

PRELIMINARY LAND QUALITY RISK ASSESSMENT

**Proposed Development
of a Care Home**

Yapton Road, Middleton-on-Sea

Prepared for: Frontier Estates Ltd

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SLR



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EXECUTIVE SUMMARY	
Site Location	West of Yapton Road, Middleton-on-Sea, West Sussex (accessed via Silver Birch Drive).
Development Proposal	Construction of a residential care home (use Class C2) and reconfiguration of the remaining site area to include internal communal and operating areas, vehicle parking, cycle storage and associated soft landscaping.
Site and Vicinity Description	The site is situated within a generally mixed residential, commercial and agricultural setting. The site is "L shaped" and occupied approximately 0.61 hectares. The site is currently a disused poultry farm; with various disused sheds, barns and a disused farmhouse.
Topography	The site is generally flat.
Published Geology	Superficial Geology: sands, gravels and silts of the River Terrace Deposits. Solid Geology: Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (Undifferentiated).
Hydrology	The closest surface water feature is a drain located along the southern site boundary. This connects to a larger drain located c.50m to the west of the site. This discharges into the Ryebank Rye located c.800m north of the site.
Hydrogeology	The superficial geology (River Terrace Deposits) is designated as a secondary (A) aquifer. The underlying chalk aquifer is designated as a principal aquifer. The site is not within a groundwater source protection zone.
Geotechnical Hazards	The risk of subsidence from landslides shrinking and swelling clays, landslides, compressible deposits, collapsible deposits and running sands is considered "low, very low or negligible".
Site History	✧ The site is recorded as undeveloped land since at least 1876. ✧ The site was redeveloped into a poultry farm in the early 1960s. ✧ The poultry farm became disused in 2005, and has remained so.
SLRs Conceptual Site Model	Sources: 1) Made Ground associated with construction and demolition of poultry farm buildings; 2) Possible leaking sewer in the south of the site; 3) Hydrocarbons migrating from the off-site vehicle repair garage 4) Contaminants from yet to be imported/site won soils. 5) As of yet unidentified contaminant sources. Receptors: Site end users, property, flora/fauna, surface and groundwater Pathways: Direct contact with soil, inhalation of vapours/dust, contaminants moving within groundwater.

Potential Pollutant Linkages	✧ PPL 1a: Potential harm to human health from exposure to contaminants entering water supply pipework ✧ PPL 1b: Potential harm to human health from exposure to contaminants in Made Ground ✧ PPL 1c: Potential damage to future buildings from exposure to aggressive ground and differential settlement ✧ PPL 1d: Potential pollution of Controlled Waters (groundwater) by contaminants in Made Ground ✧ PPL 2&b: Potential pollution of Controlled Waters (groundwater & surface water) by contaminants from leaking sewer ✧ PPL 3a: Potential harm to human health from inhalation of vapours from possible off-site contamination. ✧ PPL 3b: Potential pollution of Controlled Waters (groundwater) by contaminants migrating from an off-site source. ✧ PPL 4a-c: Potential Harm to Human and Plant Health from Potential Contaminants in Imported / Site-Won Landscaping Soils ✧ PPL 5: Potential Risks to Health or the Environment from Unidentified Sources
Summary & Recommendations	PPLs 1-3 require further assessment and can be interrogated with a limited intrusive investigation to assess the chemistry/ physical condition of soils and groundwater quality. Voluntary measures have been put forward to prevent PPLs 4a to 4c and PPL 5 from being realised during the development. SLR has not identified a significant source of ground gas on or off site that might impact the proposed redevelopment. Having undertaken the first steps of the CRL11 procedure, SLR considers that by completing the above further assessment, along with a well-managed construction process, the site / land will be in a condition where it is fit for its proposed uses and not capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990.

This executive summary should be read in conjunction with the main report.

CONTENTS

1.0	INTRODUCTION	1
1.1	Background	1
1.2	Proposed Development	1
1.3	Objectives	1
1.4	Scope of Work.....	1
1.5	Data Sources	2
2.0	SITE DETAILS, SETTING AND HISTORY	3
2.1	Site Vicinity Description	3
2.2	Physical Site Setting	3
2.3	Environmental Search Data.....	5
2.4	Site History.....	6
2.4.1	Review of OS Mapping and Aerial Images.....	6
2.5	Planning History Review.....	8
2.5.1	1948-1987 On-Site Planning Applications.....	8
2.5.2	Post 1987 Planning Applications.....	8
2.5.3	Off-Site Planning Applications.....	9
3.0	WALKOVER INSPECTION	10
3.1	Summary.....	10
3.2	Structures.....	10
3.3	External Areas	10
3.4	Drainage System	10
3.5	Bulk Storage Tanks	10
3.6	Waste	11
3.7	Site Surrounds Inspection	11
4.0	OUTLINE CONCEPTUAL MODEL AND PRELIMINARY RISK ASSESSMENT	12
4.1	Preliminary Land Quality Risk Assessment.....	12
4.1.1	Approach.....	12
4.1.2	Assumptions.....	12
4.1.3	Sources	12
4.1.4	Pathways	13
4.1.5	Receptors	13
4.1.6	Potential Pollutant Linkages (PPL)	13
5.0	FURTHER INVESTIGATION AND ASSESSMENT	19

5.1	PPL 1a.....	19
5.2	PPL 1b	21
5.3	PPL 1c.....	21
5.4	PPL 1d	21
5.5	PPL 2a and 2b.....	21
5.6	PPL 3a and 3b.....	21
6.0	VOLUNTARY PREVENTATIVE AND REMEDIAL ACTIONS AND VALIDATION OF THOSE WORKS	23
6.1	Voluntary Preventative Action to Avoid PPL 4 (a-c)	23
6.2	If Needed - Voluntary Remedial Action to Break PPL 5.....	24
6.3	Waste Stockpiles	24
6.4	Land Quality / Remedial Works Validation Report.....	24

DOCUMENT REFERENCES

TABLES

Table 1-1 Information Sources	2
Table 2-1 Site Details.....	3
Table 2-2 Summary of Physical Site Features.....	3
Table 2-3 Site History Summary	7
Table 4-1 Preliminary Conceptual Site Model.....	15
Table 5-1: Extract from Contaminative Land Assessment Guidance published by Water UK	20

DRAWINGS

Drawing 01: Site Location Plan
Drawing 02: Site Layout Plan

APPENDICES

Appendix 01: Proposed Development Plans
Appendix 02: GroundSure Historical Map Extracts
Appendix 03: GroundSure EnviroInsight Report
Appendix 04: GroundSure GeoInsight Report
Appendix 05: Site Photographs
Appendix 06: SLR Approach to PLQRA

1.0 INTRODUCTION

1.1 Background

In February 2019, SLR Consulting Limited (SLR) was appointed by Frontier Estates Limited (the Client) to provide consultancy services to support a planning application for the construction of a care home with associated car parking and soft landscaping at the Former Yapton Road Poultry Farm, Yapton Road, Middleton-on-Sea, West Sussex, PO22 6DY.

A site location plan is provided as **Drawing 01**, while the current layout is illustrated on **Drawing 02**.

This document, a Preliminary Land Quality Risk Assessment (PLQRA), records the findings of a site walkover survey and presents information with respect to the site's environmental setting, land use history and the potential for contamination.

The report has been completed by SLR Consulting's Land Quality and Remediation team based at Treenwood House, Rowden Lane, Bradford on Avon, Wiltshire, BA15 2AU (Tel: 01225 309400).

1.2 Proposed Development

A planning application will be made for Frontier Estates Limited and will seek to demolish the existing buildings and redevelop the site into a care home, which will comprise:

- ✦ 66 en-suite bedrooms, along with internal communal and operational areas;
- ✦ Car parking and cycle storage, and
- ✦ Managed landscaped gardens.

Indicative site layout plans are provided in **Appendix 01**.

1.3 Objectives

This PLQRA report presents detailed site and desk study information.

The information obtained has been used to develop a preliminary conceptual model of potential risks to human and environmental receptors. The conceptual model examines the potential for contaminant-pathway-receptor linkages. The risks associated with the potential linkages are discussed and SLR outlines recommended inspection measures.

The secondary objective of this PLQRA is to establish if there is any evidence of significant subsurface contamination from past or present activities on or adjacent to the site which could give rise to abnormal development costs i.e. expenditure on remedial works to deal with unacceptable risks to the environment or residents and visitors.

1.4 Scope of Work

The scope of work for the PLQRA was devised by SLR, it includes:

- ✦ purchase and review of an Environmental Search Report (GroundSure) which provides a listing of groundwater and surface water abstraction licences, pollution incidents discharge consents, potentially contaminative sites, waste handling/treatment sites, etc;
- ✦ Analysis of historical maps to establish the history of the property as well as past on and off site potentially contaminative activities;
- ✦ Review of published geological, hydrogeological, topographical and groundwater maps;

- ✦ Review the environmental setting of the site to determine groundwater vulnerability and presence of any environmentally sensitive sites (such as SSSI and RAMSAR sites);
- ✦ Undertake internet searches to identify if there is any anecdotal information widely available relating to the history of the site;
- ✦ Undertake a walkover survey of the site to identify key site features to include topography, vegetation type/condition, specific site and surrounding land uses, key surface water features, and an inspection of buildings and drainage features, etc.

1.5 Data Sources

This report has been produced following consultation with the sources of information summarised in **Table 1-1**.

Table 1-1
Information Sources

Information Type	Source
Topography	Ordnance Survey (OS) mapping
Site Setting and History	GroundSure Historical Ordnance Survey Map Extracts EMS_529911_712739, purchased 28th February 2019 (Appendix 02). GroundSure EnviroInsight Report EMS_529911_712741, purchased 28th February 2019 (Appendix 03). GroundSure GeoInsight Report EMS_529911_712740, purchased 28th February 2019 (Appendix 04). Multi-Agency Geographic Information for the Countryside (MAGIC) website Google Earth Arun District Council Planning Portal
Geology	British Geological Survey (BGS) website.

2.0 Site Details, Setting and History

2.1 Site Vicinity Description

Table 2-1, below, summarises the property details. Information has been obtained from OS mapping and the site visit.

Table 2-1
Site Details

Address	Former Yapton Road Poultry Farm, Yapton Road, Middleton-on-Sea, West Sussex, PO22 6DY	
Site Location	The site is located to the north of Middleton-on-Sea a mixed agricultural, residential and light industrial setting, to the west of the B2132 (Yapton Road). The site is centred on National Grid Reference 497382, 100748.	
Site Description	The site comprises an "L-shaped" parcel of land comprising approximately (c.) 0.61 hectares. Full details are provided in Section 3.0 .	
Current Usage	The site is currently disused and comprises a derelict former farmhouse and multiple poultry sheds in varying states of disrepair.	
Land Uses Surrounding the Site	North	Undeveloped open land/ agricultural land.
	South	Residential properties- Middleton-on-Sea village (Silver Birch Drive).
	East	Middleton Business Park including Dukes Motors, with agricultural fields beyond.
	West	Undeveloped open land/ agricultural land.

2.2 Physical Site Setting

A summary of the main physical features of the site are given in **Table 2-2**, below. Information has been obtained from EA and BGS mapping, along with data supplied by GroundSure (EnviroInsight and GeoInsight – **Appendices 03 and 04**).

Table 2-2
Summary of Physical Site Features

Geography and Geology	Elevation	The centre of the site has an elevation of c.5m Above Ordnance Datum (AOD).
	Gradient	The site is predominately flat.
	Made Ground	There are no records of Artificial / Made Ground listed on site, however during the site walkover building rubble was present in various heaps across the site. A thin veneer of Made Ground/ reworked ground is likely to be present across the site, associated with the demolition of the poultry sheds.
	Superficial Drift Geology	Records indicate the site is underlain by River Terrace Deposits (undifferentiated), likely to comprise sands, gravels and silts.

Geography and Geology (cont.)	Solid Geology	Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (Undifferentiated).
	Borehole Records	The nearest BGS Borehole record is located 350m southeast of the site (BGS SU90SE6A). The borehole was drilled to 10m below ground level (BGL) and comprised 0.5m of Made Ground over sand/ clay to 7.2m BGL (River Terrace Deposits). This was underlain by chalk containing occasional flint. Water strikes were recorded within the River Terrace Deposits at 3.5m BGL (rising to 2.8m BGL after 1 hour), and within the chalk at 8.0m BGL (rising to 7.5m BGL after 1 hour). BGS SU90SE31 is located c.400m north of the site and records brown silty clay over very sandy, chalky silt between 1.4-2.1m BGL. Underlying these strata, very clayey sandy gravel was encountered to 3.5m with a chalky sand beneath. A water strike was recorded at 1.9m BGL.
	Radon Gas	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. Therefore, radon protection measures are not necessary.
	Mining, and Ground Stability Hazards	There are no records of historical ground workings on site. There are two records of historical ground workings within 250m of the site relating to a brickfield c. 190m southwest of the site and a second brickfield c.240m southwest of the site dates 1932 and 1910, respectively. There are no current ground workings listed on site. There is one record of current ground workings listed within 1km of the site relating to clay and shale extraction c.320m southwest of the site. The pit is named 'Middleton Brick Field' and the status is listed as 'ceased'. There are no records of historical mining, mining, coal mining or Johnson Poole and Bloomer mining areas within 1km of the site. There are no records of natural cavities, brine extraction, gypsum extraction, tin or clay mining within 1km of the site. The following natural ground hazard ratings are listed for the site: Shrink-swell Clays – Low Landslides –Very Low Compressible Deposits – Negligible Collapsible Deposits – Low Running Sands – Low Ground dissolution – Very Low

Hydrology	Surface Water / River Network	The site is within the catchment of Ryebank Rife. A drainage ditch was observed along the southern site boundary, which contained water at the time of investigation. This connect to a larger drainage ditch located c. 50m west of the site. This subsequently connects to the Ryebank Rife c.800m to the north. The Ryebank Rye flows east to west, at a topography of 2.5mAOD.
	Flood Risk	The site is not listed as being within a Zone 2 or Zone 3 floodplain, and the site has been designated a Risk of Flooding from Rivers and the Sea (RoFRa5) as very low. Groundwater flooding susceptibility areas relating to clearwater flooding have been identified within 50m of the site with the highest susceptibility to groundwater flooding classified as 'limited potential'.
	Surface Water Abstractions	There are three surface water abstraction licences within 1km of the site all of which have a historical status. The nearest is situated c.600m northeast of the site and relates to spray irrigation – storage for an annual volume of 4550m ³ per year.
Hydrogeology	Aquifer	The superficial geology (River Terrace Deposits) is designated a secondary (A) aquifer. The underlying chalk aquifer has been designated as a principal aquifer.
	Groundwater Abstractions	There is one groundwater abstraction listed within 1km of the site relating to general farming and domestic use c.950m northwest of the site.
	Source Protection Zones	The site is not listed as being within 500m of a source protection zone.

2.3 Environmental Search Data

A copy of the GroundSure information obtained by SLR is contained in **Appendix 03** and a summary of the search information is provided below:

- Historical Industrial Sites – The Groundsure report does not record potentially contaminative land uses on site; however, the former Poultry Farm does pose a potential source of contamination. There are five records of historical potentially contaminative land uses within 500m of the site, the closest relating to a nursery c.40m west of the site.
- Historical Tanks – There are no tanks listed within 500m of the site.
- Historical Energy Features – There nearest historical energy features is situated 10m east of the site and related to an electricity substation. A gas governor is recorded c.35m east on 1985 and 1976 historical mapping and another electricity substation is present c.95m south of the site between 1976 and 1998.

- ✦ Historical Garage and Vehicle database – There are two records of vehicle repair garages within 500m of the site, the closest relating to a garage c. 180m west of the site. Dukes Motors is present c.20m to the east of the site.
- ✦ Potentially Infilled Land –There are nine records of potentially infilled land recorded within 500m of the site, the closest relating to a pond c. 120m northeast of the site.
- ✦ Environmental Permits – There is one record of Part A (2) and Part B activities within 500m of the site relating to petrol vapour recovery c.220m west of the site at a petrol filling station.
- ✦ Discharge Consents – There are no records of discharge consents within 500m of the site.
- ✦ EA recorded pollution incidents – There are no recorded pollution incidents within 500m of the site.
- ✦ Current Landfill Sites – There are no records of Environment Agency landfills, BGS/DoE non-operational landfill sites within 1km of the site.
- ✦ Historical Landfill Sites – There is one record of Environment Agency historical landfill sites within 1km of the site. The landfill is located 289m west of the site, and received inert, commercial and household waste from 1955.
- ✦ Current Industrial Sites – There are eleven records of current industrial sites within 500m of the site, most relating to activities carried out at Middleton Business Park 13m to the east.
- ✦ Petrol and Fuel Sites – There are no records current or historical petrol and fuel sites within 500m of the site.
- ✦ Designated Environmentally Sensitive Sites – The site is classified as a Nitrate Vulnerable Zone. There are no other designated environmentally sensitive sites within 2km of the site.

Groundwater and surface water abstraction data was discussed in **Section 2.2**, above.

2.4 Site History

The following section presents a summary of the history of the site and its surrounds from a review of historic OS map extracts and aerial images. The age and general type of activity and land use can often be determined from the type and layout of structures depicted on the maps and aerial images. However, specific elements of site operations cannot normally be determined from such extracts. Large scale (1:2,500 and 1:10,560) historical map extracts were reviewed for selected years between 1876 and 2014. A summary of the findings is given in **Table 2-3**, beneath. The OS maps provided by GroundSure are included in **Appendix 02**.

2.4.1 Review of OS Mapping and Aerial Images

The site initially existed as open undeveloped land until the early 1960's when two properties were constructed in the southeast of the site. During the early 1960's the site became a poultry farm which comprised the construction of multiple poultry barns and chicken sheds. The site remains in this condition save for the construction and demolition of various poultry sheds and barns until 2005 when the site became disused.

The site vicinity was initially open / undeveloped land with Yapton Road adjacent to the eastern site boundary and multiple farmhouses sporadically located around the local area. The site surrounds remained largely unchanged save for localised residential development. During the 1930s large scale residential development occurred to the south and southeast of the site, associated with Middleton-on-Sea. Middleton on sea industrial estate was constructed to the east of site in the early 1940s. The land to the north and west of the site has remained as open undeveloped agricultural land/ public open space to the present day.

Evidence for Historic Contamination

The site remained largely undeveloped with the exception of a farmhouse and outbuilding until the 1960's when Yapton Road Poultry Farm was constructed. The site remained in use as a poultry farm until 2005 when it became derelict. As such potential contamination from historical uses is thought to be localised to asbestos present on site from demolished poultry sheds (noted during the site walkover to be present in discrete piles as opposed to scattered across the surface of the site), ammonia in shallow groundwater associated with improper disposal of dead poultry.

No significant possible sources of off-site contamination have been identified within the historical mapping.

Table 2-3
Site History Summary

Map Dates	Description
1876	On-site: Open undeveloped land with a road/ footpath running along the southern site boundary. Site Vicinity: The majority of the site vicinity exists as open undeveloped land. A crossroads exists to the immediate southeast of the site and a pond is situated c.50m north of the site. Ham Barn is located c.100m south of the site, New Barn c. 200m north of the site and Ancton Farm c. 500m east of the site.
1896-1898	On-site: No significant changes. Site Vicinity: No significant changes.
1910-1912	On-site: No significant changes. Site Vicinity: A ground workings feature denoted 'Brick Field' with an adjacent kiln is located c.250m southwest of site. Small scale residential development, a pond and 'Middleton Field' now exists c. 150m south of site.
1933	On-site: Two small rectangular have been constructed in the southeast of the site. Two field boundaries are shown to intersect the north of the site. No other significant changes. Site Vicinity: Significant residential development has occurred to the south and southeast of the site. Sewage filter beds have been constructed c.500m east of the site. The majority of land to the northeast, north and west of the site exists as undeveloped open land with multiple isolated barns, cottages, farmhouse and small holdings.
1939	On-site: No significant changes. Site Vicinity: Further residential development c. 200m southeast of the site. No other significant changes.
1960-1961	On-site: Yapton Road Poultry Farm now occupies the site. The two farmhouse buildings in the southeast of the site still exist and additional site development has occurred involving four rectangular structures in the centre of the site (most likely poultry barns) and two smaller structures in the south of the site adjacent to the farmhouse. Site Vicinity: Works buildings have been constructed c.10m east of site on the opposite side of Yapton Road and a car track is now present c.50m west of the site. Further small-scale residential development has occurred c.150m southeast of site. A caravan site now exists c.200m south of the site.

Map Dates	Description
1976-1979	On-site: The poultry farm has expanded to include twelve adjoined poultry sheds in the east of the site, extensions to the four pre-existing poultry barns and an additional six structures in the west of the site. The farmhouse has been extended to the north, south and west and the small building to the west of the farmhouse has a large extension to the west. Site Vicinity: The former caravan site to the south of the site has been replaced with residential development. The farm c.150m north of the site has expanded and is now denoted Guernsey Farm. A substation has been erected on the Works site c.50m east of the site.
1985-1988	On-site: No significant changes. Site Vicinity: Small scale residential development c.200m southwest of site.
1993	On-site: New structure in the southwest corner of the site. No other significant changes. Site Vicinity: Significant residential development c. 50m – 250m south and southwest of the site.
2002	On-site: No significant changes. Site Vicinity: No significant changes.
2010	On-site: Site Vicinity: No significant changes.
2014	On-site: Site Vicinity: No significant changes.

2.5 Planning History Review

As part of the desk study, SLR reviewed the Arun District Council Planning Portal on 13th March 2019. Information on previous planning applications made for the site are discussed below.

2.5.1 1948-1987 On-Site Planning Applications

The following applications were identified for the site:

- ✦ M/40/55- Additions and drainage 09/11/1955
- ✦ M/25/74- Residential development. Refused on the 13/11/1974
- ✦ M/2/49- Pig sty horsebox and hovel. Permitted on 15/02/1949

2.5.2 Post 1987 Planning Applications

M/45/16/PL – Demolition of redundant poultry farm buildings and dwellings and erection of 13 No. dwellings with associated access, car parking & landscaping. This application is a departure from the development plan.

The planning application was received on the 3rd June 2016 and approved with conditions on the 7th February 2017.

As part of the planning application a Landmark Sitecheck report was obtained, however no evidence of a land quality investigation has been found.

2.5.3 Off-Site Planning Applications

The following planning applications have been registered to the adjacent sites:

- » 3/18/2070/NMA – Nonmaterial amendment to P/A/3/18/1152/HOU

Contaminated land planning conditions were not included as part of the above reports.

3.0 Walkover Inspection

3.1 Summary

The site inspection was undertaken by SLR on 4th March 2019 and comprised a walkover of all external areas and limited internal areas. A site layout plan is provided as **Drawing 02** and photographs taken during the walkover are contained in **Appendix 05**.

In summary, c.25% of the site area is occupied structures, with the remaining 75% comprising rough land and dense vegetation. A public footpath crosses the southern section of the site in an east-west orientation. Drainage ditches are present either side of the footpath and are culverted for proportions.

3.2 Structures

The only permanent structure is a former farmhouse, which is located in the southeast of the site. The farmhouse is a two-storey building with single storey extensions on its west and north elevations. The building is of brick construction with a pitched tiled roof. Access to the building was not permitted during the walkover.

The remainder of the structures on site comprise former chicken sheds varying in size from 10m by 5m to 2m by 2m. In total thirteen larger sheds are present and sixteen smaller sheds are present. The sheds are predominantly of timber and corrugated metal construction and in varying states of disrepair. However, the walls and roof of one shed and the roof of another shed were noted to be constructed of cement sheet, possibly containing asbestos.

The brick base courses of a further three large demolished sheds were present in the centre of the site.

3.3 External Areas

With the exception of the rough tarmac surfaced footpath crossing the south of the site, the external areas are permeable and comprise rough / dense vegetation. Several mature and semi-mature trees are located in the southwest of the site. There was no evidence of vegetation die-back.

Several patches of burnt ground were noted, likely to have been associated with small bonfires.

3.4 Drainage System

The farmhouse is connected to the public foul sewer. A foul sewer is shown crossing the southern section of the site, under the footpath, with an east to west flow. In the east of the site (i.e. to the east of Southern Water manhole chamber ref: 3701) the sewer is marked as a rising main. To the west of manhole 3701 the sewer is marked as a standard gravity fall sewer, with a vent column located c.50m west of the site.

Surface water drainage ditches, which are culverted in places, are present to the north and south of the footpath.

There was no evidence of oil/water interceptors on site.

A monitoring well (referred to MW01 for the purpose of this report) is present to the south of the farmhouse. Anecdotal evidence suggests that the monitoring well was installed to investigate a possible leaking sewer, although not further details or report have been provided for review.

3.5 Bulk Storage Tanks

There is no evidence of above or below ground tanks on site.

3.6 Waste

As the site is disused, there are no active waste streams. However, four stockpiles are located along the north and north-western site boundary and were noted to contain soil, tyres, wood and demolition materials including timber, corrugated metal sheeting and cement sheet (possibly containing asbestos). In addition to the stockpiles, several tyres are present adjacent to the southern central site access.

3.7 Site Surrounds Inspection

The site surrounds fall gently to the south. The land to the north and west of the site is open / agricultural land. A pond is located c.50m north of the site.

The site is bound to the east by Yapton Road, beyond which is Middleton Business Park (i.e. commercial / light industrial use). Open / agricultural land is present beyond Middleton Business Park.

Residential properties, forming part of Silver Birch Drive, are located adjacent to the southern site boundary.

4.0 Outline Conceptual Model and Preliminary Risk Assessment

4.1 Preliminary Land Quality Risk Assessment

4.1.1 Approach

The normal procedure for assessing land dictates that potential contaminants, pathways and receptors should be considered within the context of contaminant or pollutant linkages. An evaluation of the risks associated with each linkage should drive decisions regarding the status of the land as contaminated and requiring remediation, uncontaminated or requiring further investigation. SLR's approach to PLQRA including the regulatory context is included as **Appendix 06**. Where the PLQRA indicates a low or negligible risk, no further investigation is recommended.

4.1.2 Assumptions

The information summarised in the previous sections has been used to identify the likely contaminant sources, receptors and pathways present at the site. The elements of the preliminary conceptual site model, **Table 4-1** overleaf, have been used to consider the potential pollutant linkages (PPL), their significance and acceptability.

It must be remembered that:

- ✦ The site was open land until the 1960s, when it was redeveloped into a poultry farm. Various stages of construction and demolition of barns has occurred;
- ✦ Stockpiles of mixed soil and construction demolition rubble have been identified in the north of the site. Fragments of fibre cement sheet have been identified which might contain asbestos. This assessment assumes **these will be removed from site** prior to the commencement of groundworks.
- ✦ The site is underlain by River Terrace Deposits (sand and gravel) which are further underlain by the Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formations.
- ✦ The site is reported to be in an area which does not require radon protection measures;
- ✦ The River Terrace Deposits are designated as secondary (A) aquifer. Groundwater is anticipated to be present at c.2-3m depth;
- ✦ The Chalk Aquifer is designated as a principal aquifer;
- ✦ The site is not in the vicinity of a groundwater Source Protection Zone;
- ✦ The site is not listed as being within a Zone 2/3 flood plain;
- ✦ there is a negligible to low to very low risk from ground stability hazards on site, including from ground dissolution features;
- ✦ On-site potentially contaminative land uses are limited **to the demolition of buildings** (possibly containing ACM) associated with the poultry farm;
- ✦ A **leaking sewer** has been revealed on-site which may be discharging to groundwater;
- ✦ A vehicle repair garage has been identified off-site that could pose a potential source of contamination.

4.1.3 Sources

Following a review of all available information, the following sources of information have been identified:

- ✦ **Source 1** – Made Ground present on-site as a result of construction/demolition of agricultural buildings. Contaminants of concern include metals, PAHs, metals & asbestos;
- ✦ **Source 2** – leaking sewer, releasing contaminants into the underlying secondary A aquifer. Contaminants of concern include ammoniacal nitrogen;
- ✦ **Source 3** – Off-site vehicle repair garage. Contaminants of concern include petroleum hydrocarbons;

SLR do not consider there to be a credible source of ground gas on or off site that could impact the proposed redevelopment. If during intrusive investigation a significant thickness of Made Ground, or Made Ground containing putrescible materials are encountered that could pose a source of ground gas, this assessment will be revised.

In addition to the above possible sources, the following sources *could* be present as a result of the redevelopment process;

- ✦ **Source 3** – Contaminants within materials yet to be imported onto site. Various possible contaminants of concern; and
- ✦ **Source 4** – Unidentified sources. If present likely to comprises caches of buried asbestos.

4.1.4 Pathways

Potential environmental fate and exposure pathways specific to the Site are:

- ✦ Ingress into water supply pipes;
- ✦ Direct contact, ingestion and inhalation of contaminated soils from soft landscaped;
- ✦ Inhalation of vapours;
- ✦ Uptake by plant species of ecotoxic contaminants;
- ✦ Degradation of buried concrete due to aggressive ground conditions;
- ✦ Leaching of contaminants and vertical migration in the Vadose Zone;
- ✦ Lateral migration of contaminants within the groundwater into adjacent water courses; and

4.1.5 Receptors

Potential receptors specific to the Site are:

- ✦ Human health: Proposed care home users & workers. Neighbouring land users;
- ✦ Property: Proposed care home building, proposed ornamental plants within planting areas;
- ✦ Groundwater: Superficial (secondary A) and Bedrock (principal) aquifers
- ✦ Surface water: Surface water drain c. 50m to the west of the site.

4.1.6 Potential Pollutant Linkages (PPL)

Given the proposed site use, the most likely / significant PPL appear to be:

- ✦ **PPL 1a:** Potential harm to human health from exposure to contaminants entering water supply pipework
- ✦ **PPL 1b:** Potential harm to human health from exposure to contaminants in Made Ground
- ✦ **PPL 1c:** Potential damage to future buildings from exposure to aggressive ground and differential settlement

- ❖ **PPL 1d:** Potential pollution of Controlled Waters (groundwater) by contaminants in Made Ground
- ❖ **PPL 2&b:** Potential pollution of Controlled Waters (groundwater & surface water) by contaminants from leaking sewer
- ❖ **PPL 3a:** Potential harm to human health from inhalation of vapours from possible off-site contamination.
- ❖ **PPL 3b:** Potential pollution of Controlled Waters (groundwater) by contaminants migrating from an off-site source.
- ❖ **PPL 4a-c:** Potential Harm to Human and Plant Health from Potential Contaminants in Imported / Site-Won Landscaping Soils
- ❖ **PPL 5:** Potential Risks to Health or the Environment from Unidentified Sources.

Table 4-1
Preliminary Conceptual Site Model

Source / Area of Concern	Contaminant (	Receptors	Likelihood of PPL Forming & Comment on Consequence	Risk Classification	Next Step in Procedure
Source 1 -- Made Ground associated with the demolition of multiple on-site structures such as poultry sheds and barns.	Metals, PAHs, asbestos	Humans -- Indoors: Future workers, residents & visitors	PPL 1a: Potential harm to health from ingestion of soluble contaminants entering water supply pipework.	Moderate/ low risk	PPL 1a: Further Investigation & Assessment -- see Section 5.1
		Humans -- Outdoors: Future workers, residents & visitors	PPL 1b: Potential harm to health from ingestion, dermal contact and inhalation of contaminants in the Made Ground. This pathway would be limited to proposed landscaped areas.	Moderate Risk	PPL 1b: Further Investigation & Assessment -- see Section 5.2
		Humans - Neighbours	If contaminants present, unlikely to be mobile and migrate off-site. .	Low Risk	-
		Property -- Built Environment: Future buildings	PPL 1c: The existing building appears in good repair, but potential that exposure to contaminants in Made Ground / underlying geology could result in deterioration of buried concrete due to sulphate or acid attack.	Moderate/ low risk	PPL 1c: Further Investigation & Assessment -- see Section 5.3
		Property - Flora / Fauna: Ornamental planting	The vegetation on site including mature trees appeared healthy. There is no on-site source of phytotoxic contaminants. Topsoil will be imported into landscaped areas as part of the landscaping scheme.	Low Risk	-

Source / Area of Concern	Contaminant (	Receptors	Likelihood of PPL Forming & Comment on Consequence	Risk Classification	Next Step in Procedure
		Groundwater – superficial (secondary A) and bedrock (principal) aquifer	PPL 1d: No significant source of leachable contaminants have been identified, however if present it is possible, they may leach into the underlying superficial aquifer. Possible that superficial and bedrock aquifers are in hydraulic connectivity.	Moderate/low risk	PPL 1d: Further Investigation & Assessment – see Section 5.4
		Surface Water – surface water drain c.50m to the west.	Surface water drain not a significant water course. Low likelihood contaminants will migrate laterally and deteriorate surface water quality.	Low Risk	-
Source 2 – Possible leaking sewer <i>Note: Anecdotal information indicates that the sewer crossing the south of the site may be leaking.</i>	Ammoniacal nitrogen	Groundwater – superficial (secondary A) and bedrock (principal) aquifer	PPL 2a&b: Leaking sewer identified on-site; historic monitoring well installed. Possible that untreated sewage is discharging into the ground.	Moderate Risk	PPL 2a&b: Further Investigation & Assessment – see Section 5.5
		Surface Water – surface water drain c.50m to the west.			
Source 3 –Off-site vehicle repair garage to the east. <i>Note: No spills or pollution incidents have been recorded from the adjacent properties.</i>	Hydrocarbons	Humans – Indoors: Future workers, residents & visitors	PPL 3a: Potential harm to human health from migration of volatile contaminants from off-site via NAPL migration and/or dissolved phase migration. Volatilisation of contaminants and inhalation of vapour.	Moderate/low risk	PPL 2a&b: Further Investigation & Assessment – see Section 5.6
		Groundwater – superficial (secondary A) and bedrock (principal) aquifer	PPL 3b: Potential harm to underlying aquifer from off-site contaminant source. Despite potential source being off-site, if contamination has occurred, the developer <i>could</i> be liable for remediation costs.	Moderate/low risk	

Source / Area of Concern	Contaminant (	Receptors	Likelihood of PPL Forming & Comment on Consequence	Risk Classification	Next Step in Procedure
Source 4--Contaminants within (yet to be) imported / site-won soils to be used in landscaped areas (subsoil & topsoil). <i>Note: It is possible that site-won soil will need to be supplemented with imported material in order to create the areas of soft landscaping planned.</i>	Various contaminants depending on the import source – possibly metals, hydrocarbons & PAH compounds	Humans – Indoors: Future workers, residents & visitors	PPL 4a: Potential harm to human health from exposure to contaminants within imported or site-won landscaping soils via ingestion (of soil and home grown produce), dermal contact and inhalation indoors (from soil brought into building).	Moderate/low risk	PPL 4a and 4b: Voluntary Preventative Action – in order to prevent the risks, the developer will control the quality of soils used in the landscaped areas – see Section 6.1
		Humans – Outdoors: Future workers, residents & visitors	PPL 4b: Potential harm to human health from exposure to contaminants within imported or site-won landscaping soils via ingestion, dermal contact and inhalation outdoors (from outdoor soil).	Moderate/low risk	
		Humans – Neighbours	Unlikely	Low Risk	-
		Property – Built Environment: Future buildings	Unlikely – Imported / site won material will only be used in landscaped areas.	Low Risk	-
		Property - Flora / Fauna: Ornamental planting	PPL 4c: Potential harm to plants from exposure to phytotoxic contaminants within imported or site-won landscaping soils. This pathway would be limited to proposed landscaped areas.	Moderate/low risk	PPL 4c: As above
		Surface Water	Unlikely	Low Risk	-
		Groundwater	Unlikely	Low Risk	-
Source 5 - Unidentified Contaminant Sources <i>Although unlikely, the possibility of unidentified contaminant sources should be anticipated.</i>	Unknown	Receptors as listed above	PPL 5: Potential Harm to Health or the Environment from Unidentified Contaminant Sources – Exposure Mechanism Unknown.	Moderate risk	PPL 3: If Needed - Voluntary Remedial Action – see Section 6.2.

5.0 Further Investigation and Assessment

From the list of PPL identified in **Section 4**, PPL1-3 requires further investigation. The proposed intrusive investigation excavation locations have not been developed at this time but need to take account of the historic layouts and proposed site layout. PPL 4 and PPL 5 are discussed in **Section 6**.

5.1 PPL 1a

Potential Harm to Human Health from Exposure to Contaminants Entering Water Supply Pipework

This PPL concerns ground conditions along the route of all proposed water supply pipes.

In January 2011, UK Water Industry Research (UKWIR) published "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Ref 10/WI/03/21; the 'UKWIR Guidance'). Its aim is to ensure that the correct materials are selected for water pipes and components to be used below ground in brownfield sites to protect the quality of drinking water whilst taking into account the service life of the water distribution system. (It superseded the Water Regulations Advisory Scheme (WRAS) Information and Guidance Note 9-04-03 "Laying Pipes in Contaminated Land" which has been withdrawn).

The UKWIR Guidance was supplemented in January 2014 by "Contaminative Land Assessment Guidance" published by Water UK which includes a risk assessment procedure for water pipes. The guidance is to be applied to greenfield and brownfield sites, but "*where greenfield sites are not affected by contamination a preliminary risk assessment [such as is presented in this document] will suffice*". The 2014 guidance gives some direction about when testing is needed, stating:

There are normally only three pathways by which contamination may come into contact with water pipes. These are direct contact with the soil or backfill, an excessive vapour phase or a contaminated groundwater regime. If none of these conditions exist on site (adopting the source, pathway, receptor concept) then it is likely that extended and/or targeted soil testing will not be required, and a simple risk assessment will suffice. For those sites where land may be affected by contamination appropriate testing shall be undertaken on the materials within which the pipes are to be laid, whether that be existing ground materials, remediated materials or imported capping materials.

The contaminants relevant to water pipes are organic, as per **Table 5-1**, overleaf, which is an extract of the guidance.

Those designing fieldwork and testing should take account of the fact that water pipes are normally laid at between 0.75 and 1.35m from finished ground level to crown of pipe. Samples taken and tested must represent both a) the soil in which the water pipes are to be laid and b) the soil down to at least 500mm below the underside of the proposed pipe. Where the proposed depth of the pipes is unknown at the time of application, soil samples representative of the ground condition between surface level and 1.5m below finished ground level shall be taken as a minimum. Where appropriate (see UKWIR Guidance) groundwater sampling and groundwater monitoring will also be necessary.

Table S-1:
 Extract from Contaminative Land Assessment Guidance published by Water UK

Test Group	Testing Required?	PE threshold (mg/kg)	Metal Pipes / Barrier Pipe
Total VOCs	Where Preliminary Risk Assessment (PRA) has identified land potentially affected by contamination	0.5	Pass
Total BTEX & MTBE		0.1	Pass
Total SVOCs (excluding PAHs and those substances marked with an *)		2	Pass
EC5-EC10 aliphatic and aromatic hydrocarbons		2	Pass
EC10-EC16 aliphatic and aromatic hydrocarbons		10	Pass
EC16-EC40 aliphatic and aromatic hydrocarbons		500	Pass
Phenols* (from SVOC analysis)		2	Pass
Cresols and chlorinated phenols* (from SVOC analysis)		2	Pass
Ethers*	Only where identified	0.5	Pass
Nitrobenzene*		0.5	Pass
Ketones*		0.5	Pass
Aldehydes*		0.5	Pass
Amines		Fail	Pass
Corrosive	Conductivity, Redox and pH	Pass	Wrapped steel, corrosive if pH<7 and conductivity > 400uS/cm. Wrapped ductile iron, corrosive if pH<5, Eh not neutral and conductivity > 400uS/cm. Copper, corrosive if pH <5 or >8 and Eh positive

SLR recommends an intrusive investigation (at 2-3nr locations) to 1.5m below finished ground level, along the likely route of all proposed water supply pipes to: 1) visually establish if natural ground / Made Ground is present and whether there are visual or olfactory signs of contamination; 2) establish the presence of hydrocarbon vapours with the use of a photo-ionisation detector (PID); and 3) allow the collection of soil samples for laboratory analysis. The testing should only be instructed if Made Ground is present or if organic contamination is suspected. The risk assessment as set out in the 2014 guidance should then be completed, and pipes selected taking account of ground conditions and any remediation proposed.

5.2 PPL 1b

Potential Harm to Human Health from Exposure to Contaminants in Made Ground

This PPL concerns existing ground conditions within the proposed landscaped areas and areas beneath the proposed building footprint if soils require excavation.

SLR recommends a shallow intrusive investigation and environmental screening to take account of the chemistry of soils within the proposed landscaped areas. Secondary to the assessment of PPL 1b, this investigation would provide the opportunity to assess the chemistry of any soils identified for off-site disposal – if required.

The results of any investigation should be used to inform generic risk assessments. It is likely that the local authority will require sight of the conclusion to those assessments prior to commencement of development and will require remedial plans to be put in place and implemented in the event the unacceptable risks to humans are found.

5.3 PPL 1c

Potential Damage to Future Building from Exposure to Aggressive (Made) Ground and Differential Settlement

This PPL concerns ground conditions across the area of all proposed foundations.

SLR recommends an intrusive geo-environmental investigation to provide foundation designers with information regarding aggressive ground conditions.

5.4 PPL 1d

Potential Pollution of Controlled Waters (Groundwater) by Contaminants in Made Ground

This PPL concerns ground conditions across the whole site, but mainly within the vicinity of the infilled pond.

SLR recommends an intrusive investigation to provide the scheme's environmental consultant with information about the presence / extent of any Made Ground and its chemistry. If significant concentrations of contaminants are revealed, then SLR would recommend a second phase of work to establish groundwater chemistry, through the installation of monitoring wells and collection and analysis of groundwater samples.

5.5 PPL 2a and 2b

Potential Pollution of Controlled Waters by Contaminants in Leaking from Broken Sewer

This PPL concerns contaminants leaking from a potential broken sewer in the south of the site. During the site walkover survey, a monitoring well was installed in close proximity to this area. SLR therefore recommends this monitoring well is sampled to establish groundwater chemistry. It is also recommended that analysis within any future wells should include analysis for ammoniacal nitrogen.

5.6 PPL 3a and 3b

Potential Harm to Human Health & Pollution of Controlled Waters by Contaminants Migrating from Off-site Vehicle Repair Garage

This PPL concerns hydrocarbons migrating onto site from the garage located immediately to the east of the site. Contaminants could migrate either dissolved within the groundwater, or as a non-aqueous phase liquid (NAPL).

SLR recommends investigation of shallow soils along the eastern site boundary, and analysis of groundwater samples from petroleum hydrocarbon products. Results should be interpreted initially in the context of a generic quantitative risk assessment (GQRA) for human health and Controlled Waters.

Where volatile contaminants are identified, further investigation and assessment may be necessary specific to the vapour migration pathway.

6.0 VOLUNTARY PREVENTATIVE AND REMEDIAL ACTIONS AND VALIDATION OF THOSE WORKS

6.1 Voluntary Preventative Action to Avoid PPL 4 (a-c)

Potential Harm to Human and Plant Health from Potential Contaminants in Imported / Site-Won Landscaping Soils

Based on SLR's knowledge of redevelopment sites, the Specification for Soft Landscape Works is likely to say:

"Do not use fill materials which would, either in themselves or in combination with other materials or groundwater, give rise to a health hazard, damage to building structures or instability in the filling, including material that is:

- ✦ *frozen or containing ice;*
- ✦ *organic;*
- ✦ *contaminated or noxious;*
- ✦ *susceptible to spontaneous combustion;*
- ✦ *likely to erode or decay and cause voids;*
- ✦ *with excessive moisture content, slurry, mud or from marshes or bogs;*
- ✦ *clay of liquid limit exceeding 80 and/or plasticity index exceeding 55; or*
- ✦ *unacceptable, class U2 as defined in the Highways Agency 'Specification for Highway works', clause 601".*

The specification will also set out how the sub-soil should be prepared and placed to a level allowing the later addition of:

- ✦ 150mm of topsoil – grassed areas; and
- ✦ 450mm of topsoil – shrub planting areas.

Any tree pits put in place are expected to be a minimum of 1,200mm diameter and 1,000mm deep to allow 300mm clearance between the root ball and the edge of the pit.

In terms of quality, site-won / imported topsoil is to be tested for compliance with BS 3882:2015¹, and compost tested against BSI PAS100.

The regulator may require evidence that the chemical composition of any imported / site derived growing media or soil is suitable for use. SLR predicts that the local planning authority's (LPA) preferred soil validation regime will depend on the source of the material. It is thought likely the developer, or their representative will need to:

- ✦ obtain chemical test certificates from the supplier of proposed landscaping materials and compare the results of the analyses to soil guideline values or generic health risk assessment criteria applicable to a residential setting without plant uptake;
- ✦ arrange for a UKAS and MCERTS accredited laboratory to test samples of the materials actually delivered to site:
 - at a rate to be agreed with the LPA; and for

¹ Specification for topsoil and requirements for use

- an analysis suite agreed by the LPA (most likely comprising CLEA metals, speciated total petroleum hydrocarbons, speciated polycyclic aromatic hydrocarbons, pH and soil organic matter);
- ✦ arrange for additional samples (beyond those pre-agreed with the LPA) to be collected and tested should any uncertainty arise as to the quality and / or origin of material brought onto site; and
- ✦ prepare and submit to the LPA a Land Quality Validation Report to demonstrate that suitable imported materials were placed - see **Section 6.4**.

SLR has advised the developer of the above, and recommends these matters are considered and appoint a suitable environmental consultant as soon as possible - certainly before they or their representative buy sub-soil and topsoil and carry out landscaping work.

6.2 If Needed - Voluntary Remedial Action to Break PPL 5

Potential Risks to Health or the Environment from Unidentified Sources

The LPA may use a planning condition whereby the developer must set forward voluntary additional measures to deal with any contamination encountered (beyond that contamination previously identified) as part of the redevelopment. In practise, should the developer encounter potentially hazardous materials work should cease in that area and the matter be referred to an appropriate environmental consultant.

Any remedial actions should be agreed with the Council and recorded in the Land Quality Validation Report - see **Section 6.4**.

6.3 Waste Stockpiles

During SLR's site walkover stockpiles of waste soil/rubble were revealed, which were found to contain fibre cement sheet fragments (likely to be asbestos). This material is unlikely to be suitable for re-use without pre-treatment. It is therefore recommended these be removed from site prior to the commencement of groundworks.

6.4 Land Quality / Remedial Works Validation Report

Any remedial works, including preventative quality assurance actions regarding landscape soils, will follow a period of liaison with the LPA in which final details of the remedial scheme will be agreed. The Council may or may not want to be informed of progress during the remedial works, but the regulator will require a report shortly after the works are complete. The Land Quality Validation Report, which should be submitted to the Council with an application to discharge the relevant condition, should:

- ✦ set out which organisations have been responsible for implementing and supervising the remedial works (any environmental consultant used should be suitably experienced and operate under an externally accredited quality assurance scheme e.g. ISO9001).
- ✦ provide the results of any inspection for contaminants and the remedial scheme;
- ✦ provide details for the suppliers of imported soils;
- ✦ present chemical test certificates from the supplier;

- ❖ make reference to the health risk assessment carried out prior to soil import and the scope of quality assurance works agreed with the Council (criteria & frequencies);
- ❖ present the results of laboratory tests on imported materials showing that:
 - ❖ the rate agreed with the Council was observed; and that
 - ❖ the analysis suite agreed by the Council was carried out;
- ❖ present the results of any additional testing (beyond that agreed with the Council);
- ❖ demonstrate that quality assurance procedures relevant to soil sampling, storage and testing were complied with (including the use of accredited laboratories and, where possible, the use of MCERTS testing methods);
- ❖ form a record of the remedial activities (and any changes to the remedial design) using as-built drawings, progress photographs, etc; and
- ❖ set out any additional remedial measures volunteered to deal with contamination (beyond that previously identified) encountered as part of the redevelopment.

DRAWINGS



LEGEND



SITE LOCATION



FRONTIER



SLR

global environmental solutions

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YAPTON ROAD POULTRY FARM
MIDDLETON-ON-SEA

LAND QUALITY RISK ASSESSMENT

SITE LOCATION PLAN

DWG No. 1

Scale

1:10,000 @ A3

Date

MAY 2019

06594.00008.019.001.0_SITE_LOC_PLAN.dwg

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TIN ROOF

POSSIBLE ASBESTOS ROOF

BRICK BASE COURSE

TIN ROOF

MW01

MANHOLE 3701

TYRES

POSSIBLE ASBESTOS
ROOF AND WALLS

SITE ACCESS

VEHICLE REPAIR GARAGE

SILVER BIRCH DRIVE

YAPTON ROAD

Middleton
Business Park

FRONTIER

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global environmental solutions

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YAPTON ROAD POULTRY FARM
MIDDLETON-ON-SEA
LAND QUALITY RISK ASSESSMENT
SITE LAYOUT PLAN

DWG No. 2

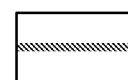
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Date
MAY 2019

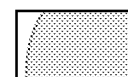
NOTES

1. DRAWING IS BASED ON EDMUND WILIAMS
SITE LOCATION/EXISTING DRAWING, DATED
FEB 2019.

LEGEND



SITE BOUNDARY



DENSE VEGETATION



HISTORIC MONITORING
WELL IDENTIFIED DURING
WALKOVER



SOUTHERN WATER
MANHOLE, REF:3701



SMALL STOCKPILES
CONTAINING: SOIL, TIMBER,
DEMOLITION MATERIAL,
TYRES, CEMENT SHEETING
(POSSIBLY CONTAINING
ASBESTOS)

