



Main Investigation Report

at

North Street Arcade, North Street, Havant, Hants PO9 1PX

for

The Malins Group

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June 2021

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Prepared by

C Swainston BSc, PGCE, CGeol, FGS, CLAIre QP

(cs@soilslimited.co.uk)

First check by

Eur Ing R B Higginson BSc, PGDip, CEng, MICE, FGS.

Second check by

N J Lambert BSc (Hons), CEnv, FGS, MEnvSci.

This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Commission

Soils Limited was commissioned by The Malins Group to undertake an intrusive ground investigation and prepare a Main Investigation Report on land at North Street Arcade, North Street, Havant, Hants PO9 1PX. The scope of the investigation was outlined in the Soils Limited quotation reference Q24288 dated 4th March 2021.

This document comprises the Main Investigation Report and incorporates the results, discussion and conclusions to this intrusive works.

This Main Investigation Report must be read in conjunction with the Preliminary Investigation Report undertaken on the above site by Soils Limited, Report ref: 18184/PIR, dated February 2020.

Standards

The site works, soil descriptions and geotechnical testing was undertaken in accordance with the following standards:

- BS 5930:2015 and BS EN ISO 22476-2 2005+A1:2011 for WS/DP
- BS 10175:2011+A2:2017 - Investigation of potentially contaminated sites

The chemical analyses were undertaken by Derwentside Environmental Testing Services (DETS) in accordance with their UKAS and MCERTS accredited test methods or their documented in-house testing procedures. This investigation did not comprise an environmental audit of the site or its environs.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sample borehole implies the specific technique used to produce a trial hole.

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Section I Introduction

I.1 Objective of Investigation

Soils Limited was commissioned by The Malins Group to undertake an intrusive ground investigation and to prepare a Main Investigation Report to supply the client and their designers with information regarding ground conditions, to assist in preparing a foundation scheme for development that was appropriate to the settings present on the site.

The investigation was to be undertaken to provide comment on appropriate foundation options for the proposed residential development. The investigation was to be made by means of in-situ testing and geotechnical laboratory testing undertaken on soil samples taken from the trial holes.

Soil samples were taken for chemical laboratory testing to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and the public from any contamination identified as dictated by the Conceptual Site Model (CSM) in the Preliminary Investigation Report undertaken for the site by Soils Limited (Report ref: 18184/PIR, February 2020).

I.2 Location

The site was located at North Street Arcade, North Street, Havant, Hants PO9 1PX and had an O.S Land Ranger Grid Reference of SU 718 064.

The site location plan is given in Figure 1.

I.3 Site Description

The site is currently an arcade of shops with flats and offices above and a central open access area. A heating unit for the flats and offices lies on the southern side of the site.

An aerial photograph of the site and its close environs has been included in Figure 2.

I.4 Proposed Development

Construction of 30 No. one and two-bedroom apartments in a part 2 and a half / part 4 storey extension fronting onto Prince George Street together with the provision of infill flexible use (Classes A1/A2/A3) town centre commercial units to North Street frontage following the demolition of existing 1 and 2 storey retail development to rear.

In compiling this report reliance was placed on drawing numbers 16-2199-154, 155, 156 and 103 dated February 2021 prepared by PLC Architects. The recommendations provided within this report are made exclusively in relation to the scheme outlined above, and must not be applied to any other scheme without further consultation with Soils

Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Development plans provided by the client are presented in Appendix D.

1.5 Anticipated Geology

The 1:50,000 BGS map showed the site to be located upon London Clay with overlying superficial deposits of Head. It is also anticipated, given the age of development, that Made Ground will also be present.

1.5.1 Made Ground

Made Ground comprises material that has been placed by man, or spread by man. It can comprise demolition material from former structures on the site or imported material placed to raise levels. Its composition can be very variable both laterally and with depth and may contain putrescible matter and voids.

1.5.2 Head

Head deposit are drifts produced by solifluxion, the downslope movement of debris outwash during the periglacial period, and characteristically comprise poorly sorted sands gravels and chalk of local derivation.

1.5.3 London Clay

The London Clay Formation in the Hampshire region comprises silty and sandy clay, clayey and sandy silt, silty sand; sporadic claystones and thin beds of flint pebbles. The formation includes the Bognor Sand, Whitecliff Sand, Durley Sand, Portsmouth Sand and Nursling Sand Members. Crystals of gypsum (Selenite) are often found within the weathered part of the London Clay, and precautions against sulphate attack to concrete are sometimes required.

The lowest part of the London Clay Formation rests on the Reading Formation (Lambeth Group).

1.6 Limitations and Disclaimers

This Main Investigation Report relates to the site located at North Street Arcade, North Street, Havant, Hants PO9 1PX and was prepared for the sole benefit of The Malins Group (The "Client"). The report was prepared solely for the brief described in Section 1.1 of this report.

The contents, recommendations and advice given in the report are subject to the Terms and Conditions given in Quotation Q24288, dated 05/03/2021 accepted by the client in their e-mail dated 13/05/2021.

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report has been prepared by Soils Limited, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

The report is personal and confidential to the Client and Soils Limited accept no responsibility of whatever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report wholly at its own risk.

The Client may not assign the benefit of the report or any part to any third party without the written consent of Soils Limited.

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief. As such these do not necessarily address all aspects of ground behaviour at the site.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot by plot basis prior to the construction of foundations. Supplied site surveys may not include substantial shrubs or bushes and is also unlikely to have data on any trees, bushes or shrubs removed prior to or following the site survey.

Where trees are mentioned in the text this means existing trees, substantial bushes or shrubs, recently removed trees (approximately 20 years to full recovery on cohesive soils) and those planned as part of the site landscaping).

Ownership of land brings with it onerous legal liabilities in respect of harm to the environment. "Contaminated Land" is defined in Section 57 of the Environment Act 1995 as:

"Land which is in such a condition by reason of substances in, on or under the land that significant harm is being caused or that there is a significant possibility of such harm being caused or that pollution of controlled waters is being, or is likely to be caused".

The investigation, analysis or recommendations in respect of contamination are made solely in respect of the prevention of harm to vulnerable receptors, using where possible best practice at the date of preparation of the report. The investigation and report do not address, define or make recommendations in respect of environmental liabilities. A separate environmental audit and liaison with statutory authorities is required to address these issues.

Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets remains with Soils Limited. License is for the sole use of the client and may not be assigned, transferred or given to a third party.

Section 2 Site Works

2.1 Proposed Project Works

The proposed intrusive investigation was designed to provide information on the ground conditions in relation to the identified risks noted in the initial Desk Study PIR for the site 18184 Dated February 2020. The intended investigation, as outlined within the Soils Limited quotation (Q24288, dated 4th March 2021), was to comprise the following items:

- 1 day of windowless sampling (likely 4-5 locations)
- Contamination laboratory testing.

2.1.1 Actual Project Works

The actual project site works were undertaken on 26th May 2021, with subsequent laboratory testing and reporting, and comprised:

- 1 day of windowless sampling (5no. locations WS1-5)
- Contamination laboratory testing.

All five windowless sampler boreholes (WS1 – WS5) were backfilled with gravel and bentonite and made safe on completion.

All trial hole locations have been presented in Figure 3.

Following completion of site works, soil cores were logged and sub-sampled so that samples could be sent to the laboratory for contamination analysis.

2.2 Ground Conditions

On 26th May 2021 five windowless sampler boreholes (WS1 – WS5) were drilled, using a Premiere 2 windowless sampler rig, to depths ranging between 2.00 and 4.00m below ground level (bgl) at locations selected by Soils Limited using a development plan provided by the client as circumscribed by access limitations.

Five complementary dynamic probes, super heavy, (DP1 – DP5) were driven prior and adjacent to their corresponding windowless sampler borehole to depths of 4.00m bgl.

No standpipes were installed within any window sample borehole locations on this occasion.

The maximum depths of trial holes have been included in Table 2.1. Note that the depth given is the final depth from which sample was recovered, not necessarily the final depth achieved.

All trial holes were scanned with a Cable Avoidance Tool (C.A.T.) and GENNY prior to excavation to ensure the health and safety of the operatives.

Table 2.1 Final Depth of Trial Holes

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS1	2.00	WS4	2.00
WS2	3.60	WS5	3.00
WS3	4.00		

The approximate trial hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the trial hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots, or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report. No Topsoil was encountered.

For more complete information about the soils encountered within the general area of the site reference should be made to the detailed records given within Appendix A, but for the purposes of discussion, the succession of conditions encountered in the trial holes in descending order can be summarised as:

Made Ground/Topsoil (MG)
Head (HEAD)
London Clay (LC)

The ground conditions encountered in the trial holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Epoch	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
MG	Recent	0.00	1.50-1.70	1.60	Fine to coarse dark greyish brown angular to sub angular slightly sandy clayey GRAVEL, with ash and brick fragments.
HEAD	Quaternary	1.60	2.00 ^{1,2}	0.40 ^{1,2}	Fine to coarse dark greyish brown angular to sub angular slightly sandy flint GRAVEL.

Strata	Epoch	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
LC	Eocene	1.50-1.70	2.00 ^{1,2} - 4.00 ^{1,2}	1.50 ^{1,2}	Soft to firm dark greyish brown slightly sandy CLAY.

Note: ¹ Final depth of trial hole. ² Base of strata not encountered

2.3 Ground Conditions Encountered in Trial Holes

The ground conditions encountered in trial holes have been described below in descending order. The engineering logs are presented in Appendix A.1.

2.3.1 Made Ground and Topsoil

Soils described as Made Ground were encountered in all five trial holes from ground level to depths ranging between 1.50m (WS3) and 1.70m bgl (WS1).

The Made Ground typically comprised fine to coarse dark greyish brown angular to sub angular slightly sandy clayey GRAVEL. Occasional rare fine to coarse ash and brick fragments. Rare intermittent pockets of light orangish brown fine to coarse sand.

The depths of Made Ground have been included in Table 2.3.

Soils described as Topsoil were not encountered in any location.

Table 2.3 Final Depth of Made Ground

Trial Hole	Depth (m bgl)
WS1	1.7
WS2	1.6
WS3	1.5
WS4	1.6
WS5	1.6

2.3.2 Head

Soils described as Head were encountered in only one location (WS2).

At this location the Head comprised fine to coarse dark greyish brown angular to sub angular slightly sandy flint GRAVEL. Sand is fine to coarse.

The depth of Head has been included in Table 2.4.

Table 2.4 Final Depth of Head

Trial Hole	Depth (m bgl)
WS4	2.00 ¹
Note: ¹ Final depth of trial hole.	

2.3.3 London Clay

Variable and possibly reworked in places and weathered in parts, London Clay was encountered in four of five locations (WS1-3 and WS5) to depth.

Generally comprising soft to firm dark greyish brown slightly sandy CLAY. Rare fine rounded gravel. Rare organic material. Rare fine selenite.

The depth of London Clay has been included in Table 2.5.

Table 2.5 Final Depth of London Clay

Trial Hole	Depth (m bgl)
WS1	2.00 ¹
WS2	3.60 ¹
WS3	4.00 ¹
WS5	3.00 ¹
Note: ¹ Final depth of trial hole.	

2.4 Groundwater

Groundwater was encountered within all trial holes and was struck at depths between 1.40 and 3.00m bgl.

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage, though it is notable in this case how close the majority of levels are to changes in stratigraphy, most notably the top of the underlying London Clay. The investigation was conducted in May (2021), when groundwater levels should be falling from their annual maximum (highest), which typically occurs around March, towards their annual minimum (lowest) elevation, which typically occurs around September.

Groundwater equilibrium conditions may only be conclusively established, if a series of observations are made via groundwater monitoring wells over time.

Section 3 Geotechnical In-Situ Testing

3.1 Dynamic Probe Tests

Dynamic probing (DPSH) was undertaken at all five locations (DP1 to DP5) adjacent and prior to the drilling of WS1 to WS5 to depths of 4.00m bgl. The results are included within Appendix B.

Further interpretation or analysis of the results was outside of the scopes of these works. Soils Limited can provide additional interpretation if required. The energy ratio for each location is presented on the individual logs within Appendix A.1.

Section 4 Determination of Chemical Analysis

4.1 Site Characterisation and Revised Conceptual Site Model

The Preliminary Investigation Report undertaken by Soils Limited (report ref: 18184/PIR dated February 2020) identified a very low to moderate/low risk of ground contamination from previous historical usage and development of the site.

The Main Investigation Report identified Made Ground to depths between 1.50 and 1.70m bgl. The Made Ground generally comprised fine to coarse dark greyish brown angular to sub angular slightly sandy clayey GRAVEL. Occasional rare fine to coarse ash and brick fragments. Rare intermittent pockets of light orangish brown fine to coarse sand. Potential hydrocarbon staining and odours were identified in WS3.

4.2 Soil Sampling

A non-targeted sampling strategy is appropriate when there is:

- No adequate information available regarding the likely locations of contamination;
- No sensitive areas where there is a need for a high degree of confidence.

A targeted sampling strategy is appropriate when there is:

- Adequate information available regarding the likely locations of contamination
- Sensitive areas where there is a need for a high degree of confidence.

The CSM identified no significant potential sources and a generic non-targeted sampling pattern was adopted, as appropriate to these sources. **Error! Reference source not found.** outlines the sampling undertaken.

4.3 Determination of Chemical Analysis

The driver for determination of the analysis suite was the information obtained from the Preliminary Investigation Report and Main Investigation Report intrusive investigation. In the absence of specific contaminants of concern outlined in the initial conceptual site model, a generic screening suite including asbestos, industrial metals and hydrocarbons as detailed further in the results.

Section 5 Qualitative Risk Assessment

5.1 Assessment Criteria

The assessment criteria used to determine risks to human health are derived and explained within Appendix C.3.

5.2 Representative Contamination Criteria - Soil

It is planned to undertake construction of 30 No. one and two-bedroom apartments in a part 2 and a half / part 4 storey extension fronting onto Prince George Street together with the provision of infill flexible use (Classes A1/A2/A3) town centre commercial units to North Street frontage following the demolition of existing 1 and 2 storey retail development to rear. In compiling this report reliance was placed on drawing numbers 19.3133.201, 203, 204, 207 and 208, Dated October 2020 prepared by PLC Architects. The recommendations provided within this report are made exclusively in relation to the scheme outlined above, and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Based on the proposed development, the results of the chemical analysis have been compared against generic guidance values for a **Commercial** end use, as presented in SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014 (C4SL), derived for the protection of human health. Where this document has not published screening values for determinants, generic screening values derived for the same end use have been adopted from the following published guidance; DEFRA Soil Guideline Values (SGV) and LQM/CIEH/Suitable 4 Use Level (S4UL).

To assess the potential toxicity of organic determinants (Petroleum Hydrocarbons and Polyaromatic Hydrocarbons) to the human health, soils samples were analysed for Soil Organic Matter (SOM). The selected samples analysed recorded, SOM values of between 0.6% and 1.4%. For each soil sample tested, the resultant Soil Organic Matter allowed for the correct comparison to be made with the appropriate guideline value for each organic determinants analysed. Table 5.1 outlines the samples that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix C.2.

Table 5.1 Summary of Chemical Analysis of Soils Sample Exceedance

Substance	Sample locations where SGV, C4SL or S4UL adopted were exceeded for the 'Commercial' land-use scenario
None	
Asbestos locations where material found (no threshold just presence)	
None	

In summary, none of the samples tested showed concentrations in excess of the relevant C4SL for a commercial land-use scenario. The only notable outlier was the elevated Arsenic in WS1 from 0.40m. The lack of any other associated elevated levels (i.e. Lead or PAH for example) makes it difficult to determine a source for this material. The slight odour noted from depth in WS3 was not replicated in the results, which showed no significant levels of hydrocarbons. WS5 also evidenced the only hydrocarbons and PAH's notably above detection limits for the methods. This appears (from ratio analysis) to be coal tar based, not fuel oil based. The latter would be more anticipated if it was to arise from a heating oil tank on site for example and so this elevation could be due to relict tarmac or possible cross contamination from the overlying tarmac at this location.

None of the substances tested recorded concentrations above the commercial end-use screening values.

5.2.1 Asbestos

Asbestos Containing Material (ACM) or asbestos as fibre was not detected within any sample. If encountered, care must be taken to ensure any such material is separated and disposed of in an appropriate manner to a licensed waste facility.

5.3 Risk to Groundwater

No groundwater risks or sources have been identified in these results and risk remains low to negligible as per the initial conceptual model and assessment.

5.4 Tier 1 Quantitative Risk Assessment

Quantitative risk assessments are undertaken for the soil, groundwater and soil gas. The CSM has not been updated to take account of these findings and results as they replicate those noted in the initial CSM. The full laboratory chemical report is presented in Appendix C.2.

5.4.1 Soils

None of the samples tested showed concentrations in excess of the relevant guidance values for a commercial land-use scenario. The Tier 1 Quantitative risk assessment therefore confirms that there is no significant risk to the human health receptors. However, the Arsenic outlier suggests that unexpected or unanticipated contamination may be present in some parts of the site.

5.4.2 Groundwater

The initial Groundwater Risk Assessment established that there was no risk to the groundwater receptor and this has been confirmed by these results and the lack of any significant source being identified.

5.4.3 Soil Gas

The Preliminary Investigation Report identified a low risk of soil gas from on-site sources. As organic concentrations are now proven to lie below 2.5% (1.4%

maximum at WS1 1.00m average <1%), the Made Ground is relatively shallow (1.5-1.7m), underlain by a cohesive aquiclude with a relatively high underlying water level (which is probably perched), and is mainly cohesive, the potential for generation on site is confirmed as being low to negligible. No significant off-site sources were identified.

5.5 Remedial Objective

The remedial objective for any site is to ensure site clean-up removes any unacceptable risk to the identified receptors of Human Health, Building Structures and Services and Groundwater receptor. In essence the remedial objective should sever any source-pathway-receptor pollutant linkages that have been established. Once this has been achieved, by whatever means, there can theoretically be no risk.

5.6 Development of Soil Remediation Strategy

Production of a remediation strategy report was not part of the brief for this Main Investigation Report Intrusive Investigation. In light of the lack of any significant linkages being established and confirmed no remediation is considered necessary in context. However, the following comments can be made:

5.6.1 Further Chemical Testing and Human Health Risk Assessment

As no significant levels of contaminants have been confirmed as being present on site, no additional testing or analysis is indicated.

5.6.2 Excavation of Impacted Soil

It could be proposed to excavate and stockpile material on the site in preparation for classification and subsequent disposal off-site to a suitable licensed facility. Such stockpiled soils must be placed on an impermeable liner with raised edges. During periods of rainfall, the stockpile must be covered over to minimise leaching and run-off into the underlying soils. Covering of the stockpile may be required to prevent fumes impacting receptors off-site.

In light of the WAC analysis and consideration of the material in a waste context, site materials should be re-usable on site and will be suitable and fit for purpose in most cases. If removed from site the material would be determined as non-hazardous and suitable for disposal at an inert landfill.

5.6.3 Excavation of All Made Ground

Made Ground was encountered across the site to depths between 1.50m and 1.70m bgl but nowhere indicated no significant levels of contaminants of concern. As such this option is not considered reasonable, sustainable or practical.

5.6.4 Hard Landscape Entire Site

Hard landscaping the entire site will eliminate all potentially significant exposure pathways to contaminated soils in the longer term, even assuming that such is

present for which there is as yet no significant evidence.

5.6.5 Asbestos

Asbestos-containing soils (ACSs) or ACM's were not identified at the site during this investigation.

5.7 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust is generated as a result of construction activities. The site should be securely fenced at all times to prevent unauthorised access.

Washing facilities should be provided and eating restricted to mess huts.

5.8 Imported Material

Any soil, which is to be imported onto the site, must undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with specific regard to contamination, i.e. to prove that it is suitable for the purpose for which it is intended.

5.9 Discovery Strategy

There may be areas of contamination not identified during the course of the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site.

Care should be taken during excavation works especially to investigate any soils, which appear by eye (e.g. such as fibrous materials, large amounts of ash and unusual discolouration), odour (e.g. fuel, oil and chemical type odours or unusual odours such as sweet odours or fishy odours) or wellbeing (e.g. light headedness and/or nausea, burning of nasal passages and blistering or reddening of skin due to contact with soil) to be contaminated or of unusual and/or different character to standard soils or those analysed.

In the event of any discovery of potentially contaminated soils or materials, this discovery should be quarantined and reported to the most senior member of site staff or the designated responsible person at the site for action. The location, type and quantity must be recorded and the Local Authority, and a competent and appropriate third-party Engineer/Environmental consultant notified immediately. An approval from the Local authority must be sought prior to implementing any proposed mitigation action.

The discovery strategy must remain on site at all times and must demonstrate a clear allocation of responsibility for reporting and dealing with contamination. A copy of the strategy must be placed on the health and safety notice board and /or displayed in a prominent area where all site staff are able to take note of and consult the document at any time. Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the discovery strategy.

This is technically and usually a separate requirement from compliance with contamination planning conditions to cover potential remaining unknowns and compliance with the emplacement, establishment, recording and reporting of such (even if negative) will be required throughout the progress of the entire development works.

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Appendix D Information Provided by the Client

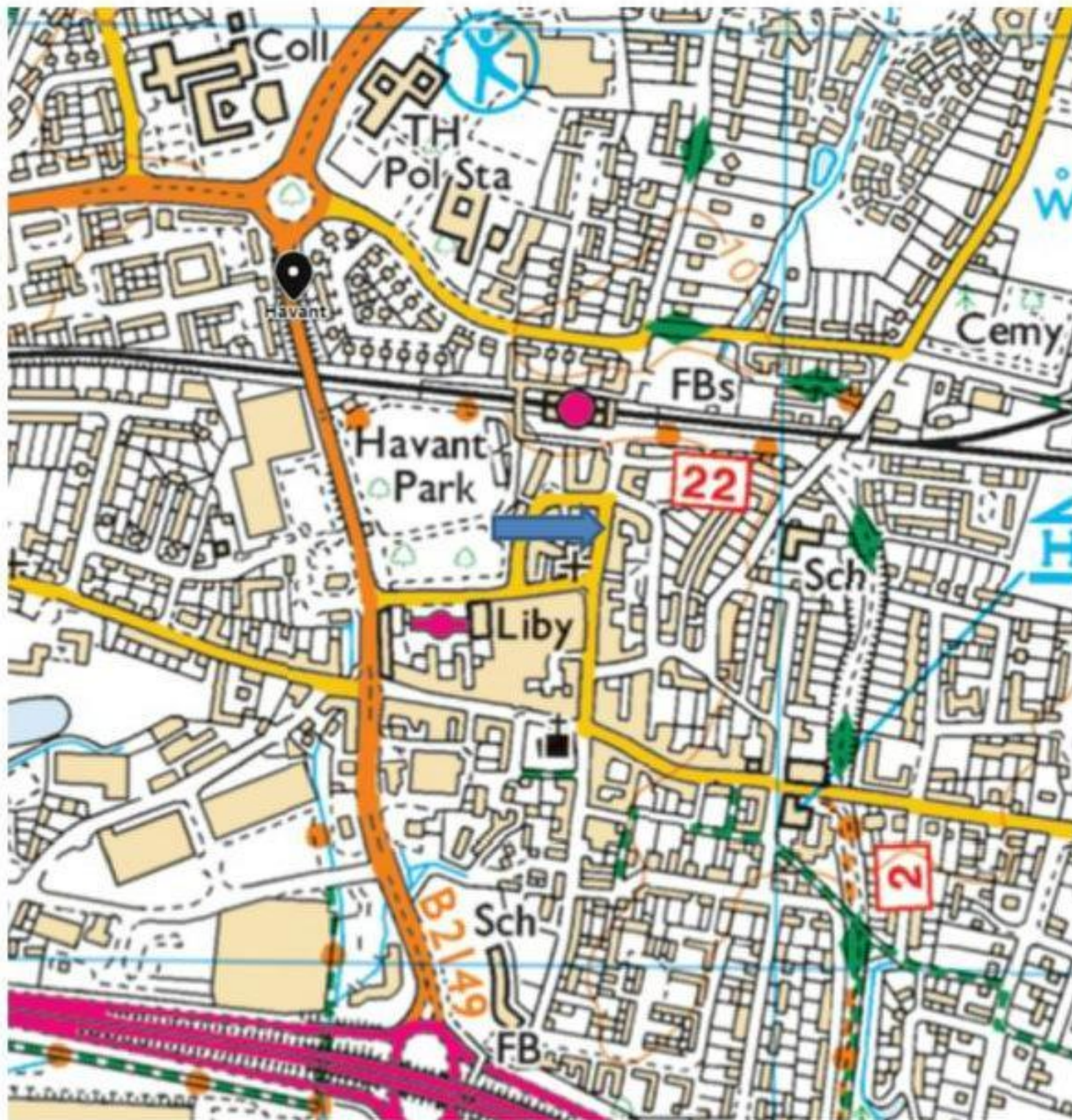


Figure 1 – Site Location Map



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North Street Arcade, North Street, Havant, Hants
PO9 1PX

Client
The Malins Group

Date
June 2021



Figure 2 – Aerial Photograph

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North Street Arcade, North
Street, Havant, Hants PO9 1PX

Client

The Malins Group

Date

June 2021

Job Number

19380



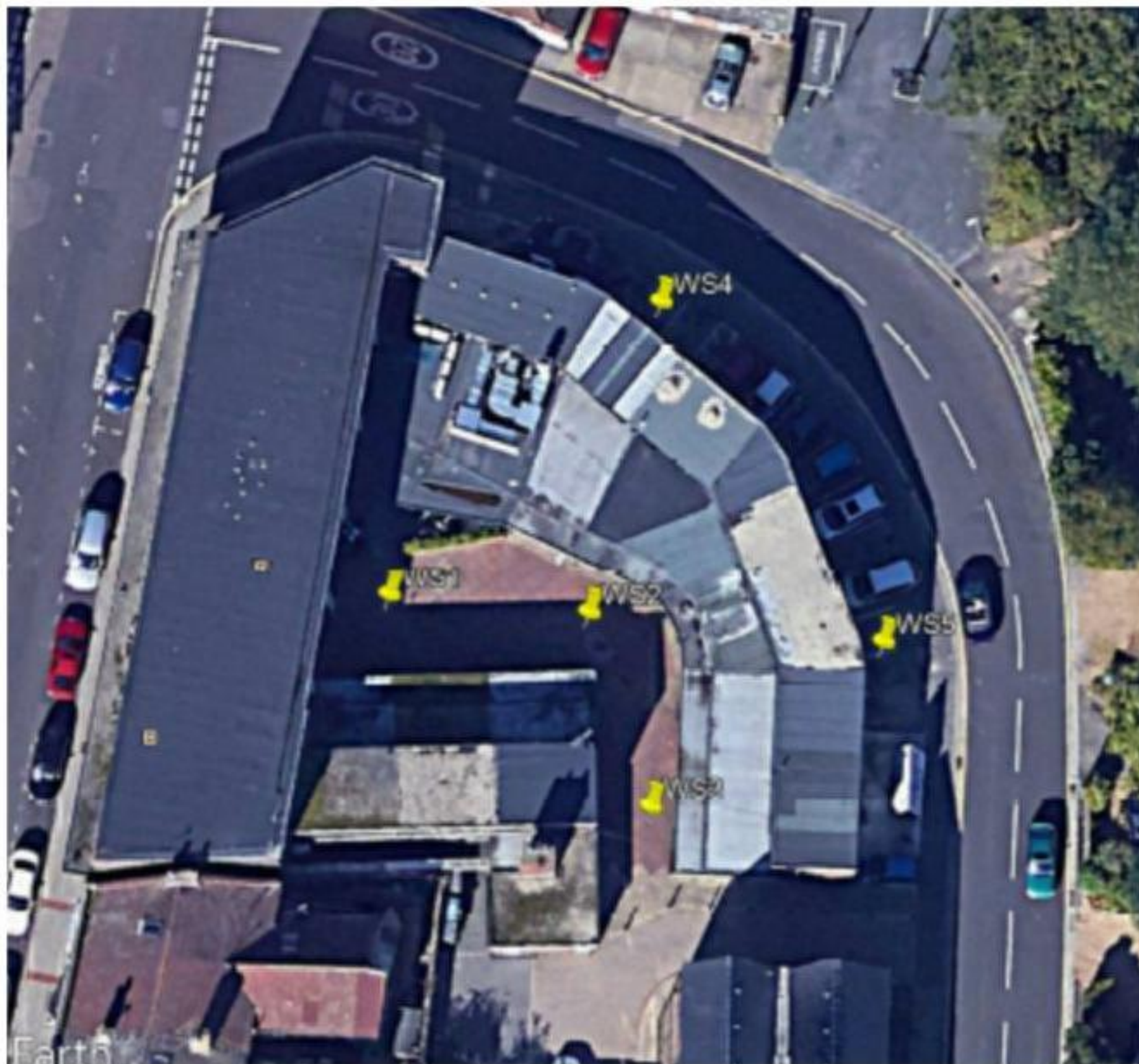


Figure 3 – Trial Hole Plan

Project

North Street Arcade, North
Street, Havant, Hants PO9 1PX

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The Malins Group

Date

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Job Number

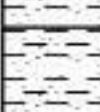
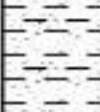
19380



Appendix A Field Work

Appendix A.1 Engineers Logs

	Contract Name:						Client:								Hole ID:						
	North Street Arcade						Malins Group								WS1						
	Contract Number:			Start and End Date:			Logged By:			Checked By:			Status:	Hole Type:							
	19380			26/05/21			GB			CS			FINAL	WS							
	Easting:			Northing:			Ground Level:			Plant Used:			Print Date:	Scale:							
										Premier 2			14/06/2021	1:50							
Weather:										Termination:										Sheet 1 of 1	
Samples & In Situ Testing					Strata Details										Groundwater						
Depth	Type	Results	Level (mADO)	Depth (m) (Thickness)	Legend	Strata Description										Water Strike	Borehole/ Installation				
0.40	J+D			0.50	[Pattern]	Fine to coarse dark grey brown angular to sub angular slightly clayey sandy flint GRAVEL. Sand is fine to coarse. Rare fine brick fragments. MADE GROUND.															
0.60	J+D			0.70	[Pattern]	Soft dark grey brown gravelly sandy CLAY. Occasional fine to coarse ash, brick fragments. Occasional fine to coarse angular to sub angular flint gravel. Rare clayey chalk fragments. MADE GROUND.															
1.00	J+D			(1.00)	[Pattern]	Fine to coarse dark grey brown angular to sub angular slightly sandy clayey flint GRAVEL. Occasional rare fine to coarse ash fragments. Rare intermittent pockjets of light orange brown fine to coarse sand. MADE GROUND.											1				
1.50	J+D			1.70	[Pattern]																
2.00	J+D			(0.30) 2.00	[Pattern]	Soft to firm dark grey brown CLAY. Rare dissipated rootlets. Rare fine rounded flint gravel. Rare organic material. Rare fine celenite.															
						End of Borehole at 2.00m										2					
																3					
																4					
																5					
																6					
																7					
																8					
																9					
																10					
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:												
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	No recovery after 2.00m												
Chiselling					Installation				Water Strikes												
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks							
									1.50			20	1.30								
									Hand vane (HV), Hand penetrometer (HP) reported in kPa, PID reported in ppm.												

	Contract Name: North Street Arcade				Client: Malins Group				Hole ID: WS2					
	Contract Number: 19380		Start and End Date: 26/05/21		Logged By: GB		Checked By: CS		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 2		Print Date: 14/06/2021		Scale: 1:50			
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing					Strata Details							Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill Installation	
1.40	J+D			(0.60)		Soft dark grey brown slightly sandy gravelly CLAY. Occasional fine to coarse angular to sub angular flint gravel. Occasional rare intermittent pockets of light orange brown fine to coarse sand. MADE GROUND.								
1.80	J+D			(0.70)		Firm dark orangish grey brown slightly sandy CLAY. Rare dissipated rootlets to 2.0M blg. Occasional intermittent pockets of light dark grey brown fine to coarse sand.								
2.20	J+D			2.30		Firm dark grey slightly sandy CLAY. Rare occasional intermittent pockets of light grey fine to coarse sand. Rare fine shell fragments. Rare fine selenite.								
2.70	D			(1.30)								3		
3.30	D											4		
3.60	D			3.60		End of Borehole at 3.60m						5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
									Water Strikes					
Chiselling					Installation			Strike (m)						Casing (m)
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	1.40			20	1.40	
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

	Contract Name:				Client:				Hole ID:					
	North Street Arcade				Malins Group				WS3					
	Contract Number:		Start and End Date:		Logged By:		Checked By:		Status:					
19380		26/05/21		GB		CS		FINAL						
Easting:		Northing:		Ground Level:		Plant Used:		Print Date:						
						Premier 2		14/06/2021						
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing				Strata Details						Groundwater				
Depth	Type	Results	Level (mADD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill Installation			
1.20	J+D			(0.50)		Fine to coarse dark grey brown angular to sub angular slightly clayey sandy flint GRAVEL. Sand is fine to coarse. Rare fine brick fragments. MADE GROUND.				1				
1.40	J+D			1.50										
1.60	J+D			(0.90)		Soft to firm dark orangish grey brown slightly sandy CLAY. Occasional rare fine to coarse angular to sub angular flint gravel. Occasional intermittent pockets of light orange brown fine to coarse sand. Strong paint thinners/ hydro carbon odour 1.6-1.7m blg, MADE GROUND.				2				
2.10	J+D			2.40										
2.50	D			(1.60)		Soft to firm dark grey brown slightly sandy CLAY. Rare intermittent pockets of light orange brown fine to coarse sand. Rare fine weak shell fragments. Rare fine selenite.				3				
3.00	D													
3.50	D													
4.00	D			4.00		End of Borehole at 4.00m				4				
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation		Water Strikes							
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									3.00			20	2.70	
Hand vane (HV), Hand penetrometer (HP) reported in kPa, PID reported in ppm.														

	Contract Name: North Street Arcade				Client: Malins Group				Hole ID: WS4					
	Contract Number: 19380		Start and End Date: 26/05/21		Logged By: GB		Checked By: CS		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 2		Print Date: 14/06/2021		Scale: 1:50			
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing				Strata Details								Groundwater		
Depth	Type	Results	Level (mADD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill Installation	
1.20	J+D													
1.40	J+D			(0.60)		Fine to coarse dark grey brown angular to sub angular slightly clayey sandy flint GRAVEL. Sand is fine to coarse. Rare fine brick fragments. MADE GROUND.						1		
				1.60										
				(0.40)		Fine to coarse dark grey brown angular to sub angular slightly sandy flint GRAVEL. Sand is fine to coarse.								
2.00	J+D			2.00		End of Borehole at 2.00m						2		
												3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	No recovery after 2.00m					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									1.50			20	1.30	
Hand vane (HV), Hand penetrometer (HP) reported in kPa, PID reported in ppm.														

	Contract Name:				Client:				Hole ID:					
	North Street Arcade				Malins Group				WS5					
	Contract Number:		Start and End Date:		Logged By:		Checked By:		Status:					
19380		26/05/21		GB		CS		FINAL						
Easting:		Northing:		Ground Level:		Plant Used:		Print Date:						
						Premier 2		14/06/2021						
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing				Strata Details						Groundwater				
Depth	Type	Results	Level (mADD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill Installation			
1.20	J+D			(0.60)		Soft to very soft dark orangish grey brown slightly sandy slightly gravelly CLAY. Rare fine brick fragments. Occasional fine to coarse angular to sub angular flint gravel. MADE GROUND.				1				
1.50	J+D			1.60		Soft dark orangish grey brown slightly sandy CLAY. Rare fine to coarse angular to sub angular flint gravel. Rare fine shell fragments. Rare intermittent pockets of light orange brown fine to coarse sand. Rare fine black staining.				2				
2.00	J+D			(1.40)										
2.50	D													
3.00	D			3.00		End of Borehole at 3.00m				3				
										4				
										5				
										6				
										7				
										8				
										9				
										10				
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	No recovery after 3.00m					
Chiselling					Installation		Water Strikes							
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									1.50			20	1.40	
Hand vane (HV), Hand penetrometer (HP) reported in kPa, PID reported in ppm.														

Appendix B Geotechnical In-Situ Testing

Appendix B.1 Geotechnical In-Situ Results

Project Name:	North Street Arcade	Project No.	19380	Co-ords:		Hole Type	DP
Location:	Havant, Hampshire, PO9 1PX	Level:	m AOD	Scale	1:50	Logged By	JO
Client:	Malins Group	Dates:	26/05/2021				

Depth (m)	Blows/100mm				Torque (Nm)
0					
1					
1.0	4				
1.1	4				
1.2	3				
1.3	3				
1.4	4				
1.5	2				
1.6	1				
1.7	2				
1.8	2				
1.9	2				
2.0	2				
2.1	2				
2.2	2				
2.3	2				
2.4	2				
2.5	2				
2.6	2				
2.7	2				
2.8	2				
2.9	2				
3.0	2				
3.1	2				
3.2	2				
3.3	2				
3.4	2				
3.5	2				
3.6	2				
3.7	2				
3.8	2				
3.9	2				
4.0	4				
4.1	2				
4.2	2				
4.3	3				
4.4	2				
4.5	2				
5.0					
6.0					
7.0					
8.0					
9.0					
10.0					

Remarks	Fall Height	760mm	Cone Base Diameter	52mm
	Hammer Weight	63.5kg	Final Depth	4m
	Probe Type		Energy Ratio (Er)	%

Project Name:	North Street Arcade	Project No.	19380	Co-ords:		Hole Type	DP
Location:	Havant, Hampshire, PO9 1PX	Level:	m AOD	Scale	1:50	Logged By	JO
Client:	Malins Group	Dates:	26/05/2021				

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
1					
2					20
3					10
4					20
5					
6					
7					
8					
9					
10					

Remarks	Fall Height	760mm	Cone Base Diameter	52mm
	Hammer Weight	63.5kg	Final Depth	4m
	Probe Type		Energy Ratio (Er)	%

Project Name:	North Street Arcade	Project No.	19380	Co-ords:		Hole Type	DP
Location:	Havant, Hampshire, PO9 1PX	Level:	m AOD	Scale	1:50	Logged By	JO
Client:	Malins Group	Dates:	26/05/2021				

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
1					
1.5					
2					
2.5					
3					
4					
5					
6					
7					
8					
9					
10					

Remarks	Fall Height 760mm	Cone Base Diameter 52mm	
	Hammer Weight 63.5kg	Final Depth 4m	
	Probe Type	Energy Ratio (Er) %	

Project Name:	North Street Arcade	Project No.	19380	Co-ords:		Hole Type	DP
Location:	Havant, Hampshire, PO9 1PX	Level:	m AOD	Scale	1:50	Logged By	JO
Client:	Malins Group	Dates:	26/05/2021				

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
1					
1.0	5				
1.1	4				
1.2	4				
1.3	4				
1.4	4				
1.5	4				
1.6	4				
1.7	4				
1.8	4				
1.9	4				
2.0	4				20
2.1	1				
2.2	2				
2.3	2				
2.4	2				
2.5	2				
2.6	2				
2.7	2				
2.8	2				
2.9	2				
3.0	3				20
3.1	3				
3.2	3				
3.3	3				
3.4	3				
3.5	3				
3.6	2				
3.7	2				
3.8	2				
3.9	2				
4.0	2				20
4.1					
4.2					
4.3					
4.4					
4.5					
4.6					
4.7					
4.8					
4.9					
5.0					
5.1					
5.2					
5.3					
5.4					
5.5					
5.6					
5.7					
5.8					
5.9					
6.0					
6.1					
6.2					
6.3					
6.4					
6.5					
6.6					
6.7					
6.8					
6.9					
7.0					
7.1					
7.2					
7.3					
7.4					
7.5					
7.6					
7.7					
7.8					
7.9					
8.0					
8.1					
8.2					
8.3					
8.4					
8.5					
8.6					
8.7					
8.8					
8.9					
9.0					
9.1					
9.2					
9.3					
9.4					
9.5					
9.6					
9.7					
9.8					
9.9					
10.0					

Remarks	Fall Height	760mm	Cone Base Diameter	52mm
	Hammer Weight	63.5kg	Final Depth	4m
	Probe Type		Energy Ratio (Er)	%

Project Name:	North Street Arcade	Project No.	19380	Co-ords:		Hole Type	DP
Location:	Havant, Hampshire, PO9 1PX	Level:	m AOD	Scale	1:50	Logged By	JO
Client:	Malins Group	Dates:	26/05/2021				

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
1					
2					10
3					20
4					20
5					
6					
7					
8					
9					
10					

Remarks	Fall Height	760mm	Cone Base Diameter	52mm
	Hammer Weight	63.5kg	Final Depth	4m
	Probe Type		Energy Ratio (Er)	%

Appendix C Chemical Laboratory Testing

Appendix C.1 Conceptual Site Model

Table C.I.1 CSM Revised Pre Testing

Source (See Error! Reference source not found. and Error! Reference source not found.)	Potential Contaminant (See Error! Reference source not found.)	Exposure Pathway (See Error! Reference source not found.)	Receptor (See Error! Reference source not found.)	Initial Assessment from Preliminary Investigation Report Information			Comments	Proposed Investigation
				Severity	Probability	Risk		
Made Ground Potentially contaminated soils arising from the demolition of cattle market on site.	Metals, Semi-metals and non-metals, PAHs, Asbestos	Inhalation of dust	Site Workers/Site Maintenance	Mild	Low	Low	The proposed development features very limited areas of soft landscaping (not formal gardens) in the east of the development.	Based on the findings of the conceptual site model the potential risks are considered to be low to very low and therefore a limited investigation is considered appropriated which could be undertaken as part of a larger geotechnical investigation.
			End Users	Mild	Unlikely	Very low		
			Off-site Users	Mild	Unlikely	Very low		
	PAHs	Inhalation of Vapour/gases (including Radon)	Site Workers/Site Maintenance	Mild	Low	Low	The risk to future occupants is considered to be low to very low as the potential pathways are limited by the absence of soft landscaping or gardens.	
			End Users					
			Off-site Users	Mild	Unlikely	Very low		
	Metals, Semi-metals and non-metals, PAHs, TPHs, Asbestos, pH	Ingestion and absorption via direct contact	Site Workers/Site Maintenance	Mild	Unlikely	Very low		
			End Users	Mild	Low	Low		
	Metals, Semi-metals and non-metals, PAHs, TPHs, pH	Migration via surface runoff	Surface Water	-	-	-		
		Migration in solution via groundwater	Surface Water	-	-	-		
			Shallow Aquifer	Mild	Low	Low		
			Deep Aquifer	-	-	-		
		Direct contact with construction material	Buried structures	Mild	Low	Low		
			Buried Services					
	PAHs,	Migration of gases via permeable soils	Site Workers/Site Maintenance	Mild	Unlikely	Very Low		
End Users								
Off-site Users			Mild	Unlikely	Very low			
		Building and confined spaces						

Table C.I.2 CSM Revised Post Testing

Source	Potential Contaminant	Exposure Pathway	Receptor	Initial Assessment from Desk Study and Main Investigation Report Information			Comments	Works required
				Severity	Probability	Risk		
None confirmed		Inhalation of dust	Site Workers/Site Maintenance				No samples in excess of guideline values, no asbestos detected – risk defaults to low to negligible. No additional sources identified or confirmed by this investigation.	No site-specific RMS required – no sources confirmed. Discovery Strategy will require emplacement during works.
			End Users					
			Off-site Users					
		Inhalation of Vapour/gases (including Radon)	Site Workers/Site Maintenance					
			End Users					
			Off-site Users					
		Ingestion and absorption via direct contact	Site Workers/Site Maintenance					
			End Users					
		Migration via surface runoff	Surface Water					
			Surface Water					
		Migration in solution via groundwater	Shallow Aquifer					
			Deep Aquifer					
		Direct contact with construction material	Buried structures					
			Buried Services					
		Migration of gases via permeable soils	Site Workers/Site Maintenance					
			End Users					
			Off-site Users					
			Building and confined spaces					

Appendix C.2 Chemical Laboratory Results



Chris Swainston
Soils Ltd
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

DETS Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 21-07077

Site Reference: North Street Arcade

Project / Job Ref: 19380

Order No: 19380

Sample Receipt Date: 02/06/2021

Sample Scheduled Date: 02/06/2021

Report Issue Number: 1

Reporting Date: 09/06/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 21-07077	Date Sampled	26/05/21	26/05/21	26/05/21	26/05/21	26/05/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: North Street Arcade	TP / BH No	WS1	WS1	WS2	WS3	WS4
Project / Job Ref: 19380	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19380	Depth (m)	0.40	0.60	1.40	1.60	1.40
Reporting Date: 09/06/2021	DETS Sample No	546974	546975	546976	546977	546978

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.9	8.0	8.2	8.0	8.1
Organic Matter (SOM)	%	< 0.1	MCERTS	0.8	0.9	0.8	0.6	1.2
Arsenic (As)	mg/kg	< 2	MCERTS	69	11	9	9	13
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	NONE	0.2	0.5	0.7	0.2	0.3
Chromium (Cr)	mg/kg	< 2	MCERTS	76	7	26	22	36
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	23	20	17	13	24
Lead (Pb)	mg/kg	< 3	MCERTS	80	68	26	13	43
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	39	6	18	17	21
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 1	MCERTS	32	11	25	31	37
Zinc (Zn)	mg/kg	< 3	MCERTS	49	32	66	43	66
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion.
 Subcontracted analysis (S)



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 21-07077	Date Sampled	26/05/21	21/05/21	21/05/21		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: North Street Arcade	TP / BH No	WS5	WS1	WS5		
Project / Job Ref: 19380	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 19380	Depth (m)	2.00	1.00	1.20		
Reporting Date: 09/06/2021	DETS Sample No	546979	546980	546981		

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected		
pH	pH Units	N/a	MCERTS	8.3	8.1	8.0		
Organic Matter (SOM)	%	< 0.1	MCERTS	1.1	1.4	0.7		
Arsenic (As)	mg/kg	< 2	MCERTS	11	8	5		
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1		
Cadmium (Cd)	mg/kg	< 0.2	NONE	< 0.2	0.6	0.6		
Chromium (Cr)	mg/kg	< 2	MCERTS	23	30	26		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	13	16	10		
Lead (Pb)	mg/kg	< 3	MCERTS	24	23	48		
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS	20	23	18		
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3		
Vanadium (V)	mg/kg	< 1	MCERTS	35	32	18		
Zinc (Zn)	mg/kg	< 3	MCERTS	62	71	42		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion.
 Subcontracted analysis (S)



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Rose Lane
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Maidstone
Kent ME17 2JN
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Soil Analysis Certificate - Speciated PAHs

DETS Report No: 21-07077	Date Sampled	26/05/21	26/05/21	26/05/21	26/05/21	26/05/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: North Street Arcade	TP / BH No	WS1	WS1	WS2	WS3	WS4
Project / Job Ref: 19380	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19380	Depth (m)	0.40	0.60	1.40	1.60	1.40
Reporting Date: 09/06/2021	DETS Sample No	546974	546975	546976	546977	546978

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.16	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.39	0.18	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	0.37	0.16	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.23	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	0.23	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.32	0.14	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.12	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.22	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.24	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.21	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	2.5	< 1.6	< 1.6	< 1.6	< 1.6



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Lenham Heath
Maidstone
Kent ME17 2JN
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Soil Analysis Certificate - Speciated PAHs

DETS Report No: 21-07077	Date Sampled	26/05/21	21/05/21	21/05/21		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: North Street Arcade	TP / BH No	WS5	WS1	WS5		
Project / Job Ref: 19380	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 19380	Depth (m)	2.00	1.00	1.20		
Reporting Date: 09/06/2021	DETS Sample No	546979	546980	546981		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.14		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.12		
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	4.23		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.10		
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	8.60		
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	7.82		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	4.11		
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	3.40		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	3.89		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.27		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	3.24		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.72		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.29		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.47		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	41.4		



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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - EPH Texas Banded

DETS Report No: 21-07077	Date Sampled	26/05/21	26/05/21	26/05/21	26/05/21	26/05/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: North Street Arcade	TP / BH No	WS1	WS1	WS2	WS3	WS4
Project / Job Ref: 19380	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19380	Depth (m)	0.40	0.60	1.40	1.60	1.40
Reporting Date: 09/06/2021	DETS Sample No	546974	546975	546976	546977	546978

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8)	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
EPH Texas (>C8 - C10)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C10 - C12)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C12 - C16)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	3	< 1
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	4	< 1
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	< 6	< 6	< 6	< 6	< 6
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	< 6	< 6	< 6	7	< 6



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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 21-07077	Date Sampled	26/05/21	21/05/21	21/05/21		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: North Street Arcade	TP / BH No	WS5	WS1	WS5		
Project / Job Ref: 19380	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 19380	Depth (m)	2.00	1.00	1.20		
Reporting Date: 09/06/2021	DETS Sample No	546979	546980	546981		

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8)	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
EPH Texas (>C8 - C10)	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
EPH Texas (>C10 - C12)	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
EPH Texas (>C12 - C16)	mg/kg	< 1	MCERTS	< 1	< 1	2		
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	< 1	< 1	40		
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	< 6	< 6	72		
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	< 6	< 6	115		

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2																																				
DETS Report No: 21-07077		Date Sampled	21/05/21		Landfill Waste Acceptance Criteria Limits <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Inert Waste Landfill</th> <th style="width: 33%;">Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill</th> <th style="width: 33%;">Hazardous Waste Landfill</th> </tr> </thead> <tbody> <tr> <td>3%</td> <td>5%</td> <td>6%</td> </tr> <tr> <td>--</td> <td>--</td> <td>10%</td> </tr> <tr> <td>6</td> <td>--</td> <td>--</td> </tr> <tr> <td>1</td> <td>--</td> <td>--</td> </tr> <tr> <td>500</td> <td>--</td> <td>--</td> </tr> <tr> <td>100</td> <td>--</td> <td>--</td> </tr> <tr> <td>--</td> <td>>6</td> <td>--</td> </tr> <tr> <td>--</td> <td>To be evaluated</td> <td>To be evaluated</td> </tr> </tbody> </table>					Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	3%	5%	6%	--	--	10%	6	--	--	1	--	--	500	--	--	100	--	--	--	>6	--	--	To be evaluated	To be evaluated
Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill																																		
3%	5%	6%																																		
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500	--	--																																		
100	--	--																																		
--	>6	--																																		
--	To be evaluated	To be evaluated																																		
Soils Ltd		Time Sampled	None Supplied																																	
Site Reference: North Street Arcade		TP / BH No	WS1																																	
Project / Job Ref: 19380		Additional Refs	None Supplied																																	
Order No: 19380		Depth (m)	1.00																																	
Reporting Date: 09/06/2021		DETS Sample No	546980																																	
Determinand	Unit	MDL																																		
TOC ^M	%	< 0.1	0.6																																	
Loss on Ignition	%	< 0.01	5.10																																	
BTEX ^M	mg/kg	< 0.05	< 0.05																																	
Sum of PCBs	mg/kg	< 0.1	< 0.1																																	
Mineral Oil ^M	mg/kg	< 10	< 10																																	
Total PAH ^M	mg/kg	< 1.7	< 1.7																																	
pH ^M	pH Units	N/a	8.1																																	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1																																	
Eluate Analysis			10:1 mg/l			Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)																													
Arsenic ^U		< 0.01				< 0.1	0.5	2	25																											
Barium ^U		< 0.02				< 0.2	20	100	300																											
Cadmium ^U		< 0.0005				< 0.005	0.04	1	5																											
Chromium ^U		< 0.005				< 0.05	0.5	10	70																											
Copper ^U		0.01				0.1	2	50	100																											
Mercury ^U		< 0.0005				< 0.005	0.01	0.2	2																											
Molybdenum ^U		0.006				0.06	0.5	10	30																											
Nickel ^U		< 0.007				< 0.07	0.4	10	40																											
Lead ^U		< 0.005				< 0.05	0.5	10	50																											
Antimony ^U		< 0.005				< 0.05	0.06	0.7	5																											
Selenium ^U		< 0.005				< 0.05	0.1	0.5	7																											
Zinc ^U		0.005				0.05	4	50	200																											
Chloride ^U		19.0				190	800	15000	25000																											
Fluoride ^U		< 0.5				< 5	10	150	500																											
Sulphate ^U		13.8				138	1000	20000	50000																											
TDS		56				560	4000	60000	100000																											
Phenol Index		< 0.01				< 0.1	1	-	-																											
DOC		15.1				151	500	800	1000																											
Leach Test Information																																				
Sample Mass (kg)			0.10																																	
Dry Matter (%)			86.9																																	
Moisture (%)			15.2																																	
Stage 1																																				
Volume Eluate L10 (litres)			0.89																																	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion

Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation

M Denotes MCERTS accredited test

U Denotes ISO17025 accredited test

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2																																							
DETS Report No: 21-07077		Date Sampled	21/05/21		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">Landfill Waste Acceptance Criteria Limits</th> </tr> <tr> <th>Inert Waste Landfill</th> <th>Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill</th> <th>Hazardous Waste Landfill</th> </tr> </thead> <tbody> <tr> <td>3%</td> <td>5%</td> <td>6%</td> </tr> <tr> <td>--</td> <td>--</td> <td>10%</td> </tr> <tr> <td>6</td> <td>--</td> <td>--</td> </tr> <tr> <td>1</td> <td>--</td> <td>--</td> </tr> <tr> <td>500</td> <td>--</td> <td>--</td> </tr> <tr> <td>100</td> <td>--</td> <td>--</td> </tr> <tr> <td>--</td> <td>>6</td> <td>--</td> </tr> <tr> <td>--</td> <td>To be evaluated</td> <td>To be evaluated</td> </tr> </tbody> </table>					Landfill Waste Acceptance Criteria Limits			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	3%	5%	6%	--	--	10%	6	--	--	1	--	--	500	--	--	100	--	--	--	>6	--	--	To be evaluated	To be evaluated
Landfill Waste Acceptance Criteria Limits																																							
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3%	5%	6%																																					
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500	--	--																																					
100	--	--																																					
--	>6	--																																					
--	To be evaluated	To be evaluated																																					
Soils Ltd		Time Sampled	None Supplied																																				
Site Reference: North Street Arcade		TP / BH No	WS5																																				
Project / Job Ref: 19380		Additional Refs	None Supplied																																				
Order No: 19380		Depth (m)	1.20																																				
Reporting Date: 09/06/2021		DETS Sample No	546981																																				
Determinand	Unit	MDL																																					
TOC ^M	%	< 0.1	0.2																																				
Loss on Ignition	%	< 0.01	2.50																																				
BTEX ^M	mg/kg	< 0.05	< 0.05																																				
Sum of PCBs	mg/kg	< 0.1	< 0.1																																				
Mineral Oil ^M	mg/kg	< 10	< 10																																				
Total PAH ^M	mg/kg	< 1.7	41.7																																				
pH ^M	pH Units	N/a	8.0																																				
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1																																				
Eluate Analysis			10:1 mg/l			Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)																																
Arsenic ^U		< 0.01				< 0.1	0.5	2	25																														
Barium ^U		< 0.02				< 0.2	20	100	300																														
Cadmium ^U		< 0.0005				< 0.005	0.04	1	5																														
Chromium ^U		< 0.005				< 0.05	0.5	10	70																														
Copper ^U		< 0.01				< 0.1	2	50	100																														
Mercury ^U		< 0.0005				< 0.005	0.01	0.2	2																														
Molybdenum ^U		0.003				0.03	0.5	10	30																														
Nickel ^U		< 0.007				< 0.07	0.4	10	40																														
Lead ^U		< 0.005				< 0.05	0.5	10	50																														
Antimony ^U		< 0.005				< 0.05	0.06	0.7	5																														
Selenium ^U		< 0.005				< 0.05	0.1	0.5	7																														
Zinc ^U		< 0.005				< 0.05	4	50	200																														
Chloride ^U		4.3				43	800	15000	25000																														
Fluoride ^U		< 0.5				< 5	10	150	500																														
Sulphate ^U		4.2				42	1000	20000	50000																														
TDS		50				500	4000	60000	100000																														
Phenol Index		< 0.01				< 0.1	1	-	-																														
DOC		6.3				63.4	500	800	1000																														
Leach Test Information																																							
Sample Mass (kg)			0.10																																				
Dry Matter (%)			93.2																																				
Moisture (%)			7.4																																				
Stage 1																																							
Volume Eluate L10 (litres)			0.89																																				
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation M Denotes MCERTS accredited test U Denotes ISO17025 accredited test																																							



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 21-07077

Soils Ltd

Site Reference: North Street Arcade

Project / Job Ref: 19380

Order No: 19380

Reporting Date: 09/06/2021

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
546974	WS1	None Supplied	0.40	6.1	Brown sandy clay with stones and chalk
546975	WS1	None Supplied	0.60	12.4	Brown sandy clay with stones and chalk
546976	WS2	None Supplied	1.40	10.7	Brown sandy clay with stones
546977	WS3	None Supplied	1.60	11.9	Brown sandy clay with stones and chalk
546978	WS4	None Supplied	1.40	8.5	Brown gravelly sand with stones
546979	WS5	None Supplied	2.00	19.7	Brown sandy clay
\$ 546980	WS1	None Supplied	1.00	13.2	Brown sandy clay with stones
\$ 546981	WS5	None Supplied	1.20	6.9	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{1/5}

\$ samples exceeded recommended holding times



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-07077

Soils Ltd

Site Reference: North Street Arcade

Project / Job Ref: 19380

Order No: 19380

Reporting Date: 09/06/2021

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenvicarbazine followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Water Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-07077

Soils Ltd

Site Reference: North Street Arcade

Project / Job Ref: 19380

Order No: 19380

Reporting Date: 09/06/2021

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40, C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35, C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44, C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	20.0	%
Loss on Ignition	Soil	BS EN 12457	35.0	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	23.0	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	11.6	%
pH	Soil	BS EN 12457	0.28	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	18.7	%
Barium	Leachate	BS EN 12457	11.6	%
Cadmium	Leachate	BS EN 12457	20.3	%
Chromium	Leachate	BS EN 12457	18.3	%
Copper	Leachate	BS EN 12457	24.3	%
Mercury	Leachate	BS EN 12457	23.7	%
Molybdenum	Leachate	BS EN 12457	14.7	%
Nickel	Leachate	BS EN 12457	16.1	%
Lead	Leachate	BS EN 12457	15.7	%
Antimony	Leachate	BS EN 12457	17.9	%
Selenium	Leachate	BS EN 12457	22.0	%
Zinc	Leachate	BS EN 12457	17.4	%
Chloride	Leachate	BS EN 12457	15.3	%
Fluoride	Leachate	BS EN 12457	16.4	%
Sulphate	Leachate	BS EN 12457	20.6	%
TDS	Leachate	BS EN 12457	12.0	%
Phenol Index	Leachate	BS EN 12457	14.0	%
DOC	Leachate	BS EN 12457	10.0	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	35.0	%
pH	Soil	BS 3882: 2015	0.14	Units
Carbonate	Soil	BS 3882: 2015	16.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	14.9	%
Copper	Soil	BS 3882: 2015	16.0	%
Nickel	Soil	BS 3882: 2015	17.7	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%

Appendix C.3 General Assessment Criteria

HUMAN HEALTH RISK ASSESSMENT

Introduction

The statutory definition of contaminated land is defined in the Environmental Protection Act 1990, ref. 1.1, which was introduced by the Environment Act 1995, ref. 1.2;

'Land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

- (a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) pollution of controlled waters is being, or is likely to be, caused.'

The UK guidance on the assessment of contaminated has developed as a direct result of the introduction of these two Acts. The technical guidance supporting the new legislation has been summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs), a proposed series of twelve documents. Seven were originally published in March 1994, four more were published in April 2002, while the last remaining guidance document, CLR 11, ref 1.3 was published in 2004. In 2008 CLR reports 7 to 10 were withdrawn by DEFRA and the Environment Agency and updated version of CLR 9 and 10 were produced in the form of Science Reports SR2, ref. 1.4 and SR3, ref. 1.5.

In establishing whether a site fulfils the statutory definition of 'contaminated land' it is necessary to identify, whether a pollutant linkage exists in respect of the land in question and whether the pollutant linkage:

- is resulting in significant harm being caused to the receptor in the pollutant linkage,
- presents a significant possibility of significant harm being caused to that receptor,
- is resulting in the pollution of the controlled waters which constitute the receptor, or
- is likely to result in such pollution.

A 'pollutant linkage' may be defined as the link between a contaminant 'source' and a 'receptor' by means of a 'pathway'.

Assessment Methodology

The guidance proposes a four-stage assessment process for identifying potential pollutant linkages on a site. These stages are set out in the table below:

No.	Process	Description
1	Hazard Identification	Establishing contaminant sources, pathways and receptors (the conceptual model).
2	Hazard Assessment	Analysing the potential for unacceptable risks (what linkages could be present, what could be the effects).
3	Risk Estimation	Trying to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it).
4	Risk Evaluation	Deciding whether the risk is unacceptable.

Stages 1 and 2 develop a '*conceptual model*' based upon information collated from desk based studies, and frequently a walkover of the site. The walkover survey should be conducted in general accordance with CLR 2, ref. 1.6. The formation of a conceptual model is an iterative process and as such, it should be updated and refined throughout each stage of the project to reflect any additional information obtained.

The extent of the desk studies and enquiries to be conducted should be in general accordance with CLR 3, ref. 1.7. The information from these enquiries is presented in a desk study report with recommendations, if necessary, for further work based upon the conceptual model. Specific DoE 'Industry Profiles' provide guidance on the nature of contaminants relating to specific industrial processes.

If potential pollutant linkages are identified within the conceptual model, a Phase 2 site investigation and report will be recommended. The investigation should be planned in general accordance with CLR 4, ref 1.8. The number of exploratory holes and samples collected for analysis should be consistent with the size of the site and the level of risk envisaged. This will enable a contamination risk assessment to be conducted, at which point the conceptual model can be updated and relevant pollutant linkages can be identified.

A two-stage investigation may be more appropriate where time constraints are less of an issue. The first stage investigation being conducted as an initial assessment for the presence of potential sources, a second being a more refined investigation to delineate wherever possible the extent of the identified contamination.

All site works should be in general accordance with the British Standards BS 10175:2011, ref. 1.9. and BS 5930:2015, ref. 1.10.

The generic contamination risk assessment screens the results of the chemical analysis against generic guidance values which are dependent on the proposed end-use of the development.

The end-use may be defined as one of the following ref. 1.15;

- Residential with homegrown produce – domestic low rise and low density housing with gardens where vegetables may be grown for home consumption
- Residential without homegrown produce – domestic low density and low density housing where no gardens are present.
- Allotments – specific areas where vegetables are grown for home consumption.
- Public open space in close proximity to residential housing – includes the predominantly grassed area adjacent to high density housing and the central green area around which houses are developed. This land-use includes the smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soil with planting.
- Public open space in use as general parkland – provided for recreational use and may be used for family visits and picnics, children's play area, sports grounds and dog walking.
- Commercial – industrial premises where there is limited exposure to soil.

Standard Land-use Scenarios

The standard land-use scenarios used to develop conceptual exposure models are presented in the following sections:

Residential with homegrown produce

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

-
- Critical receptor is a young female child (zero to six years old)
 - Exposure duration is six years.
 - Exposure pathways include direct soil and indoor dust ingestion, consumption of home-grown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
-
- Building type is a two-storey small terraced house.
-

A sub-set of the Residential land-use is **Residential without Homegrown produce**. The generic scenario assumes low density housing with communal landscaped gardens where the consumption of home grown vegetables will not occur.

Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

-
- Critical receptor is a young female child (zero to six years old)
 - Exposure duration is six years.
 - Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
 - There is no building.
-

Commercial

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

-
- Critical receptor is a working female adult (aged 16 to 65 years old).
 - Exposure duration is a working lifetime of 49 years.
 - Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
 - Building type is a three-storey office (pre 1970).
-

Public Open Space within Residential Area

The generic scenario refers to any grassed area 0.05 ha and that is close to Housing.

-
- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil
 - Predominantly used by children for playing and may be used for activities such as a football kick about
 - Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply
 - older children as the critical receptor on basis that they will use site most frequently (Age class 4-9)
 - ingestion rate 75 mg.day⁻¹
-

Public Open Space Park

This generic scenario refers to any public park that is more than 0.5ha in area:

-
- Public park (>0.5 ha), predominantly grassed and may also contain children's play equipment and border areas of soil containing flowers or shrubs (75% cover)
 - Female child age classes 1-6
 - Soil ingestion rate of 50 mg.day⁻¹
 - Occupancy period outdoors = 2 hours.day⁻¹
 - Exposure frequency of 170 days.year⁻¹ for age classes 2-18 and 85 days.year⁻¹ for age class 1
 - Outdoor exposure pathways only (no tracking back).
-

Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC).

GAC are conservative values adopted to ensure that they are applicable to the majority of possible contaminated site. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC derived by a third party or the Environment Agency/ DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC to ensure that they are used appropriately. Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific values for relevant soil contaminants based on the site specific conditions.

In 2014, the publication of Category 4 Screening Levels (C4SL) ref 1.15, 1.16, as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3) ref 1.5 used in the generation of SGVs. C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010 ref 1.16. Where a C4SL has been published, Soils Limited has adopted them as GAC for these six substances.

For all other substances the soils will be compared to Suitable 4 Use Levels (S4ULs) published by LQM ref. 1.12, which were developed for around 85 substances and are intended to enable a screening assessment of the risks posed by soil quality on development sites. The updated LQM/CIEH GAC publication was developed to accommodate recent developments in the understanding of chemical, toxicological and routine exposure to soil-based contaminants.

Where no S4UL or C4SL is available, the assessment criteria (AC) may be generated using the Contaminated Land Exposure Assessment (CLEA) Software Version 1.07, ref. 1.13. Toxicological and physico-chemical/fate and transport data used to generate the AC has been derived from a hierarchy of data sources as follows:

1. Environment Agency or Department of Environment Food and Rural Affairs (DEFRA) documents;
2. Other documents produced by UK Government or state organisations;
3. European institution documents;
4. International organisation documents;
5. Foreign government institutions.

In the case of the majority of contaminants considered, the toxicological data has been drawn from the relevant CLR 9 TOX report, or updated toxicological data published by the Environment Agency (2009), ref. 1.6, where available. Where no TOX report is available reference has been made to the health criteria values, derived for use in Land Quality Press (2006), ref. 1.17, as this is considered to represent a peer reviewed data source. Similarly, fate and transport data has been derived in the first instance from Environment Agency (2003), ref. 1.18 and for contaminants not considered in this document the fate and transport data used in previous versions of the CLEA model has been used.

Chemical laboratory test results are processed as follows. A statistical analysis of the results is conducted, as detailed in CIEH and CL:AIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', ref. 1.14. Individual concentrations are compared to the selected guideline values to identify concentrations of contaminants that are above the selected screening criteria.

Where the risk estimation identifies significant concentrations of one or more contaminants, a further risk evaluation needs to be undertaken.

References

- 1.1 The Environmental Protection Act, Part IIA, Section 78, DoE 1990.
- 1.2 Environment Act 1995, Section 57, DoE 1995.
- 1.3 CLR 11, '*Model Procedures for the Management of Contaminated Land*', DEFRA and Environment Agency, 2004.
- 1.4 Environment Agency Science Report SC050021/SR2 '*Human health toxicological assessment of contaminants in soil*'.
- 1.5 Science Report SC050021/SR3 '*Updated technical background to the CLEA model*', Environment Agency, 2008
- 1.6 CLR 2, '*Guidance on preliminary site inspection of contaminated land*', Report by Applied Environmental, DoE 1994.
- 1.7 CLR 3 '*Documentary Research on Industrial Sites*', Report by RPS Consultants Ltd., DOE, 1994
- 1.8 CLR 4, '*Sampling strategies for contaminated land*', Report by The Centre for Research into the Built Environment, the Nottingham Trent University, DoE, 1994
- 1.9 BS 10175: 2011 '*Investigation of potentially contaminated sites. Code of practice*', British Standards Institute, 2011
- 1.10 BS 5930: 2015 '*Code of practice for ground investigations*', British Standards Institute, 2015
- 1.11 Science Report SC050021 '*Contaminants in Soil: Updated Collation of Toxicological Data and Intake Values for Humans*', Environment Agency, 2009
- 1.12 The LQM/S4ULs for Human Health Risk Assessment, Nathanail P, McCaffery C, Gillett A, Ogden R, and Nathanail J, Land Quality Press, Nottingham, published 2015.
- 1.13 CLEA '*Software Version 1.071*' (downloaded from the Environment Agency website, <http://www.environment-agency.gov.uk>)
- 1.14 CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*', Chartered Institute of Environmental Health (CIEH) and Contaminated Land: Applications in Real Environments (CL:AIRE), May 2008.
- 1.15 DEFRA SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination, published March 2014.
- 1.16 Contaminated Land: Applications in Real Environment (CL:AIRE) (2014). '*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*', Revision 2, DEFRA research project SP1010.
- 1.17 Generic Assessment Criteria for Human Health Risk Assessment, Nathanail CP, McCaffery C, Ashmore M, Cheng Y, Gillett A, Hooker P and Ogden RC
- 1.18 CLR 2, '*Guidance on preliminary site inspection of contaminated land*', Report by Applied Environmental, DoE 1994.

				Residential with home-grown produce			Residential without home-grown produce			Allotments			Commercial			Public Open Space - Resi			Public Open Space -Park					
Type	Contaminants	Species	Year	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
Metals	Antimony		2010																			EIC/AGS/	CL:AIRE	2010
	Arsenic		2014		37			550			49			7500			79			168		C4SL	DEFRA	2014
			2015		37			40			40			640			79			170		S4UL	LQM/CIEH	2015
	Beryllium		2015		1.7			1.7			35			12			2.2			63		S4UL	LQM/CIEH	2015
	Boron		2015		290			11000			45			240000			21000			46000		S4UL	LQM/CIEH	2015
	Cadmium		2015		44			85			1.9			190			120			532		S4UL	LQM/CIEH	2015
			2014		26			149			4.9			410			220			880		C4SL	DEFRA	2014
	Chromium	III	2015		910			910			18000			8600			1500			33000		S4UL	LQM/CIEH	2015
		VI	2014		21			21			170			49			23			250		C4SL	DEFRA	2014
		VI	2015		6			6			1.8			33			7.7			220		S4UL	LQM/CIEH	2015
	Copper		2015		2400			7100			520			68000			12000			44000		S4UL	LQM/CIEH	2015
	Lead		2014		200			310			80			2330			630			1300		C4SL	DEFRA	2014
	Mercury	Elemental	2015		1.2			1.2			21			58			16			30		S4UL	LQM/CIEH	2015
		Inorganic	2015		40			56			19			1100			120			240		S4UL	LQM/CIEH	2015
		Methyl	2015		11			15			6			320			40			68		S4UL	LQM/CIEH	2015
	Nickel		2015		130			180			53			980			230			800		S4UL	LQM/CIEH	2015
	Selenium		2015		250			430			88			12000			1100			1800		S4UL	LQM/CIEH	2015
	Vanadium		2015		410			1200			91			9000			2000			5000		S4UL	LQM/CIEH	2015
	Zinc		2015		3700			40000			620			730000			81000			170000		S4UL	LQM/CIEH	2015
	Benzene		2014		0.87			3.3			0.18			98			140			230		C4SL	DEFRA	2014
			2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015
	Toluene		2015	130	290	660	880	1900	3900	22	51	120	65000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015
	Ethylbenzene		2015	47	110	260	83	190	440	16	39	91	4700	13000	27000	24000	24000	25000	17000	22000	27000	S4UL	LQM/CIEH	2015
	Xylenes	o-xylene	2015	60	140	330	88	210	480	28	67	160	6600	15000	33000	41000	42000	43000	17000	24000	33000	S4UL	LQM/CIEH	2015
		m-xylene	2015	59	140	320	82	190	450	31	74	170	6200	14000	31000	41000	42000	43000	17000	24000	32000	S4UL	LQM/CIEH	2015
		p-xylene	2015	56	130	310	79	180	310	29	69	160	5900	14000	30000	41000	42000	43000	17000	23000	31000	S4UL	LQM/CIEH	2015
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6		2015	42	78	160	42	78	160	730	1700	3900	3200	5900	12000	570000	590000	600000	95000	130000	180000	S4UL	LQM/CIEH	2015
	Aliphatic >C6 - C8		2015	100	230	530	100	230	530	2300	5600	13000	7800	17000	40000	600000	610000	620000	150000	220000	320000	S4UL	LQM/CIEH	2015
	Aliphatic >C8 - C10		2015	27	65	150	27	65	150	320	770	1700	2000	4800	11000	13000	13000	13000	14000	18000	21000	S4UL	LQM/CIEH	2015
	Aliphatic >C10 - C12		2015	130	330	760	130	330	770	2200	4400	7300	9700	23000	47000	13000	13000	13000	21000	23000	24000	S4UL	LQM/CIEH	2015
	Aliphatic >C12 - C16		2015	1100	2400	4300	1100	2400	4400	11000	13000	13000	59000	82000	90000	13000	13000	13000	25000	25000	26000	S4UL	LQM/CIEH	2015
	Aliphatic >C16 - C35		2015	65000	92000	110000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aliphatic >C35 - C44		2015	65000	92000	140000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aromatic >C5 - C7		2015	70	140	300	370	690	1400	13	27	57	26000	46000	86000	56000	56000	56000	76000	84000	92000	S4UL	LQM/CIEH	2015
	Aromatic >C7 - C8		2015	130	290	660	860	1800	3900	22	51	120	56000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	3500	8100	17000	5000	5000	5000	7200	8500	9300	S4UL	LQM/CIEH	2015
	Aromatic >C10 - C12		2015	74	180	380	250	590	1200	13	31	74	16000	28000	34000	5000	5000	5000	9200	9700	10000	S4UL	LQM/CIEH	2015
	Aromatic >C12 - C16		2015	140	330	660	1800	2300	2500	23	57	130	36000	37000	38000	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015
	Aromatic >C16 - C21		2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015
	Aromatic >C21 - C35		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aromatic >C34 - C44		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aliphatic + Aromatic >C44 - C70		2015	1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
Polycyclic Aromatic Hydrocarbons (PAH's) (mg/kg)	Acenaphthene		2015	210	510	1100	3000	4700	6000	34	85	200	84000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Acenaphthylene		2015	170	420	920	2900	4600	6000	28	69	160	83000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Anthracene		2015	2400	5400	11000	31000	35000	37000	380	950	2200	520000	54000	540000	74000	74000	74000	150000	150000	150000	S4UL	LQM/CIEH	2015
	Benzo(a)anthracene		2015	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	S4UL	LQM/CIEH	2015
	Benzo(a)pyrene		2014			5			5.3			5.7			76			10		21		C4SL	DEFRA	2014
			2015	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	S4UL	LQM/CIEH	2015
	Benzo(b)fluoranthene		2015	2.6	3.3	3.7	3.9	4.0	4.0	0.99	2.1	3.9	44	44	45	7.1	7.2	7.2	13	15	16	S4UL	LQM/CIEH	2015
	Benzo(ghi)perylene		2015	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	S4UL	LQM/CIEH	2015
	Benzo(k)fluoranthene		2015	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	S4UL	LQM/CIEH	2015
	Chrysene		2015	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	S4UL	LQM/CIEH	2015
	Dibenz(a,h)anthracene		2015	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	S4UL	LQM/CIEH	2015

				Residential with home-grown produce			Residential without home-grown produce			Allotments			Commercial			Public Open Space - Resi			Public Open Space -Park					
SOM				1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
Type	Contaminants	Species	Year																					
Chloroalkanes & alkenes	Fluoranthene		2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015
	Fluorene		2015	170	400	860	2800	3800	4500	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015
	Indeno(1,2,3-cd)pyrene		2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015
	Naphthalene		2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190	460	1100	4900	4900	4900	1200	1900	3000	S4UL	LQM/CIEH	2015
	Phenanthrene		2015	95	220	440	1300	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015
	Pyrene		2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	S4UL	LQM/CIEH	2015
	Coal Tar(Bap as surrogate matter)		2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015
Chloroalkanes & alkenes	1,2 Dichloroethane		2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015
	1,1,1 Trichloroethane		2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000	76000	100000	S4UL	LQM/CIEH	2015
	1,1,2,2 Tetrachloroethane		2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015
	1,1,1,2 Tetrachloroethane		2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015
	Tetrachloroethene		2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	810	1100	1500	S4UL	LQM/CIEH	2015
	Tetrachloromethane (Carbon Tetrachloride)		2015	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	S4UL	LQM/CIEH	2015
	Trichloroethene		2015	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	S4UL	LQM/CIEH	2015
Explosives	Trichloromethane		2015	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	S4UL	LQM/CIEH	2015
	Vinyl Chloride (chloroethene)		2015	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	S4UL	LQM/CIEH	2015
	2,4,6 Trinitrotoluene		2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH	2015
	RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)		2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015
	HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)		2015	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000	23000	24000	S4UL	LQM/CIEH	2015
	Aldrin		2015	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	S4UL	LQM/CIEH	2015
	Dieldrin		2015	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	S4UL	LQM/CIEH	2015
Pesticides	Atrazine		2015	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	S4UL	LQM/CIEH	2015
	Dichlorvos		2015	0.032	0.066	0.14	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	S4UL	LQM/CIEH	2015
	Alpha - Endosulfan		2015	7.4	18	41	160	280	410	1.2	2.9	6.8	5600	7400	8400	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Beta - Endosulfan		2015	7	17	39	190	320	440	1.1	2.7	6.4	6300	7800	8700	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Alpha -Hexachlorocyclohexanes		2015	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	S4UL	LQM/CIEH	2015
	Beta -Hexachlorocyclohexanes		2015	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	S4UL	LQM/CIEH	2015
	Gamma -Hexachlorocyclohexanes		2015	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	S4UL	LQM/CIEH	2015
Chlorobenzenes	Chlorobenzene		2015	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	1300	2000	2900	S4UL	LQM/CIEH	2015
	1,2-Dichlorobenzene		2015	23	55	130	24	57	130	94	230	540	2000	4800	11000	90000	95000	98000	24000	36000	51000	S4UL	LQM/CIEH	2015
	1,3-Dichlorobenzene		2015	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	S4UL	LQM/CIEH	2015
	1,4-Dichlorobenzene		2015	61	150	350	61	150	350	15	37	88	4400	10000	25000	17000	17000	1700	36000	36000	36000	S4UL	LQM/CIEH	2015
	1,2,3,-Trichlorobenzene		2015	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770	1100	1600	S4UL	LQM/CIEH	2015
	1,2,4,-Trichlorobenzene		2015	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700	2600	4000	S4UL	LQM/CIEH	2015
	1,3,5,-Trichlorobenzene		2015	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380	580	860	S4UL	LQM/CIEH	2015
	1,2,3,4,-Tetrachlorobenzene		2015	15	36	78	24	56	120	4.4	11	26	1700	3080	4400	830	830	830	1500	1600	1600	S4UL	LQM/CIEH	2015
	1,2,3,5,- Tetrachlorobenzene		2015	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49	120	240	78	79	79	110	120	130	S4UL	LQM/CIEH	2015
	1,2,4, 5,- Tetrachlorobenzene		2015	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42	72	96	13	13	13	25	26	26	S4UL	LQM/CIEH	2015
	Pentachlorobenzene		2015	5.8	12	22	19	30	38	1.2	3.1	7	640	770	830	100	100	100	190	190	190	S4UL	LQM/CIEH	2015
	Hexachlorobenzene		2015	1.8	3.3	4.9	4.1	5.7	6.7	0.47	1.1	2.5	110	120	120	16	16	16	30	30	30	S4UL	LQM/CIEH	2015
Phenols & Chlorophenols	Phenols		2015	120	200	380	440	690	1200	23	42	83	440	690	1300	440	690	1300	440	690	1300	S4UL	LQM/CIEH	2015
	Chlorophenols (4 Congeners)		2015	0.87	2	4.5	94	150	210	0.13	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	S4UL	LQM/CIEH	2015
	Pentachlorophenols		2015	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	S4UL	LQM/CIEH	2015
Others	Carbon Disulphide		2015	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	S4UL	LQM/CIEH	2015
	Hexachloro-1,3-Butadiene		2015	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	S4UL	LQM/CIEH	2015
	Sum of PCDDs, PCDFs and dioxin-like PCB's.		2012			8			8			8			240							SGV	DEFRA	2012

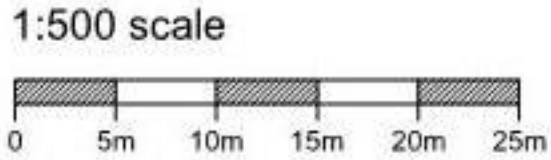
NOTE

Priority Guideline (mg kg⁻¹)

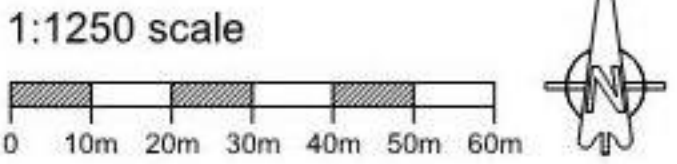
			Residential with home-grown produce			Residential without home-grown produce			Allotments			Commercial			Public Open Space - Resi			Public Open Space -Park			
			SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6
Type	Contaminants	Species	Year																		
	1	Site Specific Assessment Criteria (SSAC) (Soils Limited)																			
	2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014)																			
	3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)																			
	4	2015: Suitable 4 Use Level (S4UL) (Nathanail <i>et al</i> , 2015)																			
For Generic Risk Assessment, the values in Bold have priority																					
Table reviewed February 2020																					

Appendix D Information Provided by the Client

GENERAL NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE OTHER RELEVANT CONSULTANT'S DRAWINGS.
2. ALL FINISHES ARE TO CONFORM TO THE CURRENT BUILDING REGULATIONS.
3. REFER TO A SEPARATE DOCUMENT FOR THE DESIGNER'S RISK ASSESSMENT.
4. ALL WORKS OR MATERIALS INDICATED ON THIS DRAWING ARE TO BE TO THE LATEST RELEVANT BRITISH STANDARDS AND CARRIED OUT IN ACCORDANCE WITH THE BRITISH STANDARDS CODES OF PRACTICE OR RECOGNISED INSTITUTE OR TRADE ASSOCIATION RECOMMENDATIONS AND PUBLICATIONS.



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Revision	Date	Description	Drawn	Check
P3	Apr 2018	Planning Application	TH	

PLC ARCHITECTS
Linsdown House
25-26 Hampshire Terrace
Portsmouth PO1 2QF
Hampshire England
Tel: (023) 92 755 333
E-Mail: admin@plcarchitects.com
Web: www.plcarchitects.com

Client:

Project:
North Street Arcade
North Street
Havant

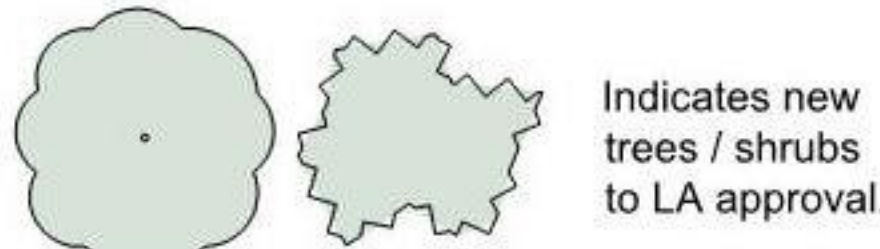
Drawing Title:
Location plan
Block plan

Drawn By	Date	Checked By	Date	Approved By	Date
TH	Jan 17				
Drawing No.	16 - 2199 - 103	Version	P3	Scale	As Shown @ A3

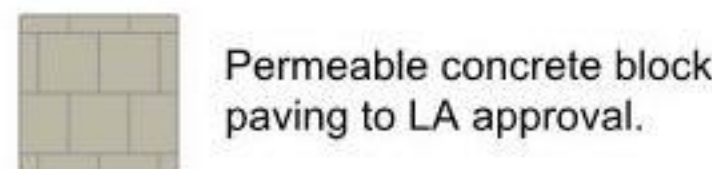
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SCALING ONLY FOR LOCAL AUTHORITY PURPOSES

GENERAL NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE OTHER RELEVANT CONSULTANTS DRAWINGS.
2. ALL FINISHES ARE TO CONFORM TO THE CURRENT BUILDING REGULATIONS.
3. REFER TO A SEPARATE DOCUMENT FOR THE DESIGNERS RISK ASSESSMENT.
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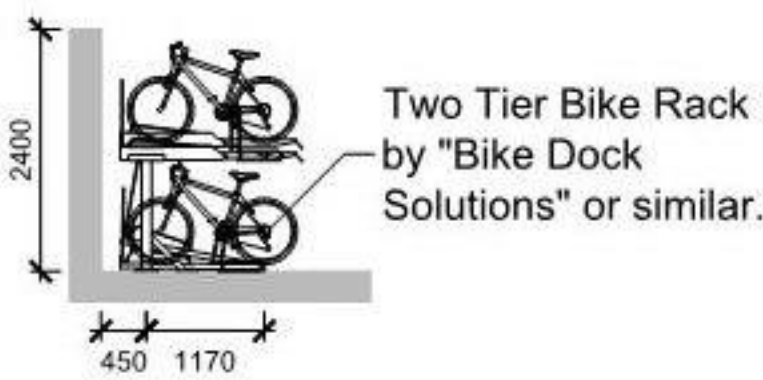
Soft Landscaping



Hard Landscaping



Two Tier Bike Rack Details



Schedule of Accommodation		
Apt No.	M²	Beds
1.	61	1B (2P)
2.	57	1B (2P)
3.	43	1B (1P)
4.	46	1B (1P)
5.	44	1B (1P)
6.	44	1B (1P)
7.	48	1B (1P)
8.	61	2B (3P)
9.	50	1B (2P)
10.	42	1B (1P)
11.	55	1B (2P)
12.	39	1B (1P)
13.	44	1B (1P)
14.	46	1B (1P)
15.	51	1B (2P)
16.	40	1B (1P)
17.	50	1B (2P)
18.	41	1B (1P)
19.	41	1B (1P)
20.	43	1B (1P)
21.	62	2B (3P)
22.	42	1B (1P)
23.	45	1B (1P)
24.	44	1B (1P)
25.	61	1B (2P)
26.	62	2B (3P)
27.	62	2B (3P)
28.	62	2B (3P)
29.	42	1B (1P)

P14	June 2020	Updated in response to LPA comments	JCB	
P13	June 2020	Updated in response to LPA comments	JCB	
P12	Mar 2020	Planning Application	TH	
P11	Feb 2020	Cycle parking provision amended.	TH	
P10	Feb 2020	Preliminary	TH	
Revision	Date	Description	Dwn	Chkd



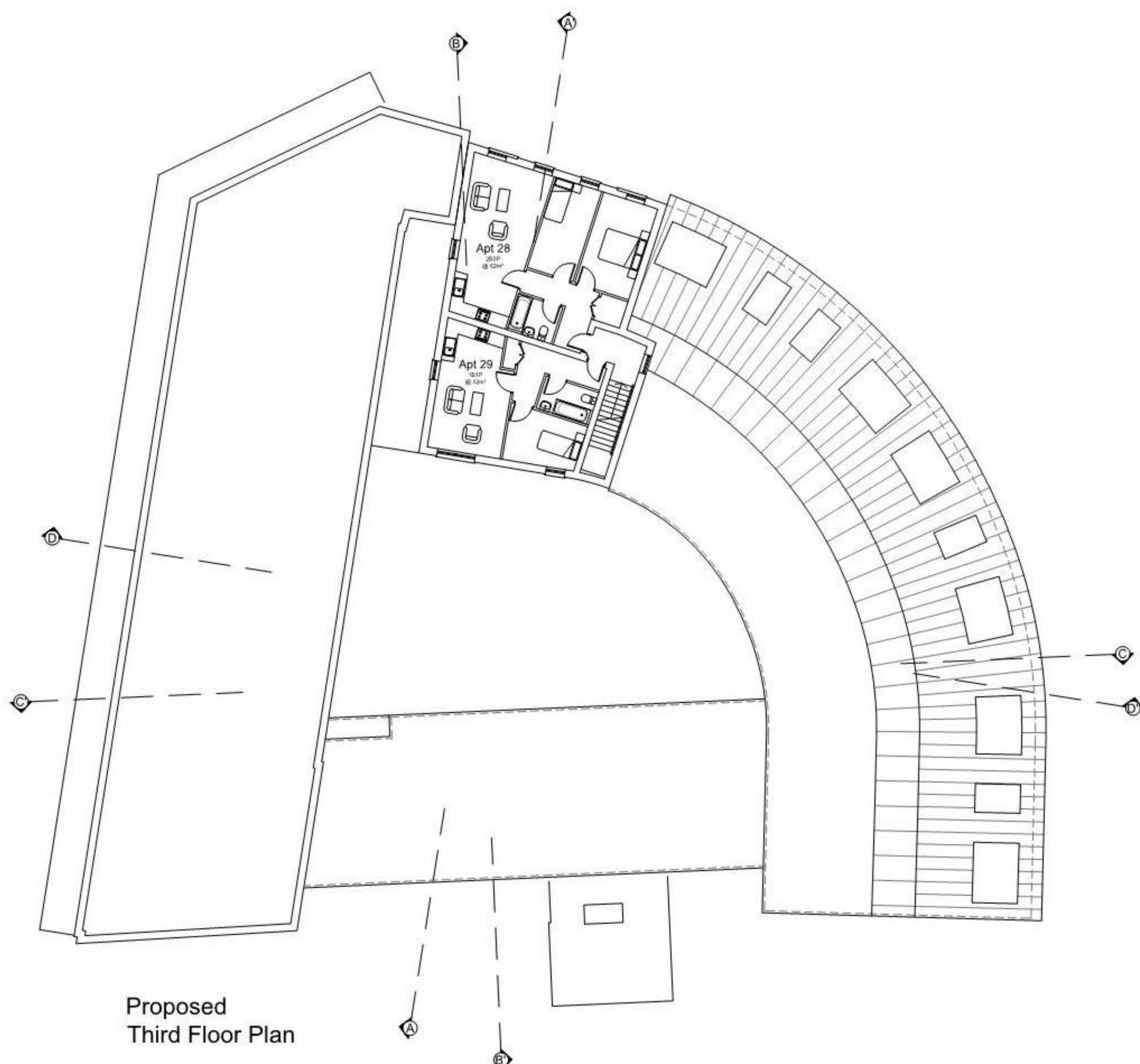
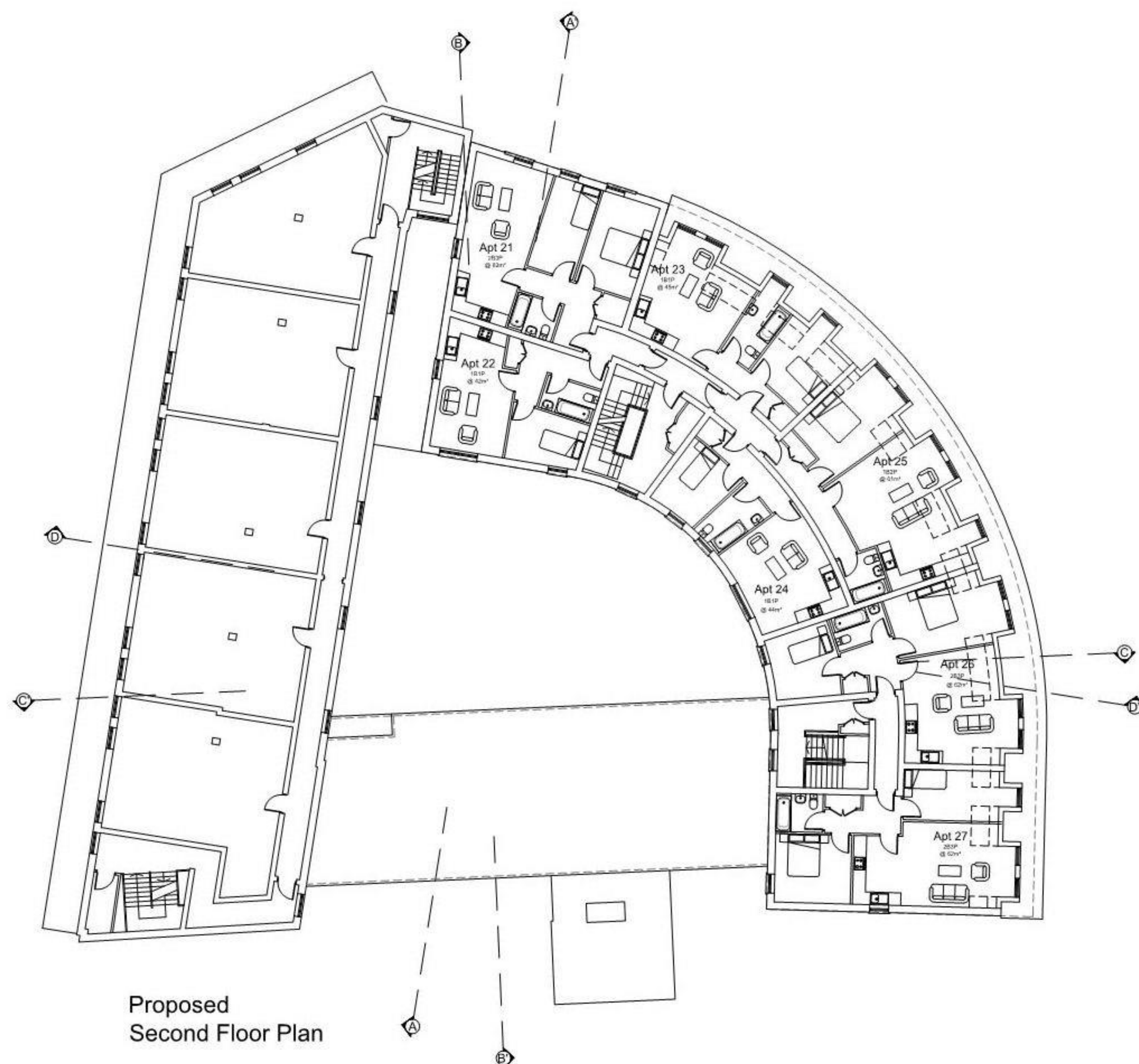
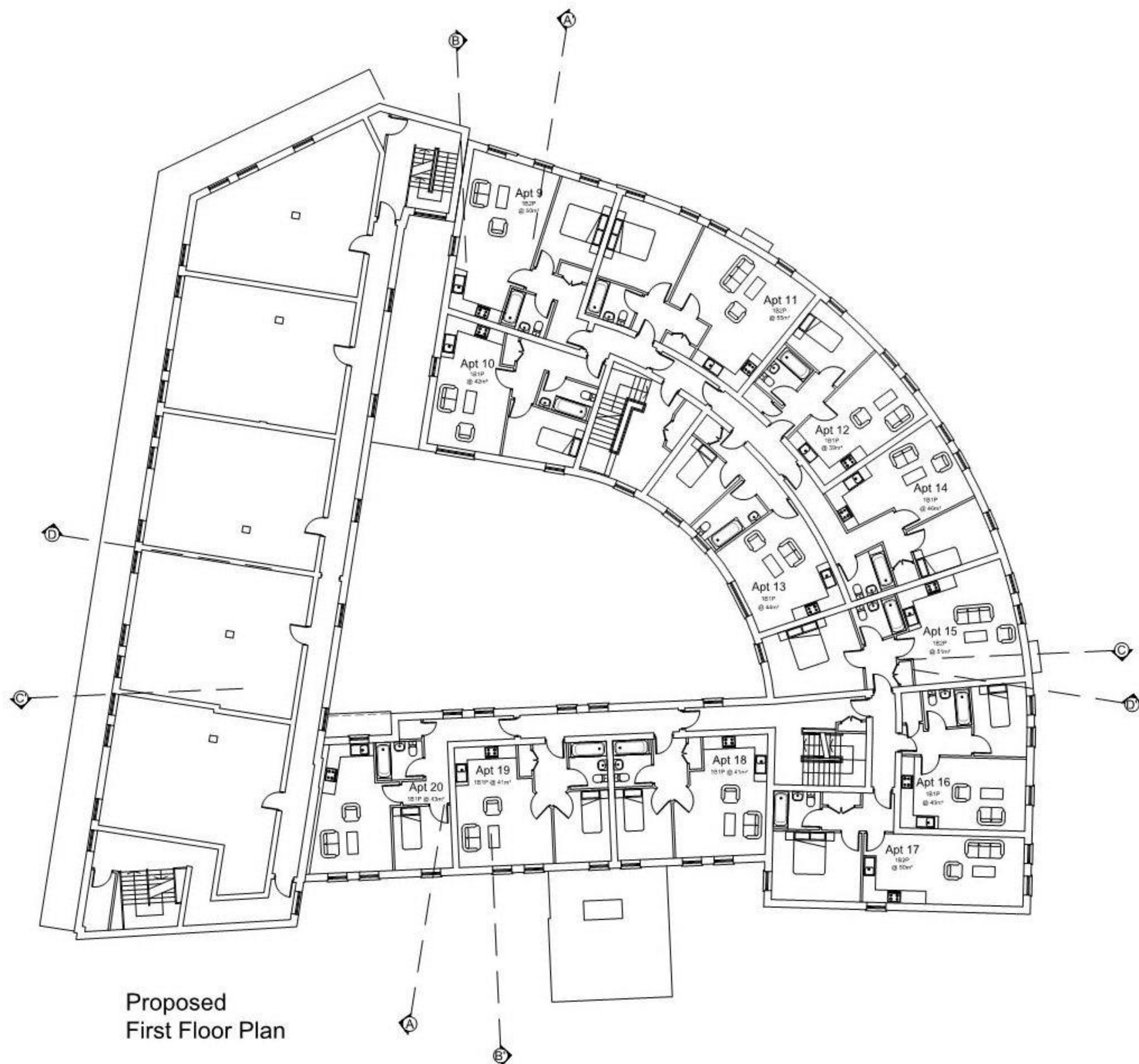
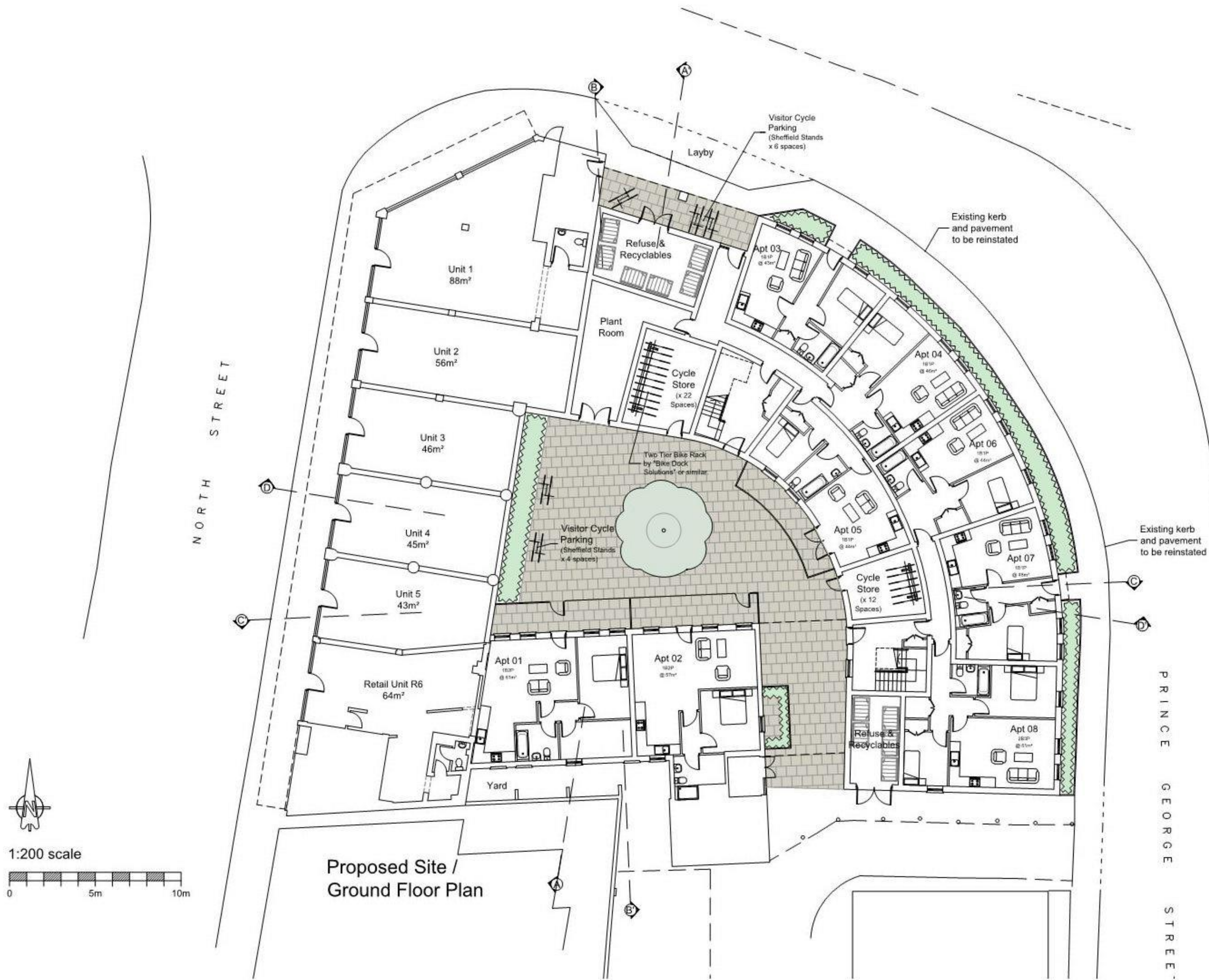
Lansdowne House
25-26 Hampshire Terrace
Portsmouth PO1 2QF
Hampshire England
Tel: (023) 92 755 333
E-Mail: admin@plcarchitects.com
Web: www.plcarchitects.com

Client :

Project :
North Street Arcade
North Street
Havant

Drawing Title :
Proposed Floor Plans

Drawn By	Date	Checked By	Date	Approved By	Date
TH	Feb '20				
Drawing No.	Revision	Scale			
16 - 2199 - 154	P14	1:200 @ A1			



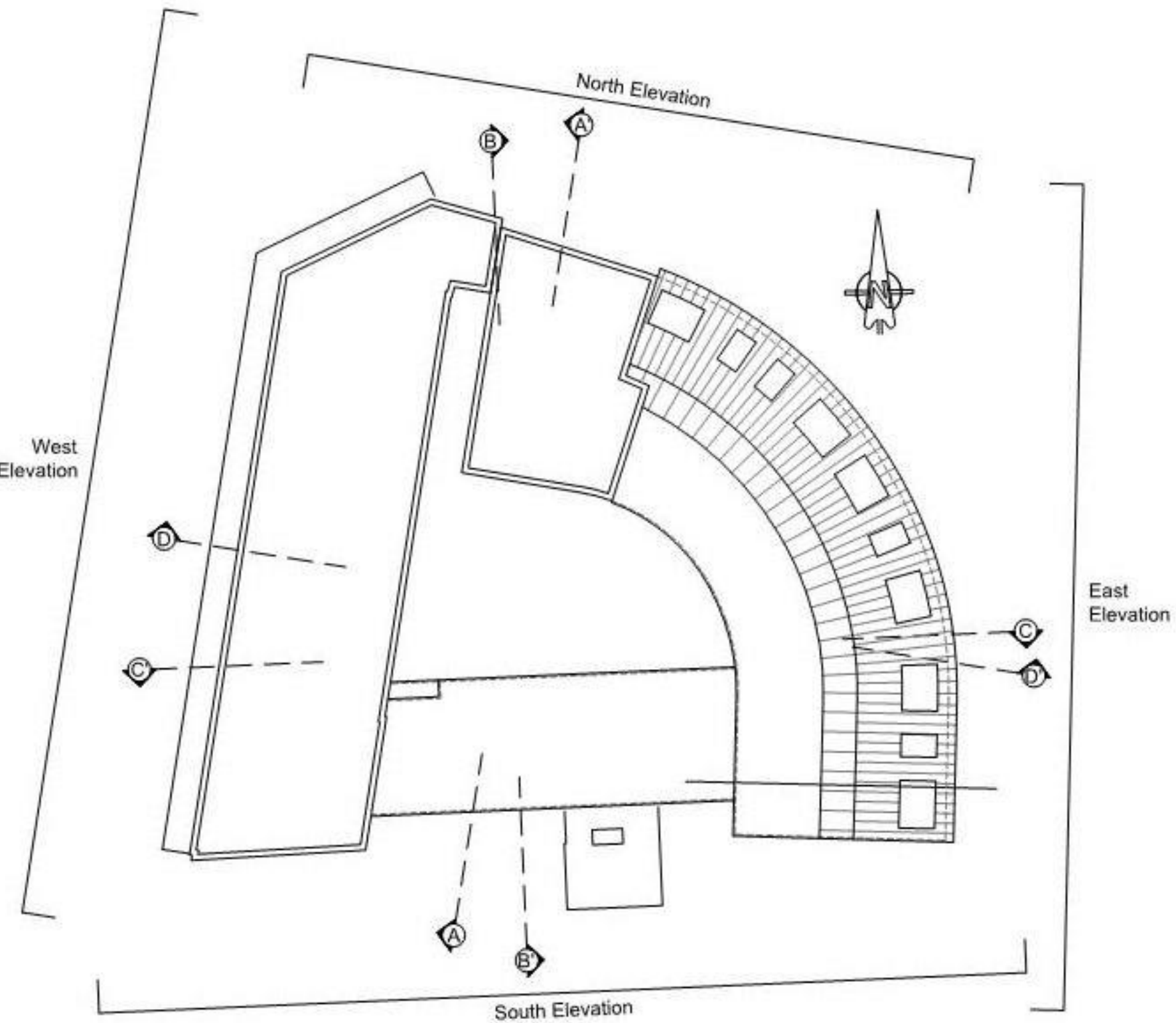
GENERAL NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE OTHER RELEVANT CONSULTANT'S DRAWINGS
2. ALL FINISHES ARE TO CONFORM TO THE CURRENT BUILDING REGULATIONS.
3. REFER TO A SEPARATE DOCUMENT FOR THE DESIGNER'S RISK ASSESSMENT.
4. ALL WORKS OR MATERIALS INDICATED ON THIS DRAWING ARE TO BE TO THE LATEST RELEVANT BRITISH STANDARDS AND CARRIED OUT IN ACCORDANCE WITH THE BRITISH STANDARDS CODES OF PRACTICE OR RECOGNIZED INSTITUTE OR TRADE ASSOCIATION RECOMMENDATIONS AND PUBLICATIONS.



Proposed West Elevation



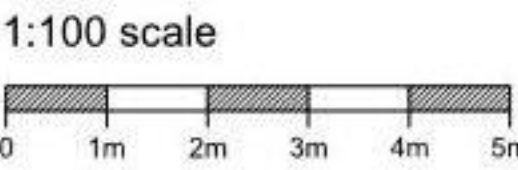
Proposed North Elevation



Proposed East Elevation



Proposed South Elevation



P11	Aug 2020	Updated in response to LPA comments	JCB	
P10	June 2020	Updated in response to LPA comments	JCB	
P9	June 2020	Updated in response to LPA comments	JCB	
P8	Mar 2020	Planning Application	TH	
Revision	Date	Description	Drawn	Checked

Lansdowne House
25-26 Hampshire Terrace
Portsmouth PO1 2QF
Hampshire England

Tel: (023) 92 755 333

E-Mail: admin@plcarchitects.com

Web: www.plcarchitects.com

Client :

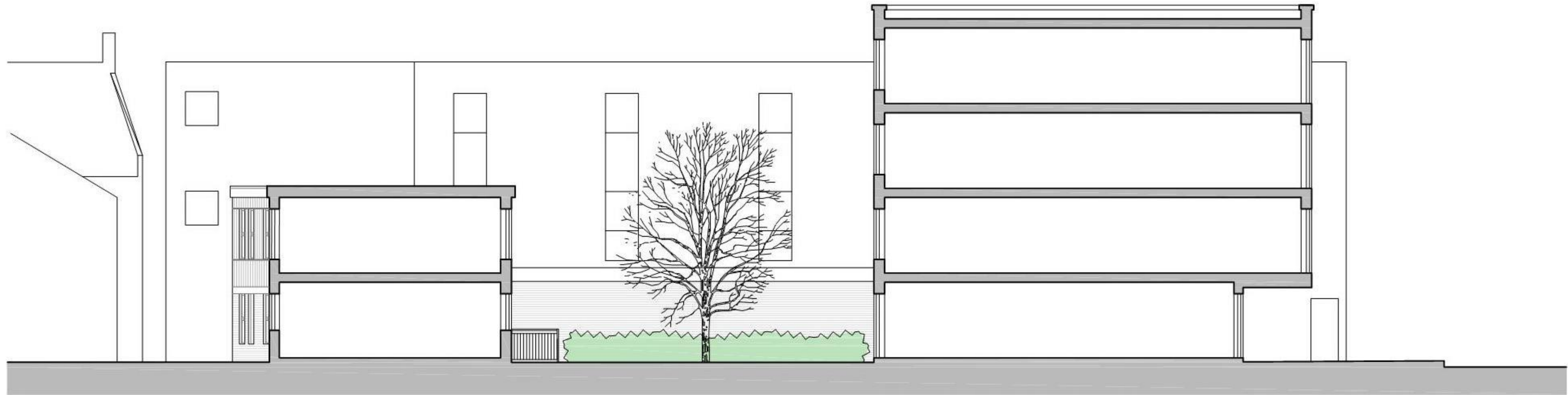
Project :
North Street Arcade
North Street
Havant

Drawing Title :
Proposed Elevations

Drawn By	Date	Checked By	Date	Approved By	Date
TH	Feb '20				
Drawing No.	Revision	Scale			
16 - 2199 - 155	P11	1:100 @ A1			

NOTES

- GENERAL NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE OTHER RELEVANT CONSULTANTS DRAWINGS.
 2. ALL FINISHES ARE TO CONFORM TO THE CURRENT BUILDING REGULATIONS.
 3. REFER TO A SEPARATE DOCUMENT FOR THE DESIGNERS RISK ASSESSMENT.
 4. ALL WORKS OR MATERIALS INDICATED ON THIS DRAWING ARE TO BE TO THE LATEST RELEVANT BRITISH STANDARDS AND CARRIED OUT IN ACCORDANCE WITH THE BRITISH STANDARDS CODES OF PRACTICE OR RECOGNIZED INSTITUTE OR TRADE ASSOCIATION RECOMMENDATIONS AND PUBLICATIONS.



Proposed Section A - A'



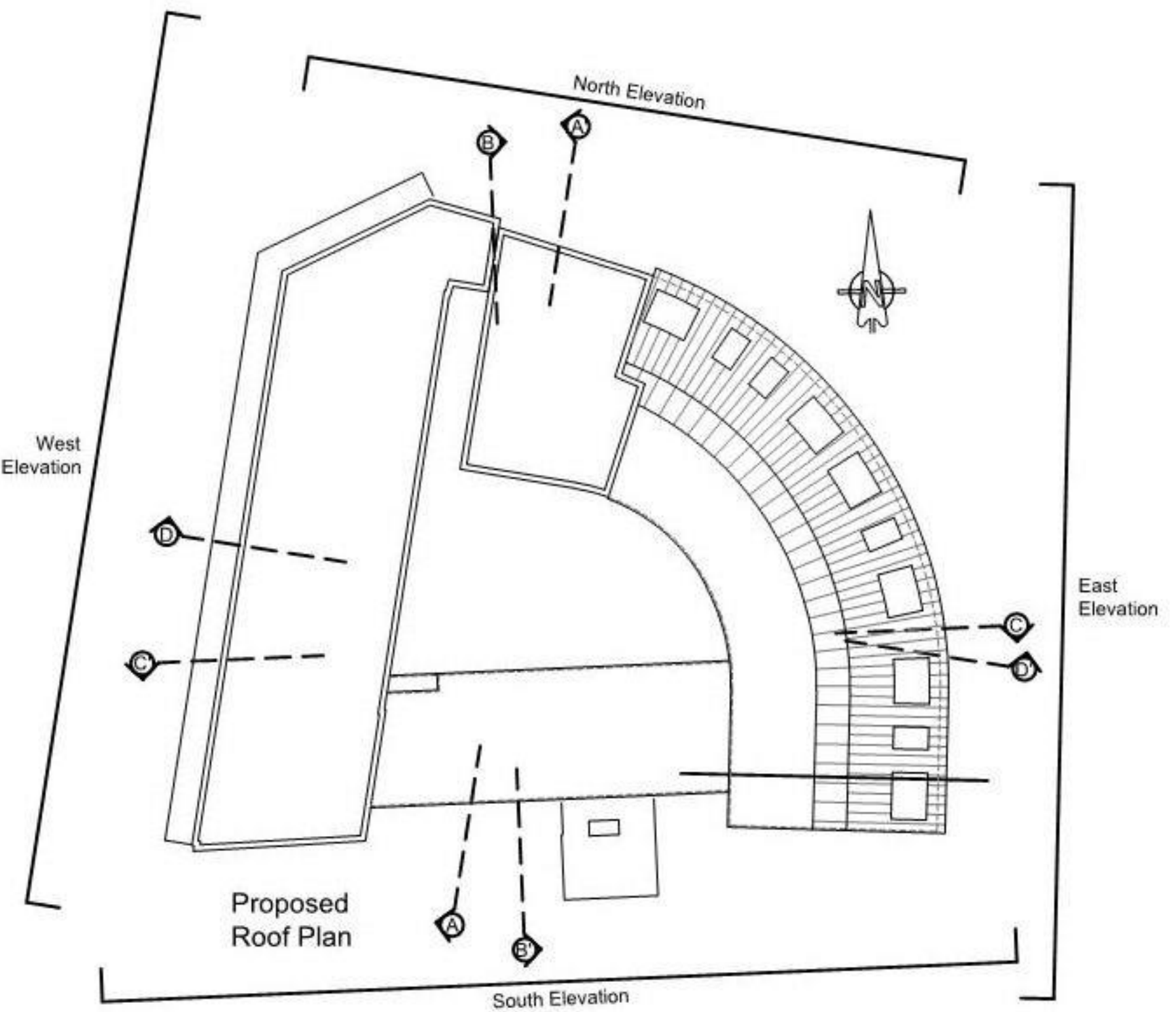
Proposed Section B - B'



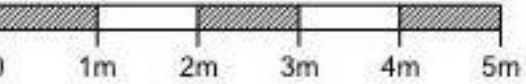
Proposed Section C - C'



Existing Section D - D'



1:100 scale



Revision	Date	Description	Drawn	Checkd
P6	Feb 2020	Planning Application	TH	



Lansdowne House
25-26 Hampshire Terrace
Portsmouth PO1 2QF
Hampshire England
Tel: (023) 92 755 333
E-Mail: admin@plcarchitects.com
Web: www.plcarchitects.com

Client :

Project:
North Street Arcade
North Street
Havant

Drawing Title:
Proposed Sections

Drawn By	Date	Checked By	Date	Approved By	Date
TH	Feb '20				
Revision	Scale				
16 - 2199 - 156	P6	1:100 @ A1			

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Appendix D Information Provided by the Client