



Phase II Site Investigation Report

***Townhouse Dairy, Townhouse Farm, Church
Lane, Ardingly, RH17 6UR***

Client Name: Balcombe Estate

Project Number: P4271.2.1

Date: 5 August 2022

Client:	Balcombe Estate
Site:	Townhouse Dairy, Townhouse Farm, Church Lane, Ardingly, RH17 6UR
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agb Environmental Ltd

Executive Summary

Client and Site Location

The client, Balcombe Estate, commissioned agb Environmental to complete a Phase II site investigation at a site known as Townhouse Dairy, Townhouse Farm, Church Lane, Ardingly, RH17 6UR.

Development Proposals

We understand that part of the site is to have the Old Dairy structure retained, and part is to have the existing agricultural barn structures demolished, followed by the construction of 2no. detached residential dwellings with car port, garden store, garage and private garden areas.

Anticipated Geology, Hydrogeology and Hydrology

Geological mapping of the area indicates the bedrock to be formed of the Cuckfield Stone Bed in the northeast flank with the remainder of the site being formed of The Lower Grinstead Clay Formation. No superficial drift deposits have been identified. In addition, there are no records of artificial/Made Ground within 500m. Given the variable nature of the bedrock geology, the aquifer in the northeast flank is recorded as being a Secondary (A) Aquifer with the remainder of the site being an Unproductive Aquifer. The maximum permeability is recorded as being high with the minimum listed as being moderate. The flow type is mixed and fractured given the variable nature of the bedrock identified.

There are no active abstraction points within 250m. The nearest surface water feature is recorded as being 92m north, which is considered to be a tributary of the Ardingly Reservoir. In addition, the site is not situated upon a Source Protection Zone designation.

History

The earliest mapping (c.1874) indicates the site to be developed with three detached structures of varying sizes and shapes noted, these are mainly confined to the northern half. In addition, the extreme western edge of the site falls within an area of historical extraction which appears to now be overgrown with trees. In subsequent mapping of 1896, an additional structure is noted along the eastern flank, the previously noted historical extraction area is labelled as being an old gravel pit. In 1910 of the previously noted structures in the western flank is no longer observed. The site remains largely unchanged in the intervening years until the late 1960's when the site was redeveloped with a number of rectangular structures now observed. In the late 1970's additional structures were evident along the southern flank and possibly along the northern flank.

The walkover survey found the site to be accessible, for both vehicles and pedestrians, from the north along to the end of Church Lane. The site itself is relatively flat and level with local undulations throughout, to the south, approximately 20m south, there is a pronounced slope from north to south. To the north of the site the ground level increases slightly from south to north.

The central area of the site is formed of a number of semi-detached barn buildings of varying sizes and shapes, predominately brick built to the west and to the east of metal construction. On the western flank possible cemented asbestos containing roofing material was observed and adjacent to the western flank is a log storage area along with farm machinery and horse trailers. To the south is used for ad-hoc vehicular parking. A building in the east area, adjacent to the barn buildings, which was unoccupied at the time, has clearly been used as an office,

with a disabled ramp noted. Signage on the frontage indicates it was used previously by a ventilation and ductwork contractors.

The ground covering is a mixture of hardstanding, compacted earthwork and gravel driveway.

Summary of Encountered Ground Conditions

The encountered ground conditions comprise of Made Ground in two exploratory positions, namely WS1 and WS5, to a maximum depth of 0.50mbgl and 0.30mbgl respectively. In general, this was encountered as a grey/brown/orange gravelly clayey sand of flint, ballast, chalk, slate and brick fragments. Topsoil was encountered in two exploratory holes, namely WS2 and WS4, as a grass covered dark brown organic sandy gravelly topsoil, to a maximum depth of 0.20mbgl in both positions. In respect of WS3 and WS5 the surface was concrete with rebar to a depth of 0.20mbgl in WS3 and 0.10mbgl in WS5.

This stratum overlies an orange/brown sandy gravelly clay, sometimes clayey gravel which was encountered in all boreholes from depths between 0.20mbgl to 0.60mbgl. This became a light brown/grey clay with a maximum depth ranging between 2.70mbgl to 3.00mbgl, which in turn became a dark grey clay to the maximum drilled depth of 4.00mbgl in all exploratory holes, where refusal was met. This stratum was considered to be representative of The Lower Grinstead Clay Formation.

During the site investigation no groundwater was recorded. which is also the case during the subsequent rounds of monitoring undertaken.

Summary of Analysis, Screening and Monitoring Results

All samples submitted for various determinands were below their respective screening values. No asbestos has been identified.

Ground gas monitoring results and subsequent classification indicate CIRIA 665 Characteristic Situation CS-3 is appropriate for the site based on monitoring undertaken. This category indicates that the following protective measures to be installed within the proposed structure (further details regarding ground gas protection measures are provided in BS:8485 *Code of practice for the design of protective measures for methane and carbon dioxide for new buildings*):

- a) Reinforced concrete vast in situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM
or
- b) Beam and block or precast concrete slab and minimum 2000 g DPM/reinforced gas membrane.
or
- c) Possible underfloor venting or pressurisation in combination with a) and b) depending on use.

All joints and penetrations sealed.

All types of floor slab as above

Proprietary gas resistant membrane and passively ventilated underfloor subspace or positively pressured underfloor subspace, oversite capping or binding and in-ground venting layer.

However, it be may possible to reduce the CS level by undertaking additional monitoring to further characterise the underlying gas regime to ascertain if the current gas regime identified is an outlier and consequently that no special gas protection measures are required to be installed within the proposed development. Should further gas monitoring be undertaken we would suggest that this is undertaken when the buildings and floor slab have been removed.

Conclusion Summary

Based on the conceptual site model and risk assessment there is a low risk to site workers and end users with a moderate to low risk to other environmental receptors identified.

It is recommended that a refurbishment/demolition asbestos survey is undertaken on site, prior to demolition commencing, to ensure that potential ACMs are identified and managed as per the Control of Asbestos Regulations 2012.

Additional recommendations are provided in the report.

We would recommend that this report be forwarded to the relevant statutory consultees including the Environment Agency and Local Authority to seek their comments and subsequent approval prior to site works commencing.

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1 Introduction

The client commissioned agb Environmental to complete a Phase II ground investigation of a plot of Townhouse Dairy, Townhouse Farm, Church Lane, Ardingly, RH17 6UR.

1.1 Development Proposals

We understand that part of the site is to have the Old Dairy structure retained, and part is to have the existing agricultural barn structures demolished, followed by the construction of 2no. detached residential dwellings with car port, garden store, garage and private garden areas. Plans provided are presented in **Appendix 1**.

1.2 Previous Reports

A Phase I geoenvironmental desk study for the site and the surrounding area was completed by agb Environmental Ltd, report reference P4271.1.0, dated 8th June 2021, and should be read in conjunction with this report.

1.3 Purpose of Investigation

The principal technical objectives of the report were as follows:

- Review of desk study information,
- Establish the ground conditions,
- Undertake analysis of selected soil samples and groundwater samples,
- Provide an updated Conceptual Site Model (CSM) and risk assessment, and
- Provide recommendations for further work, if required.

The report has been formulated in general accordance with BS10175:2011+A2:2017 Investigation into Potentially Contaminated Sites – Code of Practice, Environment Agency's Land Contamination Risk Management (LCRM) guidance, BS5930:2015 Code of Practice for Site Investigations, and guidance from the National Planning Policy Framework.

2 Site Details

Details regarding the site and anticipated ground conditions extracted from the desk study are provided below.

2.1 Location and Topography

The irregular shaped site is located in a rural setting approximately 500m east of the village centre of Ardingly which is located in West Sussex. The site is centred at National Grid Reference 533760 129341 and is approximately 0.28ha in size. The site and surrounding land are at an elevation of approximately 100mOD. A site plan is presented in **Appendix 1**.

2.2 Site Description

The walkover survey found the site to be accessible, for both vehicles and pedestrians, from the north along to the end of Church Lane. The site itself is relatively flat and level with local undulations throughout, to the south, approximately 20m south, there is a pronounced slope from north to south. To the north of the site the ground level increases slightly from south to north.

The central area of the site is formed of a number of semi-detached barn buildings of varying sizes and shapes, predominately brick built to the west and to the east of metal construction. On the western flank possible cemented asbestos containing roofing material was observed and adjacent to the western flank is a log storage area along with farm machinery and horse trailers. To the south is used for ad-hoc vehicular parking. A building in the east area, adjacent to the barn buildings, which was unoccupied at the time, has clearly been used as an office, with a disabled ramp noted. Signage on the frontage indicates it was used previously by a ventilation and ductwork contractors.

The ground covering is a mixture of hardstanding, compacted earthwork and gravel driveway.

3 Summary of Desk Study Information

Salient information extracted from the desk study report is provided below.

3.1 Anticipated Ground Conditions and Permeability

Geological mapping of the area indicates the bedrock to be formed of the Cuckfield Stone Bed in the northeast flank with the remainder of the site being formed of The Lower Grinstead Clay Formation. No superficial drift deposits have been identified. The maximum permeability is recorded as being high with the minimum listed as being moderate. The flow type is mixed and fractured given the variable nature of the bedrock identified.

3.2 Geological and Engineering Hazards and Radon

Based on information provided by the British Geological Survey (BGS), the highest risk on site from shrink-swell clays, collapsible deposits and landslides is recorded as being very low. There is a negligible risk from running sands, compressible deposits and from ground dissolution of soluble rocks.

The study site is not located within a Radon Affected Area, as less than 1% of properties are above the Action Level. Therefore, no radon protective measures are necessary for new properties or extensions to existing ones as described in Building Research Establishment (BRE) publication BR211.

3.3 Hydrogeology and Hydrology

As a result of the variable bedrock the aquifer in the northeast flank is recorded as being a Secondary (A) Aquifer with the remainder of the site being an Unproductive Aquifer.

There are no active abstraction points within 250m. The nearest surface water feature is recorded as being 92m north, which is considered to be a tributary of the Ardingly Reservoir. In addition, the site is not situated upon a Source Protection Zone designation.

Salient details regarding flooding within 250m are provided in **Table 3.1**.

Table 3.1 Flooding

Item	Details
Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating	None recorded.
Historical Flood Events	None recorded.
Flood Defences	None recorded.
Areas benefitting from Flood Defences	None recorded.
Flood Storage Areas	None recorded.
Flood Zones	The study site is not located upon or within 50m of a Zone 2 or Zone 3 flood zone.
Surface Water Flooding	Negligible risk on site and within 50m is recorded as 1 in 30 year, 0.1m – 0.3m.
Groundwater Flooding	Negligible risk on site and within 50m.

3.4 Summary of Site History

The earliest mapping (c.1874) indicates the site to be developed with three detached structures of varying sizes and shapes noted, these are mainly confined to the northern half. In addition, the extreme western edge of the site falls within an area of historical extraction which appears to now be overgrown with trees. In subsequent mapping of 1896, an additional structure is noted along the eastern flank, the previously noted historical extraction area is labelled as being an old gravel pit. In 1910 of the previously noted structures in the western flank is no longer observed. The site remains largely unchanged in the intervening years until the late 1960s when the site was redeveloped with a number of rectangular structures now observed. In the late 1970's additional structures were evident along the southern flank and possibly along the northern flank.

The surrounding environs are largely rural in nature with open fields noted immediately west, south and east. Sporadic residential dwellings are noted immediately north. Of notable interest during the reviewed mapping is an historical gravel pit immediately west (the periphery of which extends on site).

3.5 Environmental Permits, Incidents and Registers

3.5.1 Sites Determined as Contaminated Land under Part IIA EPA 1990

There are no records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 within 500m.

3.5.2 Licensed Discharges

There is one active discharge consent within 250m, this is located 223m northeast for the purposes of final/treated sewage discharge into an unnamed tributary of the Ardingly Reservoir.

3.6 Landfill and Other Waste Sites

None recorded within 250m.

3.7 Workings/Tunnels and Railway Features

3.7.1 BritPits

There are four ceased records within 250m, the closest of which is located 58m northwest for the commodity of sand and gravel. The other entries are 58m northwest, 78m west and 84m south all of which are for the commodity of sandstone.

3.7.2 Surface Ground Workings

There are twenty-four records within 250m, eleven of which are recorded as being on site for unspecified pits, old gravel pit and for ponds. In respect of off site entries the nearest is located 64m northwest also for unspecified pits/pit. Other entries relate to unspecified pits/pit, ponds and unspecified ground workings.

3.8 Historical/Current Land Uses

3.8.1 Historical Industrial Land Uses

There are twelve recorded entries within 250m, six of which are recorded as being on site, one of which is for an old gravel pit and the other five are for an unspecified pit. The nearest

off site is 64m northwest for unspecified pits/pit, with other records for unspecified pits 71m northwest and 219m southeast.

3.8.2 Recent Industrial Land Uses

None recorded within 250m.

3.9 Environmental Designations

The study site is located upon an Area of Outstanding Natural Beauty (AONB), a Conservation Area and an Environmental and Countryside Stewardship Scheme.

4 Preliminary Qualitative Risk Assessment

A preliminary assessment of plausible contaminant linkages was formulated as part of the Phase I Desk Study. It is aimed at identifying possible risks, if any, arising from substances used or deposited on-site, or from other sources of land contamination. Both past and current potentially contaminative land uses have been considered.

4.1 Potential Contaminant Sources

Based on the site walkover and desk study research, the identified potentially contaminative land uses on or within the vicinity of the site are summarised in **Table 4.1**.

Table 4.1 Potential Contaminative Sources

Identified Potentially Contaminative Land Uses / Sources	Distance From Site (approx.)	Potential Contaminants Associated with Identified Sources
Storage of machinery within barn buildings and potential for asbestos containing roof material. In addition, from potential infill to an historical gravel pit.	On site	Metals, total petroleum hydrocarbons, asbestos containing materials (ACMs), polycyclic aromatic hydrocarbons (PAHs), and ground gases/vapour.
Potential infill to historical gravel pit.	Immediately off site to the west	Metals, total petroleum hydrocarbons, ACMs, PAHs, and ground gases/vapour.

4.2 Pathways

For this assessment, the principal potential pathways for contaminant migration are provided in **Table 4.2**.

Table 4.2 Pathways

Source	Pathway
Soil / dust / fibres	Dermal contact, ingestion and inhalation.
Liquid (including surface water / groundwater)	Dermal contact, ingestion. Leaching, infiltration and migration through groundwater. Preferential pathways such as service trenches.
Harmful ground gases / vapour	Migration through permeable geological strata and preferential pathways. Inhalation, accumulation within confined spaces with subsequent asphyxiation or explosion.

4.3 Receptors

Based on the proposals and the findings of the desk study the identified receptors are described in **Table 4.3**.

Table 4.3 Receptors

Receptor	Detail
Site workers	Construction workers.
End users	Residents and visitors.
Neighbouring sites	Residents, workers and visitors.
Controlled Waters	The bedrock aquifer in the northeast flank is recorded as being a Secondary (A) Aquifer with the remainder of the site being an Unproductive Aquifer. The nearest recorded surface water feature is located approximately 92m north, which is considered to be a tributary of the Ardingly Reservoir. However, it is noted that there a pond approximately 10m east. The study site is not situated upon a Source Protection Zone designation.

Receptor	Detail
Flora and fauna	Plants and animals that may be affected by proposed redevelopment. Soft landscaped areas are planned as part of the redevelopment.
Buildings	The proposed building(s).
Buried services	Potable water pipes are anticipated as part of proposals.

4.4 Preliminary Conceptual Site Model

The preliminary conceptual site model presented in **Table 4.4** has been derived using the findings of the desk study and the development proposals. The risk evaluation methodology is presented in **Appendix 4**.

Table 4.4 Preliminary Conceptual Site Model

Source	Pathway	Receptor	Consequence	Probability	Potential Risk	Detail
On site Storage of machinery within barn buildings and potential for asbestos containing roof material. In addition, from potential infill to historical gravel pit. <i>(Metals, total petroleum hydrocarbons, asbestos containing materials (ACMs), polycyclic aromatic hydrocarbons (PAHs), and ground gases/vapour).</i>	Dermal contact, ingestion and inhalation of contaminated soil, dust and/or fibres	End users	Medium	Likely	Moderate	Contact is likely between future residential occupiers/visitors in shallow soils in the proposed garden areas of the site, soil/dust tracked back into premises, and from ingestion of home grown produce. The historical age of various structures is such that the presence of asbestos cannot be discounted. Future site workers are likely to come into direct contact with soils during groundworks. Safe working practices should be implemented, and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk.
		Site workers	Medium	Likely	Moderate	
		Adjacent users	Medium	Likely	Moderate	
	Leaching / infiltration through soils and migration via groundwater or soil pore moisture.	Controlled waters	Medium	Unlikely	Low	A low risk is considered given that there is no current evidence to suggest that groundwater quality beneath the site is affected by contaminant leaching. The bedrock aquifer in the northeast flank is recorded as being a Secondary (A) Aquifer with the remainder of the site being an Unproductive Aquifer. The nearest recorded surface water feature is located approximately 92m north, which is considered to be a tributary of the Ardingly Reservoir. However, it is noted that there a pond approximately 10m east. The study site is not situated upon a Source Protection Zone designation.
	Permeation of water pipes.	Construction materials, future end users	Medium	Likely	Moderate	Hydrocarbons, especially aromatics and chlorinated solvents, are known to permeate plastic pipes. Provision of water supply pipes and connectors formed from proprietary "barrier pipe" materials (e.g. polyethylene aluminium-polyethylene) may be required by the water supply company.
	Gas Migration and build up within buildings.	Future end users and building structures	Medium	Likely	Moderate	On-site risk from ground gas or volatilisation has been identified.
	Plant Uptake	Flora and Fauna	Medium	Unlikely	Low	Phytotoxic contamination as a consequence of historical and current land uses is unlikely.

5 Fieldwork and Analysis

The works undertaken as part of the site investigation and subsequent analysis of selected samples is summarised below.

5.1 Site Investigation

The locations of investigative positions were selected, based on the objectives of the investigation, including the client's requirements, and available access. Buried services information was provided by the client. Prior to boring, a cable avoidance tool and signal generator was used to confirm each location was clear of detectable services. The site works were completed on June 21st 2021 and comprised of five dynamic sampling (windowless) boreholes (WS1 to WS5).

The exploratory hole location plan and fieldwork records are presented in **Appendix 2**. The exploratory holes completed as part of the investigation are detailed below.

5.1.1 Dynamic Sampling (windowless) Boreholes

The boreholes were proposed to be completed to 5.00mbgl, however refusal was met at 4.00mbgl in all exploratory holes. Prior to boring, a services inspection pit was excavated to a depth of 1.00-1.20mbgl using hand tools to confirm the absence of services.

The sampling equipment comprised of a track-mounted rig used to drive successive 1.00m long, lined 90mm to 50mm diameter core sample barrels into the ground. The recovered plastic core barrel 'liners' were split and sub-sampled on-site by an engineer, and the samples, taken at regular intervals throughout the length of the boreholes, were placed in laboratory supplied sealed glass jars or plastic containers prior to being stored in cool boxes during transit to the laboratory. Standard penetration tests (SPTs) were undertaken at intervals in all the boreholes to provide data regarding the strength or density of the soil, the result of each test is presented as the 'N' value on the borehole logs.

5.1.2 Standpipe Installations and Monitoring

Single standpipe installations were placed in boreholes WS3 and WS5. Each standpipe comprised 50mm diameter PTFE piping, slotted below 1.00mbgl and installed to a depth of 4.00m. Once introduced into the ground the slotted section was surrounded by suitable gravel pack, above which a sealing material (bentonite) was used. A rubber bung with a gas tap was placed at the top of the pipework and a flush cover concreted at surface to protect the installation from damage.

The standpipes were monitored during four return visits on 6th, 14th, 21st and 30th July 2021. The ground gas flow was monitored for a period of up to two minutes, and the concentrations of ground gases including methane, carbon dioxide, hydrogen sulphide and carbon monoxide were monitored for up to five minutes. The depth to groundwater was measured using a dip-meter. The monitoring results are presented in **Appendix 3**.

5.2 Laboratory Analysis

The scheduled chemical analysis and number of samples tested is summarised in **Table 5.1**. The results are presented in **Appendix 4**.

Table 5.1 Summary of Scheduled Contamination Testing

Analysis	No. of Samples Tested	
	<i>Soil</i>	<i>Groundwater</i>
Metals	6	-
Speciated polycyclic aromatic hydrocarbons (USEPA 16 – PAHs)	6	-
Total petroleum hydrocarbons (CWG Aromatic/Aliphatic Split)	6	-
BTEX/MTBE	6	-
Asbestos screening	2	-
Phenyl Urea Herbicides	2	-
Organochlorine Pesticides	1	-
Organophosphorus Pesticides	1	-
pH	6	-
Soil organic matter (SOM)	6	-
Aggressive ground suite (total sulphate, water soluble sulphate (SO ₄), pH)	5	-

6 Ground Conditions

The encountered ground conditions are summarised below.

6.1 Encountered Ground Conditions

The ground conditions encountered are summarised in **Table 6.1** and discussed below.

Table 6.1 Summary of Encountered Ground Conditions

Stratum	Surface Depth (mbgl)	Base Depth (mbgl)
Made Ground	0.0	0.5
Topsoil	0.0	0.45
Concrete	0.0	0.2
Clay (predominantly sandy gravelly clay which became clay with depth). The Lower Grinstead Clay Formation.	0.20 to 0.60	4.00
Groundwater	During fieldwork: None identified. During monitoring: Not encountered.	

6.1.1 Made Ground

Made Ground was encountered in only two of the boreholes, namely WS1 and WS5 to a maximum depth of 0.50mbgl and 0.30mbgl respectively. In general, this was encountered as a grey/brown/orange gravelly clayey sand of flint, ballast, chalk, slate and brick fragments.

6.1.2 Topsoil/Concrete

Topsoil was encountered in two exploratory holes, namely WS2 and WS4, as a grass covered dark brown organic sandy gravelly topsoil, to a maximum depth of 0.20mbgl in both positions. In respect of WS3 and WS5 the surface was concrete with rebar to a depth of 0.20mbgl in WS3 and 0.10mbgl in WS5.

6.1.3 Clay

An orange/brown sandy gravelly clay, sometimes clayey gravel was encountered in all boreholes from depths between 0.20mbgl to 0.60mbgl. This became a light brown/grey clay with a maximum depth ranging between 2.70mbgl to 3.00mbgl, which in turn became a dark grey clay to the maximum drilled depth of 4.00mbgl in all exploratory holes, where refusal was met.

This stratum was considered to be representative of The Lower Grinstead Clay Formation.

6.1.4 Groundwater

During the site investigation no groundwater was encountered, which is also the case during the subsequent rounds of monitoring undertaken.

6.1.5 Visual and Olfactory Evidence

During the site investigation works, black staining of clay was noted underneath the concrete base in WS3 at a depth of 0.20mbgl to 0.50mbgl, no olfactory evidence of contamination was encountered.

7 Chemical Laboratory Test Results and Monitoring

The results of chemical laboratory testing and ground gas monitoring are detailed in the following section.

7.1 Soil Analysis

Based on the proposed end use, the results of chemical laboratory testing of soil samples for inorganic and organic compounds have been compared against screening criteria for residential with plant uptake end use. The screening criteria hierarchy used is as follows:

- Chartered Institute of Environmental Health (CIEH) and Land Quality Management Ltd (LQM) Suitable for Use Levels (S4ULs).
- Department for Environment Food and Rural Affairs (Defra) Category 4 Screening Levels (C4SLs).
- Contaminated Land: Applications in Real Environments (CL:AIRE) soil generic assessment criteria (GACs).
- Environment Agency: Soil Guideline Values (SGVs).

7.2 Groundwater

The results of groundwater analysis have been compared to:

- The Water Supply (Water Quality) Regulations 2016 (WSR).
- Guidelines for Drinking-water Quality: World Health Organization (WHO).

7.3 Aggressive Ground

The results of testing for aggressive ground conditions have been classified using values provided in BRE Special Digest 1:2005: Concrete in aggressive ground.

7.4 Ground Gas Monitoring

Where applicable the results of ground gas and volatile organic compound (VOC) monitoring have been compared to:

- CIRIA 665: Assessing risks posed by hazardous ground gases to buildings.
- BS 8485:2015: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- HSE EH40/2005 Workplace exposure limits.

7.5 Soil Analysis and Screening Results

Table 7.1 Results of Laboratory Analysis for Metals

Determinand <i>Metals</i>	Concentration Range (mg/kg)		Screening Values (mg/kg)		No. of Samples with Elevated Concentrations	Samples with Elevated Concentrations
	<i>Minimum</i>	<i>Maximum</i>	<i>S4ULs</i>	<i>C4SLs</i>		
Arsenic	10	20	37	-	0	None elevated
Cadmium	<0.2	<0.2	11	-	0	None elevated
Chromium (III)	20	30	910	-	0	None elevated
Chromium (VI)	<2	<2	6	-	0	None elevated
Copper	12	36	2,400	-	0	None elevated
Lead	11	64	-	210	0	None elevated
Mercury	<1	<1	40	-	0	None elevated
Nickel	10	22	130	-	0	None elevated
Selenium	<3	<3	250	-	0	None elevated
Zinc	42	97	3,700	-	0	None elevated

Table 7.2 Results of Laboratory Analysis for Polycyclic Aromatic Hydrocarbons

Determinand <i>PAHs</i>	Concentration Range (mg/kg)		Screening Values for Residential with Homegrown Produce End Use (mg/kg)				No. of Samples with Elevated Concentrations	Samples with Elevated Concentrations
	<i>Minimum</i>	<i>Maximum</i>	<i>S4ULs</i>			<i>C4SLs</i>		
			<i>1% som</i>	<i>2.5% som</i>	<i>6% som</i>	<i>6% som</i>		
Naphthalene	<0.1	<0.1	2.3	5.6	13	-	0	None elevated
Acenaphthylene	<0.1	<0.1	170	420	920	-	0	None elevated
Acenaphthene	<0.1	<0.1	210	510	1,100	-	0	None elevated
Fluorene	<0.1	<0.1	170	400	860	-	0	None elevated
Phenanthrene	<0.1	<0.1	95	220	440	-	0	None elevated
Anthracene	<0.1	<0.1	2,400	5,400	11,000	-	0	None elevated
Fluoranthene	<0.1	0.24	280	560	890	-	0	None elevated

Determinand <i>PAHs</i>	Concentration Range (mg/kg)		Screening Values for Residential with Homegrown Produce End Use (mg/kg)				No. of Samples with Elevated Concentrations	Samples with Elevated Concentrations
	Minimum	Maximum	S4Us			C4SLs		
			1% som	2.5% som	6% som	6% som		
Pyrene	<0.1	0.18	620	1,200	2,000	-	0	None elevated
Benzo[a]anthracene	<0.1	0.37	7.2	11	13	-	0	None elevated
Chrysene	<0.1	<0.1	15	22	27	-	0	None elevated
Benzo[b]fluoranthene	<0.1	0.44	2.6	3.3	3.7	-	0	None elevated
Benzo[k]fluoranthene	<0.1	<0.1	77	93	100	-	0	None elevated
Benzo[a]pyrene	<0.1	0.30	2.2	2.7	3.0	5.0	0	None elevated
Indeno[123-cd]pyrene	<0.1	<0.1	27	36	41	-	0	None elevated
Dibenzo[ah]anthracene	<0.1	<0.1	0.24	0.28	0.3	-	0	None elevated
Benzo[ghi]perylene	<0.1	<0.1	320	340	350	-	0	None elevated
Total PAH	<1.6	<1.6	-	-	-	-	-	-

Table 7.3 Results of Laboratory Analysis for Speciated Total Petroleum Hydrocarbons

Determinand <i>Petroleum Hydrocarbons</i>	Concentration Range (mg/kg)		Screening Values (mg/kg)			No. of Samples with Elevated Concentrations	Samples with Elevated Concentrations
Speciated - Aliphatic	Minimum	Maximum	S4ULs				
			1% som	2.5% som	6% som		
EC5-C6	<0.01	<0.01	42	78	160	0	None elevated
EC6-C8	<0.05	<0.05	100	230	530	0	None elevated
EC8-C10	<2	<2	27	65	150	0	None elevated
EC10-C12	<2	<2	130	330	760	0	None elevated
EC12-C16	<3	<3	1,100	2,400	4,300	0	None elevated
EC16-C34	<13	<13	65,000	92,000	110,000	0	None elevated
Aliphatic C5-C34	<21	<21	-	-	-	-	-
Speciated - Aromatic	Minimum	Maximum	S4ULs			No. of Samples with Elevated Concentrations	Samples with Elevated Concentrations
			1% som	2.5% som	6% som		
EC 5-7	<0.01	<0.01	70	140	300	0	None elevated
EC 7-8	<0.05	<0.05	130	290	660	0	None elevated
EC 8-10	<2	<2	34	83	190	0	None elevated
EC 10-12	<2	<2	74	180	380	0	None elevated
EC 12-16	<2	<2	140	330	660	0	None elevated
EC 16-21	<3	<3	260	540	930	0	None elevated
EC 21-35	<10	38	1,100	1,500	1,700	0	None elevated
Aromatic C5-C35	<21	38	-	-	-	-	-

Table 7.4 Results of Laboratory Analysis for BTEX and MTBE

Determinand <i>BTEX</i>	Concentration Range (mg/kg)		Screening Values for Proposed Land Use (mg/kg)			No. of Samples with Elevated Concentration	Samples with Elevated Concentrations
	Minimum	Maximum	S4ULs				
			1% som	2.5% som	6% som		
Benzene	<0.002	<0.002	0.087	0.17	0.37	0	None elevated
Toluene	<0.005	<0.005	130	290	660	0	None elevated
Ethylbenzene	<0.002	<0.002	47	110	260	0	None elevated
o-xylene	<0.002	<0.002	60	140	330	0	None elevated
m-xylene	<0.002	<0.002	59	140	320	0	None elevated
p-xylene	<0.002	<0.002	0.087	0.17	0.37	0	None elevated
Determinand <i>MTBE</i>	Minimum	Maximum	GACs			No. of Samples with Elevated Concentration	Samples with Elevated Concentrations
			1% som	2.5% som	6% som		
MTBE	<0.005	<0.005	49	84	160	0	None elevated

Table 7.5 Asbestos Screening

Determinand	Screening Result	Asbestos Matrix	Asbestos Type	Quantification (%)	Location of Samples with Detected Asbestos
Asbestos	Not Detected	-	-	-	Not Detected

Table 7.6 Pesticides & Herbicides

Determinand	Concentration Range (mg/kg)		No. of Samples with Elevated Concentration	Samples with Elevated Concentrations
	Minimum	Maximum		
Organochlorine Pesticides (various congeners)	-	<0.02	0	None elevated
Organophosphorus Pesticides (various congeners)	-	<0.1	0	None elevated
Phenyl Urea Herbicides (various congeners)	<0.1	<0.1	0	None elevated

7.6 Ground Gas Monitoring Results

Table 7.7 Summary of Ground Gas Monitoring Results

Date	Location	CO ₂ (%)		CH ₄ (%)		O ₂ (%)		Flow (Max. l/hr.)	Atmos. Pres. (mb)
		Min	Max	Min	Max	Min	Max		
06.07.21	WS3	0.1	11.9	0.0	0.0	1.6	20.4	-0.1	990
	WS5	0.1	8.2	0.0	0.1	0.2	20.4	0.0	990
14.07.21	WS3	14.2	17.2	0.0	0.0	0.2	13.5	0.0	1018
	WS5	0.2	1.0	0.0	0.0	19.6	20.6	0.1	1018
21.07.21	WS3	1.7	16.5	0.0	0.0	0.8	18.5	0.6	1022
	WS5	-	-	-	-	-	-	-	1022
30.07.21	WS3	10.4	20.4	0.0	0.1	0.1	17.7	0.2	1001
	WS5	4.7	6.6	0.1	0.1	0.6	18.3	0.1	1001

Table 7.8 Gas Screening Values for Carbon Dioxide and Methane

Peak Flow Rate (l/hr)	Worst Case CO ₂ (%)	CO ₂ GSV	Worst Case CH ₄ (%)	CH ₄ GSV	CIRIA 665 Characteristic Situation
0.6	20.4	0.1224l/hr CO ₂	0.1	0.0006l/hr CH ₄	GSV = CS-3 Max recorded values = CS-3

Table 7.9 Workplace Exposure Limits

Location	Recorded Concentration (ppm)					
	Carbon monoxide		Hydrogen sulphide		Liquefied Petroleum Gas (VOCs)	
	Min	Max	Min	Max	Min	Max
WS3	0	1	0	1	-	-
WS5	0	1	0	0	-	-
HSE Workplace Exposure Limits (ppm)	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term
	30	200	5	10	1000	1250

Location	Recorded Concentration (ppm)					
	Carbon monoxide		Hydrogen sulphide		Liquefied Petroleum Gas (VOCs)	
	Min	Max	Min	Max	Min	Max
Locations with Elevated Concentrations	None elevated.		None elevated.		-	

8 Updated Risk Assessment

The development proposals, summary of encountered ground conditions, analysis, screening and monitoring results, and the updated qualitative risk assessment are provided below.

8.1 Summary of Development Proposals and Ground Investigation Results

The development proposals, the encountered ground conditions, and the results of analysis and monitoring are summarised below.

8.1.1 Development Proposals

We understand that part of the site is to have the Old Dairy structure retained, and part is to have the existing agricultural barn structures demolished, followed by the construction of 2no. detached residential dwellings with car port, garden store, garage and private garden areas.

8.1.2 Summary of Encountered Ground Conditions and Groundwater

The encountered ground conditions comprise of Made Ground in two exploratory positions, namely WS1 and WS5, to a maximum depth of 0.50mbgl and 0.30mbgl respectively. In general, this was encountered as a grey/brown/orange gravelly clayey sand of flint, ballast, chalk, slate and brick fragments. Topsoil was encountered in two exploratory holes, namely WS2 and WS4, as a grass covered dark brown organic sandy gravelly topsoil, to a maximum depth of 0.20mbgl in both positions. In respect of WS3 and WS5 the surface was concrete with rebar to a depth of 0.20mbgl in WS3 and 0.10mbgl in WS5.

This stratum overlies an orange/brown sandy gravelly clay, sometimes clayey gravel which was encountered in all boreholes from depths between 0.20mbgl to 0.60mbgl. This became a light brown/grey clay with a maximum depth ranging between 2.70mbgl to 3.00mbgl, which in turn became a dark grey clay to the maximum drilled depth of 4.00mbgl in all exploratory holes, where refusal was met. This stratum was considered to be representative of The Lower Grinstead Clay Formation.

During the site investigation no groundwater was recorded, which is also the case during the subsequent rounds of monitoring undertaken.

8.1.3 Summary of Analysis, Screening and Monitoring Results

The soil samples with determinands that were above their screening values for residential without plant uptake end use is summarised in **Error! Not a valid bookmark self-reference.** and samples with detected asbestos is summarised in **Table 8.2**. The ground gas is summarised

in **Table 8.1**
Summary of Soil Exceedances

Determinand	Samples with Exceedance
-	None recorded.

Table 8.2 Asbestos Screening Summary

Determinand	Samples with Identification
Asbestos: None Identified	None identified.

Table 8.3 Summary of Ground Gas Monitoring

Item	Result
Characteristic Situation	CS-3.

Item	Result
Workplace Exposure Limits	No exceedances.

3.**Table 8.1** Summary of Soil Exceedances

Determinand	Samples with Exceedance
-	None recorded.

Table 8.2 Asbestos Screening Summary

Determinand	Samples with Identification
Asbestos: None Identified	None identified.

Table 8.3 Summary of Ground Gas Monitoring

Item	Result
Characteristic Situation	CS-3.
Workplace Exposure Limits	No exceedances.

8.2 Updated Conceptual Site Model

An updated Conceptual Site Model has been undertaken, based on the results of the investigation and in the context of the proposed development which is provided in Error! Reference source not found.4.

Table 8.4 Updated Conceptual Site Model

Source	Pathway	Receptor	Consequence	Probability	Potential Risk	Detail
On site Storage of machinery within barn buildings and potential for asbestos containing roof material. In addition, from potential infill to historical gravel pit. <i>(Metals, total petroleum hydrocarbons, asbestos containing materials (ACMs), polycyclic aromatic hydrocarbons (PAHs), and ground gases/vapour).</i>	Dermal contact, ingestion and inhalation of contaminated soil, dust and/or fibres	End users	Medium	Unlikely	Low	Given the results of soil sampling and subsequent screening which shows no impact and/or presence of asbestos containing material. Contact is likely between future residential occupiers/visitors in shallow soils in the proposed garden area of the site, soil/dust tracked back into premises, and from ingestion of home grown produce. Future site workers are likely to come into direct contact with soils during groundworks. Safe working practices should be implemented, and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk.
		Site workers	Medium	Unlikely	Low	
		Adjacent users	Medium	Unlikely	Low	
	Leaching / infiltration through soils and migration via groundwater or soil pore moisture.	Controlled waters	Medium	Unlikely	Low	Given the results of soil sampling and subsequent screening which shows no impact, in addition, no groundwater was encountered during exploratory works and subsequent monitoring. The bedrock aquifer in the northeast flank is recorded as being a Secondary (A) Aquifer with the remainder of the site being an Unproductive Aquifer. The nearest recorded surface water feature is located approximately 92m north, which is considered to be a tributary of the Ardingly Reservoir. However, it is noted that there a pond approximately 10m east. The study site is not situated upon a Source Protection Zone designation.
	Permeation of water pipes.	Construction materials, future end users	Medium	Unlikely	Low	Given the results of soil sampling and subsequent screening which shows no impact Hydrocarbons, especially aromatics and chlorinated solvents, are known to permeate plastic pipes. Provision of water supply pipes and connectors formed from proprietary "barrier pipe" materials (e.g. polyethylene aluminium-polyethylene) may still be required by the water supply company.
	Gas Migration and build up within buildings.	Future end users and building structures	Medium	Likely	Moderate	Despite the results of soil sampling and subsequent screening which shows no impact, in addition, no groundwater was encountered during exploratory works and subsequent monitoring. However, the results of gas monitoring and subsequent screening shows the site to be classed as CS-3.
	Plant Uptake	Flora and Fauna	Medium	Unlikely	Low	Phytotoxic contamination as a consequence of historic and current land uses is unlikely.

9 Contamination Conclusion and Recommendations

The following recommendations are based on the results of the conceptual site model and risk assessment.

9.1 Conclusion

Based on the conceptual site model and risk assessment there is a low risk to site workers and end users with a moderate to low risk to other environmental receptors identified.

9.2 Recommendations

Recommendations are provided below.

9.2.1 Asbestos Survey

It is recommended that a refurbishment/demolition asbestos survey is undertaken on site, prior to demolition commencing, to ensure that potential ACMs are identified and managed as per the Control of Asbestos Regulations 2012.

9.2.2 Gas Protection Measures & Additional Monitoring

Based on the gas monitoring results and in line with classification, as detailed within C665 documentation, the CS level has been calculated as CS-3. This would require the following protective measures to be installed within the proposed structure (further details regarding ground gas protection measures are provided in BS:8485 *Code of practice for the design of protective measures for methane and carbon dioxide for new buildings*):

- d) Reinforced concrete vast in situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM
or
- e) Beam and block or precast concrete slab and minimum 2000 g DPM/reinforced gas membrane.
or
- f) Possible underfloor venting or pressurisation in combination with a) and b) depending on use.

All joints and penetrations sealed.

All types of floor slab as above

Proprietary gas resistant membrane and passively ventilated underfloor subspace or positively pressured underfloor subspace, oversite capping or binding and in-ground venting layer.

However, it be may possible to reduce the CS level by undertaking additional monitoring to further characterise the underlying gas regime to ascertain if the current gas regime identified is an outlier and consequently that no special gas protection measures are required to be installed within the proposed development. Should further gas monitoring be undertaken we would suggest that this is undertaken when the buildings and floor slab have been removed.

9.2.3 Protection of Ground Workers

The implementation of suitable health and safety measures and should be completed by a suitably qualified and competent contractor with appropriate precautions in place following risk assessment. This should include the adoption of suitable safe systems of work, the provision and use of welfare facilities, and suitable protective measures.

9.2.4 Watching Brief

It is recommended that a watching brief be maintained on site, particularly during the groundwork stage. During any ground works an appraisal of the exposed soils should be made by a competent person. If any material is noted to show visual and/or olfactory signs of contamination it should be stockpiled separately and tested prior to its appropriate removal off-site or re-use. If soils suspected of being contaminated are encountered, it is recommended that a contaminated land specialist be consulted.

9.2.5 Buried Services

Potable water pipework shall comply with the Water Supply Regulations. The agreement of the water provider and Local Authority should be sought regarding the potable water pipework and fittings selected prior to commencement.

9.2.6 Importing and Re-Use of Soil and Materials Management Plan

Excavated soil that is to remain and be re-used on site, assuming it is suitable for the proposed use, may not be determined as waste and its re-use therefore may not require an Environmental Permit. It may be necessary to consult the Environment Agency or other statutory bodies regarding re-use of soils as part of the proposals and whether a Materials Management Plan or Environmental Permit is required. In any case, a site waste management plan or materials management plan may assist the design and cost assessment of the proposed development. This should be devised within the design phase of the scheme.

9.2.7 Soil Disposal

The client and contractors are advised to follow the process outlined in the Environment Agency's Technical Guidance Document WM3 '*Waste Classification – Guidance on the Classification and Assessment of Waste*', 1st edition 2018, v1.1. Background information and the results of chemical laboratory analysis within this assessment may be used as part of an initial characterisation to determine the likely waste classification of waste soils.

9.2.8 Statutory Authority Consultation

It is recommended that this report be sent to the statutory authorities including the Local Authority Environmental Health and Planning Departments prior to site works commencing to seek their comments. Where necessary, they will consult the Environment Agency or other relevant statutory authorities. If applicable to this project, this report should also be provided to the relevant building warranty provider.

10 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by agb Environmental Ltd.

Should any changes to the development be proposed, including changes to the proposed landscaping, then the risks will need to be reassessed. This may require additional site investigation work and may result in the need for alteration of the remedial works.

Advice provided within this report is based on current guidelines available at the time of writing. This report is subject to amendment in light of additional information becoming available or statutory consultee review, including the Environment Agency and Local Authority and the NHBC.

It is possible the conditions observed during the site investigation may change. This may result in changes to sources, pathways or receptors that were unforeseen and unexpected. Statements relating to ground gas or groundwater conditions are based on observations made at the time of the site investigation (unless otherwise stated). Ground gas or groundwater conditions may vary as a result of seasonal fluctuations or other effects.

Ground contamination can exist as small discrete areas of contamination and there can be no certainty that any or all such areas have been sampled or identified. This is particularly significant for an investigation by exploratory holes (as used in this site investigation) as a relatively small sample of soil is extracted, which may not be entirely representative of the surrounding ground conditions.

The geotechnical advice given in this report seeks to provide foundation design guidelines for the proposed building(s). The recommendations/advice given is based on the available information obtained during the investigation. Should any unusual ground conditions be encountered that differ from those proved in the exploratory holes further advice should be sought from agb Environmental Ltd.

This report is written in the context of an agreed scope of work between agb Environmental Ltd and the Client and should only be used in this specific context. Re-interpretation of the Site Investigation and/or this report in whole or part may become necessary if additional information becomes available or practices or legislation changes. agb Environmental Ltd does not provide legal advice; the advice of the Client's legal advisors may also be required. agb Environmental Ltd Terms and Conditions apply.

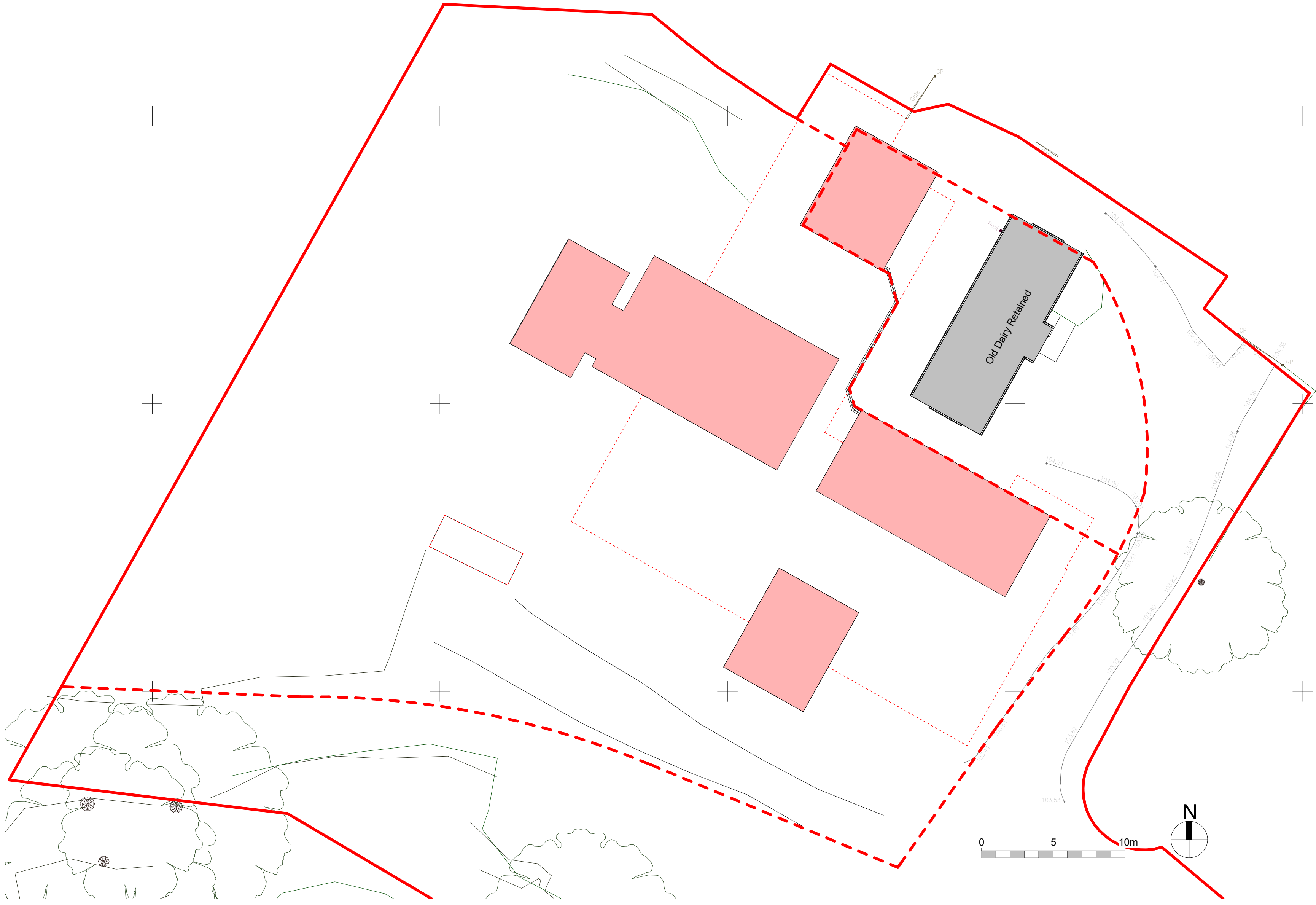
Appendix 1 Plans

Key

- Existing Building
- Proposed Building
- Existing Building (Proposed Demolition)
- Site Boundary
- Plot Boundary



1 Plot 2 & 3 Block Plan - Existing
1 : 200

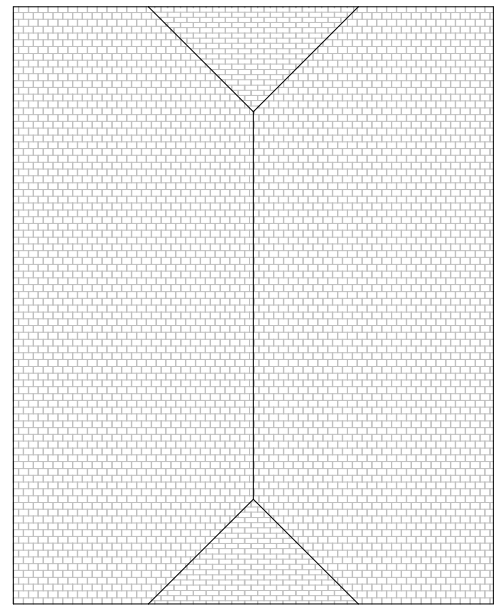
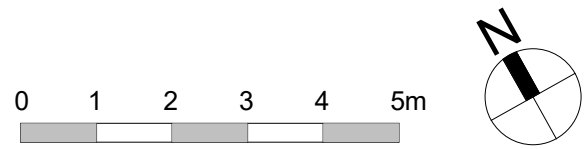
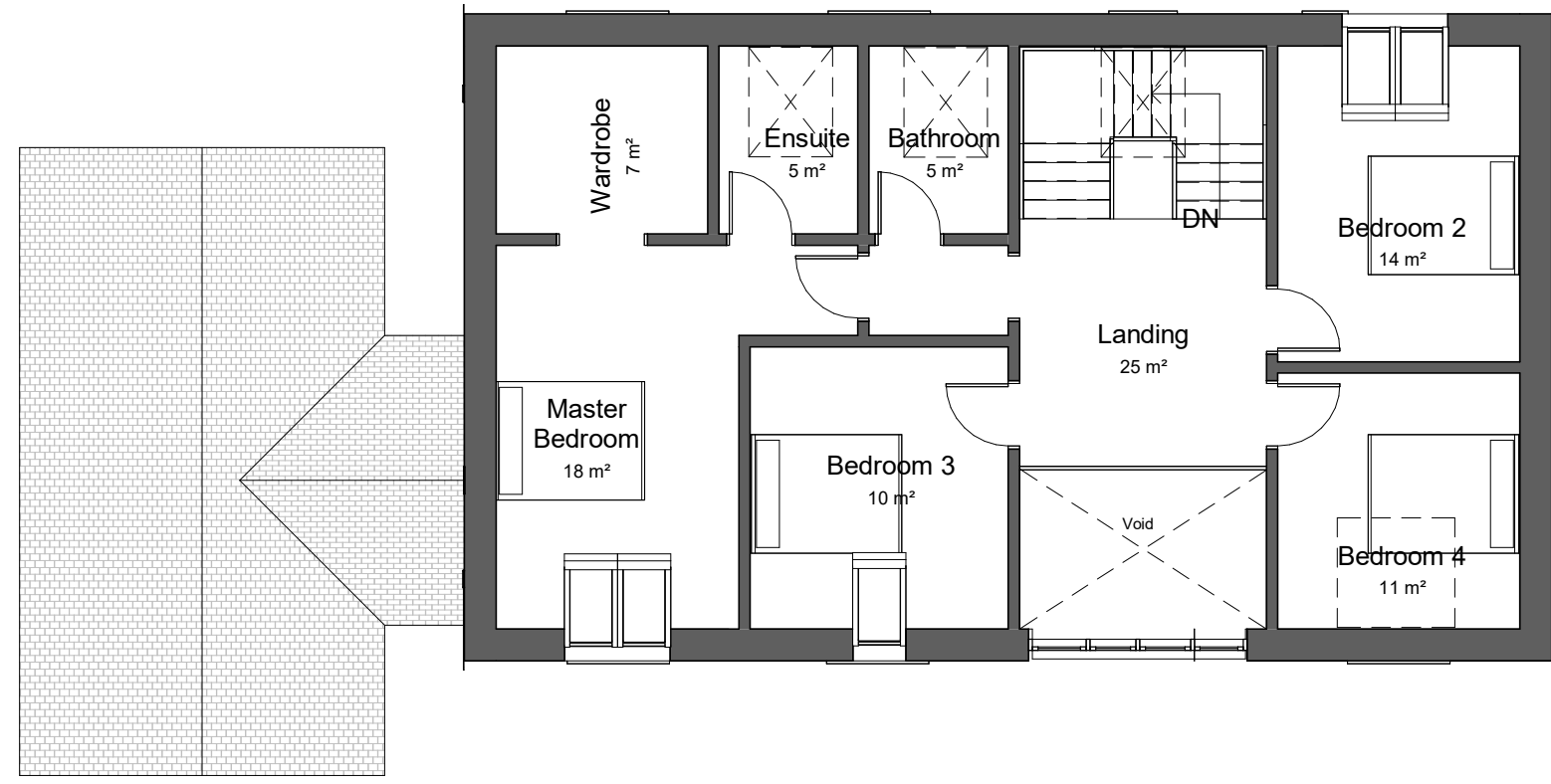


2 Plot 2 & 3 Block Plan - Proposed
1 : 200

COWAN					ARCHITECTS				
Wendy Staines, Director					01524 410042				
info@cowanarchitects.co.uk					www.cowanarchitects.co.uk				
Job:					Townhouse Farm				
Client:					Balcornie Estate				
Address:					Townhouse Farm, Church Lane, Ardingly				
Drawing Plot 2 & 3 Block Plan									
GWINNVTPL									
Project Ref		Dwg No		Scale		Rev			
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Site Status		Drawn		Checked		Date			
As indicated		DRC		NM		16/07/21			
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BUT/ED									

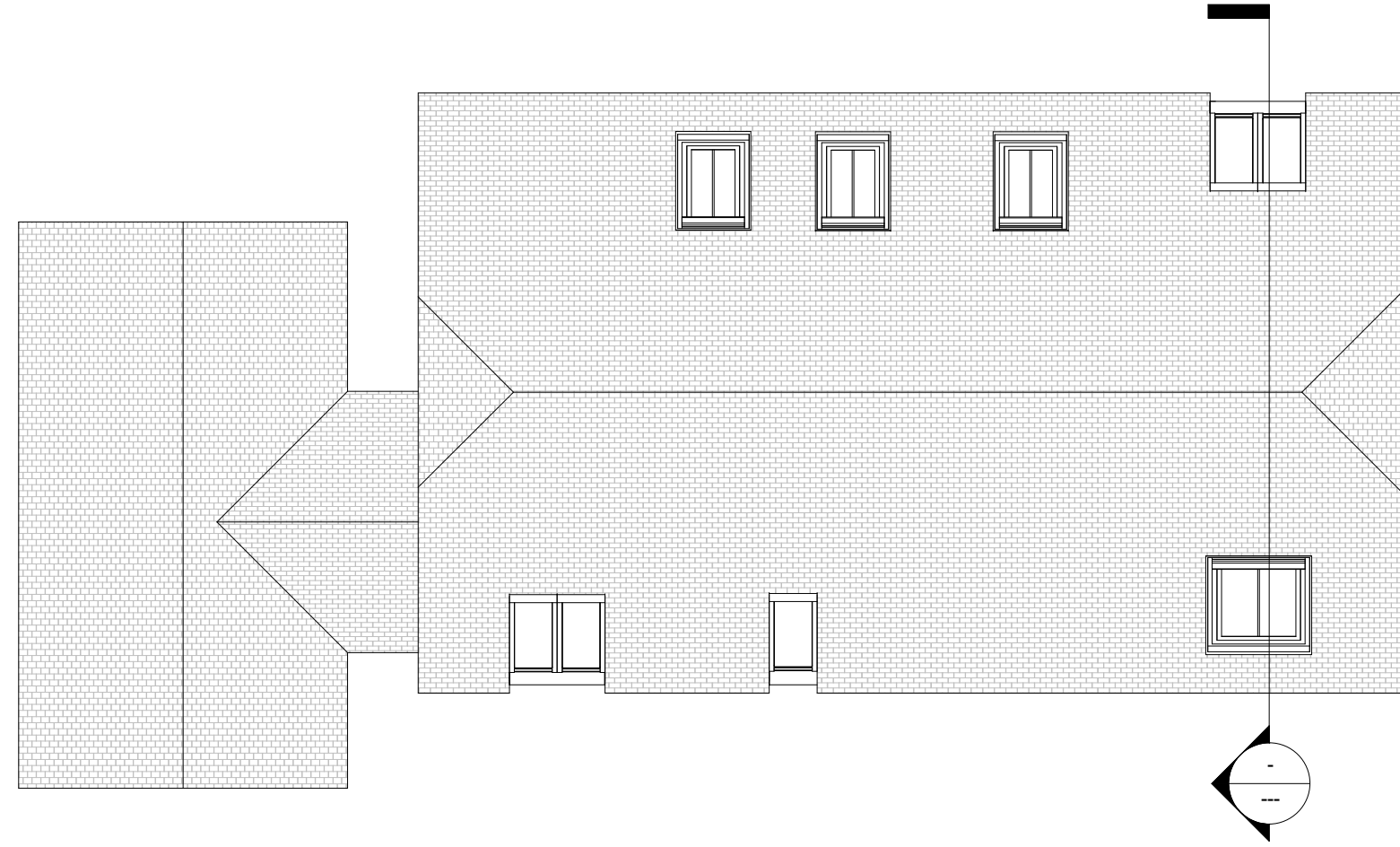
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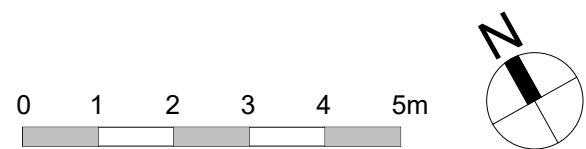
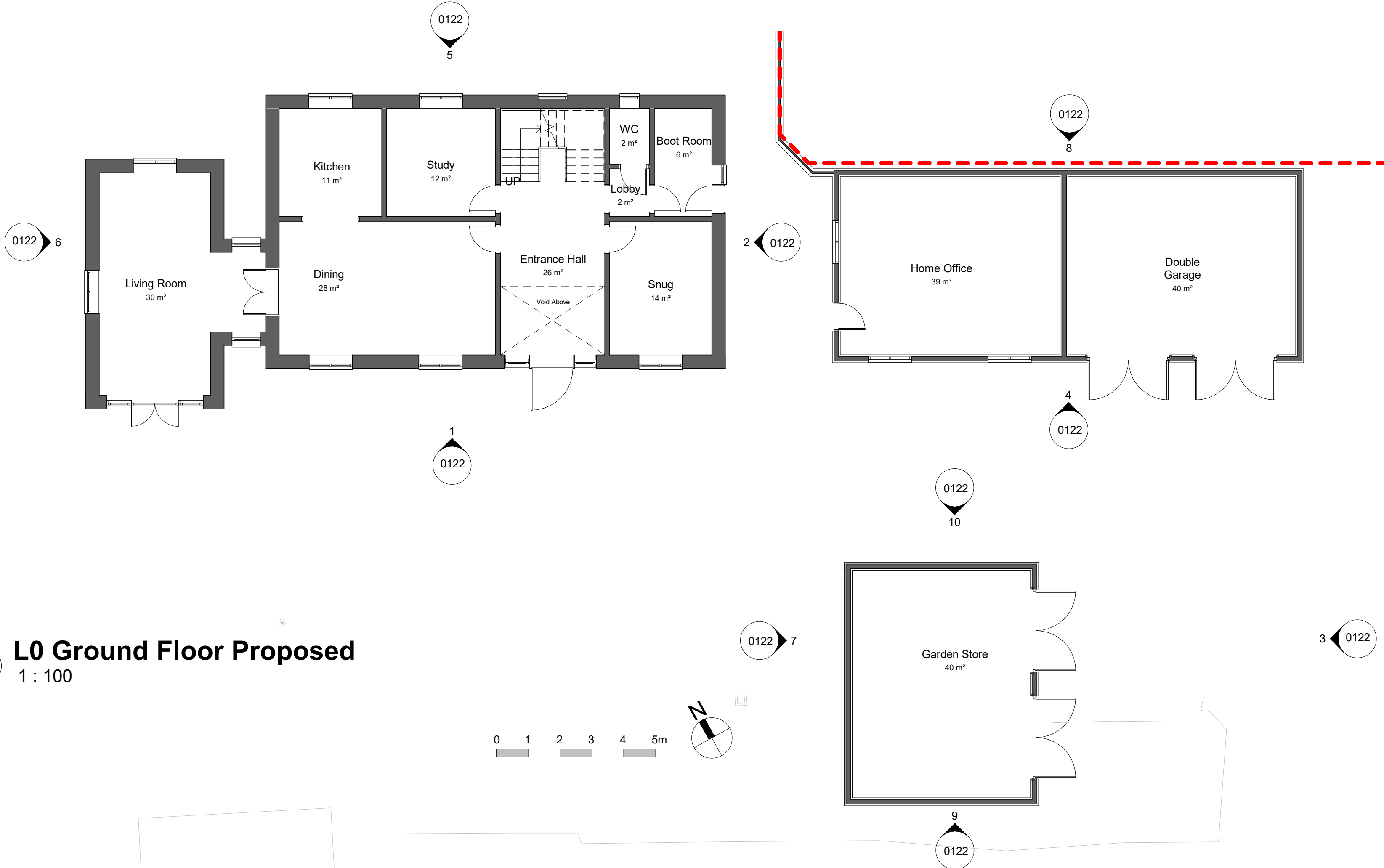
3 L2 Roof Proposed

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1 L0 Ground Floor Proposed

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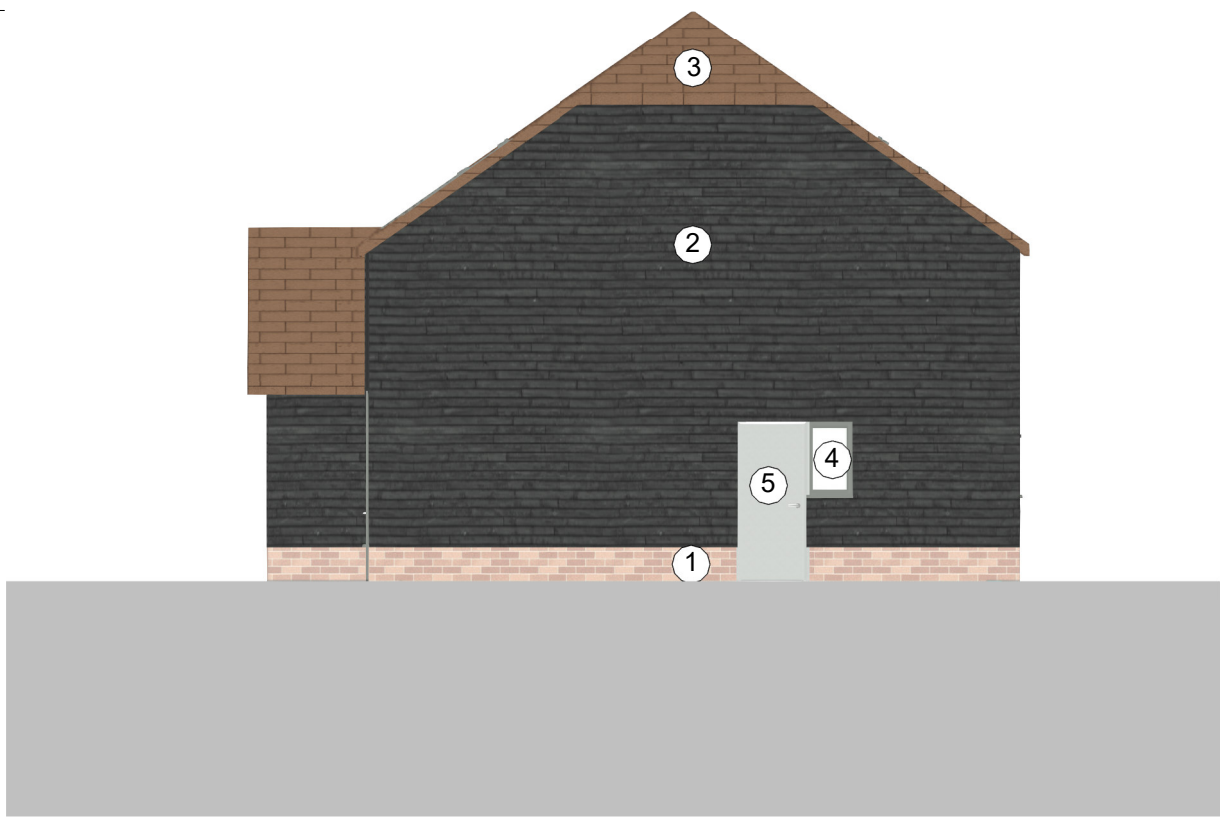


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P9	DRC	15/06/22	Reposition Garden Store
P8	DRC	09/06/22	Amend plot boundary
P7	DRC	08/06/22	Amend plot boundaries and outbuilding layouts
P6	DRC	24/05/22	Amendments post planning feedback
P5	DRC	28/01/22	Planning Re-Issue
P4	DRC		Planning Application
P3	DRC	03/06/21	Issued for client comment
P2	DRC	22/03/21	Amended following Client feedback
P1	DRC	Feb '21	Initial Issue

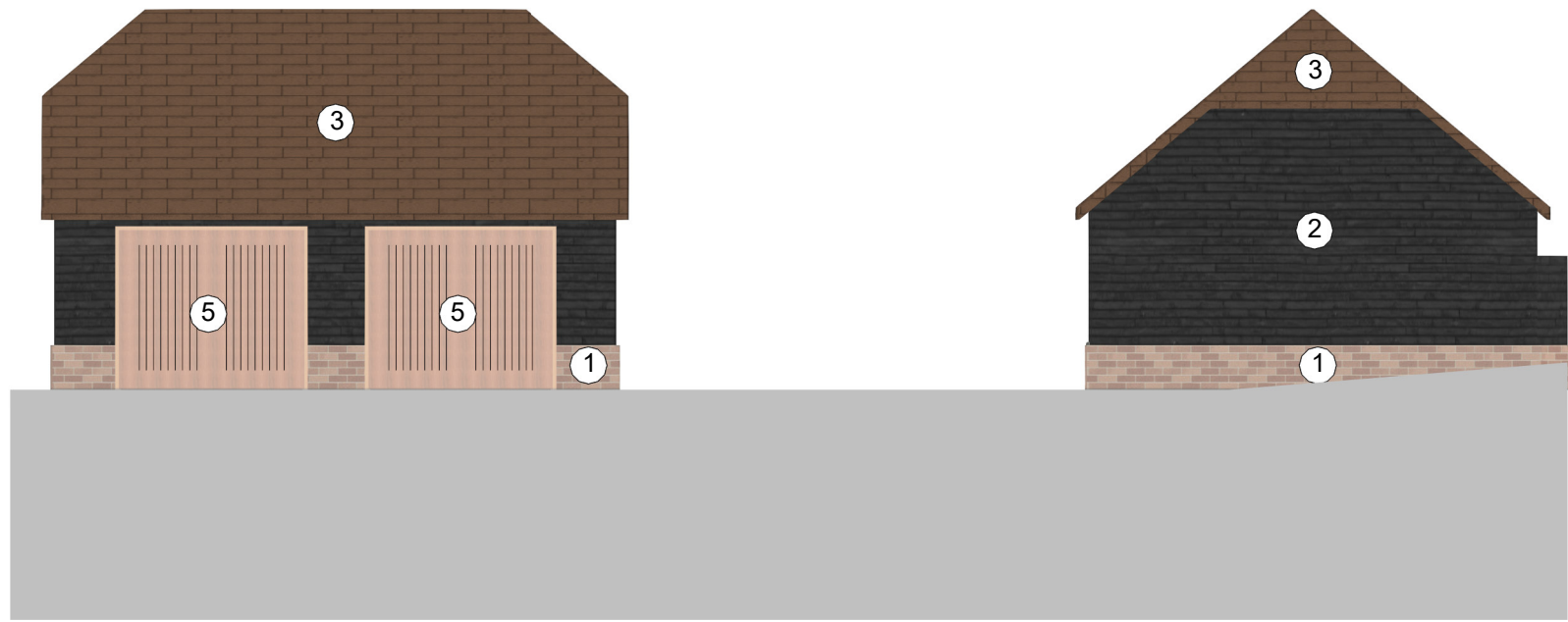
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Client:	Balcombe Estate		
Address:	Townhouse Farm, Church Lane, Ardingly		
Drawing:	Plot 2 - Floor Plans		
PLANNING			
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Size:	Scale:	Drawn:	Checked:
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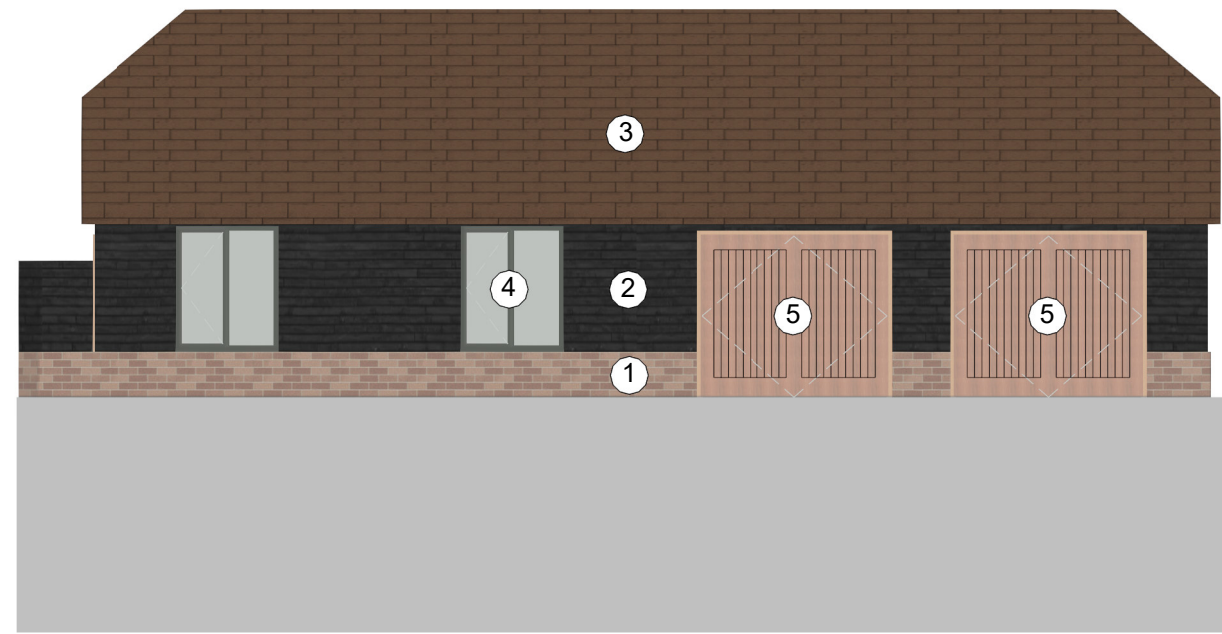
1 Elevation - South Main House
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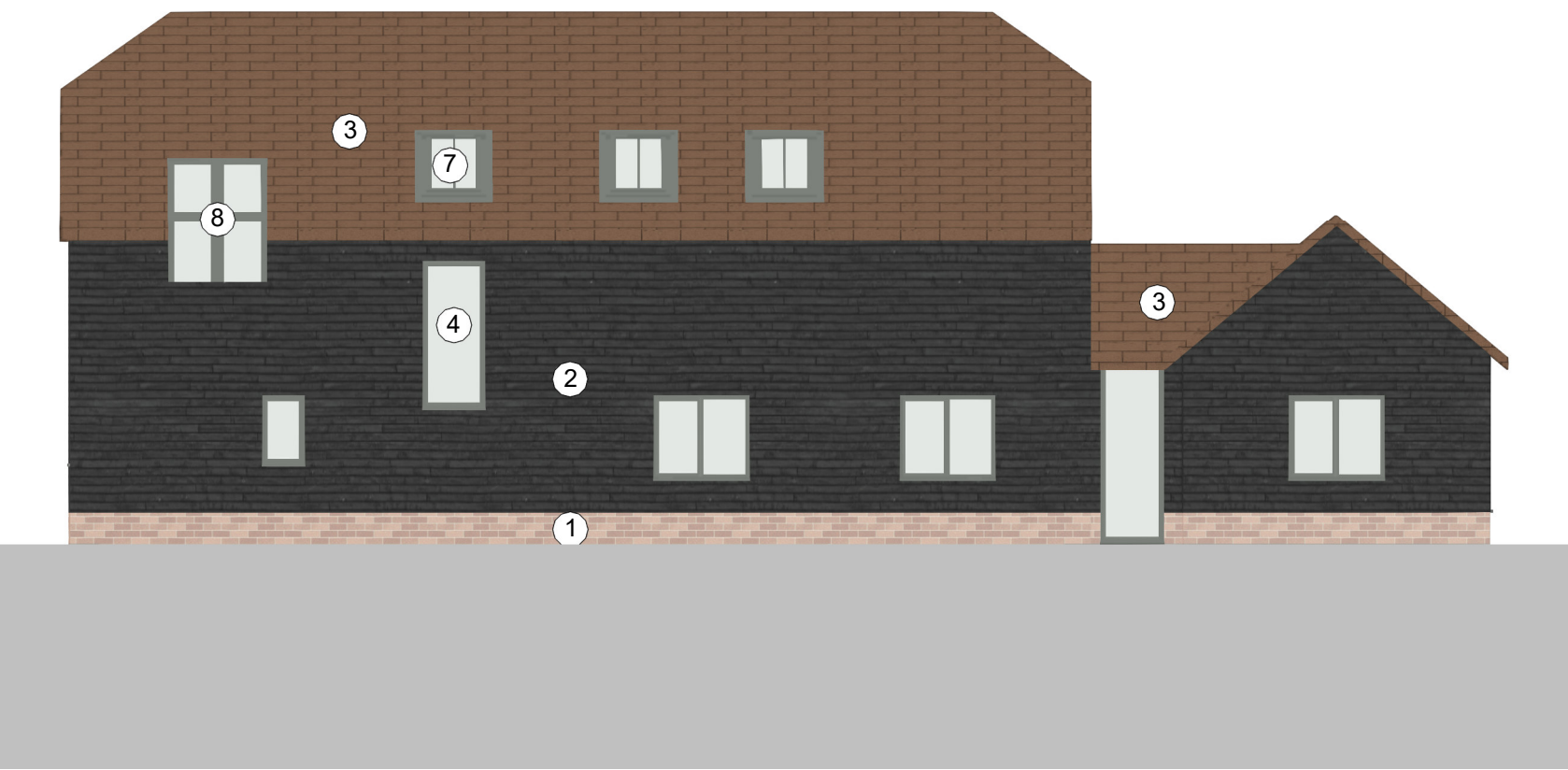
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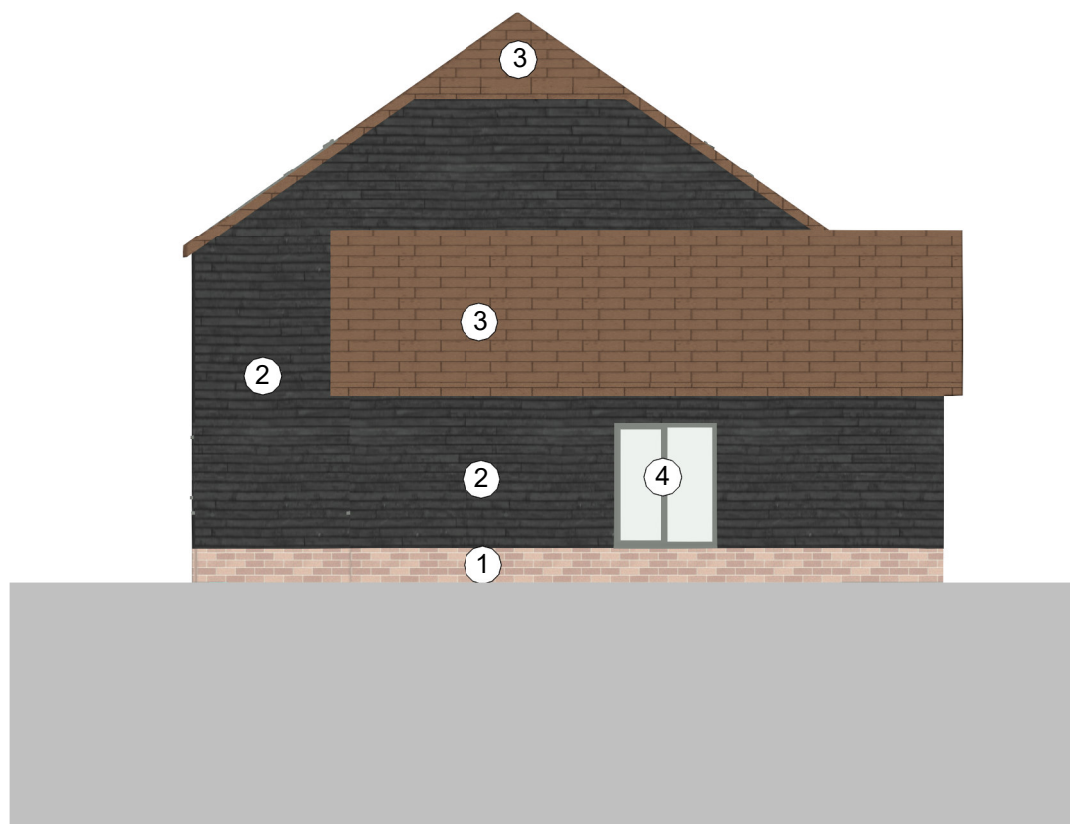
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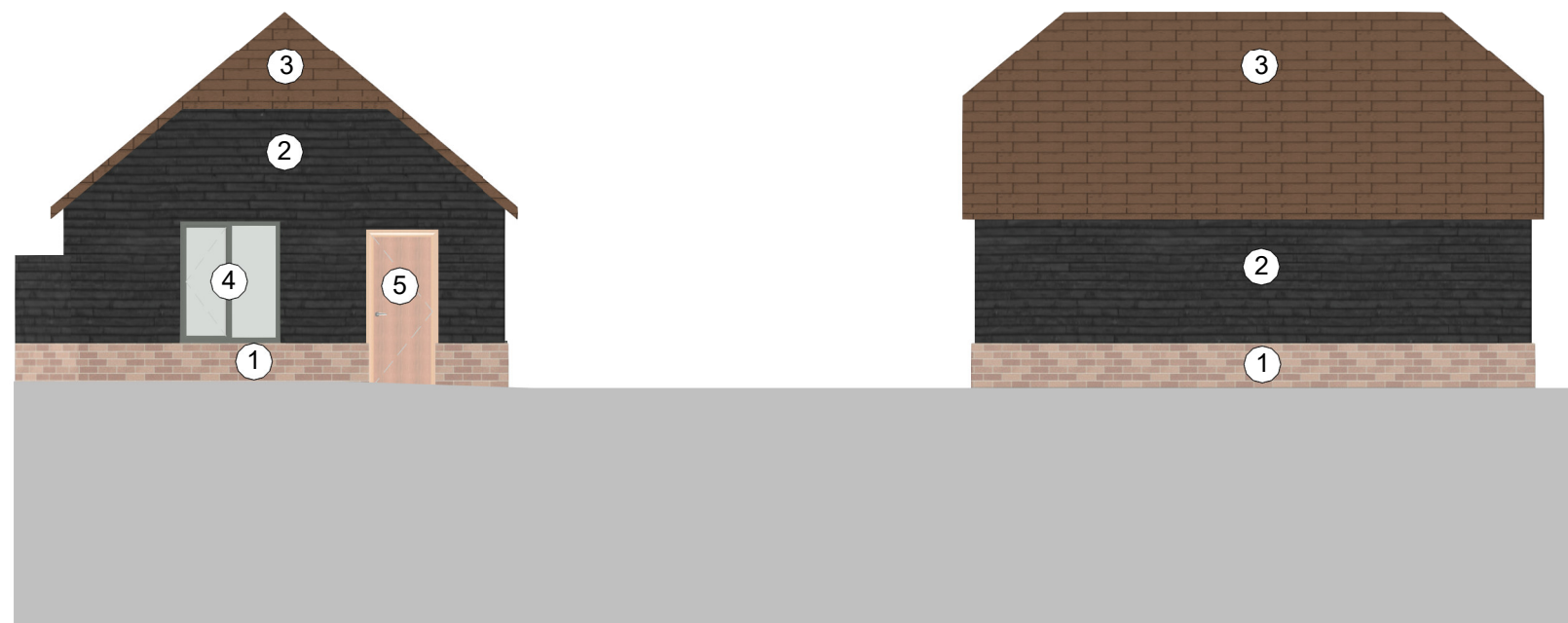
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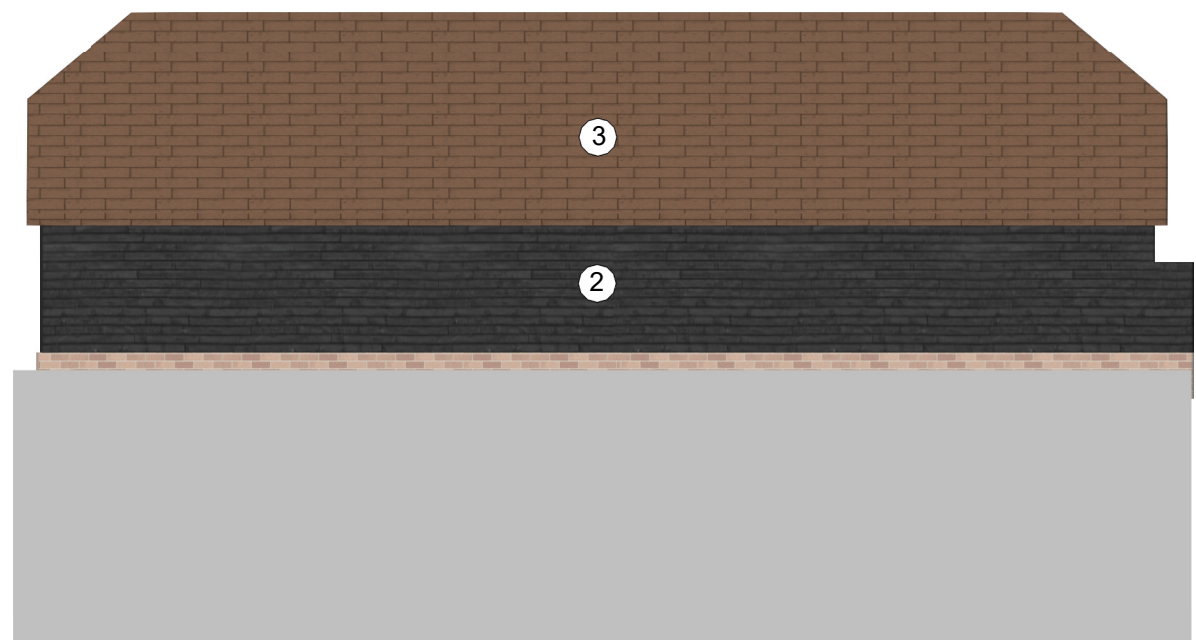
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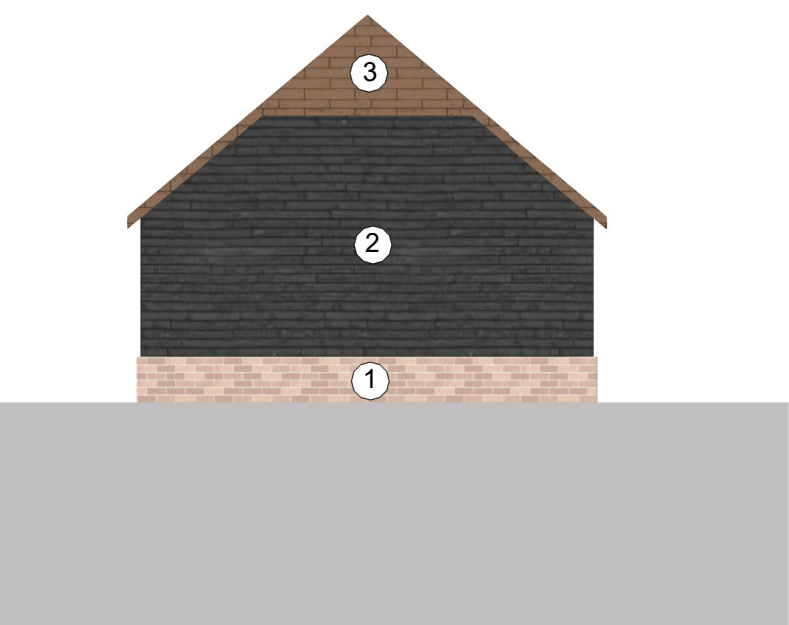
6 Elevation - West Main House
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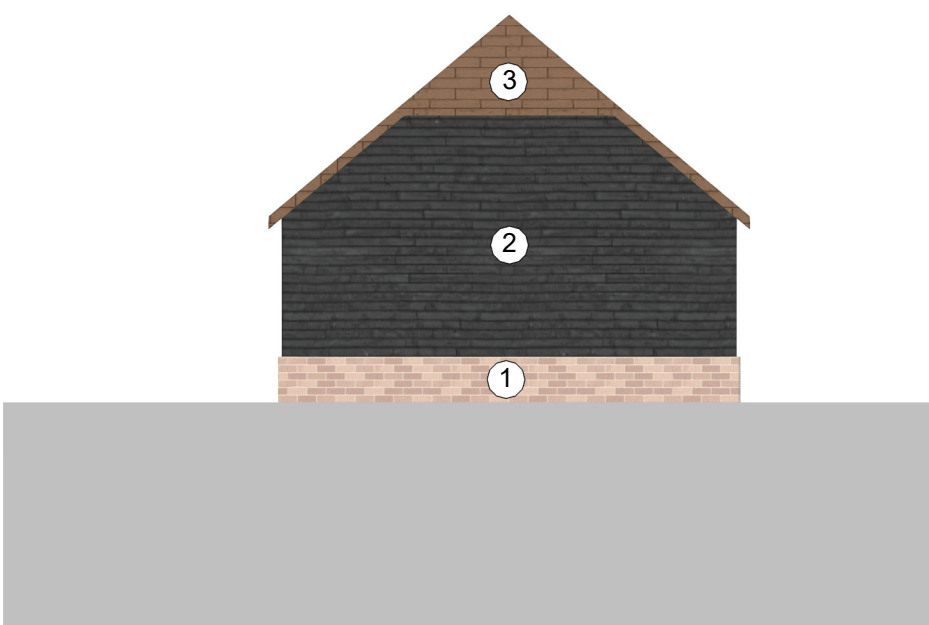
7 Elevation - West Garage & Garden Store
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8 Elevation - North Garage
1 : 100



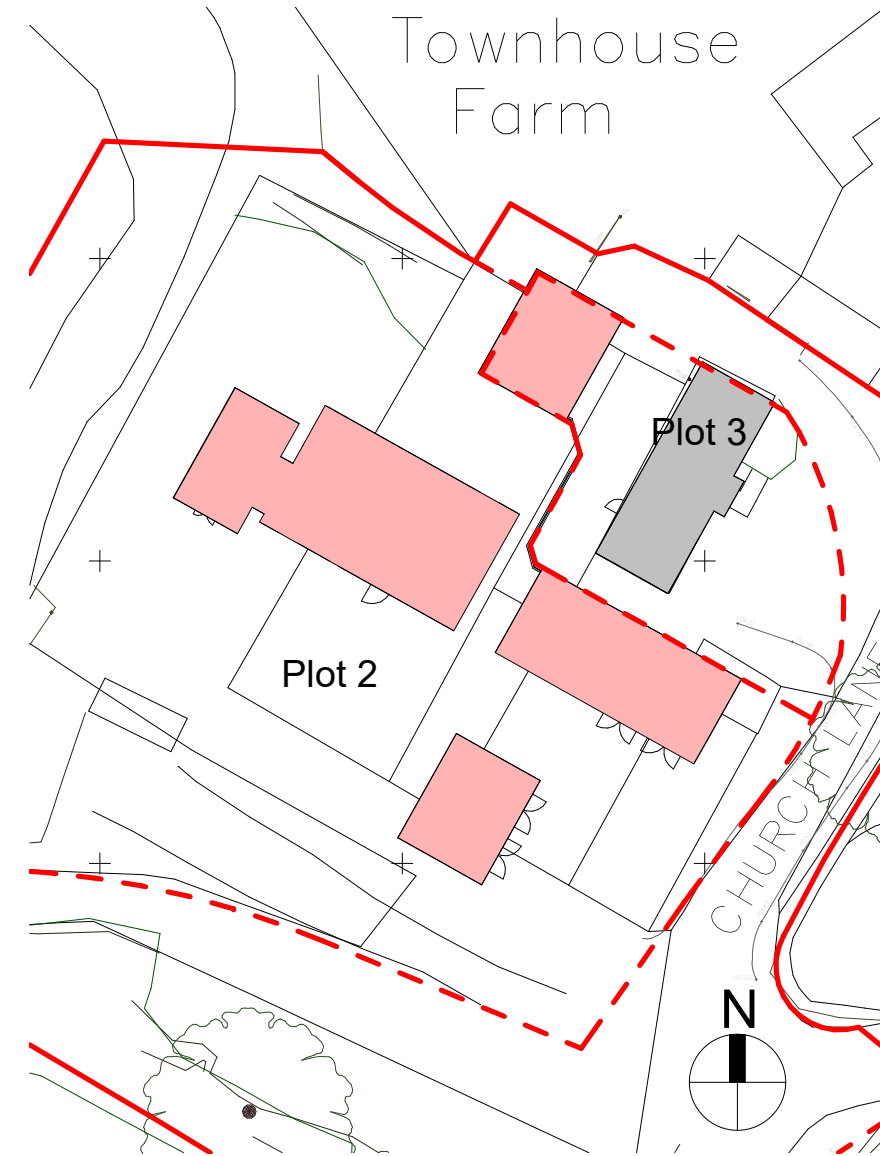
9 Elevation - South Gardens Store
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10 Elevation - North Garden Store
1 : 100

- 1 Facing Brickwork
- 2 Charred Timber
- 3 Clay Tile Roof
- 4 Powder-coating aluminium frame windows
- 5 Timber door
- 6 Powder-coating aluminium frame doors
- 7 Conservation style rooflight
- 8 Conservation style sloping/vertical rooflight

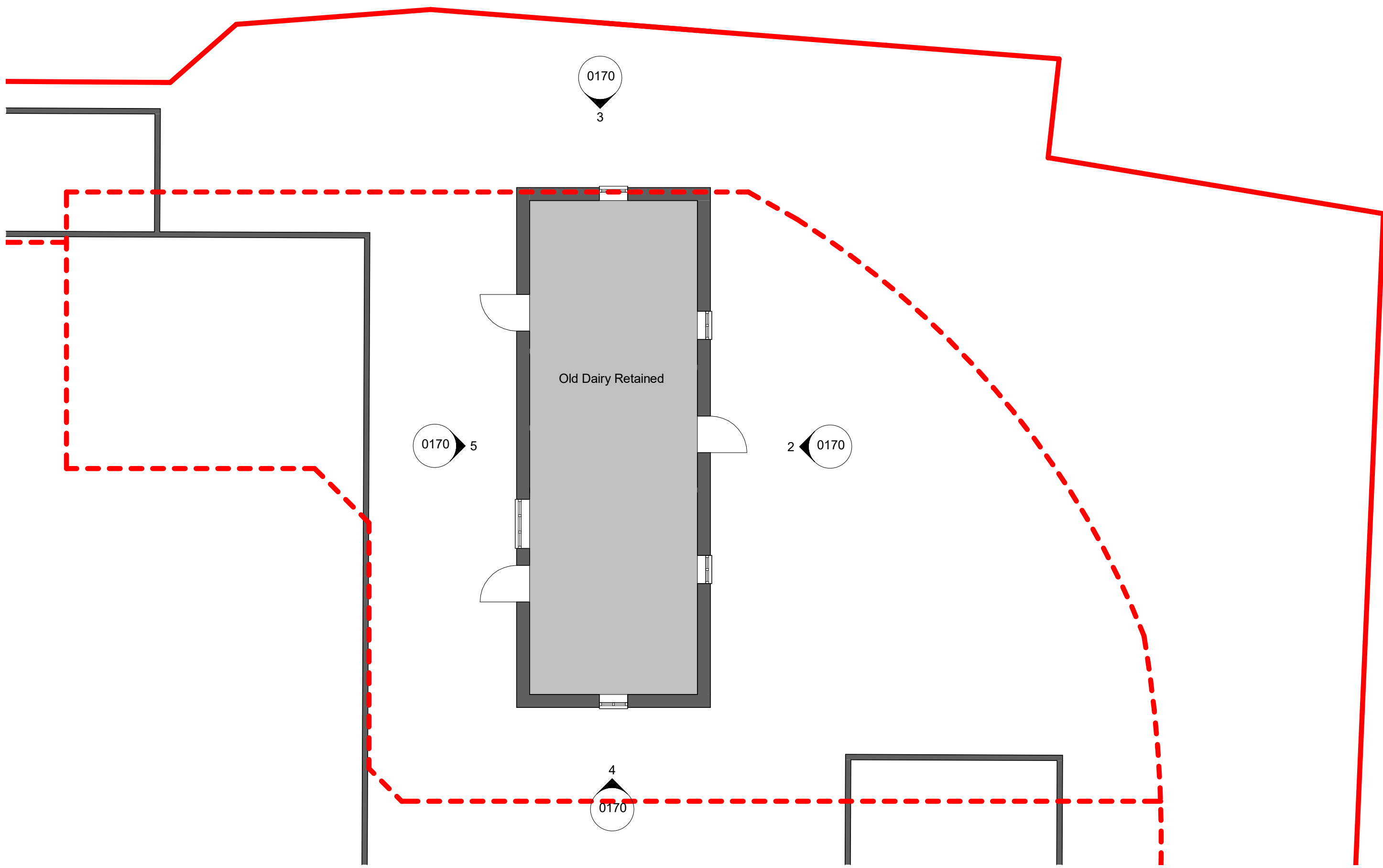
Materials Key
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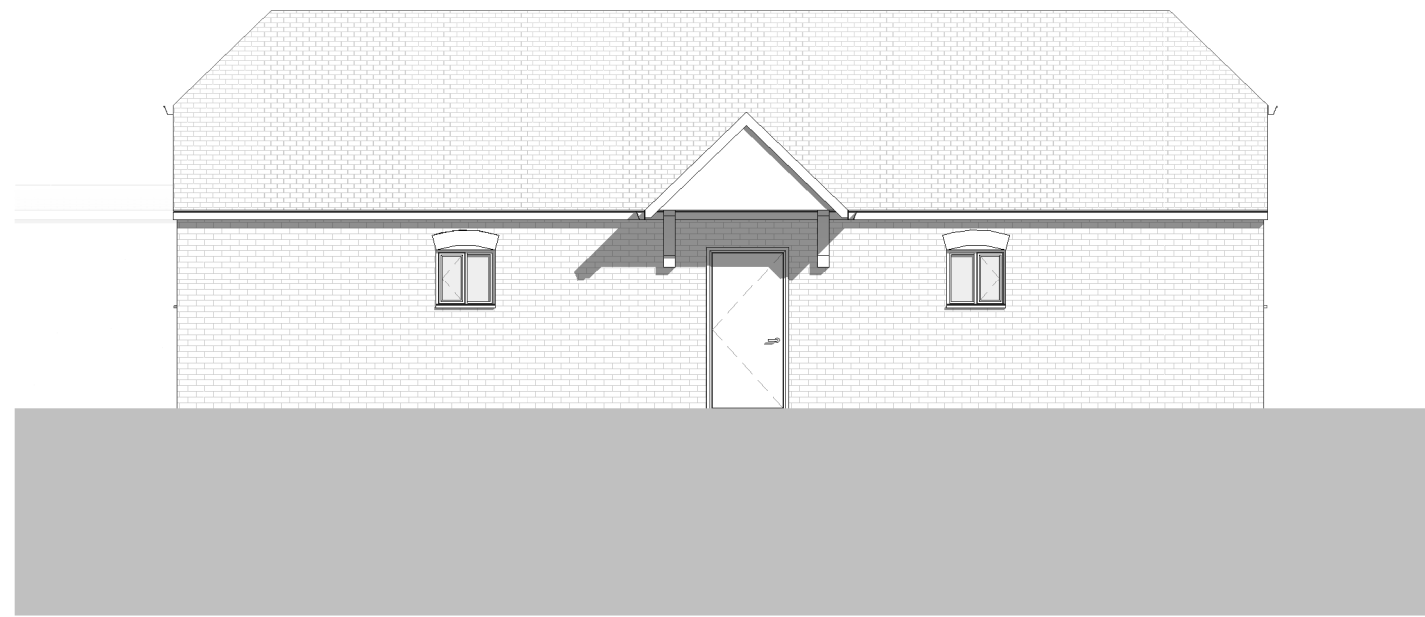
13 Key Plan - Plot 2 & 3
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P9	DRC	15/06/22	Reposition Garden Store
P8	DRC	09/06/22	Amend plot boundary
P7	DRC	08/06/22	Amend plot boundaries and outbuilding layouts
P6	DRC	24/05/22	Amendments post planning feedback
P5	DRC	24/03/22	Amendments post planning feedback
P4	DRC	28/01/22	Planning Re-Issue
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P2	DRC	03/06/21	Issued for client comment
P1	DRC	Feb '21	Initial Issue

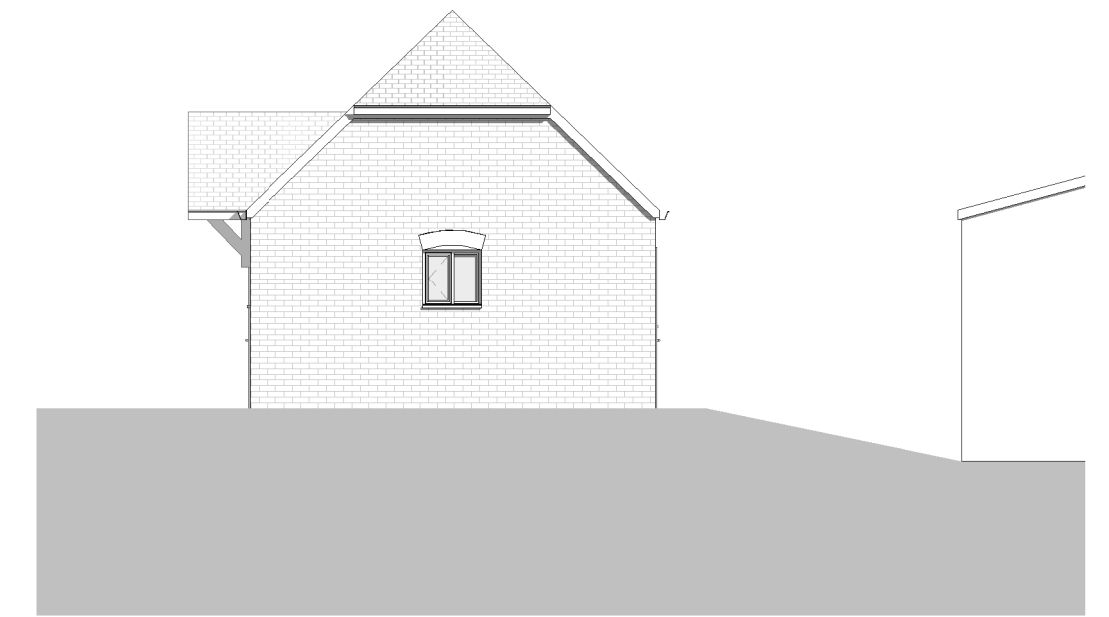
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West Sussex London Dublin T. 01342 410242 info@cowan-architects.co.uk www.cowan-architects.co.uk			
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Client: Balcombe Estate			
Address: Townhouse Farm, Church Lane, Ardingly			
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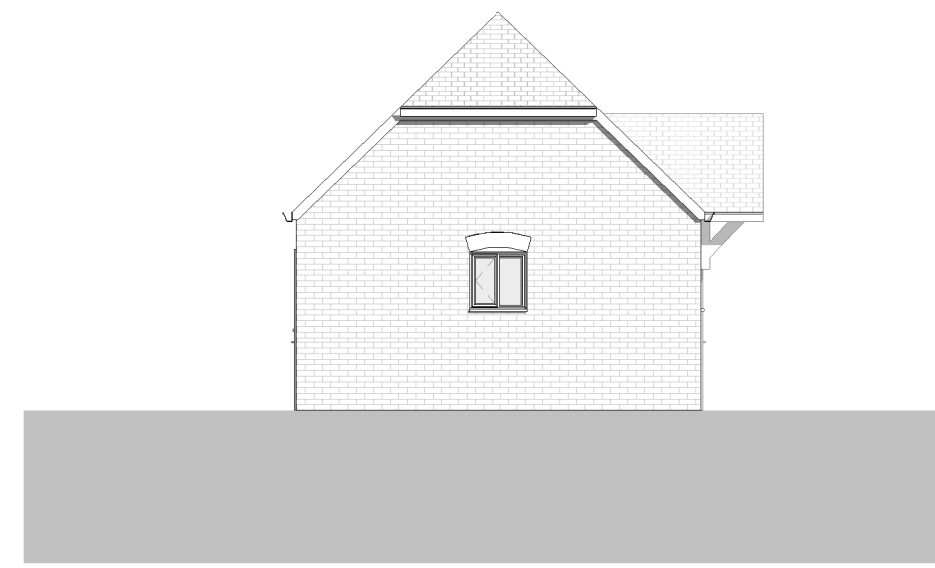
1 L0a Ground Floor Dairy
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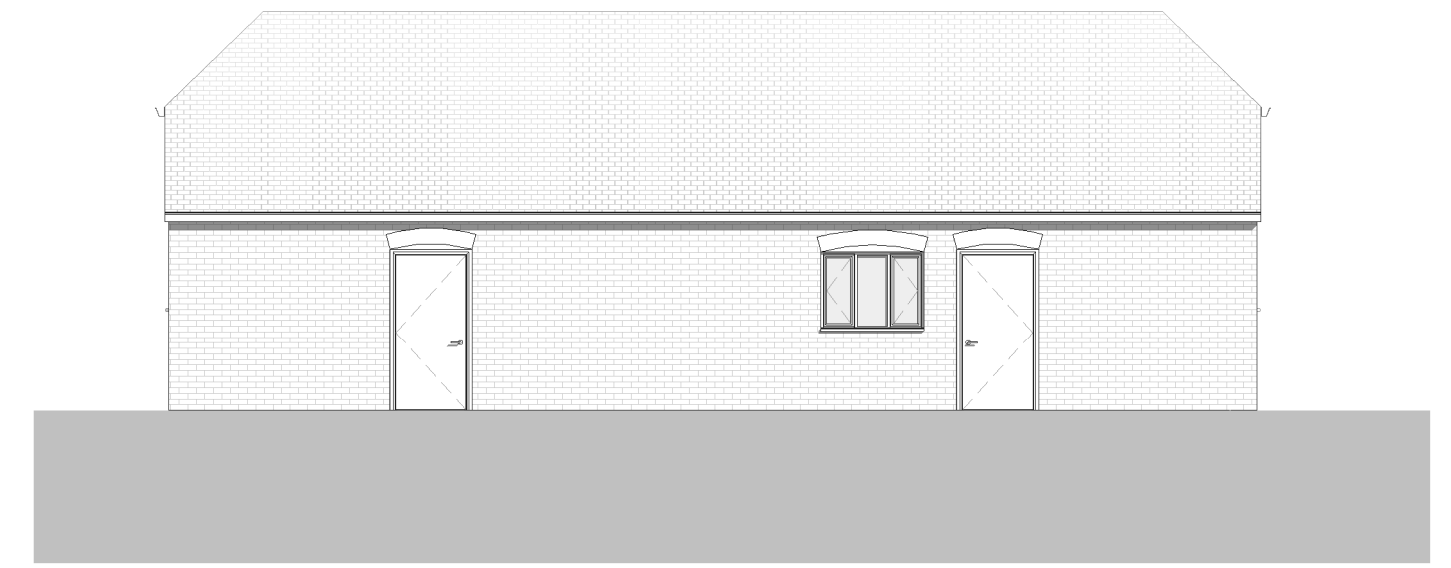
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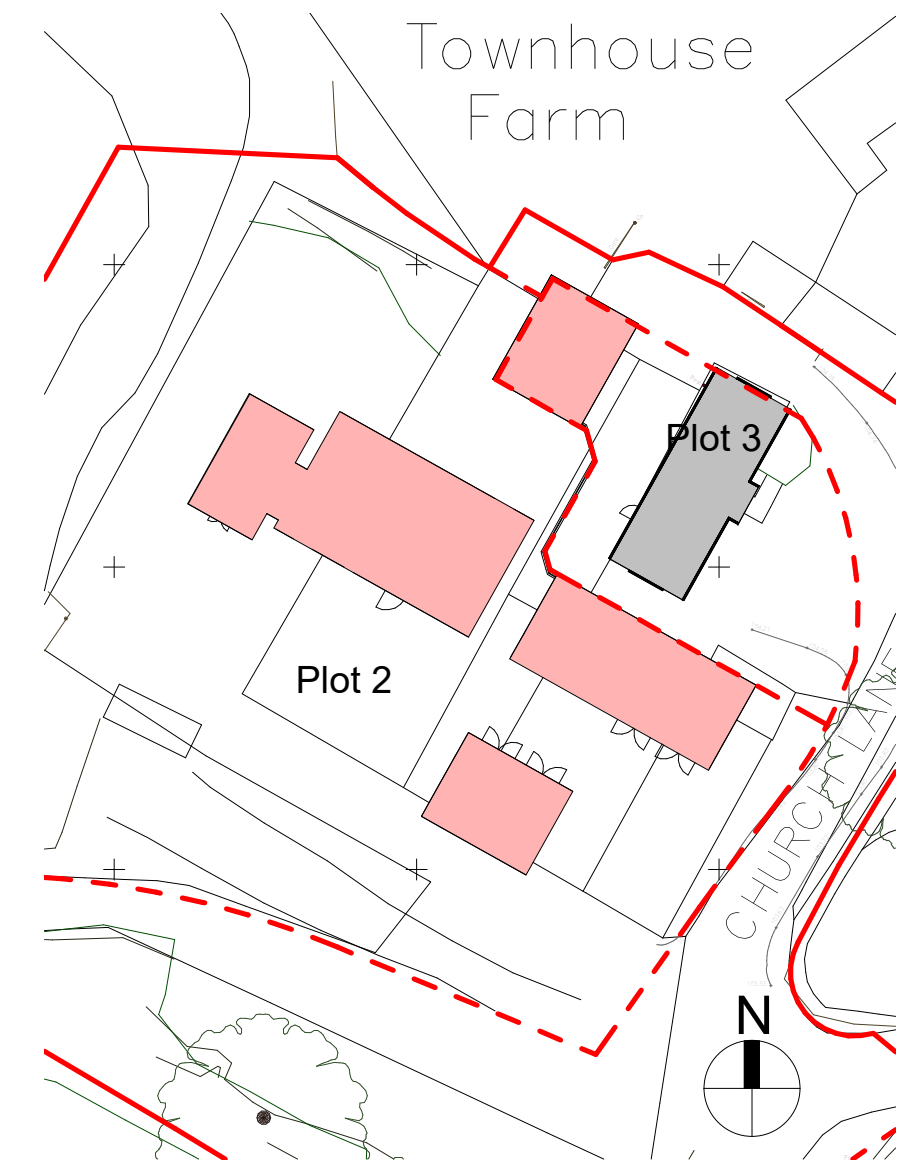
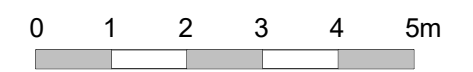
3 Elevation - Dairy North Existing
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4 Elevation - Dairy South Existing
1 : 100



5 Elevation - Dairy West Existing
1 : 100



6 Key Plan - Plot 3
1 : 500

P4	DRC	09/06/22	Amendplot boundray
P3	DRC	08/06/22	Amend plot boundaries and outbuilding layouts
P2	DRC	24/03/22	Amendments post planning feedback
P1	DRC	28/01/22	Planning Re-Issue

Revision Schedule

COWAN
ARCHITECTS

West Sussex | London | Dublin
T. 01342 410242

info@cowan-architects.co.uk | www.cowan-architects.co.uk

Job: Townhouse Farm
Client: Balcombe Estate
Address: Townhouse Farm, Church Lane, Ardingly

Drawing: Plot 3 - Existing Plans & Elevations

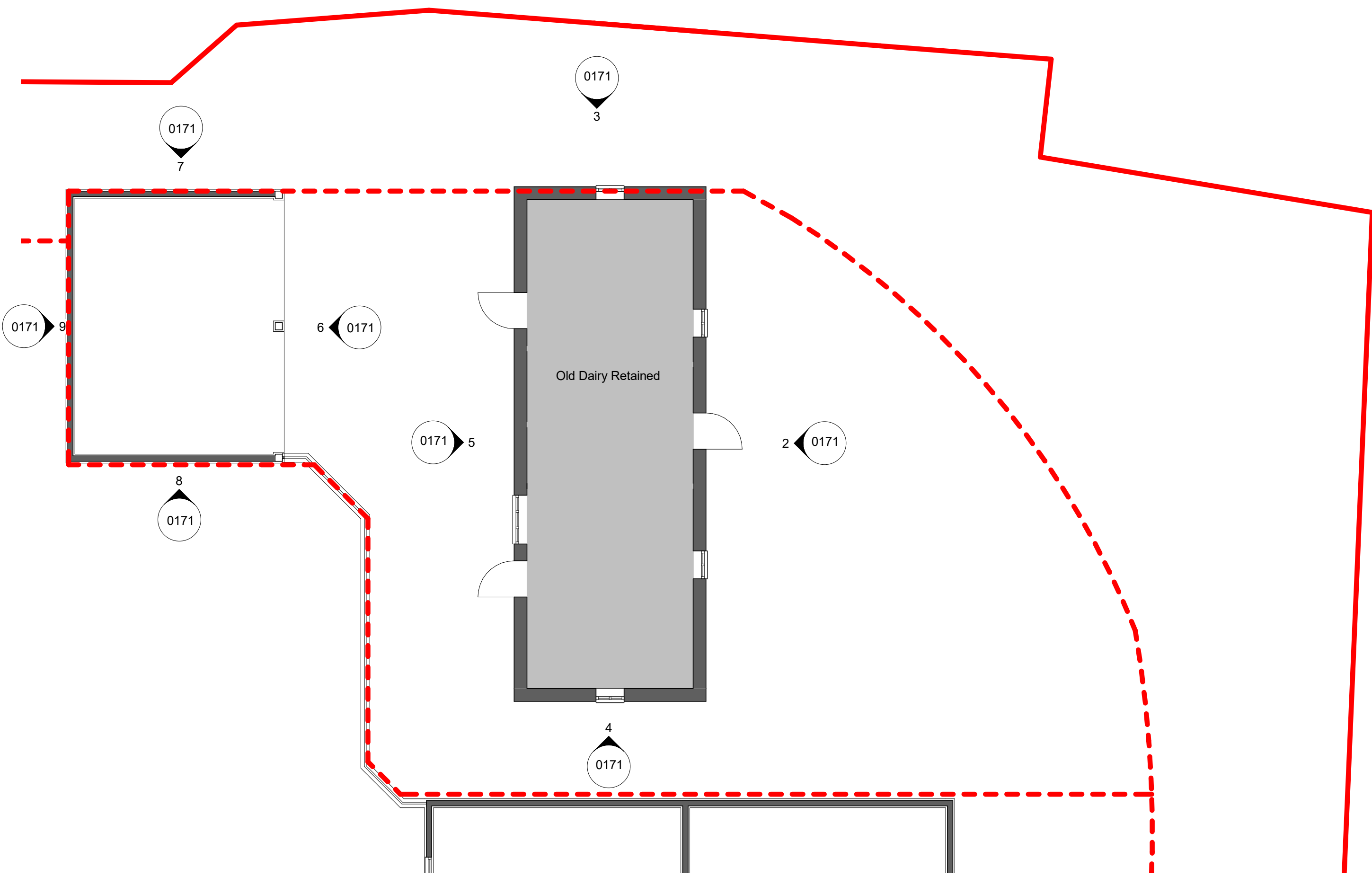
PLANNING

Project Ref: 2269
Org No: 0170
Suitability: S4
Rev: P4

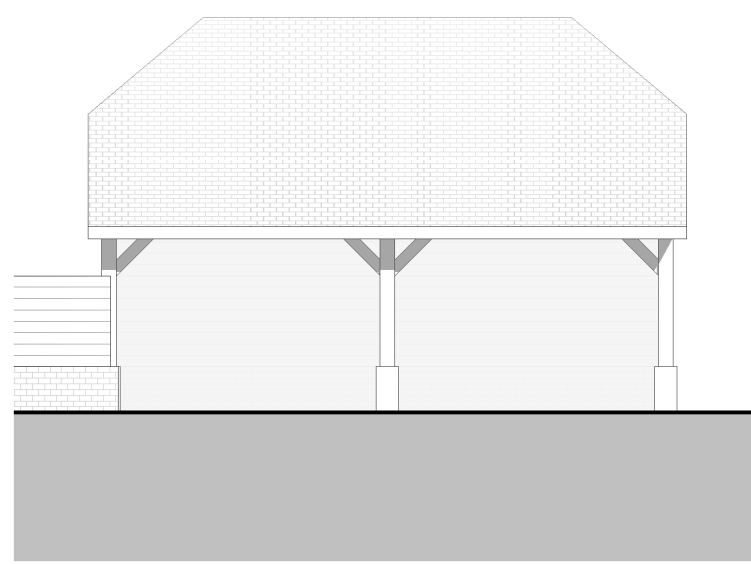
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Drawn: DNC
Checked: DNC
Date: 28/01/22

BIM Ref: 2269-CAL-XX-XX-DR-A-0170_S4-P4

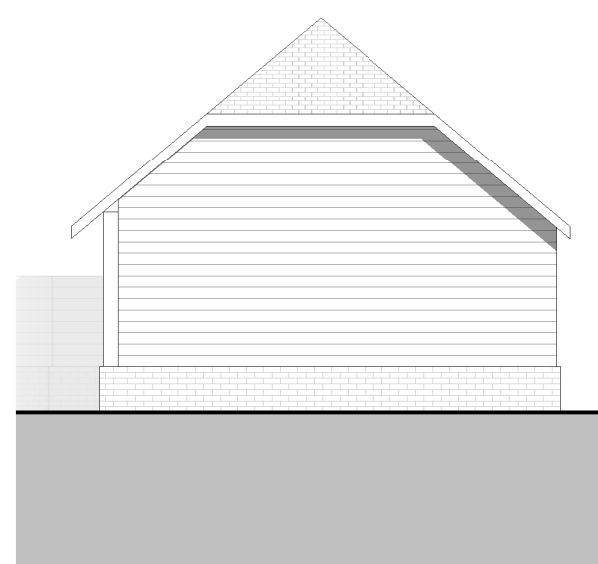
© COWAN ARCHITECTS LTD



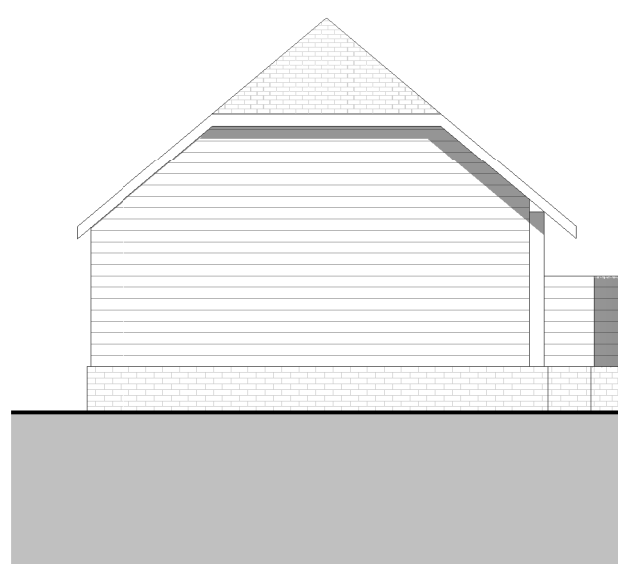
1 L0a Ground Floor Dairy Proposed
1 : 100



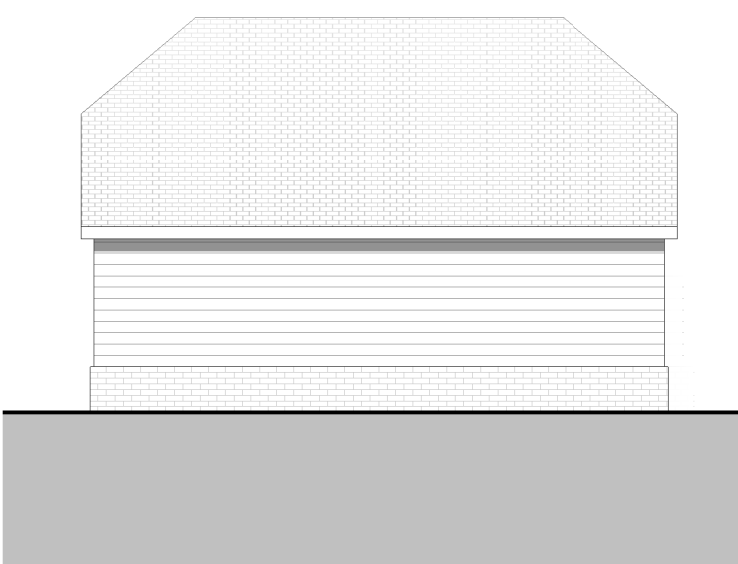
6 Carport East Proposed
1 : 100



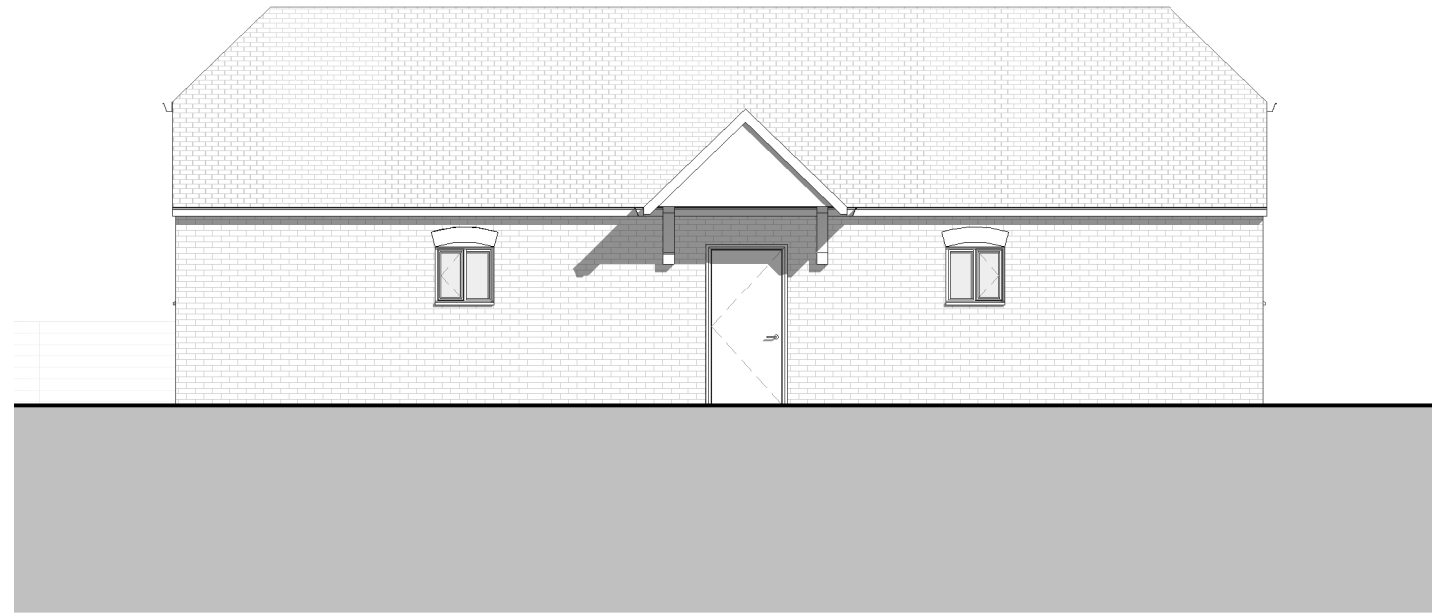
7 Carport North Proposed
1 : 100



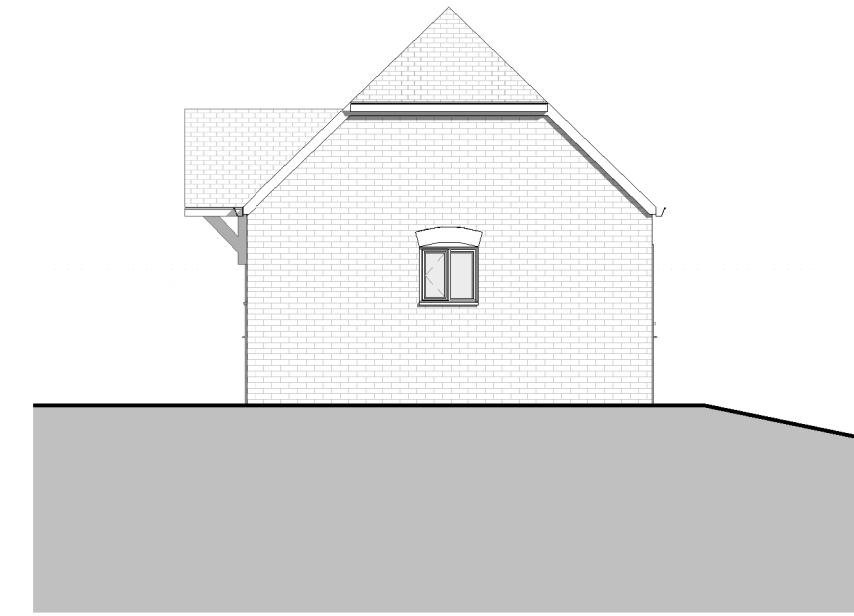
8 Carport South Proposed
1 : 100



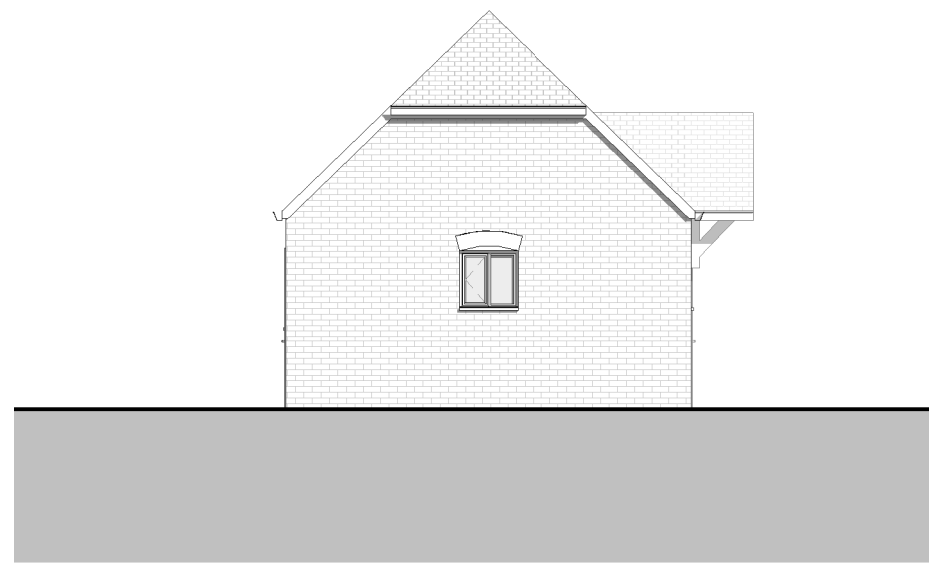
9 Carport West Proposed
1 : 100



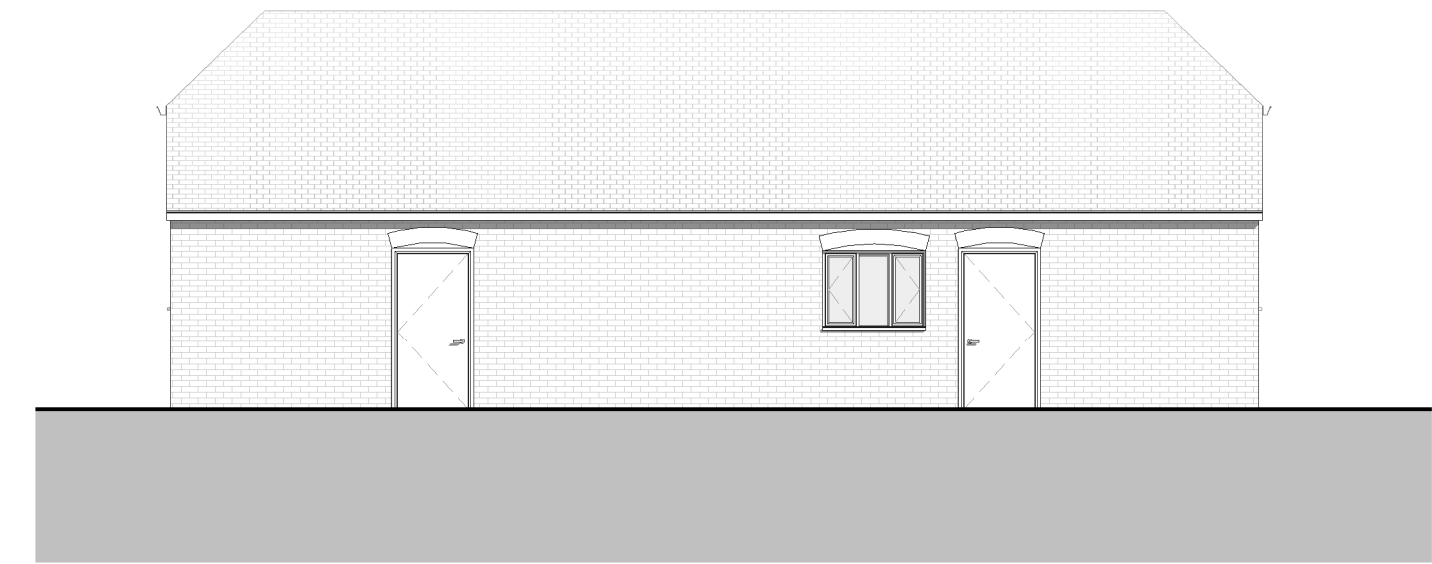
2 Elevation - Dairy East Proposed
1 : 100



3 Elevation - Dairy North Proposed
1 : 100



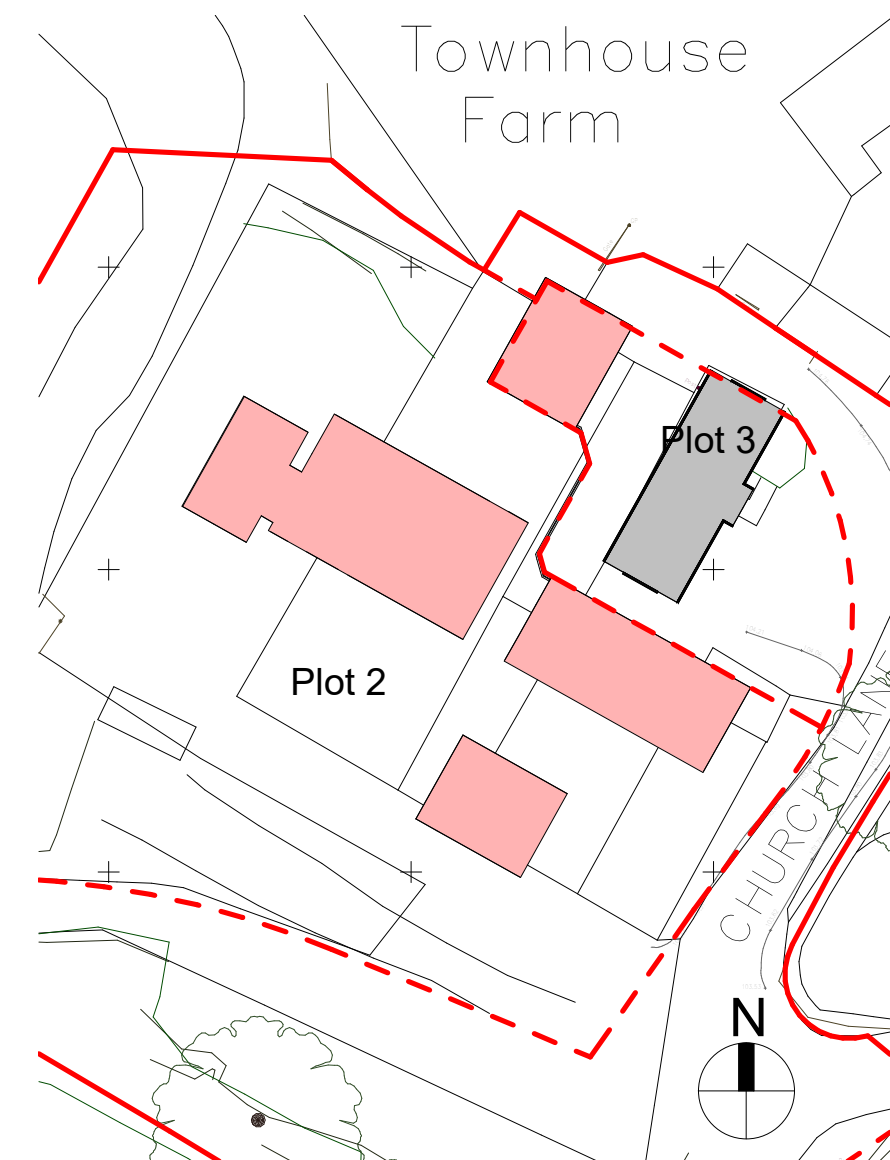
4 Elevation - Dairy South Proposed
1 : 100



5 Elevation - Dairy West Proposed
1 : 100

0 1 2 3 4 5m

Note: The 'Old Dairy' building is being retained without any change or alterations



10 Key Plan - Plot 3
1 : 500

P4	DRC	09/06/22	Amendplot boundray
P3	DRC	08/06/22	Amend plot boundaries and outbuilding layouts
P2	DRC	24/03/22	Amendments post planning feedback
P1	DRC	28/01/22	Planning Re-Issue

Revision Schedule

COWAN ARCHITECTS	
West Sussex London Dublin T. 01342 410242 info@cowan-architects.co.uk www.cowan-architects.co.uk	
Job:	Townhouse Farm
Client:	Balcombe Estate
Address:	Townhouse Farm, Church Lane, Ardingly
Drawing:	Plot 3 - Proposed Plans & Elevations

PLANNING			
Project Ref:	Orig No:	Suitability:	Rev:
2269	0171	S4	P4
Size:	Scale:	Drawn:	Checked:
A1	As indicated	SN	DNC
BM Ref:	2269-CAL-XX-XX-DR-A-0171_S4-P4	Date:	28/01/22
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Appendix 2 Fieldwork Records



Legend

-  Borehole (installed)
-  Borehole

Project
Townhouse Dairy, Ardingly, RH17 6UR

Title
Phase II Ground Investigation Plan

Client
Balcombe Estate



agb Environmental Ltd
1, The Mill, Copley Hill Business Park, Babraham
Road, Cambridge, CB22 3GN
Tel: 01223 776117
Email: Info@agbenvironmental.co.uk
Web: www.agbenvironmental.co.uk

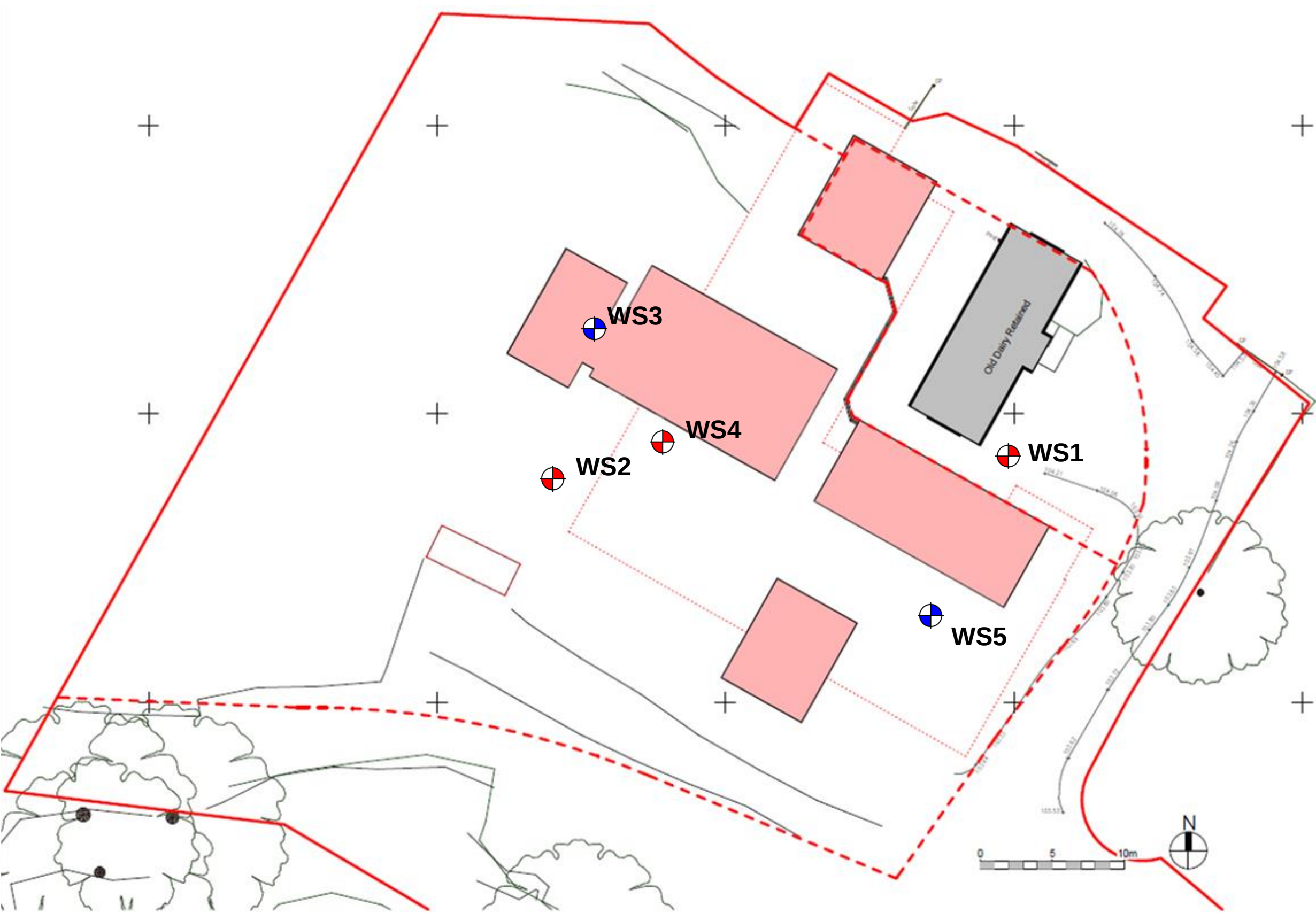
Date 26th July 2022

Scale NTS

Project number . Drawing number

P4271.002

© copyright agb Environmental



BOREHOLE LOG

Project Townhouse Dairy, Ardingly, RH17 6UR				BOREHOLE No WS1
Job No P4271	Date 21-06-21	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

SAMPLES & TESTS			STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)		
0.40	ES B	N17				0.20		
0.50-0.80						0.30		
						0.50		
0.90	ES B SPT	N17						
1.00-1.30								
1.00								
1.50-1.90	B	N34				(2.50)		
2.00-2.30								
2.00								
2.50-2.80	B	N28						
						3.00		
3.00								
3.50-4.00	B	N59				(1.00)		
						4.00		
4.00								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Refusal at 4.0m. No groundwater encountered. No visual or olfactory evidence of contamination.
All dimensions in metres Scale 1:31.25			Client Balcombe Estate			Method/ Plant Used Dynamic sampling rig			Logged By KB		

BOREHOLE LOG

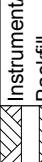
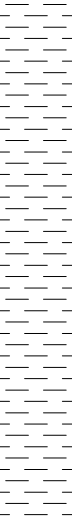
Project Townhouse Dairy, Ardingly, RH17 6UR				BOREHOLE No WS2
Job No P4271	Date 21-06-21	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)		
0.30	ES	N15			0.20	Grass covered dark brown organic topsoil.		
					(0.40)	Orange and brown gravelly CLAY. Gravel is fine to medium of subangular to subrounded flint.		
0.60	ES				0.60	Light brown and grey CLAY.		
0.80-1.00	B							
1.00-1.40	B							
1.00	SPT							
1.50-1.90	B				(2.40)			
2.00-2.40	B							
2.00	SPT							
2.50-2.90	B							
3.00-3.50	B		3.00	Dark grey CLAY.				
3.00	SPT							
3.50-4.00	B		(1.00)					
4.00	SPT							
		N62						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Refusal at 4.0m. No groundwater encountered. No visual or olfactory evidence of contamination.
All dimensions in metres Scale 1:31.25			Client Balcombe Estate			Method/ Plant Used Dynamic sampling rig			Logged By KB		

BOREHOLE LOG

Project Townhouse Dairy, Ardingly, RH17 6UR				BOREHOLE No WS3
Job No P4271	Date 21-06-21	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)		
0.30 0.50-0.80 0.60	ES	N31			0.20	Concrete with rebar.		
	B ES				(0.30) 0.50	Orange and brown gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of flint. Clay has black staining.		
				B SPT		(2.20)		
SPT	N31	2.70	Dark grey CLAY.					
							B	N31
B SPT	N31	4.00						
				B	N64			
SPT								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											Refusal at 4.0m. No groundwater encountered. No olfactory evidence of contamination.
All dimensions in metres Scale 1:31.25			Client Balcombe Estate			Method/ Plant Used Dynamic sampling rig			Logged By KB		

BOREHOLE LOG

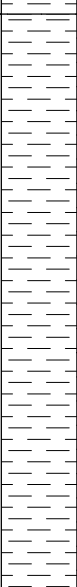
Project Townhouse Dairy, Ardingly, RH17 6UR				BOREHOLE No WS4
Job No P4271	Date 21-06-21	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	ES	N12			0.20	Light brown and buff and orange sandy gravelly clayey organic topsoil.			
0.50	ES				(0.40)	Orange and brown gravelly CLAY. Gravel is fine to medium subangular to subrounded of flint.			
1.00-1.40 1.00	B SPT				0.60	Light brown and grey CLAY.			
1.50-2.00	B	N18			(2.40)				
2.00-2.50 2.00	B SPT				3.00				
2.50-3.00	B								
3.00-3.50 3.00	B SPT	N29			(1.00)	Dark grey CLAY.			
3.50-4.00	B				4.00				
4.00	SPT		N59						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Refusal at 4.0m. No groundwater encountered. No visual or olfactory evidence of contamination.
All dimensions in metres Scale 1:31.25			Client Balcombe Estate			Method/ Plant Used Dynamic sampling rig			Logged By KB		

BOREHOLE LOG

Project Townhouse Dairy, Ardingly, RH17 6UR				BOREHOLE No WS5
Job No P4271	Date 21-06-21	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)		
0.30	ES	N13			0.10	Concrete.		
					0.30	Red brick fragments / rubble.		
0.60	ES				(0.30) 0.60	Orange and brown sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of flint.		
1.00-1.50	B SPT	N13			(2.40)	Light brown and grey CLAY.		
2.00-2.50	B SPT	N26						
3.00-3.50	B SPT	N36						
4.00	SPT	N58			4.00			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											Refusal at 4.0m. No groundwater encountered. No visual or olfactory evidence of contamination.
All dimensions in metres Scale 1:31.25			Client Balcombe Estate			Method/ Plant Used Dynamic sampling rig			Logged By KB		

1.



2.



3.



4.

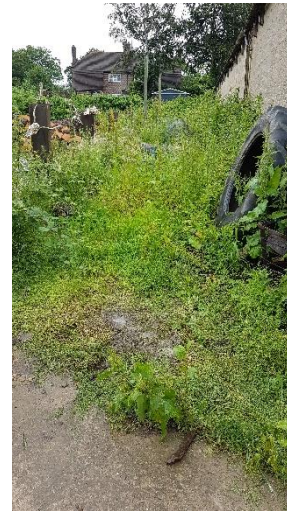


- 1. WS1 Soil Cores
- 2. WS4 Soil Cores
- 3. WS3 Soil Cores
- 4. WS3 Exploratory Hole

5.



6.



7.



8.



5. WS3 Position

6. WS2 Position

7. WS5 Soil Core

8. WS5 Concrete

Site: Townhouse Dairy, Townhouse Farm, Church Lane, Ardingly, RH17 6UR
Client: Balcombe Estate
Job Reference: P4271.2, Dated: July 2022



9.



10.



9. WS5 Install

10. WS4 Made Good

Appendix 3 Monitoring Results

Monitoring Record

Site name / location:	P4271 - Townhouse Dairy, Church Lane, Ardingly
Installation ref.:	WS3
Date:	06.07.2021
Engineer:	Anja Blockhaus
Weather / temp:	Showers, temperature 16, wind speed 14, wind direction WSW, pressure 990 rising, cloud c

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	NA	+3m	NA
+10s	NA	+4m	NA
+30s	NA	+5m	NA
+1m	NA	+6m	NA
+1m 30s	NA	+7m	NA
+2m	NA	+8m	NA
		Max	NA

Flow Rate

	Reading
	l/hr
+10s	-0.1
+30s	-0.1
+1m	0.0
+1m 30s	-0.1
+2m	-0.1
	Max 0.0

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	0.1	ND	20.4	ND	ND	990	
+30s	11.6	ND	2.2	ND	ND	990	
+1m	11.7	ND	1.8	1	1	990	
+1m 30s	11.7	ND	1.7	1	1	990	
+2m	11.7	ND	1.7	1	1	990	
+2m 30s	11.8	ND	1.6	1	1	990	
+3m	11.8	ND	1.6	1	1	990	
+3m 30s	11.9	ND	1.6	1	1	990	
+4m	11.8	ND	1.6	1	1	990	
+4m 30s	11.9	ND	1.6	1	1	990	
+5m	11.9	ND	1.6	1	1	990	
Min	0.1	ND	1.6	ND	ND	990	
Max	11.9	ND	20.4	1	1	990	

Groundwater

Water Depth (m)	3.35
Well Depth (m)	3.87
Sample:	
Comment:	silt on probe



Monitoring Record

Site name / location:	P4271 - Townhouse Dairy, Church Lane, Ardingly
Installation ref.:	WS5
Date:	06.07.2021
Engineer:	Anja Blockhaus
Weather / temp:	Showers, temperature 16, wind speed 14, wind direction WSW, pressure 990 rising, cloud c

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	NA	+3m	NA
+10s	NA	+4m	NA
+30s	NA	+5m	NA
+1m	NA	+6m	NA
+1m 30s	NA	+7m	NA
+2m	NA	+8m	NA
Max		NA	

Flow Rate

	Reading
	l/hr
+10s	0.0
+30s	0.0
+1m	0.0
+1m 30s	0.0
+2m	0.0
Max	0.0

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	0.1	ND	20.4	ND	ND	990	
+30s	8.1	0.1	0.7	1	ND	990	
+1m	8.1	0.1	0.3	1	ND	990	
+1m 30s	8.2	ND	0.2	1	ND	990	
+2m	8.2	0.1	0.2	1	ND	990	
+2m 30s	8.2	0.1	0.2	1	ND	990	
+3m	8.1	0.1	0.3	1	ND	990	
+3m 30s	8.1	0.1	0.4	1	ND	990	
+4m	7.9	0.1	0.8	ND	ND	990	
+4m 30s	7.7	0.1	1.4	1	ND	990	
+5m	7.5	0.1	2.2	ND	ND	990	
Min	0.1	ND	0.2	ND	ND	990	
Max	8.2	0.1	20.4	1	ND	990	

Groundwater

Water Depth (m)	NR
Well Depth (m)	3.80
Sample:	
Comment:	dry, silt on probe



Monitoring Record

Site name / location:

P4271 - Townhouse Dairy, Church Lane, Ardingly

Installation ref.:

WS3

Date:

14.07.21

Engineer:

Anja Blockhaus

Weather / temp:

sunny spells, temperature 21, wind speed 9, wind direction NNW, pressure 1018 stable, clo

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	NA	+3m	NA
+10s	NA	+4m	NA
+30s	NA	+5m	NA
+1m	NA	+6m	NA
+1m 30s	NA	+7m	NA
+2m	NA	+8m	NA
Max		NA	

Flow Rate

	Reading
	l/hr
+10s	0.0
+30s	0.0
+1m	0.0
+1m 30s	0.0
+2m	-0.1
Max	0.0

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	14.2	ND	13.5	ND	ND	1018	
+30s	16.8	ND	0.8	ND	1	1018	
+1m	17.0	ND	0.3	ND	1	1018	
+1m 30s	17.0	ND	0.2	ND	1	1018	
+2m	17.0	ND	0.2	1	1	1018	
+2m 30s	17.1	ND	0.2	ND	1	1018	
+3m	17.1	ND	0.2	1	1	1018	
+3m 30s	17.1	ND	0.2	ND	1	1018	
+4m	17.1	ND	0.2	1	1	1018	
+4m 30s	17.2	ND	0.2	ND	1	1018	
+5m	17.2	ND	0.2	ND	1	1018	
Min	14.2	ND	0.2	ND	1	1018	
Max	17.2	ND	13.5	1	1	1018	

Groundwater

Water Depth (m)

3.51

Well Depth (m)

3.87

Sample:

unable to take full sample due to not enough wat

Comment:

very silty



Monitoring Record							
Site name / location:		P4271 - Townhouse Dairy, Church Lane, Ardingly					
Installation ref.:		WS5					
Date:		14.07.21					
Engineer:		Anja Blockhaus					
Weather / temp:		sunny spells, temperature 21, wind speed 9, wind direction NNW, pressure 1018 stable, cloud					
Reading ppm Ambient +10s +30s +1m +1m 30s +2m Max Reading NA NA NA NA NA NA NA Reading l/hr +10s +30s +1m +1m 30s +2m Max							

Monitoring Record

Site name / location:	P4271 - Townhouse Dairy, Church Lane, Ardingly
Installation ref.:	WS3
Date:	21.07.2021
Engineer:	Anja Blockhaus
Weather / temp:	sunny, temperature 27, wind speed 3, wind direction SE, pressure 1022 stable, cloud cover

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	NA	+3m	NA
+10s	NA	+4m	NA
+30s	NA	+5m	NA
+1m	NA	+6m	NA
+1m 30s	NA	+7m	NA
+2m	NA	+8m	NA
Max			NA

Flow Rate

	Reading
	l/hr
+10s	-0.1
+30s	0.1
+1m	0.4
+1m 30s	0.6
+2m	0.6
Max	0.6

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	14.6	ND	7.3	1	1	1022	
+30s	16.5	ND	0.8	1	1	1022	
+1m	6.7	ND	12.2	1	1	1022	
+1m 30s	5.3	ND	14.9	1	1	1022	
+2m	3.2	ND	17.0	1	1	1022	
+2m 30s	2.5	ND	17.7	1	1	1022	
+3m	2.0	ND	18.2	1	1	1022	
+3m 30s	1.9	ND	18.3	ND	1	1022	
+4m	1.9	ND	18.3	1	1	1022	
+4m 30s	1.7	ND	18.5	1	1	1022	
+5m	1.9	ND	18.3	1	1	1022	
Min	1.7	ND	0.8	ND	1	1022	
Max	16.5	ND	18.5	1	1	1022	

Groundwater

Water Depth (m)	3.72
Well Depth (m)	3.90
Sample:	no
Comment:	silt on probe



Monitoring Record							
Site name / location:		P4271 - Townhouse Dairy, Church Lane, Ardingly					
Installation ref.:		WS5					
Date:		21.07.2021					
Engineer:		Anja Blockhaus					
Weather / temp:		sunny, temperature 27, wind speed 3, wind direction SE, pressure 1022 stable, clo					
<u>PID Monitoring</u>				<u>Flow Rate</u>			
	Reading		Reading		Reading		
	ppm		ppm		l/hr		
Ambient	NA	+3m	NA				
+10s	NA	+4m	NA	+10s	NR		
+30s	NA	+5m	NA	+30s	NR		
+1m	NA	+6m	NA	+1m	NR		
+1m 30s	NA	+7m	NA	+1m 30s	NR		
+2m	NA	+8m	NA	+2m	NR		
Max			NA	Max		NR	
<u>Gas Monitoring</u>							
	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	NR	NR	NR	NR	NR	NR	
+30s	NR	NR	NR	NR	NR	NR	
+1m	NR	NR	NR	NR	NR	NR	
+1m 30s	NR	NR	NR	NR	NR	NR	
+2m	NR	NR	NR	NR	NR	NR	
+2m 30s	NR	NR	NR	NR	NR	NR	
+3m	NR	NR	NR	NR	NR	NR	
+3m 30s	NR	NR	NR	NR	NR	NR	
+4m	NR	NR	NR	NR	NR	NR	
+4m 30s	NR	NR	NR	NR	NR	NR	
+5m	NR	NR	NR	NR	NR	NR	
Min	NR	NR	NR	NR	NR	NR	
Max	NR	NR	NR	NR	NR	NR	
<u>Groundwater</u>							
Water Depth (m)	NR						
Well Depth (m)	NR						
Sample:	no						
Comment:	unable to monitor because the barn was locked /						
				 agb Environmental Ltd			

Monitoring Record

Site name / location:	P4271 - Townhouse Dairy, Church Lane, Ardingly
Installation ref.:	WS3
Date:	30.07.2021
Engineer:	Anja Blockhaus
Weather / temp:	showers/stormy, temperature 15, wind speed 16, wind direction SSW, pressure 1001 rising,

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	NA	+3m	NA
+10s	NA	+4m	NA
+30s	NA	+5m	NA
+1m	NA	+6m	NA
+1m 30s	NA	+7m	NA
+2m	NA	+8m	NA
		Max	NA

Flow Rate

	Reading
	l/hr
+10s	0.2
+30s	0.2
+1m	0.2
+1m 30s	0.1
+2m	0.1
	Max
	0.2

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	10.4	0.1	17.7	ND	ND	1001	
+30s	12.3	0.1	8.5	ND	ND	1001	
+1m	17.5	0.1	3.3	1	ND	1001	
+1m 30s	19.8	0.1	0.8	1	ND	1001	
+2m	20.2	0.1	0.4	1	ND	1001	
+2m 30s	20.3	0.1	0.3	1	ND	1001	
+3m	20.3	ND	0.2	1	ND	1001	
+3m 30s	20.3	0.1	0.2	ND	ND	1001	
+4m	20.4	0.1	0.1	1	ND	1001	
+4m 30s	20.3	ND	0.1	1	ND	1001	
+5m	20.4	ND	0.1	1	ND	1001	
Min	10.4	ND	0.1	ND	ND	1001	
Max	20.4	0.1	17.7	1	ND	1001	

Groundwater

Water Depth (m)	3.67
Well Depth (m)	3.88
Sample:	no
Comment:	gas point was under water, water was removed b



Monitoring Record

Site name / location:	P4271 - Townhouse Dairy, Church Lane, Ardingly
Installation ref.:	WS5
Date:	30.07.2021
Engineer:	Anja Blockhaus
Weather / temp:	showers/stormy, temperature 15, wind speed 16, wind direction SSW, pressure 100

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	NA	+3m	NA
+10s	NA	+4m	NA
+30s	NA	+5m	NA
+1m	NA	+6m	NA
+1m 30s	NA	+7m	NA
+2m	NA	+8m	NA
		Max	NA

Flow Rate

	Reading
	l/hr
+10s	0.1
+30s	0.1
+1m	0.0
+1m 30s	0.1
+2m	0.1
	Max
	0.1

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	4.7	0.1	18.3	1	ND	1001	
+30s	4.9	0.1	6.0	1	ND	1001	
+1m	5.0	0.1	5.4	1	ND	1001	
+1m 30s	5.1	0.1	5.1	1	ND	1001	
+2m	5.2	0.1	4.6	1	ND	1001	
+2m 30s	5.4	0.1	4.0	1	ND	1001	
+3m	5.7	0.1	3.3	1	ND	1001	
+3m 30s	5.9	0.1	2.6	1	ND	1001	
+4m	6.2	0.1	1.7	1	ND	1001	
+4m 30s	6.5	0.1	1.0	1	ND	1001	
+5m	6.6	0.1	0.6	1	ND	1001	
Min	4.7	0.1	0.6	1	ND	1001	
Max	6.6	0.1	18.3	1	ND	1001	

Groundwater

Water Depth (m)

Well Depth (m)

Sample:

Comment:

3.80
no
dry



Appendix 4 Laboratory Results



Kevin Brown
AGB Environmental Ltd
341 Exning Road
Newmarket
CB8 0AT

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

DETS Report No: 21-08237

Site Reference: Townhouse Dairy, Ardingly

Project / Job Ref: P4271

Order No: 008388

Sample Receipt Date: 28/06/2021

Sample Scheduled Date: 28/06/2021

Report Issue Number: 1

Reporting Date: 02/07/2021

Authorised by:

A handwritten signature in black ink, appearing to read "Dave Ashworth".

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.



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Soil Analysis Certificate						
DETS Report No: 21-08237	Date Sampled	21/06/21	21/06/21	21/06/21	21/06/21	21/06/21
AGB Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS2	WS3	WS3	WS4	WS4
Project / Job Ref: P4271	Additional Refs	NAT	MG	NAT	MG	NAT
Order No: 008388	Depth (m)	0.60	0.30	0.60	0.20	0.60
Reporting Date: 02/07/2021	DETS Sample No	551877	551878	551879	551880	551881

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025		Not Detected		Not Detected	
pH	pH Units	N/a	MCERTS	7.9	9.6	7.6	6.5	7.2
Organic Matter (SOM)	%	< 0.1	MCERTS	0.7	2.6	0.8	4.6	2.1
Arsenic (As)	mg/kg	< 2	MCERTS	20	10	16	12	14
Cadmium (Cd)	mg/kg	< 0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	30	22	26	20	27
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	12	12	36	29	28
Lead (Pb)	mg/kg	< 3	MCERTS	11	23	36	64	30
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	22	13	21	10	11
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	75	42	97	94	73

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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Soil Analysis Certificate						
DETS Report No: 21-08237	Date Sampled	21/06/21				
AGB Environmental Ltd	Time Sampled	None Supplied				
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS5				
Project / Job Ref: P4271	Additional Refs	NAT				
Order No: 008388	Depth (m)	0.60				
Reporting Date: 02/07/2021	DETS Sample No	551882				

Determinand	Unit	RL	Accreditation				
Asbestos Screen ^(S)	N/a	N/a	ISO17025				
pH	pH Units	N/a	MCERTS	7.5			
Organic Matter (SOM)	%	< 0.1	MCERTS	1			
Arsenic (As)	mg/kg	< 2	MCERTS	14			
Cadmium (Cd)	mg/kg	< 0.2	NONE	< 0.2			
Chromium (Cr)	mg/kg	< 2	MCERTS	22			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	14			
Lead (Pb)	mg/kg	< 3	MCERTS	20			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	14			
Selenium (Se)	mg/kg	< 2	MCERTS	< 3			
Zinc (Zn)	mg/kg	< 3	MCERTS	57			

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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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-08237	Date Sampled	21/06/21	21/06/21	21/06/21	21/06/21	21/06/21
AGB Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS2	WS3	WS3	WS4	WS4
Project / Job Ref: P4271	Additional Refs	NAT	MG	NAT	MG	NAT
Order No: 008388	Depth (m)	0.60	0.30	0.60	0.20	0.60
Reporting Date: 02/07/2021	DETS Sample No	551877	551878	551879	551880	551881

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	< 0.1	< 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	0.20	0.14	< 0.1	0.24	0.13
Pyrene	mg/kg	< 0.1	MCERTS	0.16	0.12	< 0.1	0.18	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.36	< 0.1	< 0.1	0.37	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.44	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.30	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 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	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-08237	Date Sampled	21/06/21				
AGB Environmental Ltd	Time Sampled	None Supplied				
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS5				
Project / Job Ref: P4271	Additional Refs	NAT				
Order No: 008388	Depth (m)	0.60				
Reporting Date: 02/07/2021	DETS Sample No	551882				

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6			



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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 21-08237	Date Sampled	21/06/21	21/06/21	21/06/21	21/06/21	21/06/21
AGB Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS2	WS3	WS3	WS4	WS4
Project / Job Ref: P4271	Additional Refs	NAT	MG	NAT	MG	NAT
Order No: 008388	Depth (m)	0.60	0.30	0.60	0.20	0.60
Reporting Date: 02/07/2021	DETS Sample No	551877	551878	551879	551880	551881

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	38	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	38	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42



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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 21-08237	Date Sampled	21/06/21				
AGB Environmental Ltd	Time Sampled	None Supplied				
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS5				
Project / Job Ref: P4271	Additional Refs	NAT				
Order No: 008388	Depth (m)	0.60				
Reporting Date: 02/07/2021	DETS Sample No	551882				

Determinand	Unit	RL	Accreditation				
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01			
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05			
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10			
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21			
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01			
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05			
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2			
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2			
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2			
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3			
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10			
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21			
Total >C5 - C35	mg/kg	< 42	NONE	< 42			



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 21-08237	Date Sampled	21/06/21	21/06/21	21/06/21	21/06/21	21/06/21
AGB Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS2	WS3	WS3	WS4	WS4
Project / Job Ref: P4271	Additional Refs	NAT	MG	NAT	MG	NAT
Order No: 008388	Depth (m)	0.60	0.30	0.60	0.20	0.60
Reporting Date: 02/07/2021	DETS Sample No	551877	551878	551879	551880	551881

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 21-08237	Date Sampled	21/06/21				
AGB Environmental Ltd	Time Sampled	None Supplied				
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS5				
Project / Job Ref: P4271	Additional Refs	NAT				
Order No: 008388	Depth (m)	0.60				
Reporting Date: 02/07/2021	DETS Sample No	551882				

Determinand	Unit	RL	Accreditation				
Benzene	ug/kg	< 2	MCERTS	< 2			
Toluene	ug/kg	< 5	MCERTS	< 5			
Ethylbenzene	ug/kg	< 2	MCERTS	< 2			
p & m-xylene	ug/kg	< 2	MCERTS	< 2			
o-xylene	ug/kg	< 2	MCERTS	< 2			
MTBE	ug/kg	< 5	MCERTS	< 5			



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Soil Analysis Certificate - Organochlorine Pesticides						
DETS Report No: 21-08237	Date Sampled	21/06/21				
AGB Environmental Ltd	Time Sampled	None Supplied				
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS4				
Project / Job Ref: P4271	Additional Refs	NAT				
Order No: 008388	Depth (m)	0.60				
Reporting Date: 02/07/2021	DETS Sample No	551881				

Determinand	Unit	RL	Accreditation				
Aldrin	mg/kg	< 0.02	NONE	< 0.02			
alpha-HCH	mg/kg	< 0.02	NONE	< 0.02			
beta-HCH	mg/kg	< 0.02	NONE	< 0.02			
cis-chlordane	mg/kg	< 0.02	NONE	< 0.02			
delta-HCH	mg/kg	< 0.02	NONE	< 0.02			
Dieldrin	mg/kg	< 0.02	NONE	< 0.02			
Endosulfan A	mg/kg	< 0.02	NONE	< 0.02			
Endosulfan B	mg/kg	< 0.02	NONE	< 0.02			
Endrin	mg/kg	< 0.02	NONE	< 0.02			
gamma-HCH (Lindane)	mg/kg	< 0.02	NONE	< 0.02			
Heptachlor	mg/kg	< 0.02	NONE	< 0.02			
Heptachlor epoxide	mg/kg	< 0.02	NONE	< 0.02			
Hexachlorobenzene (HCB)	mg/kg	< 0.02	NONE	< 0.02			
Isodrin	mg/kg	< 0.02	NONE	< 0.02			
Methoxychlor	mg/kg	< 0.02	NONE	< 0.02			
o,p' - DDD	mg/kg	< 0.02	NONE	< 0.02			
o,p' - DDE	mg/kg	< 0.02	NONE	< 0.02			
o,p' - DDT	mg/kg	< 0.02	NONE	< 0.02			
p,p' - DDD	mg/kg	< 0.02	NONE	< 0.02			
p,p' - DDE	mg/kg	< 0.02	NONE	< 0.02			
p,p' - DDT	mg/kg	< 0.02	NONE	< 0.02			
trans-chlordane	mg/kg	< 0.02	NONE	< 0.02			
Trifluralin	mg/kg	< 0.02	NONE	< 0.02			



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Soil Analysis Certificate - Organophosphorus Pesticides						
DETS Report No: 21-08237	Date Sampled	21/06/21				
AGB Environmental Ltd	Time Sampled	None Supplied				
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS5				
Project / Job Ref: P4271	Additional Refs	NAT				
Order No: 008388	Depth (m)	0.60				
Reporting Date: 02/07/2021	DETS Sample No	551882				

Determinand	Unit	RL	Accreditation				
Azinphos-methyl	mg/kg	< 0.1	NONE	< 0.1			
Chlorfenvinphos, alpha	mg/kg	< 0.1	NONE	< 0.1			
Chlorfenvinphos, beta	mg/kg	< 0.1	NONE	< 0.1			
Chlorpyrifos-methyl	mg/kg	< 0.1	NONE	< 0.1			
Diazinon	mg/kg	< 0.1	NONE	< 0.1			
Dichlorvos	mg/kg	< 0.1	NONE	< 0.1			
Dimethoate	mg/kg	< 0.1	NONE	< 0.1			
Fenitrothion	mg/kg	< 0.1	NONE	< 0.1			
Fenthion	mg/kg	< 0.1	NONE	< 0.1			
Malathion	mg/kg	< 0.1	NONE	< 0.1			
Mevinphos, E	mg/kg	< 0.1	NONE	< 0.1			
Mevinphos, (Z)	mg/kg	< 0.1	NONE	< 0.1			
Parathion-ethyl	mg/kg	< 0.1	NONE	< 0.1			
Parathion-methyl	mg/kg	< 0.1	NONE	< 0.1			
Phorate	mg/kg	< 0.1	NONE	< 0.1			



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Soil Analysis Certificate - Phenyl Urea Herbicides						
DETS Report No: 21-08237	Date Sampled	21/06/21	21/06/21			
AGB Environmental Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS4	WS5			
Project / Job Ref: P4271	Additional Refs	NAT	NAT			
Order No: 008388	Depth (m)	0.60	0.60			
Reporting Date: 02/07/2021	DETS Sample No	551881	551882			

Determinand	Unit	RL	Accreditation					
Chloroxuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Chlortoluron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Diiflubenuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Dimefuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Diuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Isoproturon	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Linuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Methabenzthiazuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Metoxuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Monolinuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Monuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			
Pencycuron	mg/kg	< 0.1	NONE	< 0.1	< 0.1			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 21-08237	
AGB Environmental Ltd	
Site Reference: Townhouse Dairy, Ardingly	
Project / Job Ref: P4271	
Order No: 008388	
Reporting Date: 02/07/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
551877	WS2	NAT	0.60	14.4	Light brown sandy clay with stones
551878	WS3	MG	0.30	9	Brown gravelly sand with stones and concrete
551879	WS3	NAT	0.60	18.2	Grey clay
551880	WS4	MG	0.20	15.5	Brown sandy clay with vegetation
551881	WS4	NAT	0.60	15.9	Light brown sandy clay with vegetation
551882	WS5	NAT	0.60	15.2	Light 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}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-08237

AGB Environmental Ltd

Site Reference: Townhouse Dairy, Ardingly

Project / Job Ref: P4271

Order No: 008388

Reporting Date: 02/07/2021

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 diphenylcarbazide 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



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DETS Report No: 21-08238

Site Reference: Townhouse Dairy, Ardingly

Project / Job Ref: P4271

Order No: 008388

Sample Receipt Date: 28/06/2021

Sample Scheduled Date: 28/06/2021

Report Issue Number: 1

Reporting Date: 02/07/2021

Authorised by:

A handwritten signature in black ink, appearing to read "Dave Ashworth".

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.



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Soil Analysis Certificate						
DETS Report No: 21-08238	Date Sampled	21/06/21	21/06/21	21/06/21	21/06/21	21/06/21
AGB Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Townhouse Dairy, Ardingly	TP / BH No	WS1	WS1	WS3	WS3	WS4
Project / Job Ref: P4271	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 008388	Depth (m)	0.40	0.90	0.30	0.60	0.50
Reporting Date: 02/07/2021	DETS Sample No	551883	551884	551885	551886	551887

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	7.3	7.6	10.1	7.4	7.3
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	432	260	5994	388	467
Total Sulphate as SO ₄	%	< 0.02	MCERTS	0.04	0.03	0.60	0.04	0.05
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	17	55	48	91	105
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	0.05	0.05	0.09	0.11

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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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 21-08238	
AGB Environmental Ltd	
Site Reference: Townhouse Dairy, Ardingly	
Project / Job Ref: P4271	
Order No: 008388	
Reporting Date: 02/07/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
551883	WS1	None Supplied	0.40	12.2	Brown loamy sand with vegetation
551884	WS1	None Supplied	0.90	15.7	Light brown sandy clay
551885	WS3	None Supplied	0.30	9	Brown gravelly sand with stones and concrete
551886	WS3	None Supplied	0.60	18.2	Grey clay
551887	WS4	None Supplied	0.50	14	Brown sandy clay with stones

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

Insufficient Sample ^{u/s}

Unsuitable Sample ^{u/s}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-08238

AGB Environmental Ltd

Site Reference: Townhouse Dairy, Ardingly

Project / Job Ref: P4271

Order No: 008388

Reporting Date: 02/07/2021

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 diphenylcarbazide 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

Appendix 5 Risk Evaluation Methodology

Classification of Consequence

The classifications of consequence (severity) are taken from R&D Publication 66 (NHBC and Environment Agency, 2008). agb Environmental has chosen to apply the classifications to a broad range of development scenarios.

It should be noted that the categories of pollution incident have no relation to the categories of significant possibility of significant harm to human health or significant possibility of significant pollution of controlled waters in respect of the Part 2A Statutory Guidance.

Classification	Definition
Severe	Highly elevated concentrations likely to result in “significant harm” to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.
Medium	Elevated concentrations which could result in “significant harm” to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.
Mild	Exposure to human health unlikely to lead to “significant harm”. Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population. Minor damage to crops, buildings or property.
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structure and services.

Classification of Probability

The classifications of probability are taken from R&D Publication 66 (NHBC and Environment Agency, 2008). agb Environmental has chosen to apply the classifications to a broad range of development scenarios.

It should be noted that the categories of pollution incident have no relation to the categories of significant possibility of significant harm to human health or significant possibility of significant pollution of controlled waters in respect of the Part 2A Statutory Guidance. Also, in the Part 2A Statutory Guidance “pollutant linkage” is now termed “contaminant linkage”, although it is noted that the terms are effectively synonymous.

Category	Definition
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

Categorisation of Risk

		Consequence (Severity)			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Description of Risk Levels and Likely Action Required

Term	Description
Very high risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action <u>or</u> there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.
High risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action. Realisation of the risk is likely to present a substantial liability to the site owner or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.
Moderate risk	It is possible that without appropriate remediation action, harm would arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
Low risk	It is possible that harm could arise to a designated receptor from identified hazard. It is likely that, at worst, if any harm was realised any effects would be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Very low risk	It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.
No potential risk	There is no potential risk if no pollutant linkage has been established.

Summary of Definitions

Term	Description
Hazard	A property or situation which in certain circumstances could lead to harm. (The properties of different hazards must be assessed in relation to their potential to affect the various different receptors).
Consequences	The adverse effects (or harm) arising from a defined hazard which impairs the quality of the environment or human health in the short or longer term.
Probability	The mathematical expression of the chance of a particular event in a given period of time (e.g. probability of 0.2 is equivalent to 20% or a 1 in 5 chance).
Likelihood	Probability; the state of face of being likely.
Risk	A combination of the probability or frequency of the occurrences of a defined hazard AND the magnitude of the consequences of that occurrence.
Contaminant linkage	An identified pathway is capable of exposing a receptor to a contaminant and that contaminant is capable of harming the receptor. In the Part 2A Statutory Guidance the terms “contaminant”, “pollutant” and “substance” have the same meaning, and some non-statutory technical guidance relevant to land contamination uses alternative terms such as “pollutant”, “substance” and associated terms in effect to mean the same thing.