



Phase II Geo-Environmental Assessment

Land at Burwash Manor

New Road
Barton
Cambridge
CB23 7EY

Prepared for:

Burwash Manor LLP

New Road
Barton
Cambridge
CB23 7EY

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LAND AT BURWASH MANOR, BARTON

NON-TECHNICAL CLIENT SUMMARY


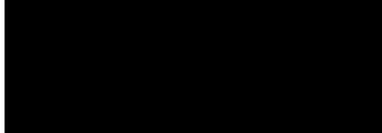
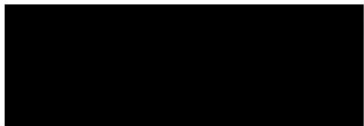
This report presents the findings of a Phase II Geo-Environmental Assessment undertaken to determine if there are any unacceptable risks from contaminated land to future users or the environment. Pertinent findings and conclusions may be summarised as follows:

- The site is currently occupied by storage buildings as well as static caravans and a metalworks. It is being redeveloped into a mixed use scheme of mainly commercial, with some holiday lets and single residential dwelling.
- The investigation involved forming six windowless sample boreholes and five hand auger boreholes to collect shallow soil samples.
- Made ground comprising clayey sandy gravel with anthropogenic materials such as brick concrete and reworked limestone was encountered in all locations underlain by gravels and clays of the River Terrace Deposits. Dark grey heavy clay of the Gault Formation was also encountered within several of the deeper boreholes.
- Laboratory analysis has identified that some shallow contamination in the made ground as well as sporadic impacts of petroleum hydrocarbons is present, including under an old tank.
- To mitigate the risks to receptors, cover systems of clean soils have been recommended for the three different landuses in all spot landscaping, with a localised excavation around the tank. Barrier drinking water pipes and good practise measures around removal of asbestos and groundworker safety have also been recommended. This report should be submitted to South Cambridgeshire District Council to satisfy the pre-commencement requirements of the planning process. Verification of the remedial strategy will be required prior to occupation.

The above points represent a simplified summary of the findings of this assessment and **must not** form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.



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Where ground investigations have been conducted, these have been limited to the level of detail required for the site in order to achieve the objectives of the investigation.

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance, with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.



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1 INTRODUCTION

In September 2023, Environmental Protection Strategies Ltd (EPS) was commissioned by Burwash Manor LLP to complete a Phase II Geo-Environmental Assessment for Land at Burwash Manor, New Road, Barton, Cambridge CB23 7EY ('the site'); see Figure 1.

The work was commissioned to address pre-commencement planning requirements relating to contamination for the following proposals:

Demolition of existing agricultural buildings. Conversion of existing barn to accommodate retail (E(a)) and a hydrotherapy unit (F2(d)) and first floor offices (E(g)(i)). Erection of storage unit. Erection of Artisan workshops (E(g)(iii)) and educational facility (F1). Erection of commercial unit (E(c)) to replace existing building 11. Relocation of two existing static caravans and the replacement of one static caravan with a site manager's dwelling (C3). Associated bin and cycle stores and car parking spaces. This proposal was granted planning consent under South Cambridgeshire District Council's reference 21/02524/FUL. Current and proposed development plans are included as Appendix A. The proposed dwelling is also shown on a plan in Appendix B, positioned in the far north west of the site.

In addition, an earlier planning permission also applies to part of the site as follows:

Part demolition and part conversion of existing barns to accommodate a restaurant (Class E) and 9 holiday let units, ref 20/04325/FUL. The proposed layout for this application is also included in Appendix A.

1.1 Objectives

The objectives of this Phase II Geo-Environmental Assessment were as follows:

- a) Investigate potential contaminant linkages identified and established through the previous phase of work in the Conceptual Site Model (CSM), by means of an Intrusive Investigation and Generic Quantitative Risk Assessment.
- b) Determine the potential risks posed by the site and make recommendations for further work that may be required, to ensure safe development in accordance with the Environment Agency's *Land Contamination: Risk Management* guidance and the *National Planning Policy Framework*.

1.2 Scope of Work

To perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRA's '*Contaminated Land Statutory Guidance*' (2012), BS10175 – '*Investigation of Potentially Contaminated Sites*' and BS5930:2015 '*Code of practice for ground investigations*', the following tasks were undertaken:

Intrusive Investigation:

- Site walkover, inspection of any visual evidence of contamination at the site, obtaining photographic records.
- Health and safety briefing/ site supervision.
- Drilling of 6 Windowless Sample Boreholes to 4.00m bgl and 5 hand auger boreholes to a maximum depth of 0.8m below ground level (bgl).

- Logging of ground conditions including inspection of soils for visual and olfactory contamination, and laboratory analysis of representative samples.

Reporting:

- Data collection.
- Interpretation of data including completion of Generic Quantitative Risk Assessment.

The findings and conclusions of these investigations are presented in the following sections.

1.3 Limitations and Constraints

The purpose of this report is to present the findings of a soil sampling investigation conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, Environmental Protection Strategies Ltd (EPS) makes the following statements:

No investigation method is capable of completely identifying all ground conditions that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes and/ or trial pits to recover soil and/ or groundwater samples. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site sub-surface however, ground conditions are naturally variable and it may be possible that the conditions encountered may differ to those found during the investigation.

No visible evidence of Japanese Knotweed was identified during the site walkover. However, this plant can be difficult to identify in the early stages of growth and therefore it is not always possible to identify its' presence at certain times of the year. For this reason, EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

This report does not include a specific survey for the presence of Potential Asbestos Containing Material (PACM), rather it is a soil-survey where asbestos may be identified as a contaminant. Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

The investigation was carried out to assess the significance of contamination resulting from the use of the site as identified in this report. Unless EPS has otherwise indicated, no assessment of potential impact of any other previous uses has been made.

Whilst it is recognised that information contained within this report may assist relevant and suitably qualified professionals, this report does not provide a geotechnical appraisal of ground conditions with respect to suitability of foundations or future structures, nor does it intend to identify a need for any associated geotechnical ground improvement works.

2 SITE CONTEXT

The following section provides a summary of the information collected as part of the Phase I Geo-Environmental Desk Study completed by Your Environment ('YE') in April 2020 for the same Client. For full background and reference, it is recommended that the reader review the following report, which is briefly summarised below and has been supplemented as needed by EPS.

- *Phase I Desktop Study & Preliminary Risk Assessment, Burwash Manor, Barton.* (Your Environment Ref: YE8129), Dated April 2020 (Issue 1)

2.1 Site Location and Description

Detail	Description
Location	The site lies in the west of Burwash Manor Grounds, off New Road, Barton.
Grid Reference	NGR 540848, 255774
Topographic Elevation	The site is generally flat with a general local mild gradient to the north and the topographical elevation lies at approximately 26m Above Ordnance Datum (AOD).
Site Description EPS (2023)	<p>At the time of the EPS walkover in 2023, the site area was primarily hard surfaced storage yards and buildings, with stored materials consisting of construction materials, farm equipment and vehicles. A disused above ground oil/fuel tank is also present in the east of the site which appears to have been repurposed into a water storage tank as per a down pipe and anecdotal from the site owner (see Appendix A). In the Phase I report, YE highlight that on the walls of the bricked platform under the tank appeared to be black oil or fuel spillage.</p> <p>Residential static caravans were present in the north of the site and were in-use at the time of the site investigation. An active metalworks/smithy was present centrally, with associated materials stockpiled. The southern area of the site was grassed, and was also used for storage of farm equipment and materials.</p>
Surrounding Land Use	The property is located within the grounds of Burwash Manor. To the south east buildings associated with farm shops and restaurants are present. School grounds are present to the west and grassed fields are present to the north east. A pond, or moat, is present to the north.
Geology	Geological maps of the area show that the site is directly underlain by bedrock geology of the Gault Formation. No superficial deposits are mapped on site, however River Terrace Deposits are located approximately 200m to the north.
Radon	Online data indicates that the property lies within a lower probability radon area, meaning less than 1% of homes are estimated to be at or above the Action Level. As a result, radon protection measures will not be required in new properties

Hydrogeology	Superficial River Terrace Deposits are designated to be a Secondary A Aquifer and Bedrock geology of the Gault Formation is recorded to be unproductive Strata. The study site is not located within a Source Protection Zone.
Hydrology	A water feature is present approximately 2m to the northeast of the site which appears to be a pond or moat, with the next closest surface water feature is a river located approximately 160m to the south.
Industrial Land Use	There are four current/recent industrial land uses within 250m, the closest of which is a furniture workshop 12m to the south and three electrical sub stations located 131m southwest, 171m northeast, and 203m southeast. There are also two historic industrial land uses within 100m associated with a sand pit approximately 59m, to the northeast and 98m to the southwest.
Landfill, Waste & Pollution	There are no records for active or historic landfill within 500m of the site, however there are 14 records associated 140m to the east.
Site History	<p>The Your Environment report refers to ten records of potentially contaminative land uses within 250m with the closest of which relating to a sand pit 59m to the north east and a smithy 98m to the south west.</p> <p>On site structures are recorded from earliest mapping dated 1886 to 1887, followed by a moat in the north of the site From 1902/1903. The Your Environment report states no other discernible changes up to 2020, with the exception of 'more structures showing' on mapping from 1969-1974.</p>
Regulatory Background	<p>The Phase I report was submitted to Greater Cambridge Planning and comments were received from South Cambridgeshire District Council's Contaminated Land team on the 6th July 2021.</p> <p>The memo highlighted the contaminative historical usage comprising a forge, buildings constructed using ACM, a fuel tank and other machinery. In that memo, the site was proposed being developed primarily for commercial use, which carries a lower risk of chronic exposure to contamination. However, there is a class C use (accommodation) within the proposed development and as such the development is sensitive to the presence of contamination. The Council subsequently welcomed the suggestion, presented by the desk study, of an intrusive investigation so that this risk assessment can be made with confidence.</p>

2.2 Findings and Conclusions of Your Environment Phase I Desk Study

Based on the Your Environment report, and EPS' observations the identified plausible contaminant linkages should be further investigated are outlined below, along with an updated Conceptual Site Model (CSM). These linkages form the basis of the EPS investigation. The contaminant linkages which were found to carry the greatest potential risks at this site comprise the following:

- Human health risks associated with interaction between future residents and potentially contaminated shallow soils.
- Potential exposure of site workers to contaminated soils during the proposed redevelopment.

- Potential exposure of site workers or end users associated with inhalation of potential ACM.
- Risks to controlled waters via vertical and lateral migration of contaminants.

2.3 Conceptual Site Model

The Conceptual Site Model (CSM) which is underpinning the site investigation is shown below. The CSM identifies all of the plausible contaminant linkages, which are considered potentially active, or may become active through the development:

Source	Pathway	Receptor
Contaminated Soils Potential / ACM roofing (Sources include residual contamination from Fuel Tank, Made Ground & Residual Agricultural Industrial Contamination Inc. Forge)	Direct contact and inadvertent ingestion by eating or smoking with dirty hands & inhalation of fugitive dusts Inc. asbestos fibres	Construction workers during redevelopment & Site users
	Direct uptake and/or adherence of contaminated soil to vegetation and subsequent ingestion* (residential only).	Site users
	Ingress/diffusion through permeable potable water supply pipes	
	Direct uptake via root systems	Plants
	Vertical Migration in Unsaturated Soils	Groundwater
	Lateral migration of contaminants in soils, groundwater, land drainage & surface run-off	Surface Waters

*A range of land uses will apply at this site (Residential, Public Open Space and Commercial) and not all of the exposure pathways shown above will apply to each landuse, as highlighted in the table above. The reasoning for the specific landuses are described further in Section 5.

3 SUMMARY OF INTRUSIVE INVESTIGATIONS

Intrusive investigations were undertaken on the 21st August and 22nd September 2023 in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of all site activities is presented in the following sections:

3.1 Borehole Locations

Six Windowless sampler boreholes (WS01-WS06) and five hand auger borehole locations (HP01-HP05) were selected through consideration of the proposed development layout, the location of below ground utilities and according to operational and health & safety considerations. The presence of the buildings on site significantly limited the available borehole positions.

The overall objective in terms of borehole locations was to provide an appropriate lateral and vertical coverage of the soils underlying the site in order to offer information relating to their nature and suitability for future use. The exploratory locations were formed in accordance with standard EPS methodologies.

Location	Rationale
WS01-WS06	Achieve good coverage of the site and target areas of stored machinery/vehicles
HP01, HP02, HP04 & HP05	Increase site coverage by investigating within areas inaccessible to the windowless sampling rig
HP03	Sample soil underlying the tank on site, as access was not possible with the windowless sample rig.

A borehole location plan is presented as Figure 2.

3.2 In-Situ Testing & Soil Sampling

Each hand auger borehole was logged for ground conditions encountered and inspected for any physical evidence of contamination, such as soil staining, odour and the presence of separate phase liquids on a precautionary basis.

Soil samples were recovered from each location for record purposes and laboratory testing. Selection of samples for laboratory analysis from these positions focused on providing an assessment of the quality of shallow subsurface soils present across the site, particularly those that are likely to coincide with areas of soft landscaping associated with the proposals.

3.3 Laboratory Testing

Samples obtained for analysis of identified contaminants of concern were submitted to Element Materials Technology of Flintshire, who hold appropriate UKAS / MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered by an approved courier. An environmental laboratory testing schedule is included as Table 1 and copies of chain of custody documentation are held by EPS and will be made available on request.

4 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the various aspects of the ground investigation.

4.1 Ground Conditions

A total of six hand auger boreholes were formed throughout the study area and the ground conditions encountered, from surface level, were interpreted to comprise:

- Topsoil/ Made Ground
- River Terrace Deposits
- Gault Formation

Site specific hand windowless sampler and hand auger logs are included as Appendix C and give descriptions and depths of strata encountered. A summary of the general strata encountered across the site is provided in the table below, with more detailed description given in the following sub sections.

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Topsoil/ Made Ground	1.3	0.1-1.3
River Terrace Deposits	>4.0	0.7->3.4
Gault Formation	>4 (Not Proven)	0.3->2.7 (Not Proven)

4.1.1 Topsoil/ Made Ground

Topsoil, with some made ground, was encountered in locations WS01, HP01 and HP02. It was generally encountered as brown sandy gravelly clayey topsoil with gravels of flint and brick.

More clearly Made Ground soils were encountered in all locations across the site to variable depths of between 0.10m and 1.30m bgl and generally comprised of sandy clayey gravel with anthropogenic materials such as brick, concrete and reworked limestone.

4.1.2 River Terrace Deposits

Natural soils, interpreted to be representative of the River Terrace Deposits were encountered underlying topsoil and made ground in all locations to a maximum depth of 4.00m bgl, which was the maximum investigation depth. River Terrace Deposit soils on site were generally encountered as either Brownish orange clayey very sandy flint gravel or light grey sandy clay.

4.1.3 Gault Formation

Natural soils, interpreted to be representative of the Gault Formation, were identified below River Terrace Deposits in boreholes WS02, WS04 WS05 and WS06. These soils were recovered as firm, dark grey heavy clay.

4.2 Groundwater

Groundwater was not encountered within any of the boreholes formed as part of the investigation.

4.3 Physical Evidence of Contamination

No physical evidence of contamination was identified within any of the soils recovered from any of the hand augered or windowless sampled boreholes. Despite the presence of made ground in all locations, no visual or olfactory evidence of contamination such as hydrocarbon staining or odours was recorded within the soils.

Some fragments of construction debris, as well as stockpiles of general construction material such as scrap and timber were recorded throughout the site. Tools and equipment as well as disused vehicles, including farm machinery were also present across the site.

4.4 Laboratory Analysis – Soil

A laboratory analysis testing schedule is presented as Table 1 and all environmental sample results obtained from the laboratory are included as Appendix D. The key results of laboratory testing on environmental soil samples are summarised below.

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	8	8	6.7	35.0	WS02 (0.30)
Cadmium	8	1	7.7		HP03 (0-0.15)
Chromium III	8	8	50.2	96.9	HP02 (0-0.50)
Copper	8	8	7	438	HP03 (0-0.15)
Lead	8	8	7	864	WS02 (0.30)
Mercury	8	2	0.1		HP02 (0-0.50) & WS02 (0.30)
Nickel	8	8	10.3	40.2	WS02 (0.30)
Selenium	8	3	1		-
Zinc	8	5	30	971	HP03 (0-0.15)
Naphthalene	8	0	-	-	-
Benzo(a)pyrene	7	4	0.66	62.25	HP01 (0-0.50)
Dibenz(ah)anthracene	7	4	0.21	9.41	HP01 (0-0.50)
PAH (Total of 16)	7	5	0.9	440.9	HP01 (0-0.50)
TPH (Total aliphatic and aromatic)	7	4	112	22,989	HP03 (0-0.15)
MTBE	8	0	-	-	-
Benzene	8	0	-	-	-
Toluene	8	0	-	-	-
Xylene	8	1	8		WS05 (1.40)-
Cyanide	8	0	-	-	-
Asbestos (% mass)	8	1	0.079%		HP04 (0-0.50)

Notes: - Contaminant not detected above laboratory detection limit
 MTBE Methyl tert-butyl ether

PAH Polycyclic Aromatic Hydrocarbons
 TPH Total Potential Hydrocarbons

- PAH compounds were detected within five of the seven shallow soil samples, with the majority of the largest concentrations being identified in HP01 (0-0.50m); where the total of 16 compounds amounted to 440.9mg/kg. The extractable petroleum hydrocarbons were interpreted by the laboratory as traces of possible lubricating oil and PAHs.
- Aliphatic and aromatic TPH compounds were identified within four of seven samples tested with the majority detected within sample HP03 0-0.15m with compounds amounting to 22,989mg/kg. This soil did however have a very high organic/peat content and this may be a factor in the origin of the hydrocarbons. HP03 was also located at the base of the repurposed fuel tank on site, another potential source of TPH contamination. Generally the speciated TPH results fell outside of the volatile range (<16).
- Asbestos containing material was detected within sample HP04 at 0-0.50m, to a detection limit of 0.001% by mass.

5 ENVIRONMENTAL APPRAISAL

The following section outlines the approach applied to assessing the risks posed to human health and controlled waters through a Generic Quantitative Risk Assessment, then identifies any sample results found by this investigation which warrant further consideration.

5.1 Human Health

5.1.1 Land Use Settings & Generic Screening

The technical framework used to derive DEFRA's Category 4 Screening Levels (Policy Companion Document '*SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*') outlines the relevant factors for determining land use selection in the application of the screening levels and the following key considerations have been taken into account.

It is understood that the proposed development comprises the construction of a new dwelling and commercial/holiday let buildings. Therefore, in order to screen laboratory data for concentrations of contaminants in soil with potential to cause harm to human health, relevant generic screening values for three different land uses, as summarised below. The areas of the site showing the subdivisions of landuses are shown on Figure 3.

1. For the new dwelling, a Residential (with home-grown produce) land use setting has been adopted.
2. For the holiday lets, a Public Open Space (Residential) landuse has been adopted.
3. For elsewhere on the site, a commercial landuse has been adopted.

The technical framework used to derive the assessment criteria and the documents in which they are published are summarised as follows:

- *EA Science Reports* (SC050021/SR2, SC050021/SR3, and SC050021/SR7)
- *EA Soil Guideline Value Science Reports*
- *Suitable For Use Levels (S4ULs) for Human Health Risk Assessment* – LQM and CIEH (2015)
- *Soil Generic Assessment Criteria for Human Health Risk Assessment* - EIC/AGS/CL:AIRE (2010)

Where assessment of the risk to human health from asbestos in soil is concerned there is no nationally recognised suitable for use /generic screening value commonly referred to through the planning system. Due to this, it is necessary to take a more qualitative approach to the risks posed to future site users from asbestos on a site-specific basis.

Category 4 Screening Levels (C4SLs) provide generic suitable for use screening values for common contaminants in a variety of land uses and are also utilised as appropriate generic screening criteria.

It is considered reasonable to utilise Benzo(a)pyrene (BaP) as a risk driver or marker representative of genotoxic PAHs (i.e. including dibenzo(ah)anthracene and benzo(b)fluoranthene) given the absence of any 'low risk' (C4SL) equivalent screening values for these compounds.

In the absence of any widely used UK screening value for cyanide within soils, reference has been made to the Dutch Intervention Value for free cyanide of 20mg/kg.

A summary of the screening criteria and the methodology used to derive them is included in Appendix E.

5.1.2 Assessment of Soil Results

The results of the screening process for on-site human receptors showed that adopted criteria, representative of suitability limits to future site users were exceeded for Lead, Benzo(a)pyrene (BaP), and total TPH.

Contaminant	Assessment Criteria (Resi/POS _{RESI} /Comm) mg/kg	Max Contaminant Concentration mg/kg	Soil Type/Source
Lead	200/630/2,330	864 WS02 (0.30)	River Terrace Deposits
BaP	5/10/76	62.25 HP01 (0-0.50)	Topsoil/Made Ground
Asbestos	NA	0.079% HP04 (0-0.50)	Made Ground
Petroleum Hydrocarbon Fraction - Aromatic C16- 21	260/3,800/28,000	2,665 (HP03, 0-0.15)	Topsoil/Made Ground
Petroleum Hydrocarbon Fraction - Aromatic C21- 35	1,100/3,800/28,000	7,826 (HP03, 0-0.15)	Topsoil/Made Ground

*Failures of screening criteria are shown in bold

The results indicate that a remedial control will be required to ensure safe development. The majority of the petroleum hydrocarbons were recorded outside of the volatile range (<16) which indicates that risks from organic vapours are not significant.

The evidence collected as part of this investigation indicatives that barrier drinking water pipes will be needed for all new supplies on site.

5.2 Controlled Waters

5.2.1 Generic Screening

In addition to screening the recorded concentrations of contaminants to pose risks to human health, EPS has also screened the results of soil analysis for potential to cause harm to water resources.

The criteria used for this process were derived by EPS using the following technical guidance

- *Environment Agency Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination.*

Primary Receptor Associated with Site	Basis of Tier 1 Criteria
Groundwater	UK Drinking Water Standards (UKDWS)
Surface Water	UK Environmental Quality Standards (EQS)

The site is underlain by Secondary Aquifer, and as such the primary water resource receptor associated with the site is groundwater. The nearby water feature appears to be a pond/moat and therefore of limited sensitivity. Groundwater screening criteria have been selected in the assessment of risks to water resource receptors. The following exceedances of screening criteria (where EPS have developed them) that are protective of groundwater:

Contaminant	Assessment Criteria (GW) mg/kg	Max Contaminant Concentration mg/kg	Soil Type/Source
Petroleum Hydrocarbon Fraction - Aromatic C12-16	4.2	34 (HP03, 0-0.15)	Topsoil/Made Ground

There does appear to be a plausible risk associated with groundwater and residual hydrocarbon contamination, particularly in the area around HP03. This soil did however have a very high organic/peat content but was also located at the base of the repurposed fuel tank on site, which is a viable source (no longer in use though).

Recommendations have been made to verify the area around the tank when it is removed, in Section 5.4.

5.3 Summary of Findings

The Phase I Desk Study identified a number of plausible contaminant linkages associated with made ground and residual industrial contamination underlying the majority of the site, which may become exposed to future residents through the redevelopment. Although the commercial elements of the proposed development are less sensitive to contamination than residential, a dwelling is included in the scheme.

To assess the nature and quality of shallow soils present, six Windowless Sampler boreholes to 4.00m and five done Hand Auger Boreholes were drilled to a depth of up to 0.50m bgl.

Laboratory analysis of shallow soils sampled from both Hand Auger and windowless Sample Boreholes across the site found exceedances of lead, PAHs and TPHs as well as some asbestos (in the proposed residential area), indicating the soils are not suitable for the proposed end use in their current state, and recommendations for soil cover systems have been outlined in Section 5.4.

In terms of risks to controlled waters, there do appear to be pockets of hydrocarbons in the soils which have the potential to pose a risk to groundwater. The area of the disused tank around HA03 warrants a watching brief and verification when it is removed.

5.4 Environmental Recommendations (Remedial Strategy)

In the context of potentially unacceptable or acceptable risks as outlined within the Environment Agency's *Land Contamination: Risk Management guidance* (LC:RM, 2023), the risks identified by this work will not require further assessment, providing the following control measures (which can be considered as the remedial strategy for the site) are adhered to at the appropriate stage in the redevelopment process:

- 1) ASBESTOS: During demolition, any materials suspected of being asbestos containing should be removed in accordance with current best practise including the *Control of Asbestos Regulations* (CAR) 2012. Evidence of the safe removal and disposal of ACMs to a suitably licensed facility should be retained for use in verification reporting of recommendation.
- 2) AST REMOVAL & VERIFICATION: There does appear to be some contaminated soils beneath the disused above ground tank (AST) in the vicinity of HA03 which will require removal. It's unlikely the contamination will have migrated significantly laterally in the underlying soils so the excavation is likely be relatively small, and it should be overseen by EPS (or equivalent suitably qualified person).

Once the grossly impacted soils have been removed, verification face and base testing (following head space screening with a Photo-Ionisation Detector) of the remaining soils will be required by EPS or equivalent to prove the absence of any significant residual contamination. The verified excavation will then need to be backfilled with clean, non-waste material.

- 3) COVER SYSTEMS: The most appropriate form of remedial action / control measure that will mitigate risks associated with the identified contamination in shallow soils to acceptable levels is considered to be the implementation of a clean soil cover system in all areas of proposed gardens and soft landscaping within the redline planning boundary. This recommendation is given with all due consideration to the BRE publication: *Cover Systems for Land Regeneration: Thickness Design of Cover Systems for Contaminated Land* (BRE, Mar 2004). Such a system would be recommended only for areas of private garden and soft landscaping and there would be no such requirement for areas beneath any proposed hardstanding / building footprint. The following cover system thicknesses are deemed appropriate for the residential, holiday lets (Public Open Space_{RESIDENTIAL}) and commercial parts of the site, which are shown on Figure 3.
 - a. Residential – 600mm
 - b. Holiday Lets – 300mm
 - c. Commercial – 100mm

It is recognised that some shallow soils may need to be removed to achieve this cover thickness. Following the sufficient removal of shallow soils (to allow for the recommended cover system thickness), the excavations should then be made up with certified clean

imported soils, free from contamination and accompanied by appropriate laboratory analysis to demonstrate its chemical suitability for use.

These remedial works must be verified and reported to the Local Authority to support the associated planning application, EPS can provide further assistance / consultation in regards to this recommendation on request. All waste transfer documentation must be retained, with photographs of any excavations including any exposed clean natural soils provided together with the compiled information outlined in the Cover Soils Checklist included as Appendix F. If an established supplier such as British Sugar was used, then the soil is tested at source and no further analysis would typically be needed.

- 4) SAFETY OF GROUND WORKERS: All construction workers operating at the site should be advised of the potential for contact with contaminated soils. Appropriate health and safety precautions should be adopted during any excavation works to avoid exposure to infilled soils. Reference should be made to relevant health & safety guidance including the following CIRIA document: *R132 Guide to Safe Working on Contaminated Sites*.

Although the findings of the investigation would suggest that significant quantities of asbestos are unlikely to be encountered in the soil, the possibility of discrete pockets of this material existing within the made ground remains. If any evidence of visually identifiable ACM is suspected and is to be disturbed during the site development it is recommended that all works are postponed until suitable assessment and control measures (including a Safe Working Method) are created. This SWM should be in accordance with guidance from CIRIA as well as the CL:AIRE /Joint Industry Working Group industry guidance on Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials (2016).

- 5) BARRIER DRINKING WATER PIPES: To reduce any risk associated with the ingestion of potable water which may have been affected by the diffusion of contaminants in soil into buried water supply pipes, barrier drinking water pipework should be used for all water supply pipes in the development. This will include all pipes (private supplies, mains and any communication pipes). Water Industry Standard 4-32-19 and associated fittings should be used subject to agreement with the local water company. Reference should be made to UK Water Industry Research (UKWIR) – *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* and any relevant local water company guidance.
- 6) WASTE MANAGEMENT: All soils disposed of off-site must be sent to a suitably licensed facility with the relevant waste transfer documentation retained by the Client.
- 7) UNFORESEEN CONTAMINATION: Should any palpable evidence of unexpected contamination be encountered during the redevelopment work beyond what is described above, it should be reported to EPS so that an inspection can be made and appropriate sampling and assessment work carried out. A method statement for this is provided as Appendix G.

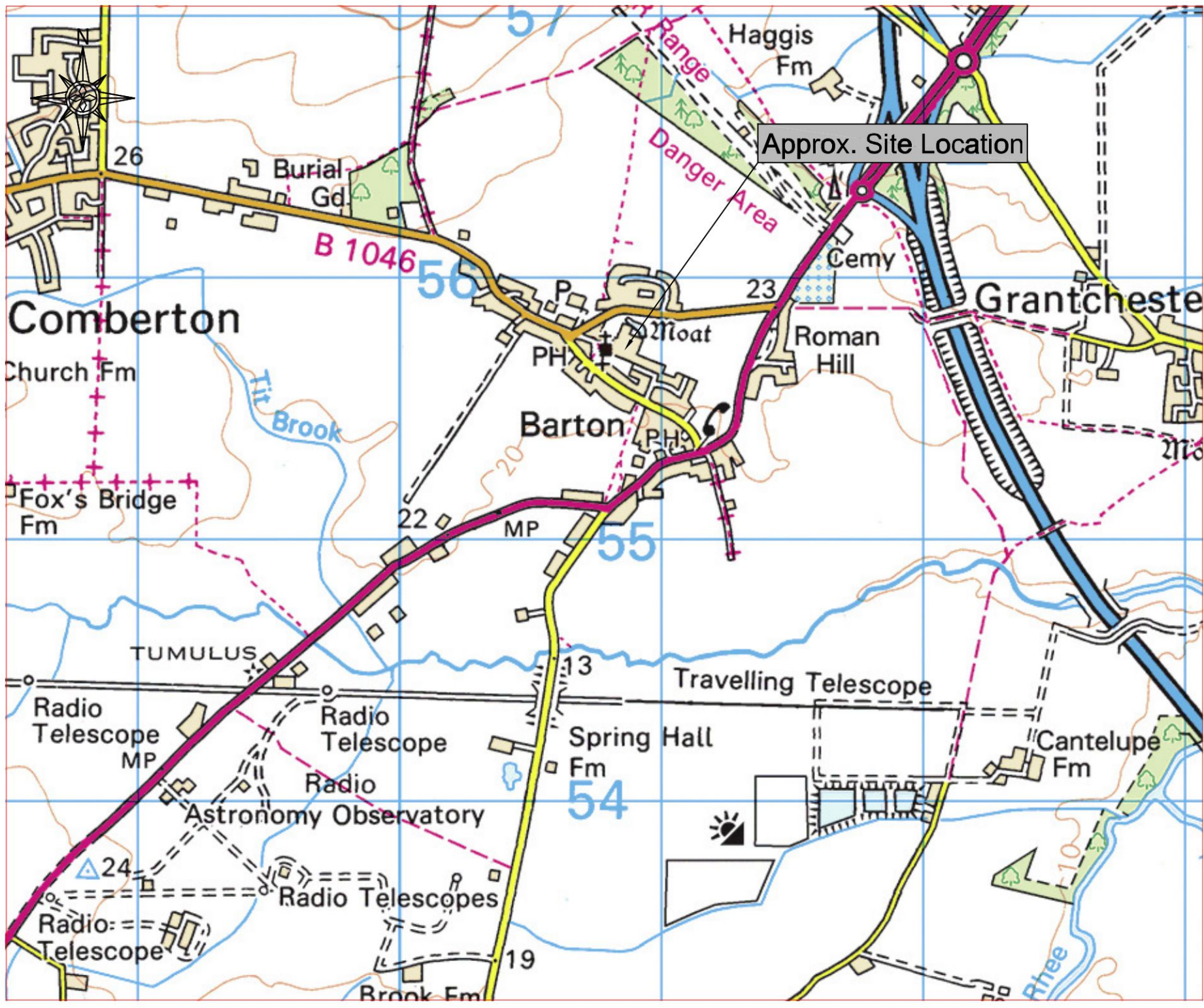
A copy of this report should be provided to the Environmental Health Department of the South Cambridgeshire District Council for inclusion into their land quality records and to support the associated planning application. This report should satisfy the pre-commencement aspects of the



planning process, although verification of the above-described remedial measures will be required to fully comply with outstanding conditions relating to contamination.



FIGURES



Rev	Date	Drawn	Description	CHK'd



The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site: Land at Burwash Manor, Barton

Client: Burwash Manor LLP

Title: Figure 1 - Site Location Plan

Surveyed: [At Sheet] Drawn by: MJo

Checked by: MB Date: 03/11/2023

Scale: Not to Scale Drawing Reference: UK23.6613/1123/01

Job No: UK23.6613 Rev: 00



- KEY:
- SITE BOUNDARY
 - EPS WINDOW SAMPLE BOREHOLE
 - EPS HAND AUGER BOREHOLE

Rev	Date	Drawn	Description	CHK'd


 The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site
Land at Burwash Manor, Barton

Client
Burwash Manor LLP

Title
Figure 2 - Borehole Location Plan

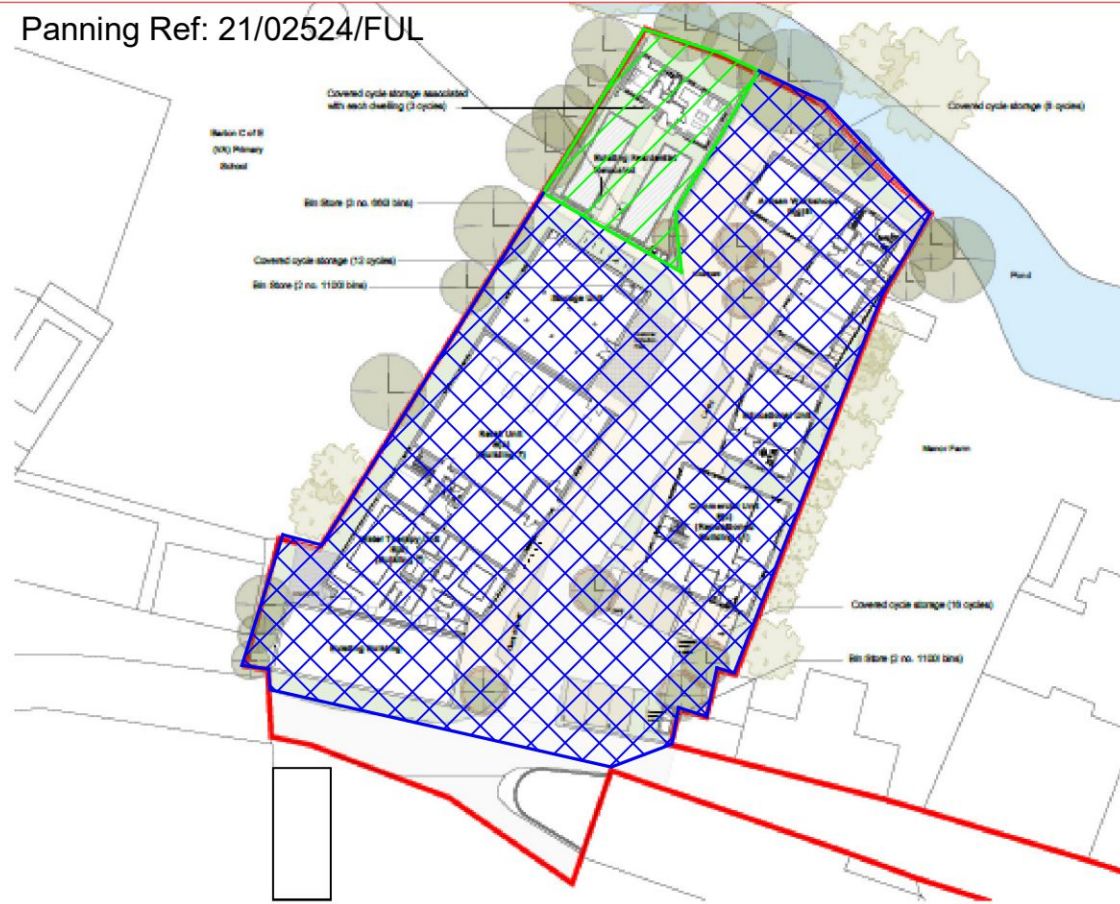
Surveyed:		Drawn by:	MJo
Checked by:	MB	Date:	03/11/2023

Scale	[At Sheet]	Drawing Reference
Not to Scale		UK23.6613/1123/02




Job No	UK23.6613	Rev	00
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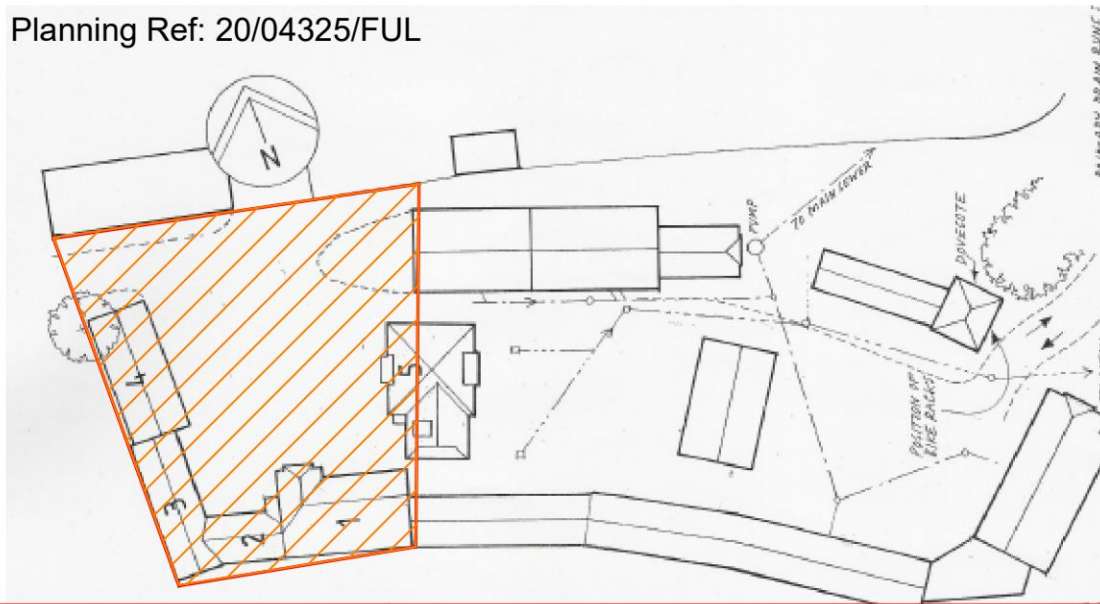
Panning Ref: 21/02524/FUL



KEY:
SITE BOUNDARY

-  Residential area requiring 600mm cover soil
-  Commercial Area requiring 100mm cover soil
-  Holiday Let Area requiring 300mm cover soil

Planning Ref: 20/04325/FUL



Rev	Date	Drawn	Description	CHK'd



The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site
Land at Burwash Manor, Barton

Client
Burwash Manor LLP

Title
Figure 3 - Remedial Plan

Surveyed: [] Drawn by: **MB**
Checked by: **BV** Date: **03/11/2023**

Scale: **Not to Scale** Drawing Reference: **UK23.6613/0311/03**

Job No: **UK23.6613** Rev: **00**



TABLES



Table 1 – Laboratory Testing Schedule

Sample ID	Sample Depth (m bgl)	EPS Mini Suite	TPH, BTEX & MTBE	VOCs	Combined Pesticides Suite	Acid Herbicides
HP01	0-0.50	X	X			
HP02	0-0.50	X				
HP03	0-0.15	X	X			
HP04	0-0.50	X				
HP05	0-0.50	X	X			
WS01	0.40	X	X	X		
WS02	0.30	X			X	X
WS02	1.20		X			
WS03	1.00	X	X			
WS05	0.60		X		X	X
WS05	1.40			X		

Notes:

mbgl

meters below ground level

1

Sample Analysed

-

Sample Not Analysed

EPS Mini Suite

Organic Matter, Cyanide, Metals, PAH's, Phenols & Asbestos Screen

EPS TPH Suite

Total Potential Hydrocarbons

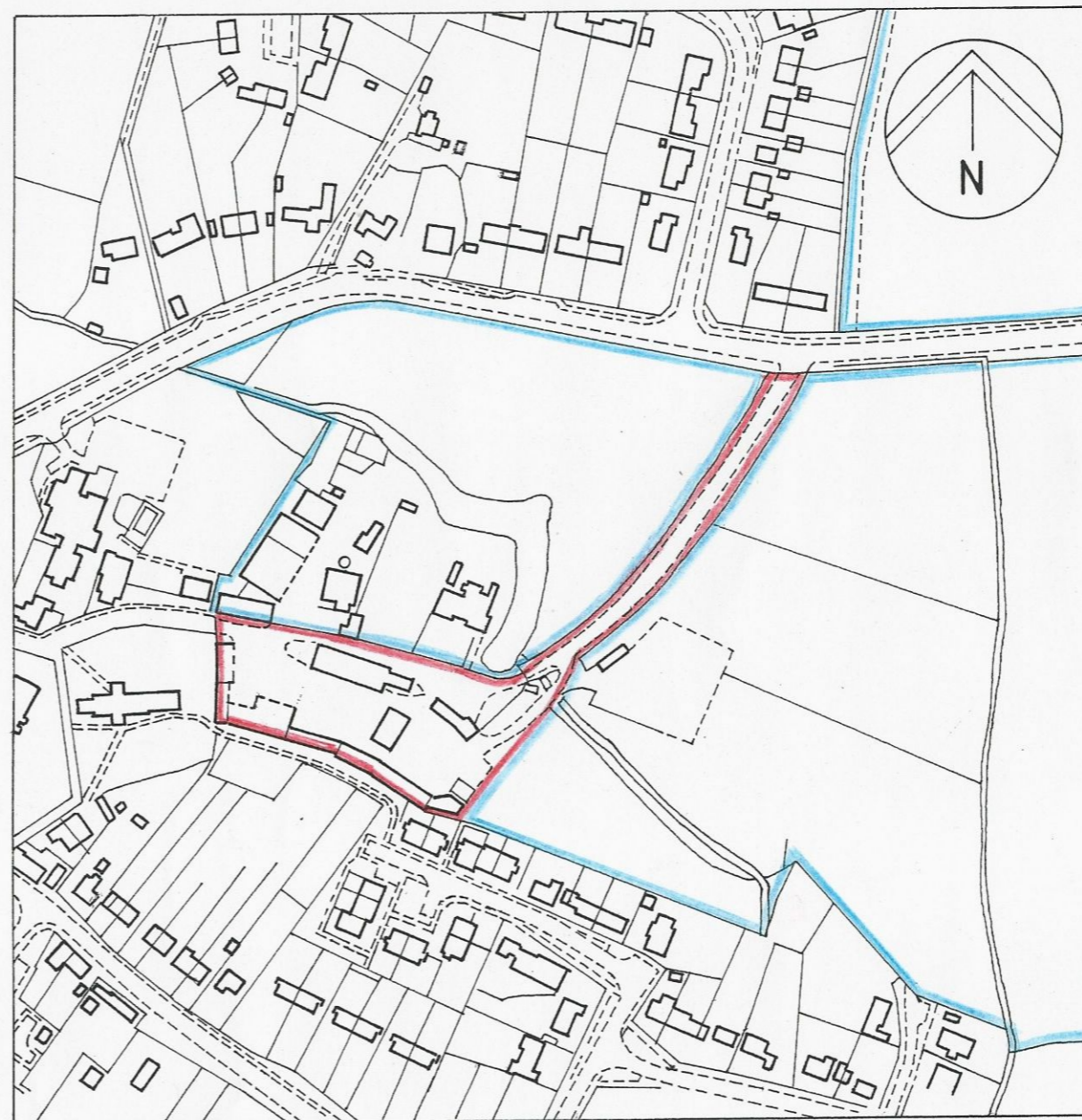
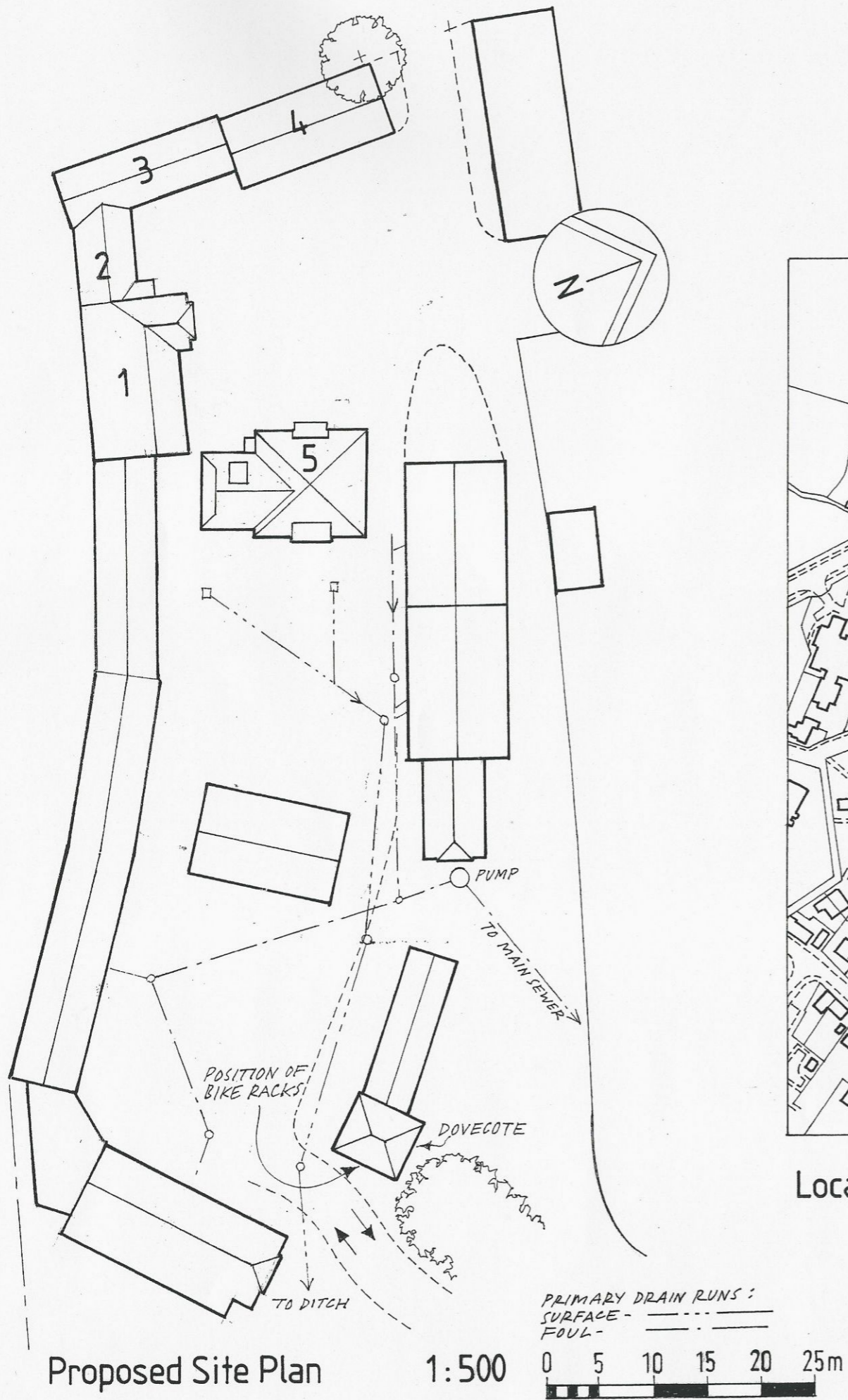


APPENDICES



APPENDIX A

Current & Proposed Development Plan



Wilson MacGarry Architects
11 Church Street
Thriplow
Nr. Royston
Herts SG8 7RE
Tel & Fax: 01763 208002
e-mail: sean@macgarry.com
website: wilson.macgarry.com

JOB

BURWASH MANOR BARNs
NEW ROAD
BARTON, CAMBS CB23 7EY

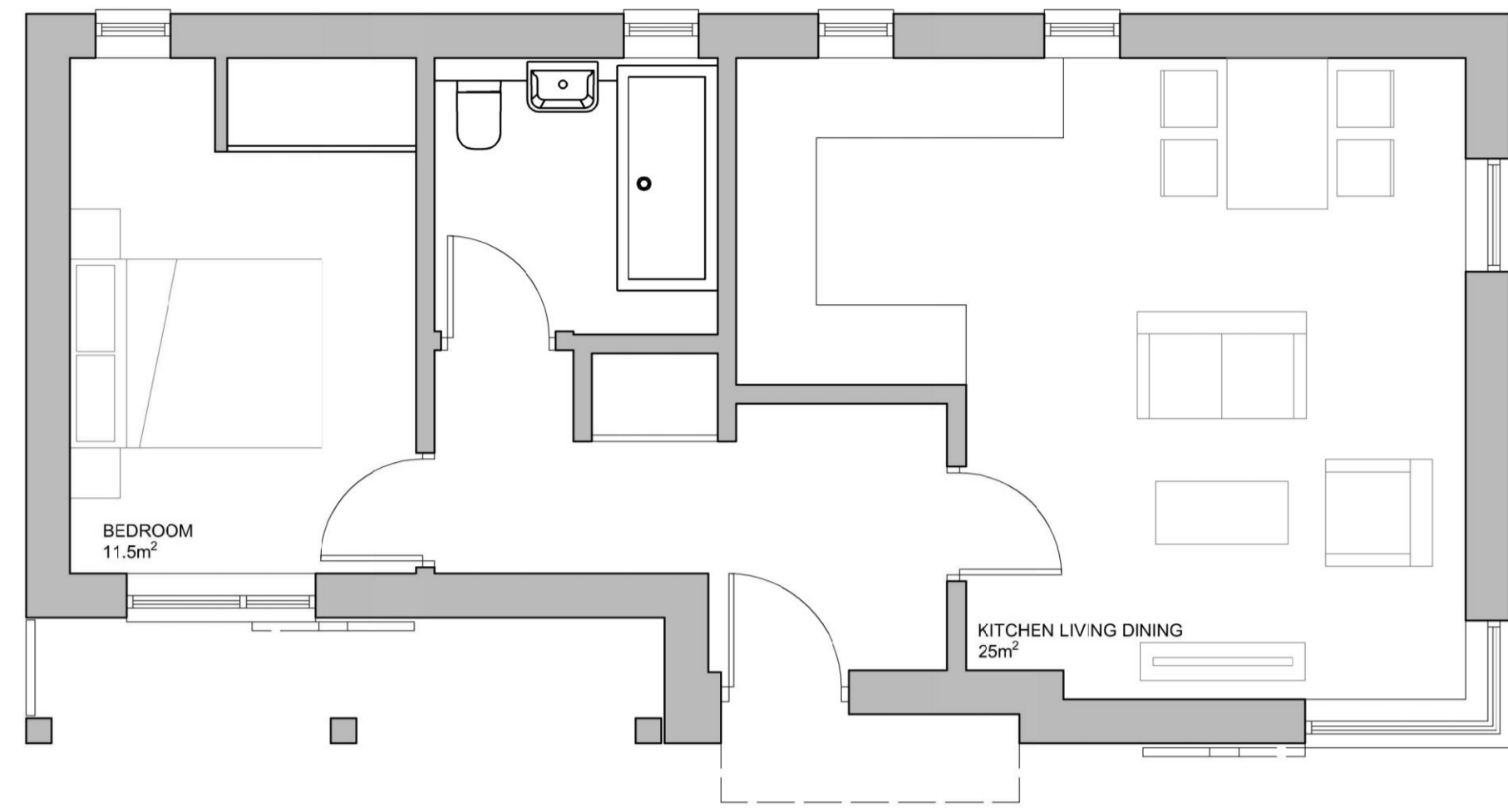
DRAWING

SITE &
LOCATION PLANS

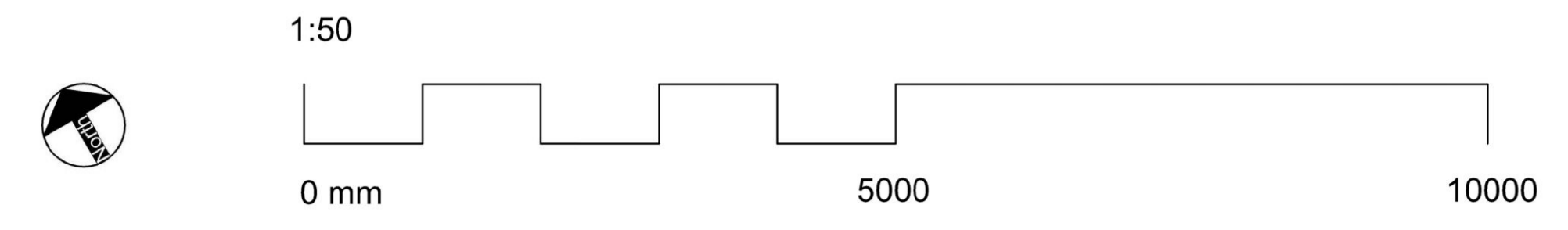
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13 / 3 / 20	1:500, 1:2500

DRG. NO.

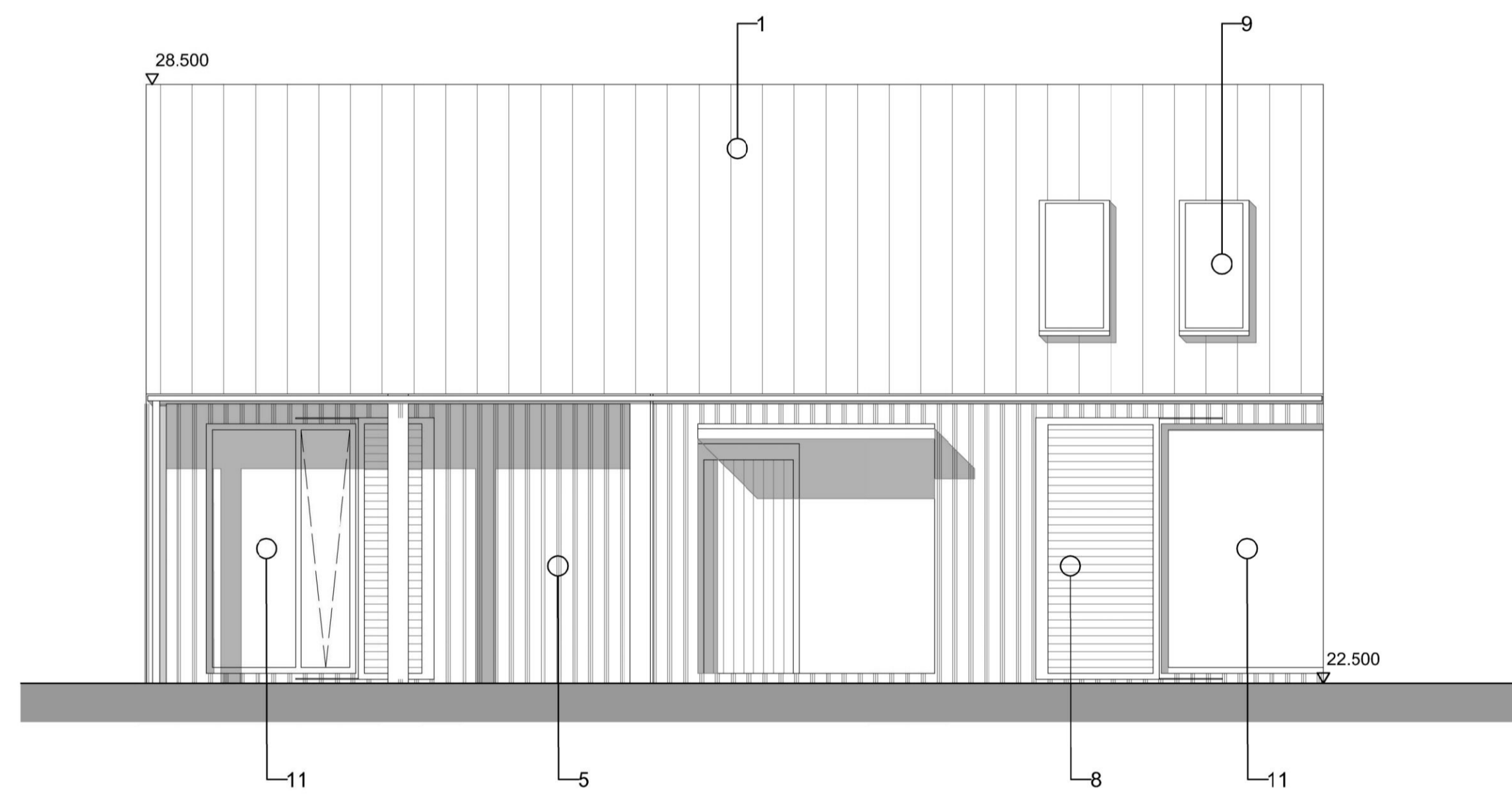
349 / 02



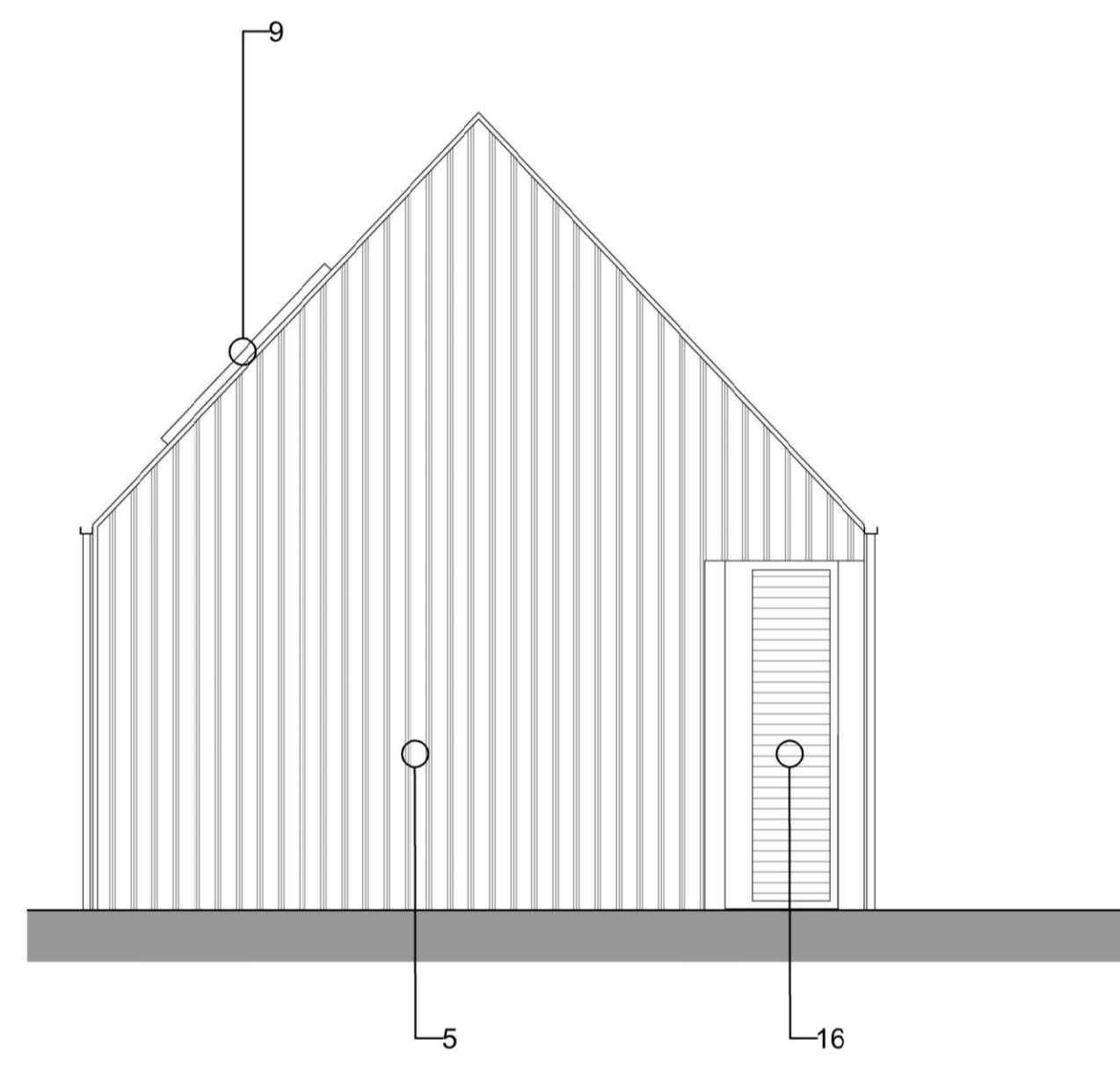
Proposed Ground Floor Plan



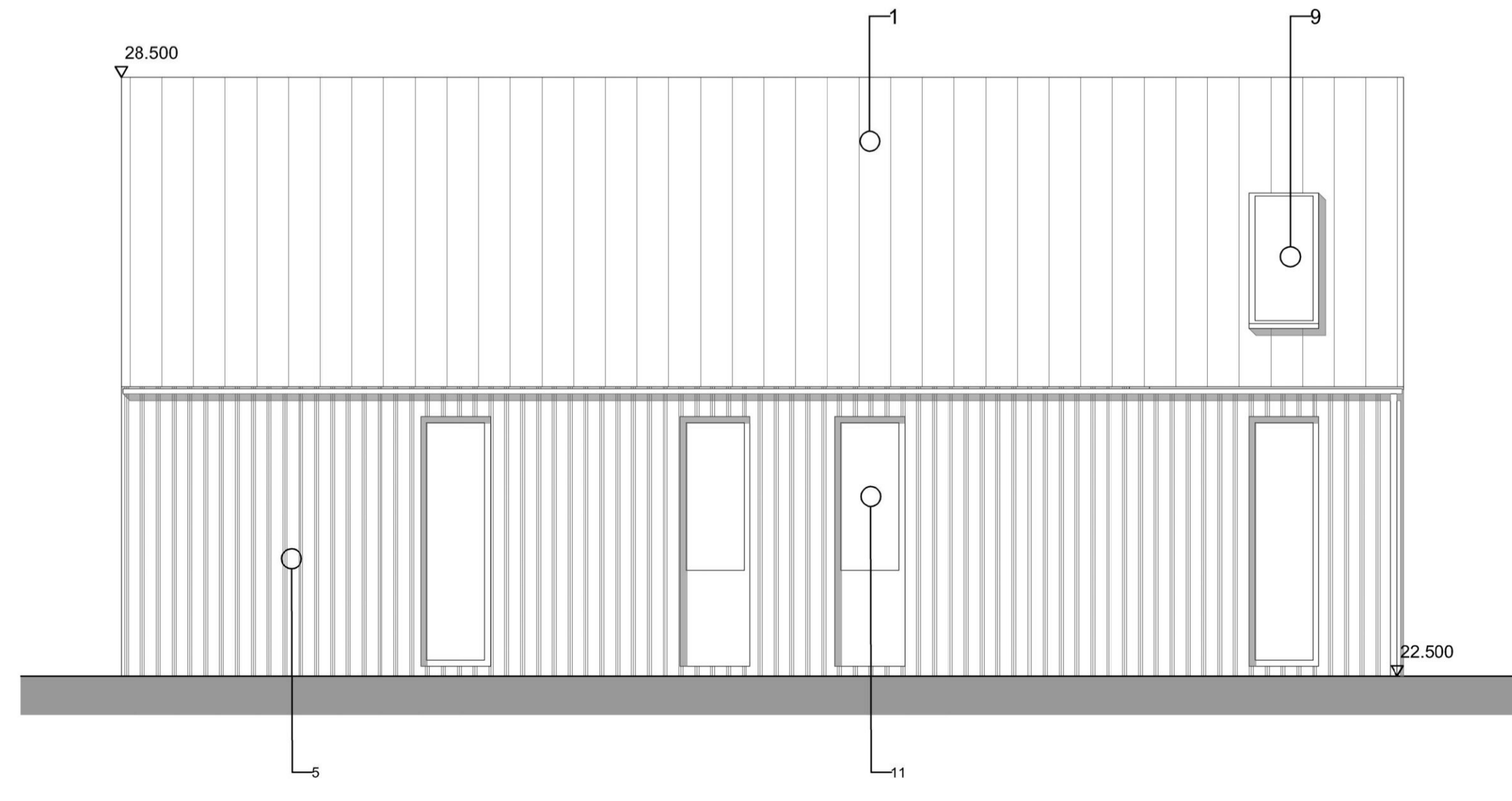
KEY PLAN



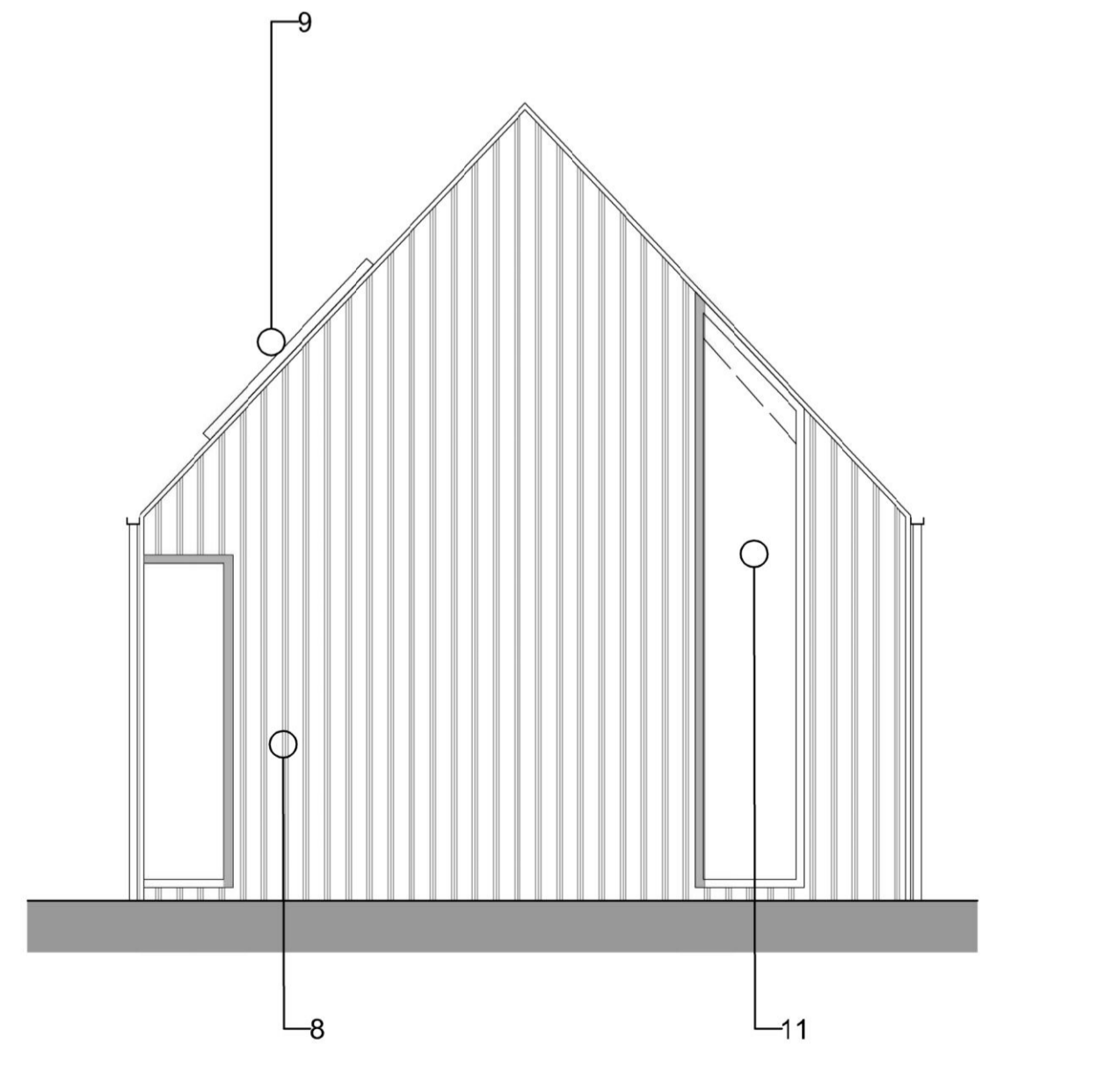
Proposed South West Elevation



Proposed North-West (School-Facing) Elevation



Proposed North East Elevation



Proposed South East Elevation

LEGEND

1. Metal Standing Seam Roof / Cladding (dark grey)
2. Cambridge Gault handmade brickwork
3. Vertical board on board larch cladding (treated; mid-grey)
4. Vertical board on board larch cladding (natural)
5. Vertical batten larch cladding (treated; mid-grey)
6. Horizontal sliding timber batten louvres | solar-shading
7. Vertical sliding timber batten concertina louvres | solar shading
8. Horizontal sliding timber shutter | security
9. Rooflight
10. Glazed doors | Entrance glazed curtain walling
11. Aluminium framed double-glazed window
12. External timber door, clad as wall finishes
13. External metal escape stair
14. PV panels
15. Pergola Structure
16. Louvre Structure
17. Semi-intensive green roof

P01 Issued for Planning	21.02.22	PG	TM
Rev Description	07/10/20	PG	PG
Project No: 200160	Scale @ A1: As Indicated	Drawn By: PG	

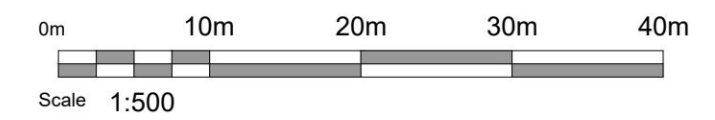


Vision, form and function
 Project:
Burwash Manor
 New Road
 Barton
 Cambridge CB237EY
 Client:
 Mike Radford
 Title:
Residential Dwelling
Plans and Elevations
 Drawing Number:
 200160- IW -ZZ -ZZ -DR -A -2056
 Status: S2 Purpose of Issue: Planning Revision: P01



LEGEND

- Application site boundary
- Low maintenance turf margins
- Reinforced gravel to courtyard and pedestrian areas
- Permeable block paving to parking bays
- Tar Spray and Chip with buff granite
- Existing Trees
- Proposed Trees
- Existing Hedge and Shrub plants



Ingleton Wood LLP shall have no liability to the Employer arising out of any unauthorized modification or amendment to, or any transmission, copy or use of the material, or any proprietary work contained therein, by the Employer, Other Project Team Member, or any other third party.

All dimensions are to be checked and verified on-site by the Main Contractor prior to commencement; any discrepancies are to be reported to the Contract Administrator.

This drawing is to be read in conjunction with all other relevant drawings and specifications
 Scale provided for Planning purposes only

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P03	Issued for Planning.	31.10.22	PG	PG
P02	Issued for Planning	21.02.22	PG	IM
Rev	Description	Date	Chk	Apr
Project No: 200160		Scale @ A3: 1:500		Drawn By: CB

Project:
 Burwash Manor
 New Road
 Barton
 Cambridge, CB23 7EY

Client:
 Mike Radford

Title:
 Site Plan as Proposed

Drawing Number:
 200160 - IWD - ZZ - ZZ - DR - A - 2020

Status: S2 | Purpose of Issue: Information | Revision: P03

Ingleton
Wood

Property and Construction
Consultants

Issuing office: Cambridge
T: 01223 965200
www.ingletonwood.co.uk

Vision, form and function



APPENDIX B

Selected Site Photographs

Photo 1: showing arisings from WS01



Photo 2: Image showing the storage building in the west of the site.



Photo 3: Image showing the grain store and residential dwellings on site.



Photo 4: Image showing the soft landscaped area used for storage in the east of the site, including a disused fuel tank.



Photo 5: Image showing heavy machinery stored in the south of the site.



Photo 6: Image showing the area of storage in the south of the site.





APPENDIX C

Site Specific Borehole and Hand Auger Logs



Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton

Project No.
UK23.6613

Co-ords:

Hole Type
WLS

Location: New Road, Barton, Cambridge CB23 7EY

Level:

Scale
1:25

Client: Burwash Manor LLP

Dates: 21/09/2023

Logged By
Mjo

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.40	ES		0.20			Brown sandy gravelly clayey TOPSOIL. Gravel consists of fine to coarse subangular to subrounded flint and brick.	
					0.60		Orangish brown clayey sandy fine to coarse brick concrete and flint GRAVEL. (MADE GROUND)		
		2.50	ES		4.00		Brownish orange clayey very sandy fine to coarse subangular to subrounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)		
							End of Borehole at 4.000m		

Remarks

No Groundwater Encountered & Reached Target Depth





Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton

Project No.
UK23.6613

Co-ords:

Hole Type
WLS

Location: New Road, Barton, Cambridge CB23 7EY

Level:

Scale
1:25

Client: Burwash Manor LLP

Dates: 21/09/2023

Logged By
Mjo

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.30	ES		0.10		Brown sandy gravelly CLAY. Gravel consists of fine to coarse subangular to subrounded flint limestone (MADE GROUND) Brownish orange clayey very sandy fine to coarse subangular to subrounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)	1	
		1.20	ES		1.30		Firm light grey sandy CLAY. (RIVER TERRACE DEPOSITS)	2	
					2.60		Brownish orange clayey very sandy fine to coarse subangular to subrounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)	3	
					3.70		Stiff dark grey CLAY. (GAULT FORMATION)	4	
				4.00		End of Borehole at 4.000m	5		

Remarks

No Groundwater Encountered & Reached Target Depth





Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton

Project No.
UK23.6613

Co-ords:

Hole Type
WLS

Location: New Road, Barton, Cambridge CB23 7EY


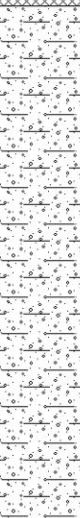
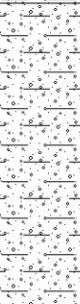
Level:

Scale
1:25

Client: Burwash Manor LLP

Dates: 21/09/2023

Logged By
Mjo

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		1.00	ES		1.30		Brown sandy gravelly CLAY. Gravel consists of fine to coarse subangular to subrounded flint limestone (MADE GROUND)		1
					3.00		Firm brownish orange clayey very sandy fine to coarse subangular to subrounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)		2
					4.00		No recovery, assumed to be gravel as above. (RIVER TERRACE DEPOSITS)		3
							End of Borehole at 4.000m		4
									5

Remarks

No Groundwater Encountered & Reached Target Depth





Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton

Project No.
UK23.6613

Co-ords:

Hole Type
WLS

Location: New Road, Barton, Cambridge CB23 7EY

Level:

Scale
1:25

Client: Burwash Manor LLP

Dates: 21/09/2023

Logged By
Mjo

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.50	ES		0.60		Brown sandy gravelly CLAY. Gravel consists of fine to coarse subangular to subrounded flint limestone (MADE GROUND)		
					1.30		Brownish orange clayey very sandy fine to coarse subangular to subrounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)	1	
					4.00		Firm to stiff dark grey CLAY. (GAULT FORMATION)	2 3	
							End of Borehole at 4.000m	4	
								5	

Remarks

No Groundwater Encountered & Reached Target Depth





Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton

Project No.
UK23.6613

Co-ords:

Hole Type
WLS

Location: New Road, Barton, Cambridge CB23 7EY

Level:

Scale
1:25

Client: Burwash Manor LLP

Dates: 21/09/2023

Logged By
Mjo

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.60	ES		0.80		Brown sandy gravelly CLAY. Gravel consists of fine to coarse subangular to subrounded flint limestone (MADE GROUND)		
					1.20		Brownish orange clayey very sandy fine to coarse subangular to subrounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)	1	
		1.40	ES				Firm light grey sandy CLAY. (RIVER TERRACE DEPOSITS)	2	
					2.80		Firm to stiff dark grey CLAY. (GAULT FORMATION)	3	
					4.00		End of Borehole at 4.000m	4	
								5	

Remarks

No Groundwater Encountered & Reached Target Depth





Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton

Project No.
UK23.6613

Co-ords:

Hole Type
WLS

Location: New Road, Barton, Cambridge CB23 7EY

Level:

Scale
1:25

Client: Burwash Manor LLP

Dates: 21/09/2023

Logged By
Mjo

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.30	ES		0.40		Brown sandy gravelly CLAY. Gravel consists of fine to coarse subangular to subrounded flint limestone (MADE GROUND)		
					1.80		Brownish orange clayey very sandy fine to coarse subangular to subrounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)	1	
					2.70		Firm light grey sandy CLAY. (RIVER TERRACE DEPOSITS)	2	
					4.00		Dark grey CLAY. (GAULT FORMATION)	3	
							End of Borehole at 4.000m	4	
								5	

Remarks

No Groundwater Encountered & Reached Target Depth





Trial Pit Log

Trialpit No

HP01

Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton

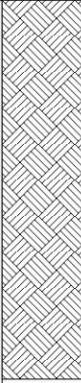
Project No.
UK23.6613Co-ords: -
Level:Date
22/10/2023

Location: New Road, Barton, Cambridge CB23 7EY

Dimensions
(m):Scale
1:10

Client: Burwash Manor LLP

Depth
0.50Logged
Mjo

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.50	ES					Brown sandy gravelly clayey TOPSOIL. Gravel consists of fine to coarse subangular to subrounded flint and limestone.
				0.50			End of pit at 0.50 m

1

2

Remarks: No Groundwater Encountered & Reached Target Depth

Stability:





Trial Pit Log

Trialpit No

HP02

Sheet 1 of 1


Project Name: Land at Burwash Manor, Barton

Project No.
UK23.6613Co-ords: -
Level:Date
22/10/2023

Location: New Road, Barton, Cambridge CB23 7EY

Dimensions
(m):Depth
0.50Scale
1:10Logged
Mjo

Client: Burwash Manor LLP

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.50	ES					Brown sandy gravelly clayey TOPSOIL. Gravel consists of fine to coarse subangular to subrounded flint limestone and brick.
				0.50			End of pit at 0.50 m

1

2

Remarks: No Groundwater Encountered & Reached Target Depth

Stability:





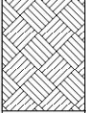
Trial Pit Log

Trialpit No
HP03
Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton Project No. UK23.6613 Co-ords: -
Level: Date 22/10/2023

Location: New Road, Barton, Cambridge CB23 7EY Dimensions (m): Scale 1:10

Client: Burwash Manor LLP Depth 0.15 Logged Mjo

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.15	ES		0.15			Brown sandy gravelly clayey TOPSOIL with organic material. Gravel consists of fine to medium brick and concrete. ----- End of pit at 0.15 m

Remarks: No Groundwater Encountered & Refusal

Stability:



1

2



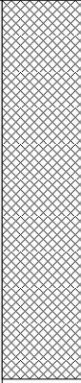
Trial Pit Log

Trialpit No
HP04
Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton Project No. UK23.6613 Co-ords: - Level: Date 22/10/2023

Location: New Road, Barton, Cambridge CB23 7EY Dimensions (m): Scale 1:10

Client: Burwash Manor LLP Depth 0.50 Logged Mjo

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.50	ES					Orangish brown clayey sandy fine to coarse brick concrete and flint GRAVEL. (MADE GROUND)
				0.50			End of pit at 0.50 m

Remarks: No Groundwater Encountered & Reached Target Depth

Stability:



1
2



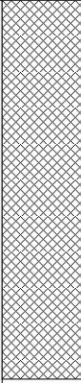
Trial Pit Log

Trialpit No
HP05
Sheet 1 of 1

Project Name: Land at Burwash Manor, Barton Project No. UK23.6613 Co-ords: - Level: Date 22/10/2023

Location: New Road, Barton, Cambridge CB23 7EY Dimensions (m): Scale 1:10

Client: Burwash Manor LLP Depth 0.50 Logged Mjo

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.50	ES					Orangish brown clayey sandy fine to coarse brick concrete and flint GRAVEL. (MADE GROUND)
				0.50			End of pit at 0.50 m

Remarks: No Groundwater Encountered & Reached Target Depth

Stability:



1
2



APPENDIX D

Laboratory Results – Environmental

EPS Ltd
7B Caxton House
Broad Street
Cambourne
Cambridgeshire
United Kingdom
CB23 6JN



4225



Attention : Tom Androsiuk
Date : 5th September, 2023
Your reference : UK23.6613
Our reference : Test Report 23/13896 Batch 1
Location : Land at Burwash Manor, Barton
Date samples received : 23rd August, 2023
Status : Final Report
Issue : 1

Six samples were received for analysis on 23rd August, 2023 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:**Liza Klebe**

Project Co-ordinator

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: EPS Ltd
Reference: UK23.6613
Location: Land at Burwash Manor, Barton
Contact: Tom Androsiuk
EMT Job No: 23/13896

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3		4-6		7-9		10-12		13-15		16-18		Please see attached notes for all abbreviations and acronyms	LOD/LOR	Units	Method No.
	Sample ID	WS01	WS02	WS02	WS03	WS05	WS05	Depth	0.40	0.30	1.20	1.00				
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T									
Sample Date	21/08/2023	21/08/2023	21/08/2023	21/08/2023	21/08/2023	21/08/2023	21/08/2023									
Sample Type	Clayey Sand	Clay	Clay	Clay	Clay	Clay	Clayey Sand									
Batch Number	1	1	1	1	1	1										
Date of Receipt	23/08/2023	23/08/2023	23/08/2023	23/08/2023	23/08/2023	23/08/2023	23/08/2023									
Arsenic ^{#M}	16.4	35.0	-	13.7	-	-							<0.5	mg/kg	TM30/PM15	
Cadmium ^{#M}	<0.1	<0.1	-	<0.1	-	-							<0.1	mg/kg	TM30/PM15	
Chromium ^{#M}	66.3	65.5	-	50.2	-	-							<0.5	mg/kg	TM30/PM15	
Copper ^{#M}	7	274 ^{AA}	-	33	-	-							<1	mg/kg	TM30/PM15	
Lead ^{#M}	7	864	-	50	-	-							<5	mg/kg	TM30/PM15	
Mercury ^{#M}	<0.1	0.1	-	<0.1	-	-							<0.1	mg/kg	TM30/PM15	
Nickel ^{#M}	21.8	40.2	-	25.2	-	-							<0.7	mg/kg	TM30/PM15	
Selenium ^{#M}	<1	1	-	<1	-	-							<1	mg/kg	TM30/PM15	
Total Sulphate as SO4 ^{#M}	852	834	-	318	-	-							<50	mg/kg	TM50/PM29	
Zinc ^{#M}	30	393	-	149	-	-							<5	mg/kg	TM30/PM15	
PAH MS																
Naphthalene ^{#M}	<0.04	0.78 ^{AB}	-	<0.04	-	-							<0.04	mg/kg	TM4/PM8	
Acenaphthylene	<0.03	1.06 ^{AB}	-	<0.03	-	-							<0.03	mg/kg	TM4/PM8	
Acenaphthene ^{#M}	<0.05	0.66 ^{AB}	-	<0.05	-	-							<0.05	mg/kg	TM4/PM8	
Fluorene ^{#M}	<0.04	0.74 ^{AB}	-	<0.04	-	-							<0.04	mg/kg	TM4/PM8	
Phenanthrene ^{#M}	<0.03	10.20 ^{AB}	-	<0.03	-	-							<0.03	mg/kg	TM4/PM8	
Anthracene [#]	<0.04	3.52 ^{AB}	-	<0.04	-	-							<0.04	mg/kg	TM4/PM8	
Fluoranthene ^{#M}	<0.03	24.13 ^{AB}	-	<0.03	-	-							<0.03	mg/kg	TM4/PM8	
Pyrene [#]	<0.03	19.27 ^{AB}	-	<0.03	-	-							<0.03	mg/kg	TM4/PM8	
Benzo(a)anthracene [#]	<0.06	11.65 ^{AB}	-	<0.06	-	-							<0.06	mg/kg	TM4/PM8	
Chrysene ^{#M}	<0.02	10.91 ^{AB}	-	<0.02	-	-							<0.02	mg/kg	TM4/PM8	
Benzo(b)fluoranthene ^{#M}	<0.07	20.18 ^{AB}	-	<0.07	-	-							<0.07	mg/kg	TM4/PM8	
Benzo(a)pyrene [#]	<0.04	12.33 ^{AB}	-	<0.04	-	-							<0.04	mg/kg	TM4/PM8	
Indeno(123cd)pyrene ^{#M}	<0.04	9.01 ^{AB}	-	<0.04	-	-							<0.04	mg/kg	TM4/PM8	
Dibenzo(ah)anthracene [#]	<0.04	1.85 ^{AB}	-	<0.04	-	-							<0.04	mg/kg	TM4/PM8	
Benzo(ghi)perylene [#]	<0.04	9.11 ^{AB}	-	<0.04	-	-							<0.04	mg/kg	TM4/PM8	
PAH 16 Total	<0.6	135.4 ^{AB}	-	<0.6	-	-							<0.6	mg/kg	TM4/PM8	
Benzo(b)fluoranthene	<0.05	14.53 ^{AB}	-	<0.05	-	-							<0.05	mg/kg	TM4/PM8	
Benzo(k)fluoranthene	<0.02	5.65 ^{AB}	-	<0.02	-	-							<0.02	mg/kg	TM4/PM8	
PAH Surrogate % Recovery	93	96 ^{AB}	-	98	-	-							<0	%	TM4/PM8	
Methyl Tertiary Butyl Ether ^{#M}	<6	-	-	-	-	-							<6	ug/kg	TM15/PM10	
Benzene ^{#M}	<5	-	-	-	-	-							<5	ug/kg	TM15/PM10	
Toluene ^{#M}	<3	-	-	-	-	-							<3	ug/kg	TM15/PM10	
Ethylbenzene ^{#M}	<3	-	-	-	-	-							<3	ug/kg	TM15/PM10	
m/p-Xylene ^{#M}	<4	-	-	-	-	-							<4	ug/kg	TM15/PM10	
o-Xylene ^{#M}	<4	-	-	-	-	-							<4	ug/kg	TM15/PM10	
Surrogate Recovery Toluene D8	98	-	-	-	-	-							<0	%	TM15/PM10	
Surrogate Recovery 4-Bromofluorobenzene	98	-	-	-	-	-							<0	%	TM15/PM10	

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EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18														
Sample ID	WS01	WS02	WS02	WS03	WS05	WS05														
Depth	0.40	0.30	1.20	1.00	0.60	1.40														
COC No / misc																				
Containers	V J T	V J T	V J T	V J T	V J T	V J T														
Sample Date	21/08/2023	21/08/2023	21/08/2023	21/08/2023	21/08/2023	21/08/2023														
Sample Type	Clayey Sand	Clay	Clay	Clay	Clay	Clayey Sand														
Batch Number	1	1	1	1	1	1														
Date of Receipt	23/08/2023	23/08/2023	23/08/2023	23/08/2023	23/08/2023	23/08/2023														
											LOD/LOR	Units	Method No.							
Pesticides																				
Organochlorine Pesticides																				
Aldrin	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Alpha-HCH (BHC)	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Beta-HCH (BHC)	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Delta-HCH (BHC)	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Dieldrin	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Endosulphan I	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Endosulphan II	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Endosulphan sulphate	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Endrin	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Gamma-HCH (BHC)	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Heptachlor	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Heptachlor Epoxide	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
p,p'-DDE	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
p,p'-DDT	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
p,p'-TDE	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Total Methoxychlor	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Organophosphorus Pesticides																				
Azinphos methyl	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Diazinon	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Dichlorvos	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Disulfoton	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Ethion	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Ethyl Parathion (Parathion)	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Fenitrothion	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Malathion	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Methyl Parathion	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							
Mevinphos	-	<10	-	-	<10	-					<10	ug/kg	TM42/PM8							

Please see attached notes for all abbreviations and acronyms

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Containers	V J T	V J T	V J T	V J T	V J T	V J T																		
Sample Date	21/08/2023	21/08/2023	21/08/2023	21/08/2023	21/08/2023	21/08/2023																		
Sample Type	Clayey Sand	Clay	Clay	Clay	Clay	Clayey Sand																		
Batch Number	1	1	1	1	1	1																		
Date of Receipt	23/08/2023	23/08/2023	23/08/2023	23/08/2023	23/08/2023	23/08/2023																		
												LOD/LOR	Units	Method No.										
Acid Herbicides																								
2,3,6-TBA	-	<0.1	-	-	<0.1	-																		
2,4-D	-	<0.1	-	-	<0.1	-																		
2,4-DB	-	<0.1	-	-	<0.1	-																		
2,4,5-T	-	<0.1	-	-	<0.1	-																		
4-CPA	-	<0.1	-	-	<0.1	-																		
Benazolin	-	<0.1	-	-	<0.1	-																		
Bentazone	-	<0.1	-	-	<0.1	-																		
Bromoxynil	-	<0.1	-	-	<0.1	-																		
Clopyralid	-	<0.1	-	-	<0.1	-																		
Dicamba	-	<0.1	-	-	<0.1	-																		
Dichloroprop	-	<0.1	-	-	<0.1	-																		
Diclofop	-	<0.1	-	-	<0.1	-																		
Fenoprop	-	<0.1	-	-	<0.1	-																		
Flamprop	-	<0.1	-	-	<0.1	-																		
Flamprop-isopropyl	-	<0.1	-	-	<0.1	-																		
Ioxynil	-	<0.1	-	-	<0.1	-																		
MCPA	-	<0.1	-	-	<0.1	-																		
MCPB	-	<0.1	-	-	<0.1	-																		
Mecoprop	-	<0.1	-	-	<0.1	-																		
Pentachlorophenol	-	<0.1	-	-	<0.1	-																		
Picloram	-	<0.1	-	-	<0.1	-																		
Triclopyr	-	<0.1	-	-	<0.1	-																		
TPH CWG																								
Aliphatics																								
>C5-C6 (HS_1D_AL) ^{#M}	<0.1	-	<0.1	<0.1	<0.1	-																		
>C6-C8 (HS_1D_AL) ^{#M}	<0.1	-	<0.1	<0.1	<0.1	-																		
>C8-C10 (HS_1D_AL)	1.3	-	<0.1	<0.1	0.1	-																		
>C10-C12 (EH_CU_1D_AL) ^{#M}	<0.2	-	<0.2	<0.2	6.2	-																		
>C12-C16 (EH_CU_1D_AL) ^{#M}	<4	-	<4	<4	21	-																		
>C16-C21 (EH_CU_1D_AL) ^{#M}	<7	-	<7	<7	75	-																		
>C21-C35 (EH_CU_1D_AL) ^{#M}	<7	-	<7	<7	122	-																		
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	<19	-	<19	<19	224	-																		

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