future Site Users	Likely	Medium	Moderate	Potentially Active – Further Investigation
	Asbestos Fibres in Soil	Inhalation of fibres	Future Site Users	Likely	Medium	Moderate	Potentially Active – Further Investigation
	Total Petroleum Hydrocarbons (TPH)	Inhalation of vapours	Future Site Users	Likely	Medium	Moderate	Potentially Active – Further Investigation
AST and USTs	TPH and PAH	Inhalation of vapours	Future Site Users	Likely	High	High	Potentially Active – Further Investigation
		Lateral migration via preferential pathway	Source Protection Zone 3 – Total Catchment	Likely	High	High	Potentially Active – Further Investigation
			Secondary (A) Aquifer 300m north	Likely	High	High	Potentially Active – Further Investigation
		Lateral migration via preferential pathway and	Adjacent	Likely	High	High	Potentially Active – Further Investigation

		inhalation of vapours	Residential Site Users				
Previous historical garage on site	Metals (As, Cd, Cr, Pb, Hg, Se, Ni)	Ingestion and dermal contact of contaminated soils	Future Site Users	Likely	Medium	Moderate	Potentially Active – Further Investigation
	Asbestos Fibres in Soil	Inhalation of fibres	Future Site Users	Likely	Medium	Moderate	Potentially Active – Further Investigation

Source	Contaminant	Potential migration pathways	Potential Receptors	Likelihood of Occurrence On site	Magnitude of Occurrence	Overall Risk Rating	Active/Inactive
Previous historical garage on site	TPH, PAH and Volatile and Semi-volatile Organic Compounds (VOCs and SVOCs)	Inhalation of vapours	Future Site Users	Likely	Medium	Moderate	Potentially Active – Further Investigation
		Lateral migration via preferential pathway	Source Protection Zone 3 – Total Catchment	Likely	Medium	Moderate	Potentially Active – Further Investigation
		Lateral migration via preferential pathway	Secondary (A) Aquifer 300m north	Likely	Medium	Moderate	Potentially Active – Further Investigation
		Lateral migration via preferential pathway, inhalation of vapours	Adjacent Residential Site Users	Likely	Medium	Moderate	Potentially Active – Further Investigation
Off site							
Electrical substation (49m north-west)	PCB	Lateral migration onto site via preferential pathway Dermal contact and ingestion of contaminated soils	Future Site Users	Unlikely	Medium	Low	Inactive – no further investigation required due to assumed presence of cohesive materials and low mobility of PCB contamination
Historical graveyard (50m north)	Formaldehyde and Ground Gas	Lateral migration onto site via preferential pathway Migration of gas into buildings	Future Site Users	Unlikely	Medium	Low	Inactive – no further investigation required due to assumed presence of cohesive materials and low mobility of formaldehyde contamination and lack of significant source material for generation of ground gases.

7.0 CONCLUSIONS & RECOMMENDATIONS

Current Environmental Risk

The subject site comprises a disused petrol filling station which is currently in use as a car wash and for vehicle storage. 11,000 litre AST for diesel on site and USTs of unknown volumes still thought to be in situ beneath site.

Environmental Sensitivity

Geology - London Clay Formation.

Aquifers – Unproductive Aquifer.

Sensitive Land Uses – Residential dwellings within close proximity.

Hydrology – There are no surface watercourses within influencing distance of the site.

Likelihood of Historical Contamination

Historical maps indicate that the site was developed in the 1960s for use as a garage and records suggest that petrol filling activities took place on site from 1972 onwards. The site has remained unchanged since. Underground fuel tanks are likely to have been changed from metal to plastic containers within this time but, in the absence of any historical site investigation data, it is assumed that a degree of contamination of the shallow soils beneath the site has occurred.

Surrounding Constraints

Residential and commercial properties in close proximity to the site.

Utility Constraints

A site walkover identified surface water drainage presumed to link into existing drainage infrastructure in Midcroft.

Likelihood of Regulatory Action

The local regulatory authority provided a brief response within the reporting timescales. Any additional information will be provided as an addendum to this report but it is anticipated that the authority will identify the former potentially contaminative use of the site and require site specific ground investigation and gas monitoring as part of a future planning application.

Radon Risk

Unaffected – no special precautions required.

Geotechnical Risk

Preliminary Geotechnical Assessment	Ground Conditions
	The underlying clay deposits may be subject to heave or swell based upon the close proximity of the mature trees to the proposed development.
	Ground Instability
	The site is not situated in an area affected by coal mining.
Indicative Foundation Solutions	
Based on the information reviewed as part of the Phase I Assessment, it may be feasible to construct	

	the proposed development using strip foundations if the site investigation encountered suitable bearing capacities within the strata.	
Environmental Risk		
Initial Conceptual Site Model (CSM)	<p>On-site The Made Ground materials generated during construction of the site, the AST and USTs and the historic use of the site as a petrol filling station have the potential to have impacted the site by toxic heavy metals, sulphates, ACM, PAH and TPH from the deposition of ash or lead pipework and from fuel leakage. Given the type and nature of the historical development the likelihood of the site being affected by the presence of any on-site contamination is considered to be moderate to high.</p> <p>Off-site The nearby electricity substation and graveyard are not considered to present significant risks to the proposed development due to the limited mobility of the contaminants associated with these potential sources and the assumed presence of cohesive near surface deposits. The risk from off site sources of contamination is therefore considered to be low.</p>	Overall Environmental Risk Rating
		Moderate to High
Recommendations	<p>A detailed Phase II intrusive Geo-Environmental ground investigation should be undertaken in order to confirm the findings of the initial conceptual site model, to determine foundation design and to assess the underlying clay for its susceptibility to heave / swell.</p> <p>A Remediation Strategy (RS) for the site will be required. The degree of remediation required will be governed by the contamination impact encountered during the Phase II ground investigation. In addition a Material Management Plan (MMP) should be developed to ensure a cost effective and regulatory compliant approach to enabling works.</p> <p>A full set of service drawings should be obtained for the site prior to any intrusive works being undertaken. The intrusive works will return site investigation information with a higher degree of confidence if unobstructed access to the whole site area can be obtained (free of parked vehicles) prior to the Phase II intrusive works being undertaken.</p>	

END OF REPORT

APPENDIX I

LIMITATIONS

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1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between Syntegra Consulting Ltd. and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
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10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

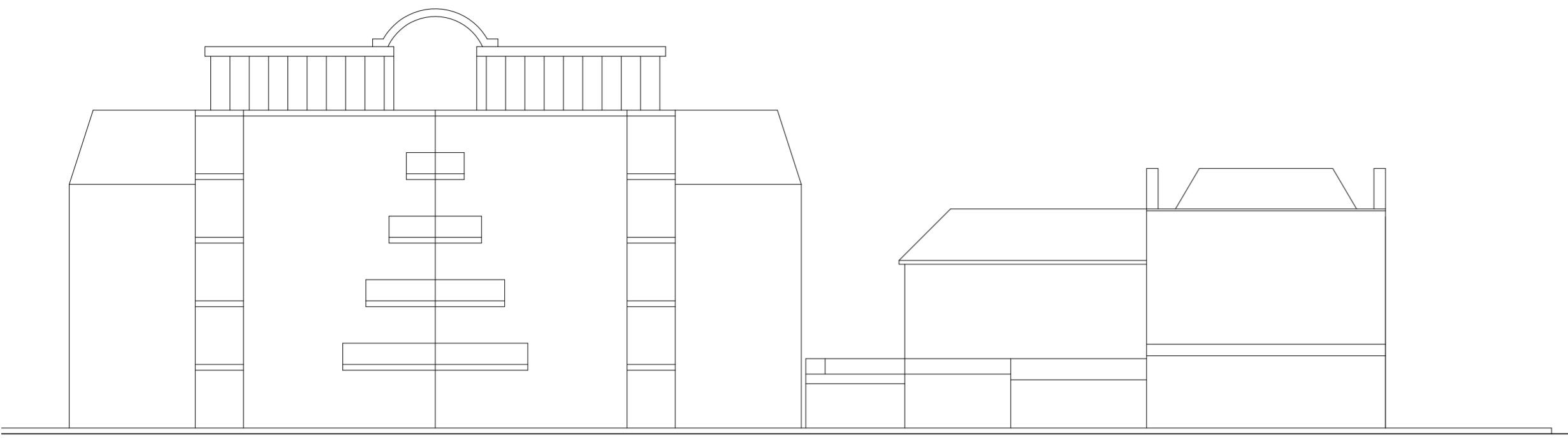
APPENDIX II

DRAWINGS

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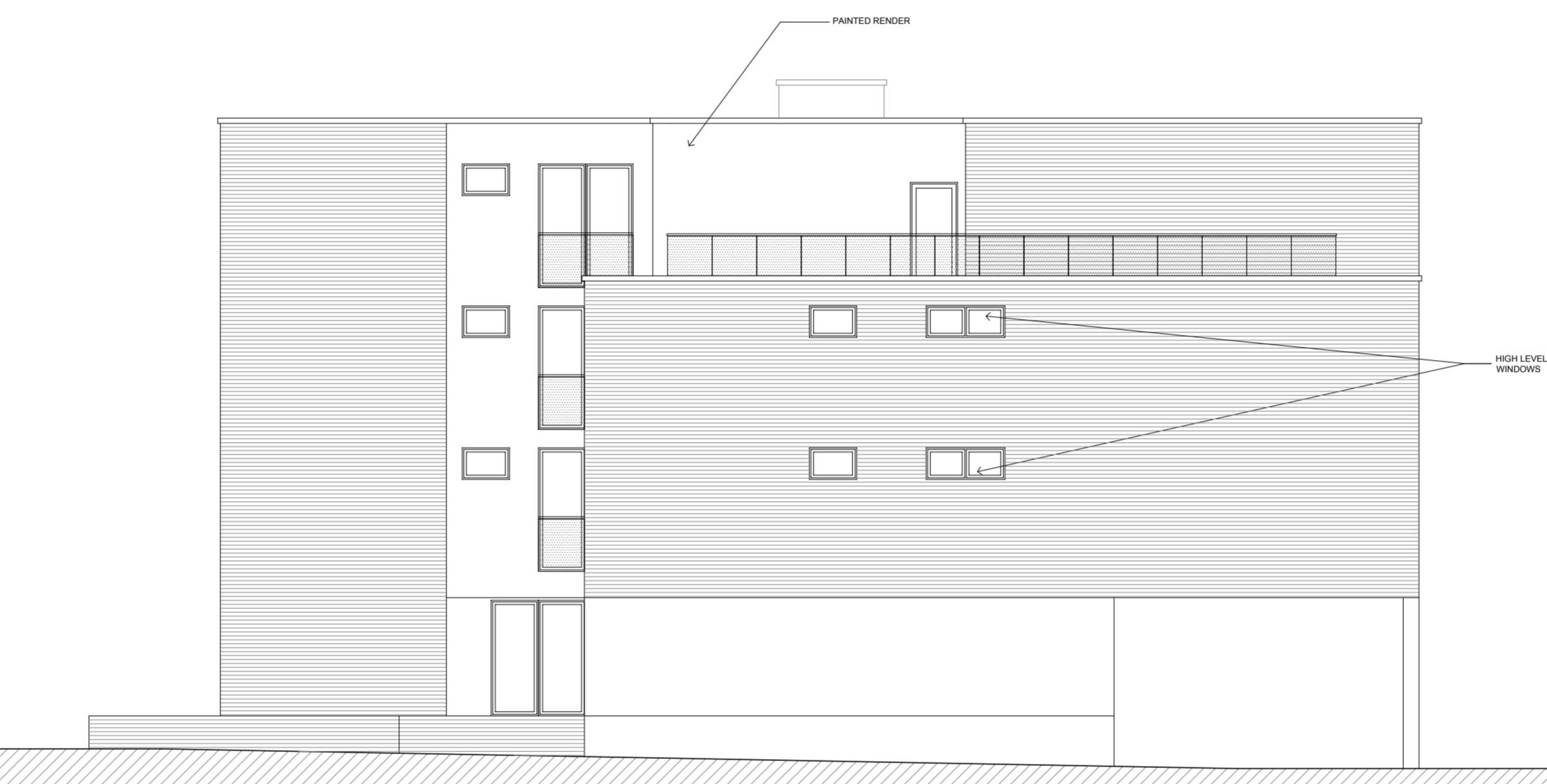




STREET MASSING
SCALE 1:250



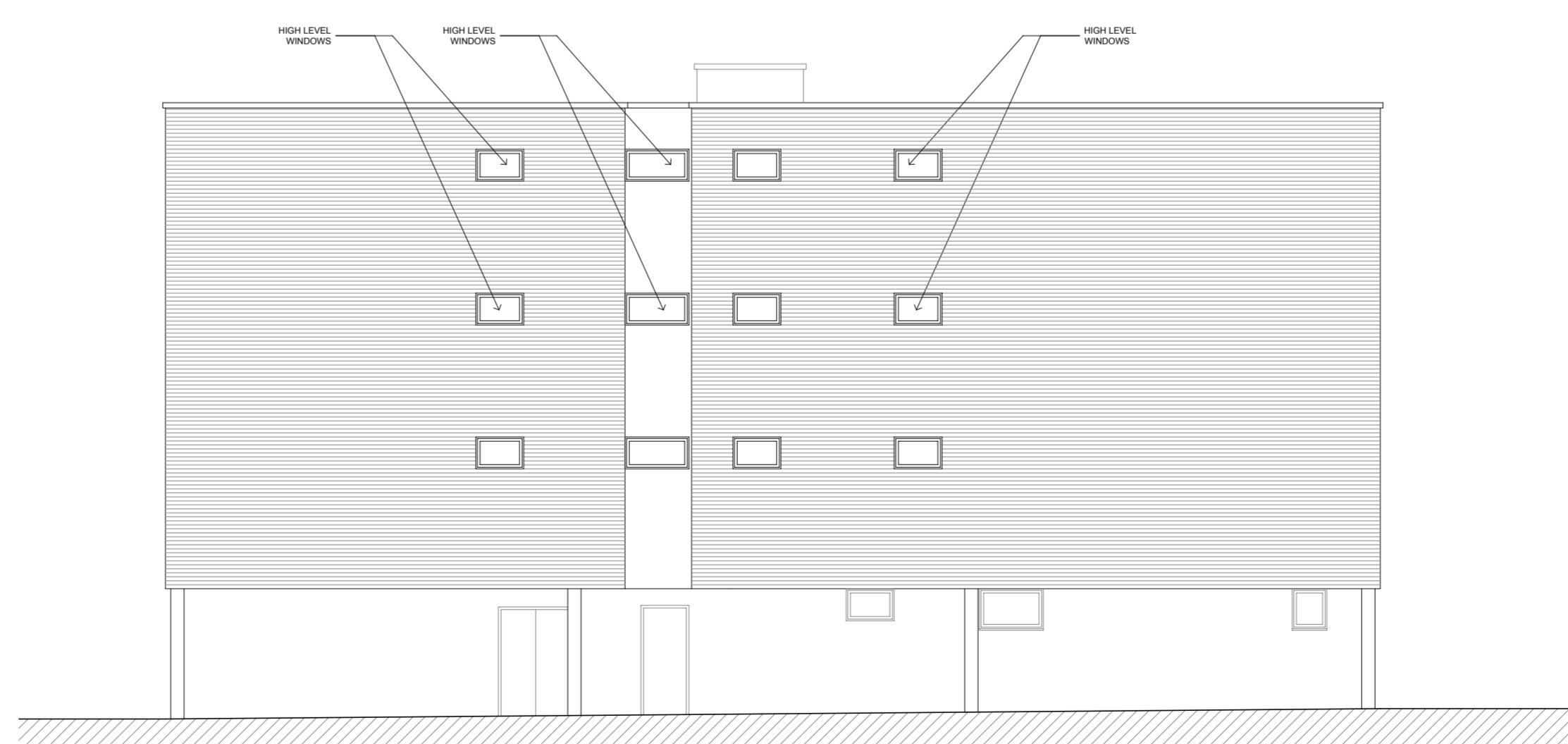
PROPOSED FRONT ELEVATION
SCALE 1:100



PROPOSED SIDE ELEVATION
SCALE 1:100



PROPOSED REAR ELEVATION
SCALE 1:100



PROPOSED SIDE ELEVATION
SCALE 1:100



LOCATION PLAN
SCALE 1:1250

F	20.04.14	SCHEME AMENDED	PJ
E	27.03.14	SCHEME AMENDED	PJ
D	04.03.14	SCHEME AMENDED	PJ
C	13.01.14	SCHEME AMENDED	PJ
B	08.01.14	SCHEME AMENDED	PJ
A	20.11.13	SCHEME AMENDED	PJ
Rev.	Date	Description	Init.

Client Name

Project Title

PROPOSED APARTMENTS BUILDING

2 MIDCROFT, RUISLIP, HA4 8ES

Drawing Title

LOCATION PLAN

PROPOSED ELEVATIONS

Cad File	Sheet Size	Scale
S001 REV F	A1	AS NOTES
Drawn by	Drawing Date	Approved by
PJ	AUG 2013	NJ
Project No.	Drawing No.	Revision
1329	S201	F

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SKETCH ISSUE

APPENDIX III

PHOTOGRAPHS

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PLATE 1 – VIEW OF SITE FROM MIDCROFT STREET



PLATE 2 – VIEW OF SITE FACING SOUTH

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PLATE 3 – TANK PRESENT ON SITE

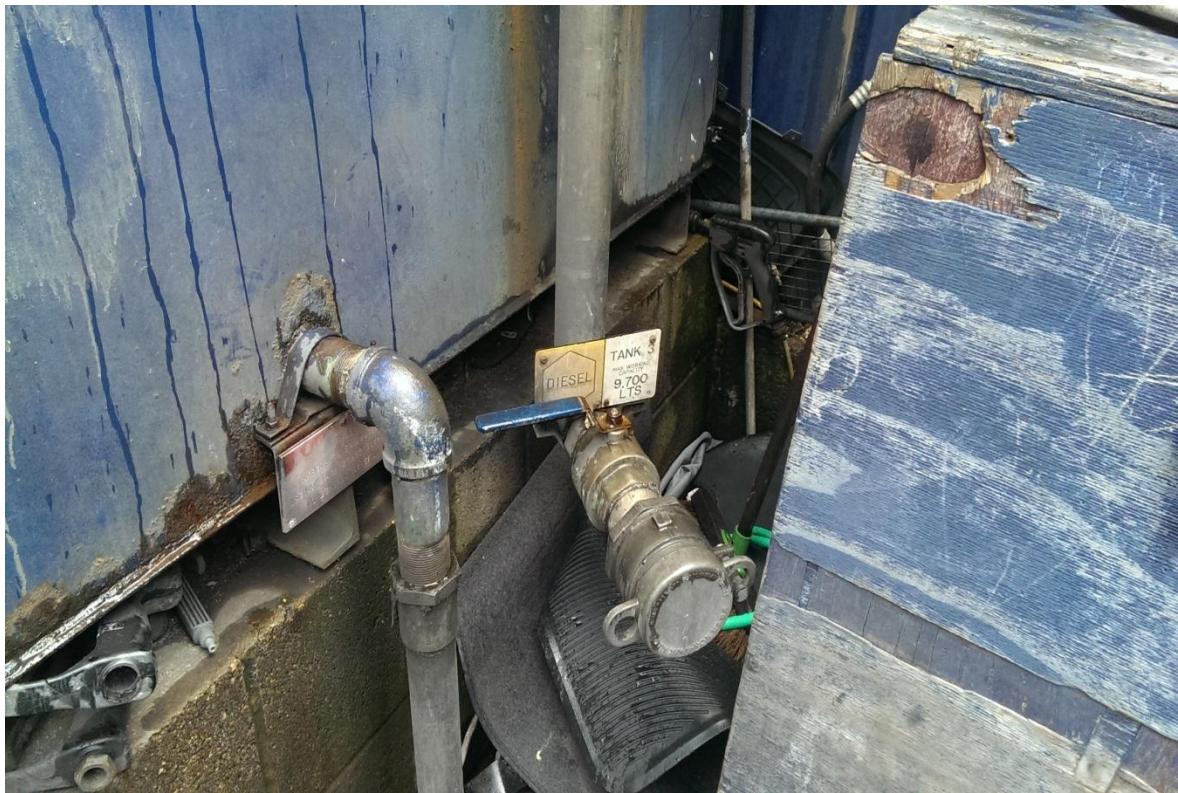


PLATE 4 – DIESEL TANK ON SITE

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PLATE 5 – DIESEL AST ON SITE



PLATE 6 – POTENTIAL HYDROCARBON SPILLAGE FROM DIESEL TANK

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PLATE 7 – VIEW OF MIDCROFT ROAD FROM EAST OF SITE



PLATE 8 – CAR WASH AREA



PLATE 9 EASTERN BOUNDARY OF SITE



PLATE 10 – BOREHOLE LOCATION ON SITE

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PLATE 11 – VIEW OF SITE FROM MIDCROFT ROAD

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APPENDIX IV

HISTORICAL MAPS

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