

Flood Risk Assessment and Drainage Strategy

Upper Seagry – Commercial

For and on behalf of:
Thala Family Investments

July 2025

Report title:

Flood Risk Assessment and Drainage Strategy

Site name:

Upper Seagry – Commercial

For and on behalf of:

Thala Family Investments

Prepared by:

Andy Clay BSc MSc PhD
Flood and Drainage Consultant

Date issued:

July 2025

Sustain Environmental Ltd disclaims any responsibility to the client and others in respect of matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence. This report is confidential to the client and Sustain Environmental Ltd accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

CONTENTS

1	INTRODUCTION	1
	Scope of the Assessment.....	1
	Limitations of the Assessment.....	2
2	PLANNING POLICY AND CONSULTATION	3
	National Planning Policy	3
	Sequential Test and Exception Test	4
	National Standards for Sustainable Drainage Systems	5
	Local Planning Authority	6
	Lead Local Flood Authority:.....	7
	Pre-Application Consultation.....	8
3	SITE DESCRIPTION.....	9
	Site Setting and Location	9
	Existing Site Layout.....	10
	Proposed Development.....	11
	Topography	11
	Hydrology	12
	Geology	13
	Hydrogeology	13
	Soils	13
	Soil Infiltration	14
	Drainage Infrastructure	15
4	ASSESSMENT OF FLOOD RISK.....	17
	Fluvial and Tidal Flood Risk.....	17
	Surface Water Flood Risk	18
	Groundwater Flood Risk.....	19
	Other Sources of Flood Risk.....	20
	Drainage and Infrastructure Flood Risk.....	20
5	FLOOD MITIGATION.....	21
6	DRAINAGE STRATEGY.....	22
	Surface Water Discharge Receptor.....	22
	Surface Water Drainage Design	25
	Exceedance Events.....	29
	Water Quality.....	30
	Management and Maintenance.....	31
	Foul Drainage	33

7 CONCLUSIONS..... 35

APPENDICES

Appendix A – Existing Site Layout
Appendix B – Proposed Development Layout
Appendix C – Topographical Survey
Appendix D – Phase 1 and 2 Desk Study and Ground Investigation
Appendix E – Information from Wessex Water
Appendix F – EA Flood Map for Planning
Appendix G – Drainage Strategy Layout and Calculations

1 INTRODUCTION

- 1.1 This Flood Risk Assessment (FRA) is for a site north of Henn Lane in the village of Upper Seagry, Wiltshire. It has been prepared by Sustain Environmental (SE) on behalf of Thala Family Investments (the Seagry House Estate) for a proposed commercial development.
- 1.2 The proposed development consists of four flexible B8 storage and distribution and/or Class E(g) commercial, business and service units and one building for mixed-use agricultural and equestrian workshop storage, office and stables.
- 1.3 The site has an area of 0.95ha and a central post code of SN15 5JZ and OS national grid reference of E: 394490 and N: 180778.
- 1.4 The Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA) are Wiltshire Council (WC). Wessex Water (WW) are the local sewerage provider.
- 1.5 This FRA and Drainage Strategy is submitted in support of a planning application for the proposed development of the site.
- 1.6 This FRA makes reference to the pre-application response(s) of the Council and the following appended information:
 - Appendix A – existing site layout;
 - Appendix B – proposed development layout;
 - Appendix C – topographical survey;
 - Appendix D –Phase 1 and 2 Desk Study and Ground Investigation;
 - Appendix E – information from WW;
 - Appendix F – EA Flood Map for Planning; and
 - Appendix G – drainage strategy layout and calculations.

Scope of the Assessment

- 1.7 This FRA has been produced to support the submission of a planning application for a proposed commercial development of the site.

- 1.8 The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG) as well as the local planning policy of WC and the guidance of WW.
- 1.9 The aim of this FRA is to demonstrate that the site can be developed safely, without exposing it to unacceptable risks from flooding or increasing the flood risk to third parties.

Limitations of the Assessment

- 1.10 The general limitations of this assessment are that:
- A number of sources have been used to compile this FRA. Whilst SE believes them to be trustworthy; SE is unable to guarantee the accuracy of the information provided by others.
 - This FRA is based on information available at the time of preparation. Consequently, there is potential for further information to become available. This may lead to future alteration to the conclusions that have been drawn in this report, for which SE cannot be held responsible.

2 PLANNING POLICY AND CONSULTATION

National Planning Policy

- 2.1 The National Planning Policy Framework (NPPF) sets out the national policies for flood risk management in a planning context. The revised NPPF was published in December 2024, replacing the previous published version
- 2.2 As part of the planning process, the NPPF requires that:
- A site-specific Flood Risk Assessment (FRA) will be undertaken for any site that has a flood risk potential;
 - Flood risk potential is minimised by applying a 'sequential approach' to locating 'vulnerable' land uses;
 - Sustainable drainage systems (SuDS) are used for surface water disposal where practical;
 - Flood risk is managed using flood resilient and resistant techniques, and;
 - Residual risks are identified and safely managed.
- 2.3 In terms of the flood risk classification, the NPPF categorises this into Flood Zones:
- Flood Zone 1 – Low probability (< 1 in 1000 years);
 - Flood Zone 2 – Medium probability (1 in 1000 to 1 in 100 years); and
 - Flood Zone 3 – High probability (> 1 in 100 years).
- 2.4 Sites that are located in Flood Zones 2 and 3 require a site-specific FRA to be provided, to assess the flood risks to and resulting from the proposed development and where required to provide appropriate mitigation and management measures.
- 2.5 In addition, sites with an area that is greater than 1ha would also require an FRA to be provided. This is due to the potential for the development of such a sizeable site to impact upon the surface water runoff regime and, as a consequence, to change the flooding over the site and surrounding area.
- 2.6 The site area in the case of this proposed development is less than 1ha. However, a FRA and Drainage Strategy has been provided for completeness

and to set out the measures for the management of surface water and foul drainage.

- 2.7 The NPPF classifies different types of land use and development in accordance with their vulnerability to flooding. This uses a classification of Highly Vulnerable, More Vulnerable and Low Vulnerable also Essential Infrastructure and Water Compatible Development.
- 2.8 The NPPF then sets out a matrix based on the results of the Flood Zones and the Flood Risk Vulnerability Classification, included below as **Figure 2.1**. This indicates whether the proposed land use would normally be considered to be incompatible or compatible for location in that particular area.
- 2.9 The NPPF classifies commercial uses as Less Vulnerable development. This is considered to be appropriate for locating in Flood Zones 1, 2 and 3a.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Figure 2.1 – Development Compatibility and Incompatibility

Sequential Test and Exception Test

- 2.10 The NPPF states that development should be located in flood zones with the lowest probability of flooding. This should be achieved by application of the Sequential Test, which aims to steer new development to areas with the lowest probability of flooding.
- 2.11 Where new development is proposed in areas of higher risk, the policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

- 2.12 In terms of the approach for providing flood and drainage advice to the development layout, Paragraph 175 of the NPPF advises the following:

“The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).”

- 2.13 In flood-affected areas, the Exception Test is a method to demonstrate that the flood risk to people and property will be managed satisfactorily. This can allow necessary development to go ahead in situations where suitable sites at a lower level of risk are not available.

- 2.14 The Exception Test requires a proposed development to demonstrate that it will:

- Provide wider sustainability benefits to the community that outweigh flood risk, and;
- That it will be safe for its lifetime, without increasing flood risk elsewhere and, where possible, to reduce flood risk overall.

National Standards for Sustainable Drainage Systems

- 2.15 The national standards for SuDS in England were released in June 2025. These provide information for designers, property developers, local authorities and other interested parties, such as sewerage undertakers and the EA. They also contain links to additional supporting information relating to SuDS.
- 2.16 The standards are intended for application in the design of surface water drainage systems for new infrastructure and development on greenfield and brownfield sites. The standards only apply to the management of surface water runoff that is essentially uncontaminated and consists predominantly of rainwater.

- 2.17 Although the standards apply for developments which include road drainage, they are not intended to be applied to the trunk road network managed by National Highways. Equivalent provision for SuDS for these roads is contained in the Design Manual for Roads and Bridges (DMRB).
- 2.18 The principles for the surface water drainage system design explain the objectives and approach for applying the standards. There are two types of standards:
- The hierarchy standard (standard 1) gives criteria for prioritising the choice of final runoff destination; and
 - Fixed standards (standards 2 to 7) state the minimum design criteria that all surface water drainage systems should satisfy and how they should be built, maintained and operated.
- 2.19 Both types of standards have accompanying requirements which provide detail on how to interpret, deliver and evaluate each standard.
- 2.20 The standards are complementary, and the delivery of each standard should support the delivery of the other standards. A surface water drainage system design that delivers multiple benefits will include a range of features and each of these should contribute to the delivery of several, if not all, of the standards.
- 2.21 However, there may be specific circumstances or constraints, such as the type or size of a development that mean it is not possible to deliver one or more of the standards. In these circumstances, the opportunity to meet the standard shall be maximised and justification be developed in consultation with the approving body, who may agree to a departure unless regulatory controls prohibit such a departure.

Local Planning Authority

- 2.22 The LPA for this area is WC. The Core Strategy for WC (2015) includes policies of relevance to the assessment of flood risk and drainage.
- 2.23 Core Policy 67 (Flood Risk) states that all new development will include measures to reduce the rate of rainfall run-off and improve rainwater infiltration

to soil and ground (sustainable urban drainage) unless site or environmental conditions make these measures unsuitable.

Lead Local Flood Authority:

- 2.24 The LLFA for this area is WC. This means that WC have a leadership and coordinating role for flood risk resulting from surface water runoff, ordinary watercourses and groundwater across the authorities area.
- 2.25 WC provides advice on flood risk management and also a Local Flood Risk Management Strategy (LFRMS). The LFRMS was published in April 2015.
- 2.26 The LFRMS advises that flood risk within Wiltshire is often a complex interaction between river, surface, groundwater and sewer flooding, and the local geology is a significant factor.
- 2.27 The northern part of the county is predominately underlain by clay, with flooding generally caused by river or excessive surface water runoff. The southern part of the county is characterised by underlying chalk deposits, and there is the potential risk of groundwater flooding in certain areas.
- 2.28 WC's Local Flood Risk Management Strategy seeks to:
- Improve knowledge regarding flood risk;
 - Improve protection from flooding;
 - Improve resilience to flooding;
 - Improve the environment; and
 - Improve communications about flooding issues.
- 2.29 WC produced a Strategic Flood Risk Assessment (SFRA), dated May 2019.
- 2.30 The SFRA forms part of a comprehensive and robust evidence base for the Local Plan which will set out a vision and framework for development in Wiltshire up to 2036. This is also used to guide the Sequential Test and decisions on the location of future development.

- 2.31 The SFRA is additionally used to assess planning applications, and flood risk mapping information will be made available to developers for carrying out Flood Risk Assessments.
- 2.32 The Groundwater Management Strategy for WC was published in 2016. It advises that flood risk in Wiltshire is often a complex interaction between, river, surface and groundwater.
- 2.33 Local geology plays a significant factor as the northern part of Wiltshire is predominately clay, where flooding is caused generally by river or excessive surface water runoff, although there are some areas that are susceptible to groundwater flooding where they are underlain by sand and gravel deposits. Whereas the southern and eastern parts of Wiltshire sit above chalk aquifers, where there is a greater potential risk of flooding from groundwater.
- 2.34 Amongst other things, the strategy seeks to give guidance on areas within Wiltshire that are susceptible to groundwater flooding; determine the level of detail required when development is within groundwater areas; to outline methods for dealing with groundwater by resolving flow path and receptor routes; and give guidance and specifications for future development.

Pre-Application Consultation

- 2.35 The response from pre-application consultation with WC included advice in relation to flood risk and drainage. These comments have informed the approach that has been taken in this FRA and Drainage Strategy.

3 SITE DESCRIPTION

Site Setting and Location

- 3.1 The village of Upper Seagry is approximately 1km north of the M4 motorway and 9.6 km north of the town of Chippenham. Together with the neighbouring locality of Lower Seagry, the area is collectively known as Seagry.
- 3.2 The village is centred around main streets, comprising Startley Road and Henn Lane, which runs north to south and to the west. The rural setting features a mix of traditional farmhouse-style properties and detached family houses.
- 3.3 Along the main street, houses are set back from the road, with front gardens, driveways, and boundaries defined by walls, fences or vegetation.
- 3.4 Beyond the residential area, the surrounding landscape consists primarily of farmland, open countryside, woodland and the Seagry House Estate.
- 3.5 Details of the existing site layout are included as **Appendix A** and a site location plan also showing the site extent is included as **Figure 3.1**.



Figure 3.1 – Location Plan and Approximate Site Extent

- 3.6 The application site is located to the south-east of Seagry House, with access to the public highway via Henn Lane to the south and Startley Road to the east.

3.7 To the north of the site lies the currently unused village cricket pitch, which forms part of the Seagry Estate. To the east and south of the site is a cluster of dwellings collectively known as 'The Courtyard'. Further east, there are three large homes and which have been constructed within the past decade.

3.8 The Seagry Estate extends to the east of the site and is owned by the applicant.

Existing Site Layout

3.9 A plan of the existing site layout has been included as **Figure 3.2** and with photos of the site and surrounds included as **Appendix A**.

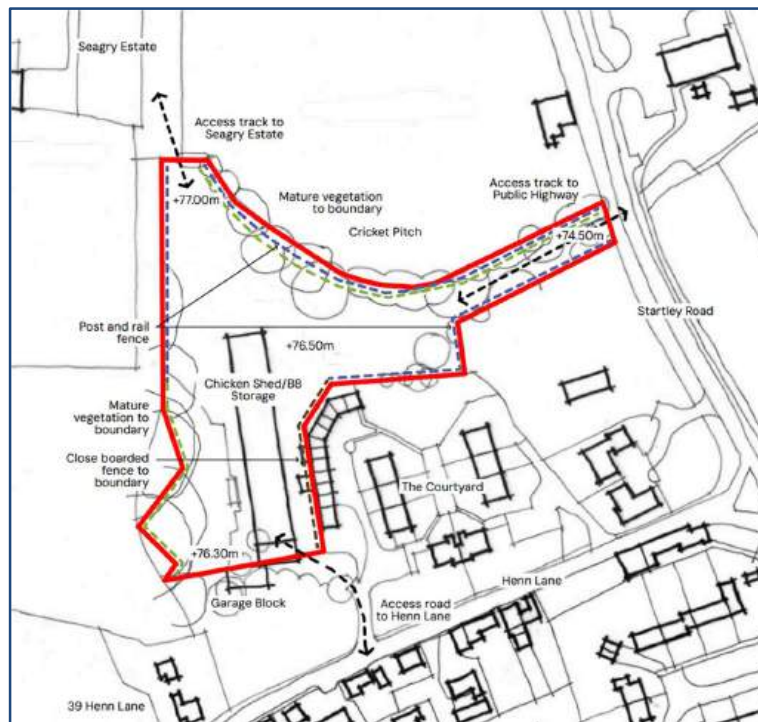


Figure 3.2 – Existing Site Layout

3.10 There is an access track leading to the Seagry Estate in the northern corner of the site. To the north-east, a narrow strip of land connects the site to the public highway, with another access track located here. In the south-eastern corner, a gated access opens onto Henn Lane via a short, single-lane tarmac track.

3.11 The northern boundary is adjacent to the cricket ground. The western boundary is adjacent to the Seagry Estate. The south-western corner of the site is adjacent to 39 Henn Lane and the eastern boundary is adjacent to The Courtyard.

- 3.12 Within the site, there is a large, single-story timber storage and fibre cement sheet covered (lawful B8) former “chicken shed” that is structurally unsound and in a state of disrepair. This shed occupies the central open area of the site, alongside a garage block and several smaller storage structures.
- 3.13 The site features a variety of mature, well-established trees, which are integral to the landscape but also a number of dead and dying Ash trees and self seeded Sycamore. Apart from the trees, the site is predominantly covered with trackways, hard-surfacing, grass, native hedgerows and bushes.
- 3.14 An existing water tank, notable for its aesthetic appeal and general historical interest, is located on the site. The proposal includes re-positioning this tank as a central feature of the new development, serving as an entrance marker or way-point to maintain a connection to the site's history.

Proposed Development

- 3.15 A plan of the proposed development has been included as **Appendix B**.
- 3.16 The eastern part of the proposed development includes the site access carriageway and footway and junction with Startley Road. The western part of the site layout is divided into two distinct areas: Block A and Block B.
- 3.17 Block A is a two-story building housing workshop, storage, and office spaces for the Seagry Estate. This block also includes a stable for three horses and a covered parking area, arranged in a courtyard layout.
- 3.18 Block B is a two-story building comprising four rental units with parking opposite, along with bin/bike storage and a breakout space. The layout is designed around the existing trees and their root protection zones (RPZs) while adhering to previously defined parameters.

Topography

- 3.19 A topographical survey of the site and surrounds is included as **Appendix C**, with all levels recorded as metres Above Ordnance Datum (m AOD).

- 3.20 Ground levels in the northern corner are +77.00m, and the site slopes gently down to the southern boundary, to a ground level of +76.30m. There is a fall in ground levels from the centre of the site towards the eastern boundary and vehicle access point onto Startley Road, where the ground levels drop to +74.50m. There is also a fall in ground levels from the centre of the site towards the south-western boundary, where the ground levels drop to +74.25m.

Hydrology

- 3.21 Information on hydrological catchments is provided by Defra and the EA for the ten river basin districts in England. The site is located in the river basin district of the Severn.
- 3.22 There are 11 management catchments in this river basin district. The site is located in the Avon Bristol and Somerset North Streams management catchment.
- 3.23 There are 4 operational catchments in this management catchment. The site is located in the Avon Bristol Rural operational catchment.
- 3.24 There are 73 waterbodies in this operational catchment. The eastern part of the site is located in the Avon (Bristol) waterbody in the section between the Tetbury Avon and the River Marden waterbody. The western part is located in the Sutton Bengar Brook waterbody in the section between the source and the River Avon (Bristol) waterbody.
- 3.25 There is a watercourse to the east of the site, on the eastern side of Startley Road, which drains away to the east. Based on the hydrological description as above, this watercourse is in the catchment of the Avon (Bristol) waterbody.
- 3.26 There is a drainage ditch on the west side of Startley Road, adjacent to the eastern site boundary. There is a culvert under Startley Road which drains to a headwall chamber on the east side of Startley Road, and then to this watercourse. A photo of the headwall chamber is included in **Appendix A**.
- 3.27 There is a watercourse to the south-west of the site, with this located on the boundary of the clients land ownership. This drains in a south-easterly direction

and under Henn Lane. Based on the hydrological description as above, this watercourse is in the catchment of the Sutton Bengar Brook waterbody.

- 3.28 In addition to these local watercourses, there are some existing ponds to the west of the site, located within the gardens of Seagry House. There is a private surface water sewer to the south-west of the site, located within the clients land ownership. It is understood that this is conveying surface water runoff from The Courtyard and discharging it to these ponds and then to the waterbody.

Geology

- 3.29 The 1 to 50,000 scale British Geological Survey (BGS) online mapping provides an understanding of bedrock geology and whether there are any superficial deposits recorded.
- 3.30 The bedrock geology is the Kellaways Sand Member, which is described as a sandstone. The bedrock geology to the west is the Kellaways Clay Member, which is described as a mudstone. There are no superficial deposits recorded.

Hydrogeology

- 3.31 The BGS and EA jointly provide a dataset that classifies the aquifer designations. The designations reflect the importance of aquifers in terms of groundwater as a resource and in supporting surface water flows.
- 3.32 The eastern part of the site is on the outer edge of a Secondary A Aquifer for the bedrock geology.
- 3.33 Secondary A Aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers.

Soils

- 3.34 An understanding of the local soil types has been provided through a review of the information available from the Land Information System (LandIS), which is an online based product of the National Soil Resources Institute at Cranfield Environment Centre.

- 3.35 The local soils are described as loamy some clays, which typically would have slightly impeded drainage.

Soil Infiltration

- 3.36 A Phase 1 and 2 Desk Study and Ground Investigation has been completed, with the summary report included as **Appendix D**. This included trial pits at locations across the site and with soakway testing completed in April 2025 to determine the potential for soil infiltration.
- 3.37 The trial pits were machine excavated at six locations across the site (TP1 to TP6), as shown in **Figure 3.3**. The substrate encountered in the trial pits was logged with depth, with this typically with clay and silt or very silty sand.

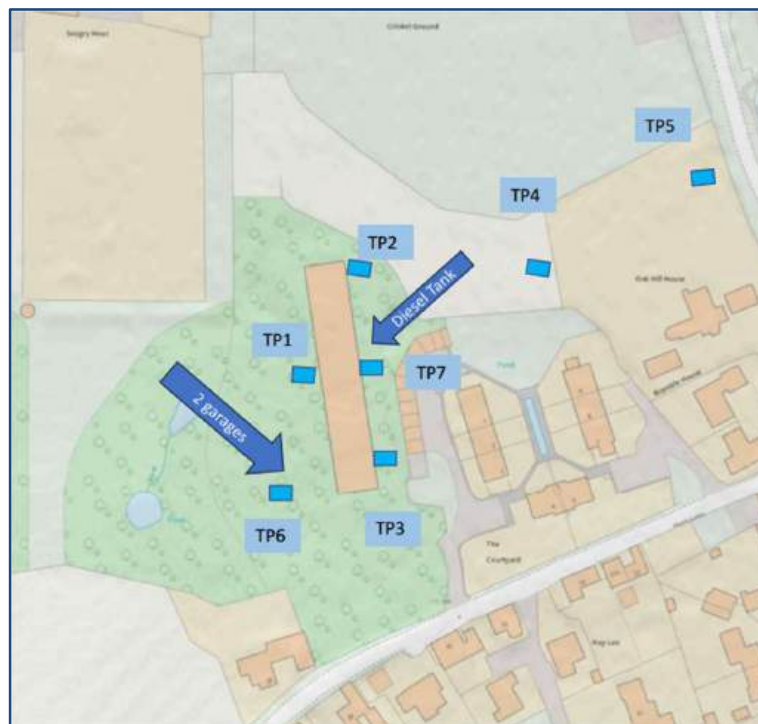


Figure 3.3 – Location of Trial Pits and Soakaway Testing

- 3.38 The trial pits were excavated to a depth of approximately 3.6m. There was no standing groundwater or seeping water encountered in any of the trial pits.
- 3.39 Soakaway testing was completed in three of the trial pits (TP1, TP4 and TP5) in general accordance with BRE Digest 365. There was no significant infiltration at these locations, demonstrating that infiltration drainage would not be viable.

Drainage Infrastructure

- 3.40 The public sewerage authority is WW, with mapped information and consultation with WW included as **Appendix E**.

Surface Water Drainage:

- 3.41 WW advise that surface water from the proposed development should be disposed of in accordance with NPPF Guidelines and the sustainable drainage hierarchy and should be discharged to local land drainage systems.
- 3.42 WW advise that the surface water strategy is subject to the approval of LLFA and drainage arrangements and discharge rates must be discussed and agreed with the Wiltshire Council drainage engineer.
- 3.43 The sewer plan from WW does not show there to be public surface water sewers across the site or immediate surrounds. There are surface water sewers to the east of the site associated with The Courtyard, but with these a part of a drainage network that is of a limited extent.
- 3.44 WW have advised that no surface water runoff, land drainage or groundwater will be accepted into the public foul sewer either directly or indirectly.
- 3.45 There is a private surface water sewer to the south-west of the site and located within the clients land ownership, with this understood to be conveying surface water runoff from The Courtyard and discharging it to the adjacent ponds.
- 3.46 This appears to be a relatively recent sewer. Manhole chamber levels were not recorded at the time of the topographic survey.
- 3.47 A manual measurement of the sewer depth was completed during the site visit, with this demonstrating the sewer to be at least 2.5m beneath the cover level.

Foul Drainage:

- 3.48 WW advise that land contours indicate the site levels to fall in a south-westerly direction. There does not appear to be a point of connection readily available in open access area or public highway in the immediate vicinity of the site.

- 3.49 WW advise that there is a 150mm public foul sewer that runs to the south of the site behind properties on Henn Lane. This sewer runs through third party land to the Upper Seagry sewage pumping station.
- 3.50 A new 150mm offsite gravity sewer could run from the site boundary across land owned by the applicant and then to a point where it can connect to the public foul sewer in the vicinity of manhole ST94804606 near the Upper Seagry pumping station.
- 3.51 WW go on to advise that this would require private agreement, or a S98 sewer requisition application to lay a new sewer across third party land to achieve a foul connection. As part of a S98 sewer requisition application to cross third party land, WW would have to look at all options for connection.

4 ASSESSMENT OF FLOOD RISK

- 4.1 An assessment of flood risk sources to the site and resulting from the proposed development has been completed.
- 4.2 This has determined the requirement for any mitigation measures to make the development safe from flooding and/or to manage adverse flood risks that may result elsewhere.

Fluvial and Tidal Flood Risk

- 4.3 The EA has the delegated responsibility for producing Flood Zones in line with government guidance. The Flood Zones show the extent of land at present day risk of flooding from rivers and the sea, ignoring the benefits of flood defences.
- 4.4 From 25th March 2025, the Flood Zones have been produced as part of the National Flood Risk Assessment (NaFRA2). This uses new national modelling alongside local models. The updated Flood Map for Planning (FMfP) will combine several datasets to create a picture of flood risk, including:
- Un defended – flood defences are removed or de-activated;
 - Defended – existing flood defences are present and operational;
 - Recorded Flood Outlines – from past floods; and
 - Other suitable data from third parties.
- 4.5 The Flood Zones on the FMfP indicate the present-day chance of flooding from tidal and/or fluvial sources during high, medium and low probability events. Based on the locality of the site in the hydrological catchment, the flood source in this area would be fluvial only.
- 4.6 Dark blue areas on the FMfP are classified as Flood Zone 3 with a 1 in 100-year probability of occurrence; light blue areas as Flood Zone 2 with between a 1 in 100-year and 1 in 1000-year probability; and areas with no colour as Flood Zone 1 with a 1 in 1000-year probability.
- 4.7 The FMfP is included as **Appendix F**, with an extract of the Flood Zones and for where the site is located included as **Figure 4.1**.

- 4.8 This shows the site to be located in Flood Zone 1, indicating a low level of flood risk from fluvial and tidal sources.
- 4.9 Flood Zone 1 is described in the NPPF as an area of low fluvial and/or tidal flood risk, with the flood risk vulnerability of this area deemed to be compatible for all development types.

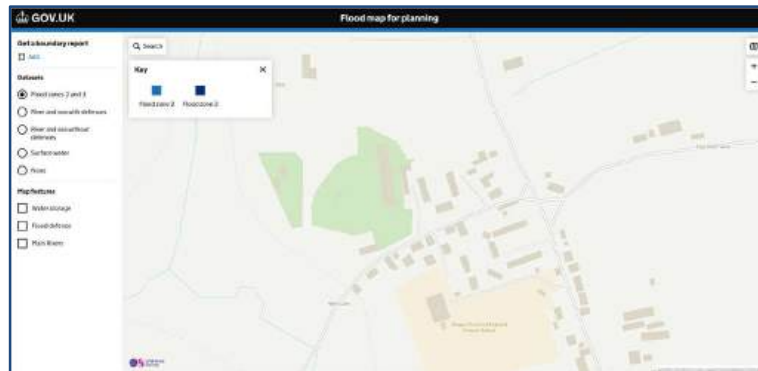


Figure 4.1 – Flood Map for Planning (Flood Zones 2 and 3)

- 4.10 The FMfP also provides an understanding of flood extents with the removal of any flood defences and in the future as a result of climate change in a 1 in 100-year and 1 in 1000-year flood event. The implications of these scenarios have been considered, with the site still shown to be unaffected by fluvial flooding.

Surface Water Flood Risk

- 4.11 Surface water flooding is a result of overland flow and ponding due to saturated ground that can follow a heavy rainfall event.
- 4.12 The FMfP includes flood extents from surface water flooding with the NAFRA2 release of the Risk if Flooding from Surface Water (RoFSW). A review of the RoFSW that is available from the FMfP has therefore been completed.
- 4.13 The FMfP provides flood events resulting from surface water flooding with a 1 in 30-year, 1 in 100-year and 1 in 1000-year storm event.
- 4.14 With a 1 in 30-year storm event, the site is mainly unaffected by surface water flooding. There is a surface water flow path to the north-west of the existing building. There is also a surface water flow path along Startley Road to the east of the site, and which flows along the route of the watercourse to the east.

- 4.15 With a 1 in 100-year storm event, the site is still mainly unaffected by surface water flooding. The surface water flow paths become slightly more pronounced, as shown in **Figure 4.2**. There could also be some localised surface water ponding in the eastern part of the site in the area next to Startley Road.
- 4.16 With a 1 in 1000-year storm event, the site is still mainly unaffected by surface water flooding. The surface water flow paths and areas of ponding become slightly more pronounced but they do not affect the main site area.

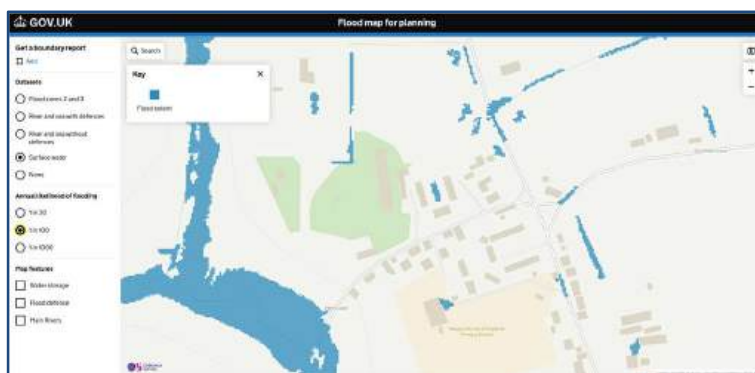


Figure 4.2 – Flood Map for Planning (1 in 100-year Surface Water)

Groundwater Flood Risk

- 4.17 Groundwater flooding is more typically associated with low-lying areas that are underlain by permeable rocks, although it can occur where the groundwater table is perched. This is where groundwater is held within a porous media at an elevation that is higher than the local or regional groundwater table, such as with superficial floodplain deposits.
- 4.18 The site is located in the northern part of Wiltshire, and where the SFRA advises that flooding is caused generally by river or excessive surface water runoff, although there are some areas that are susceptible to groundwater flooding where they are underlain by sand and gravel deposits.
- 4.19 The bedrock geology is the Kellaways Sand Member, which is described as a sandstone. The bedrock geology to the west is the Kellaways Clay Member, which is described as a mudstone. There are no superficial deposits recorded. The site is on a Secondary A Aquifer for the bedrock geology.

- 4.20 A ground investigation was completed which included trial pits at locations across the site and soakway testing completed in April 2024. The trial pits were excavated to a depth of approximately 3.6m. There was no standing groundwater or seeping water encountered in any of the trial pits.
- 4.21 The Long Term Flood Map provides an understanding on the potential risk from groundwater flooding. From a check of locations around the periphery of the site, this has concluded that flooding from groundwater is unlikely.

Other Sources of Flood Risk

- 4.22 Other sources of flooding include artificial and impounded waters, such as reservoirs, lakes and canals.
- 4.23 The Long Term Flood Map provides an understanding on the potential risk from reservoir flooding. From a check of locations around the periphery of the site, this has concluded that flooding from reservoirs is unlikely.
- 4.24 As noted earlier, there are some existing ponds to the west of the site. These are located at a lower ground level to the site and adjacent to ground that falls away to the south-west and away from the site. If there were to be flooding associated with these ponds, then it would not affect the site.

Drainage and Infrastructure Flood Risk

- 4.25 Drainage and infrastructure flooding can occur when sewers become overwhelmed and result in flooding, which may occur alone or be combined with other flood sources (e.g. fluvial or surface water).
- 4.26 There are no public sewers shown across the site, with those in the wider area at a lower ground level to the site. If there were to be a surcharge from these sewers and flooding, then it would not affect the site.
- 4.27 There is a private sewer to the south-west of the site, with this conveying surface water runoff from The Courtyard. This appears to be a relatively recent sewer, and therefore it has been assumed that there are no drainage constraints or flooding associated with this system.

5 FLOOD MITIGATION

- 5.1 Following the assessment of flood risk, certain mitigation and management measures are suggested for proposed development of the site.
- 5.2 The finished floor level of buildings would be elevated above surrounding ground levels to protect against the possibility of shallow ponding from prolonged rainfall.
- 5.3 The finished floor level of new buildings should typically be set to at least the greatest of:
- 600mm above the design 1 in 100-year fluvial flood level, with the appropriate allowance for climate change depending on the expected life of the development;
 - 300mm above the design water level in any local foul, combined or surface water drainage system; or
 - 150mm above local ground levels to minimise flood risk.
- 5.4 A surface water drainage strategy would be incorporated into the layout, with measures for managing the surface water runoff from the proposed development.
- 5.5 The surface water drainage strategy would incorporate a series of SuDS features into the layout, as described in Section 6 of this FRA.

6 DRAINAGE STRATEGY

- 6.1 The NPPF states that flood risk to land and property must not be increased as a result of development, and would need to make an appropriate allowance for the projected impacts resulting from climate change in the future.
- 6.2 WC as the LPA and LLFA provide planning policy on the approach for managing surface water runoff from new development sites and the use of SuDS drainage features.
- 6.3 The national guidance in the NPPF and the national standards for SuDS are of particular importance for the design of an appropriate surface water drainage strategy in new development sites.
- 6.4 These local and national requirements as summarised earlier in the FRA form the basis of the surface water drainage strategy for the proposed development of the site, as described below.
- 6.5 The key components of a surface water drainage strategy are to consider the potential for infiltration; to determine an appropriate and available discharge receptor; to define the conveyance routes across and from the site; and then, to assess the impact of the development on surface water runoff, and the mitigation measures required to manage these to an acceptable level.
- 6.6 Additional considerations are the environmental and community benefits that a well-incorporated and multifunctional SuDS solution can bring to the proposed development, such as to water quality, biodiversity, landscape, recreational amenity and to provide a network of green and blue corridors.

Surface Water Discharge Receptor

- 6.7 The guidance in the NPPF on the use of SuDS promotes the use of the sustainable discharge hierarchy for the discharge of surface water. Standard 1 from the national standards for SuDS also relates to runoff destinations. This advises that runoff shall be discharged to the following final destinations, to the maximum extent practicable, in accordance with the below hierarchy:

- Priority 1: collected for non-potable use;
- Priority 2: infiltrated to ground;
- Priority 3: discharged to an above ground surface waterbody;
- Priority 4: discharged to a surface water sewer, or another piped surface water drainage system; and then
- Priority 5: discharged to a combined sewer.

6.8 The aim should be to discharge surface water runoff as high up the hierarchy as reasonably practicable, and to demonstrate the reasoning behind the decision-making process.

Collected for non-potable use:

6.9 Consideration has been given to the incorporation of rainwater harvesting facilities, either as water butts at the base of downpipes or as a subsurface tank. The intention would then be for this collected water to be used for watering landscaping and/or as a grey water supply for flushing toilets.

Infiltrated to ground:

6.10 The bedrock geology is the Kellaways Sand Member, described as a sandstone. There are no superficial deposits recorded. The local soils are described as loamy some clays, and typically have slightly impeded drainage.

6.11 A ground investigation was completed which included trial pits across the site and soakway testing. Soakaway testing was completed in general accordance with BRE Digest 365. There was no significant infiltration at the tested locations, demonstrating that infiltration drainage would not be viable.

Discharged to an above ground surface waterbody:

6.12 The eastern part of the site is located in the hydrological catchment of the Avon (Bristol) waterbody. There is a watercourse to the east of the site, on the eastern side of Startley Road, which drains away to the east. There is a drainage ditch on the west side of Startley Road, adjacent to the eastern site boundary. There is a culvert under Startley Road which drains to a headwall chamber on the east side of Startley Road, and then towards the Avon (Bristol) waterbody.

6.13 The western part of the site is located in the hydrological catchment Sutton Bengar Brook waterbody. There is a watercourse to the south-west of the site, and on the boundary of the clients land ownership. This drains in a south-easterly direction and under Henn Lane, and then to this waterbody. There are some existing ponds to the west of the site.

6.14 As the site drains in two directions to different waterbodies, there would need to be a surface water drainage strategy that retained this drainage regime.

Discharged to a surface water sewer, or another piped surface water drainage system:

6.15 There are no public surface water sewers across the site or immediate surrounds. There are surface water sewers to the east of the site associated with The Courtyard, but with these a part of a drainage network that is of a limited extent. There is a private surface water sewer to the south-west of the site, with this understood to be conveying surface water runoff to the ponds to the west of the site and then to the watercourse to the south-west of the site.

Discharged to a combined sewer:

6.16 There are no public combined sewers across the site or immediate surrounds. There are some public foul sewers in the area. However, WW have advised that no surface water runoff, land drainage or groundwater will be accepted into the public foul sewer either directly or indirectly.

Summary:

6.17 Based on the review of options in accordance with the sustainable drainage hierarchy, the western part of the surface water drainage strategy will be designed to drain to the west and the eastern part to the east.

6.18 The western part of the site would drain to the manhole of the private surface water sewer that is to the south-west of the site. This would drain to the existing ponds that are to the west of the site, and which then drain to the watercourse to the south-west of the site, and on the boundary of the clients land ownership.

- 6.19 The eastern part of the site would continue to drain to the drainage ditch adjacent to the eastern boundary, with this draining to a culvert under Startley Road which drains to a headwall chamber on the east side of Startley Road, and then to the watercourse to the east of the site.
- 6.20 The surface water drainage strategy would incorporate appropriate drainage features to enable a controlled discharge of surface water from these parts of the site to these discharge receptors.

Surface Water Drainage Design

- 6.21 The drainage strategy layout for the western part of the proposed development (Network 1) and for the eastern part (Network 2) together with drainage calculations and typical SuDS sections are included as **Appendix G**.
- 6.22 The western part of the drainage strategy includes Blocks A and B. Block A is a two-story building housing workshop, storage, and office spaces. This block also includes a stable for horses and a covered parking area, arranged in a courtyard layout. Block B is a two-story building comprising four rental units with parking opposite, along with bin/bike storage and a breakout space.
- 6.23 Permeable block paving will be included beneath the car parking areas, with this upon a stone sub-base. This will provide a source control drainage solution. A drain would be provided at a low point within the stone sub-base to convey flows. The remaining surfaced areas will either be resin bound or permeable resin bound surfaces, with the latter helping to reduce surface water runoff.
- 6.24 A detention basin will be included in the south-western part of the layout. This would provide an attenuation volume for managing the surface water runoff from the western part of the site. The total depth of the detention basin is 1.5m, with the attenuation volume in the lower 1.2m and a freeboard in the upper 0.30m. An additional storage volume would be provided through the use of a subsurface cellular attenuation tank beneath the adjacent car parking area.
- 6.25 There is the possibility of combining this attenuation tank with a rainwater harvesting tank, such as through the use of a combined tank or active attenuation.

- 6.26 A combined tank provides two separate but conjoined storage volumes, a lower part that retains water as a rainwater harvesting tank and an upper part for attenuation that fills when it rains and drains to empty. If there is available capacity in the rainwater harvesting tank, then this would be replenished. And the part for attenuation would be available for managing the rainfall runoff.
- 6.27 Whereas active attenuation works by combining a rainwater harvesting tank and attenuation into one intelligent system via smart weather monitoring. This operates as rainwater harvesting tank during drier periods. When a storm event is forecast, the system operates a valve in the tank before it arrives to reduce the stored water to a safe level, to ensure that the attenuation is available.
- 6.28 The detention basin would drain to the manhole of the private surface water sewer that is to the south-west of the site. This would drain to the existing ponds that are to the west of the site, and which then drain to the watercourse to the south-west of the site, and on the boundary of the clients land ownership.
- 6.29 A flow control chamber would be included prior to the discharge of surface water run-off from the detention basin. The attenuation volume and flow control chamber would maintain a flow of 1.40 l/s for all storm events up to and including the 1 in 100-year with a 45% allowance for future climate change.
- 6.30 The eastern part of the drainage strategy includes the access road carriageway and a footway, adjacent to the carriageway on the northern side.
- 6.31 The footway would be incorporated into the road construction and could be delineated by a concrete edging strip or painted line. This would remove any upstand kerb and the carriageway will have a single camber to the north. This would result in the drainage of water from the road and towards the footway.
- 6.32 Sections of the access road are to include a cellweb type no-dig construction over the tree root protection areas. The access road would include a 0.30m deep stone sub-base to provide an attenuation volume. The adjacent footway would include a gravel strip to intercept the runoff from the road carriageway and convey it to the stone sub-base, with this feature operating as a filter drain.

- 6.33 The existing junction to Startley Road is to be amended, therefore requiring the existing culvert to be lengthened. This would continue to drain to the drainage ditch on the west side of Startley Road. This drains to a culvert under Startley Road and drains to a headwall chamber on the east side of Startley Road, and then to the watercourse in the catchment of the Avon (Bristol) waterbody.
- 6.34 A flow control chamber would be included prior to the discharge of surface water run-off from the stone sub-base to the drainage ditch. The attenuation volume and flow control chamber would maintain a flow of 0.90 l/s for all storm events up to and including the 1 in 100-year with a 45% allowance for future climate change.
- 6.35 The drainage calculations and typical SuDS sections are included as **Appendix G**. The design and location of the various SuDS features would be progressed at a later stage through provision of a detailed drainage design. Some further details and information on these SuDS features have been provided below.

Detention Basin:

- 6.36 A typical plan and image of a detention basin is included as **Figure 6.2**.
- 6.37 Detention basins are landscaped depressions that are normally dry except for during and immediately following storm events. They can be designed with a small permanent pool at the outlet to help prevent resuspension of sediment particles and to provide enhanced water quality treatment.
- 6.38 Where designed appropriately, some parts of the basin area can also be used as a recreational area or other amenity facility.
- 6.39 The basin bank side slopes should not exceed 1 in 3 and basin depth should be less than 2m. The bottom of a detention basin should be fairly flat with a gentle slope towards the outlet.
- 6.40 The upper level of the detention basin would provide the attenuation volume to manage the surface water runoff, whereas a lower level of the detention basin could be over-deepened beneath the outfall to create a permanent pool. The detention basin would drain via an outfall to a pipe or swale.

- 6.41 In addition to the management of surface water runoff, detention basins provide other environmental and community benefits (e.g. benefits to water quality, landscape, recreational amenity, ecology and biodiversity).

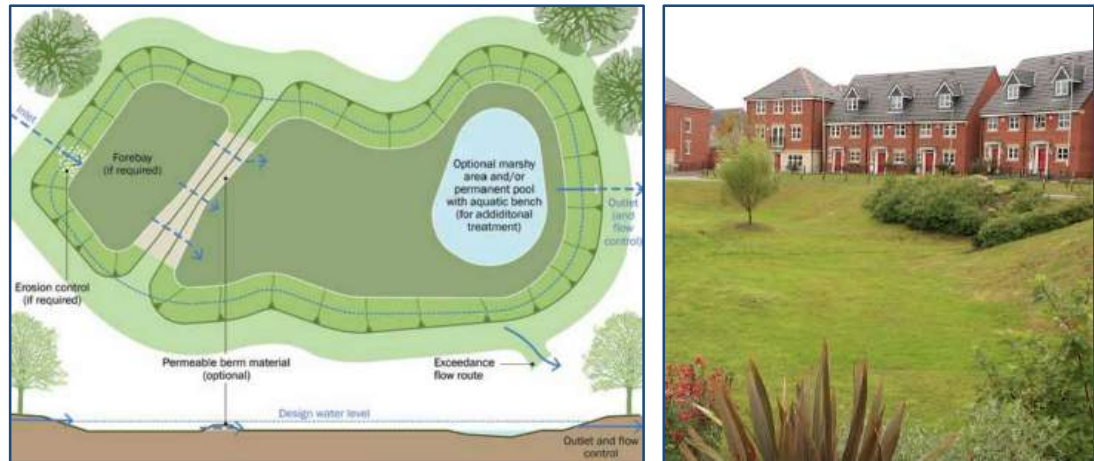


Figure 6.2 – Typical Detention Basin

Filter Drain:

- 6.42 A typical section and image of a filter drain is included as **Figure 6.3**.

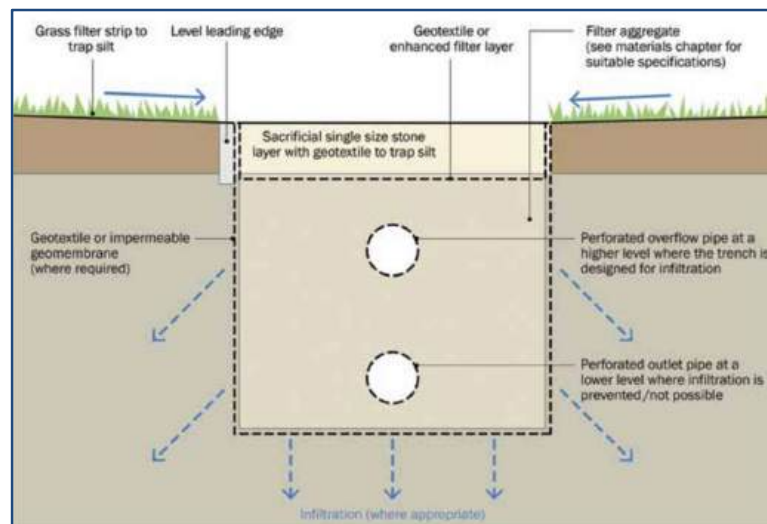


Figure 6.3 – Typical Filter Drain

- 6.43 In addition to the conveyance of surface water runoff, the filter drain would provide some attenuation and drainage into the substrate and other benefits, in particular to water quality and biodiversity.

Permeable Paving:

- 6.44 Permeable paving could be incorporated within appropriate areas of the site, to reduce surface water runoff and to provide an attenuation volume and a source control solution.
- 6.45 For example, car parking areas could be fitted with a permeable surface with a suitable depth of granular fill beneath. It would also be possible if required to include geocellular storage at appropriate locations to provide source control.

Geocellular Storage:

- 6.46 Geocellular storage are modular plastic units with a high porosity that can be used to efficiently create a below-ground structure for the temporary storage of surface water before a controlled release to an appropriate discharge receptor. The storage is formed by assembling the required number of individual units and wrapping them in either a geotextile or a geomembrane.
- 6.47 The conceptual drainage strategy has been derived to provide all of the required attenuation volume in landscaped drainage solutions. However, geocellular storage could be used to provide an additional or alternative attenuation volume if required.
- 6.48 These are considered to be a sustainable drainage solution described in the CIRIA SuDS Manual, and would provide a source control solution to complement the proposed landscaped drainage solutions.

Exceedance Events

- 6.49 Rainfall events in excess of the design standard event could potentially flood surrounding areas. Exceedance events should be managed in conveyance routes across and from the site that minimise risk to people and property.
- 6.50 In an exceedance event, overland flows will follow the site topography and be influenced by the layout.
- 6.51 There is a fall in ground levels from the centre of the site towards the eastern boundary and towards Startley Road. Exceedance flows would therefore drain

to the drainage ditch on the west side of Startley Road and then under Startley Road to the watercourse on the east side of Startley Road.

- 6.52 There is also a fall in ground levels from the centre of the site towards the south-western boundary. Exceedance flows would therefore drain to the existing ponds that are to the west of the site, which then drain to the watercourse to the south-west of the site.
- 6.53 The surface water drainage strategy would be designed to manage a 1 in 100-year rainfall event with a 45% allowance for future climate change. This therefore provides additional storage capacity for managing current rainfall events.
- 6.54 Furthermore, the detention basin includes a 0.30m freeboard. This is therefore an additional storage volume available for managing rainfall events.

Water Quality

- 6.55 Water quality has been considered in accordance with the guidance in the CIRIA SuDS Manual. This advises that any proposed drainage scheme must demonstrate that the hazard index for the particular land use is less than the mitigation index of the proposed SuDS features.
- 6.56 The pollution hazard indices for the eastern and western parts of the proposed development are summarised in **Table 6.2**. This is based on the water quality management indices for different land uses as set out in Section 26 of the CIRIA SuDS Manual.

Pollution Hazard		Total Suspended Solids	Metals	Hydro-carbons
Eastern	Low Traffic Roads	0.50	0.40	0.40
Western	Non-Residential Car Parking	0.70	0.60	0.70
	Commercial Roof	0.30	0.20	0.05

Table 6.2 – Pollution Hazard Indices for the Proposed Development

- 6.57 The mitigation measures for the eastern and western parts of the drainage strategy are summarised as **Table 6.3**. The mitigation measures and indices are based on the features in Table 26.3 of the CIRIA SuDS Manual.

Mitigation Measure		Total Suspended Solids	Metals	Hydro-carbons
Eastern	Permeable Pavement	0.70	0.60	0.70
	Filter Drain	0.20	0.20	0.40
	Total	0.90	0.80	1.10
Western	Permeable Pavement	0.70	0.60	0.70
	Detention Basin	0.25	0.25	0.30
	Total	0.95	0.85	1.00

Table 6.3 – SuDS Mitigation Indices for Drainage to Surface Waters

- 6.58 In all of the assessed parameters, the total of the pollution mitigation indices exceeds the total of the pollution hazard indices. The assessment of water quality therefore demonstrates that an adequate level of mitigation would be provided for the potential polluting effects from the proposed development.
- 6.59 As advised in the CIRIA SuDS Manual, a factor of 0.5 has been applied to the pollution mitigation values typically associated with a detention basin. This is required to account for the reduced performance of secondary or tertiary components associated with the already reduced inflow concentration.

Management and Maintenance

- 6.60 The Design and Construction Guidance (DCG) which has now replaced the Sewers for Adoption guidance allows for a greater range of sewer types to be adopted by sewerage authorities, including some SuDS. On-site drainage sewers and drainage features would be offered for adoption to WW.
- 6.61 Although requiring further discussion with WW, drainage sewers and drainage features would therefore ordinarily be designed to current adoptable standards. However, it is proposed that this design work would be progressed at a later stage after consultation with the LPA / LLFA and with the completion of a detailed drainage design to achieve full S104 technical approval.

- 6.62 Any on-site sewers and drainage features that are not adopted would be managed through a SuDS Management and Maintenance Plan (M&MP), which could be included as part of the landscape management plan.
- 6.63 It is anticipated that the management and maintenance of the SuDS would be undertaken in accordance with the recommendations outlined in the CIRIA SuDS Manual, with the extract for detention basins provided as **Figure 6.5**, for filter drains as **Figure 6.6** and for permeable paving as **Figure 6.7**.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Figure 6.5 – Detention Basin Management and Maintenance

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Figure 6.6 – Filter Drain Management and Maintenance

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Figure 6.7 – Permeable Paving Management and Maintenance

Foul Drainage

- 6.64 WW advise that there is a 150mm public foul sewer that runs to the south of the site behind properties on Henn Lane. This sewer runs through third party land to the Upper Seagry sewage pumping station.

- 6.65 A new 150mm offsite gravity sewer could run from the site boundary across land owned by the applicant and then to a point where it can connect to the public foul sewer in the vicinity of manhole ST94804606 near the Upper Seagry pumping station.
- 6.66 For some sections, this may require private agreement, or a S98 sewer requisition application to lay a new sewer across third party land to achieve a foul connection. As part of a S98 sewer requisition application to cross third party land, WW would have to look at all options for connection.
- 6.67 This foul drainage connection has been shown on the drainage strategy layout for the proposed development included as **Appendix G**.

7 CONCLUSIONS

- 7.1 This FRA has been prepared for a proposed commercial development of a site north of Henn Lane in Upper Seagry, Wiltshire.
- 7.2 A summary of the relevant national and local planning policy was provided, including from WC as the LPA and LLFA and from pre-application consultation.
- 7.3 A background understanding based on a site walkover and desk-based investigation was provided. This covered the site setting and location, the existing layout and the proposed development. This also included the topography from a topographical survey, hydrology, geology, hydrogeology and soils with information from a ground investigation and soil infiltration testing, and drainage infrastructure including information and consultation from WW.
- 7.4 An assessment of flood risk sources to and resulting from the proposed development of the site was completed.
- 7.5 The site was found to be located in Flood Zone 1, indicating a low risk from fluvial and tidal flooding. The NPPF advises that a commercial development would be an appropriate land use in Flood Zone 1. An understanding of the flood extents with the removal of flood defences and in the future as a result of climate change was also considered, with the site still unaffected by flooding.
- 7.6 The risk from surface water flooding across the site was found to be very low, with the site mainly unaffected. There is a surface water flow path to the north-west of the existing building. There is another flow path along Startley Road to the east of the site, and which flows along the route of the watercourse to the east. In more extreme flood events, there could also be some localised surface water ponding in the eastern part of the site in the area next to Startley Road.
- 7.7 The risk of groundwater flooding was considered, based on information from the Long Term Flood Map, SFRA and groundwater levels observed during the ground investigation. It was concluded that groundwater flooding is unlikely.
- 7.8 The flooding from other sources, which include artificial and impounded waters, and also from drainage and infrastructure were all considered to be of no risk.

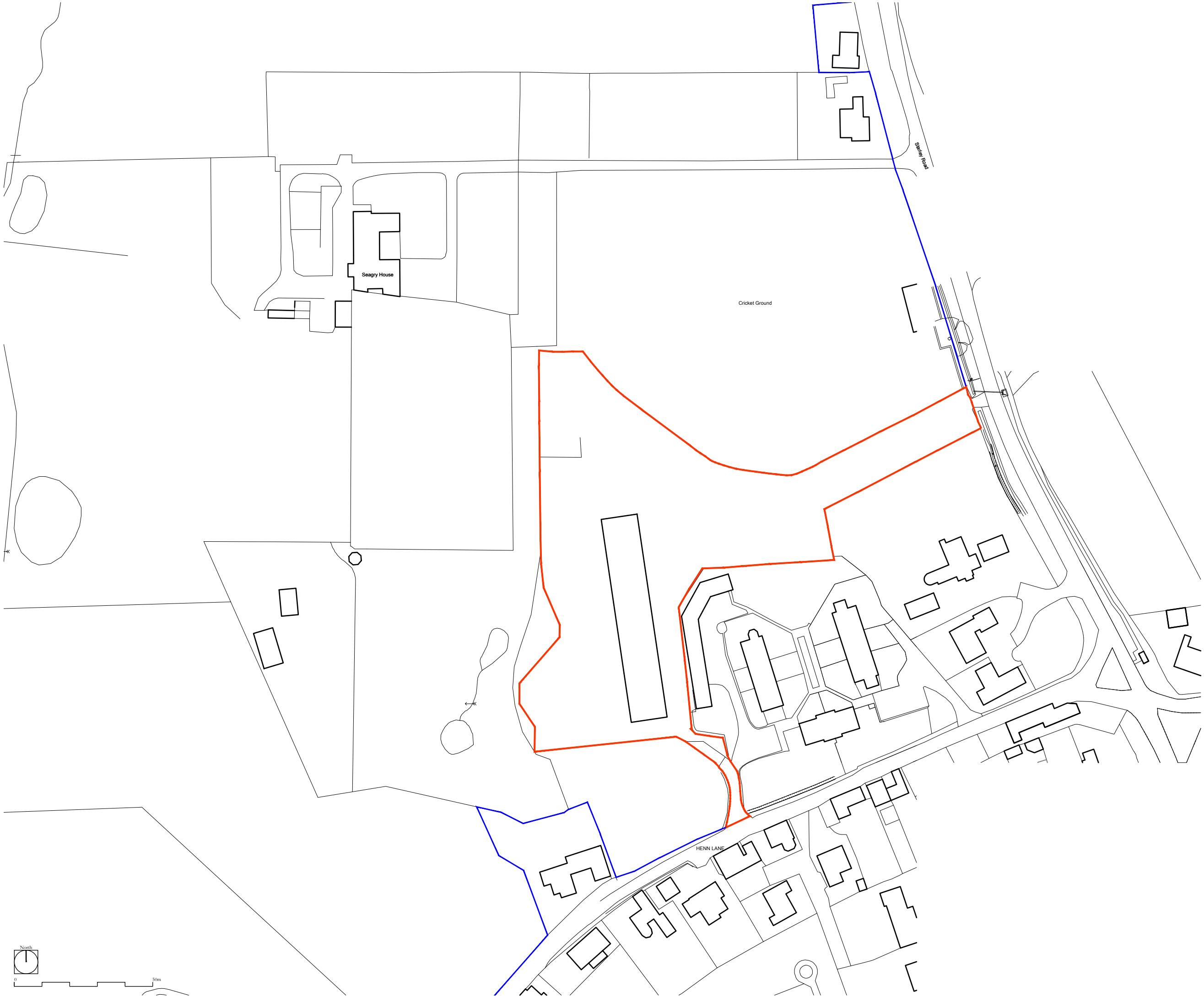
- 7.9 Some flood mitigation and management measures were suggested. The finished floor level of buildings would be elevated above surrounding ground levels. A surface water drainage strategy including appropriate SuDS drainage features would be incorporated into the layout to capture and convey surface water runoff at a controlled runoff rate to an appropriate discharge receptor.
- 7.10 A surface water drainage strategy for the proposed development of the site was provided and which considered discharge receptors in accordance with the sustainable drainage hierarchy.
- 7.11 Consideration was given to the incorporation of rainwater harvesting facilities, either as water butts at the base of downpipes or as a subsurface tank.
- 7.12 The ground investigation that was completed included trial pits at locations across the site and soakway testing. This found there to be no significant infiltration, demonstrating that infiltration drainage would not be viable.
- 7.13 The eastern part of the site is located in the hydrological catchment of the Avon (Bristol) waterbody. There is a watercourse to the east of the site, on the eastern side of Startley Road. The western part of the site is located in the hydrological catchment Sutton Bengar Brook waterbody. There is a watercourse to the south-west of the site, and on the boundary of the clients land ownership.
- 7.14 As the site drains in two directions to different waterbodies, there would need to be a surface water drainage strategy that retained this drainage regime.
- 7.15 In the western part of the site, permeable block paving upon a stone sub-base would be included beneath the car parking areas, to provide a source control drainage solution. A drain would be provided at a low point within the stone sub-base to convey flows. The remaining surfaced areas would either be resin bound or permeable resin bound surfaces, to reduce surface water runoff.
- 7.16 A detention basin would be included in the south-western part of the layout to provide an attenuation volume for managing the surface water runoff. An additional storage volume would be provided by a subsurface cellular attenuation tank beneath the adjacent car parking area.

- 7.17 There is the possibility of combining this attenuation tank with a rainwater harvesting tank, such as through the use of a combined tank or active attenuation.
- 7.18 The detention basin would drain to the manhole of a private surface water sewer. This would drain to the existing ponds that are to the west of the site, and which would then drain to the watercourse to the south-west of the site.
- 7.19 A flow control chamber would be included prior to the discharge of surface water run-off from the detention basin.
- 7.20 In the eastern part of the site, sections of the access road would use a cellweb type no-dig construction. The access road would include a 0.30m deep stone sub-base to provide an attenuation volume. The adjacent footway would include a gravel strip to intercept the runoff from the road carriageway and convey it to the stone sub-base, with this feature operating as a filter drain.
- 7.21 The access road would drain to the existing culvert at the junction with Startley Road. This would continue to drain to the adjacent drainage ditch and then under Startley Road to a headwall chamber on the east side. This would then drain to the watercourse in the catchment of the Avon (Bristol) waterbody.
- 7.22 A flow control chamber would be included prior to the discharge of surface water run-off from the stone sub-base to the drainage ditch.
- 7.23 The features in the surface water drainage strategy would be sized to manage the 1 in 100-year rainfall event including a 45% allowance for climate change.
- 7.24 The design and location of these various SuDS drainage features would be progressed at a later stage with a detailed drainage design.
- 7.25 In addition to the management of surface water runoff, these SuDS drainage features provide other environmental and community benefits (e.g. to water quality, biodiversity, landscape and to recreational amenity).
- 7.26 The potential of events that exceed the design standard of the surface water drainage strategy to affect the site and surrounds was considered.

- 7.27 Water quality was considered in accordance with the guidance in the CIRIA SuDS Manual. In all of the assessed water quality parameters, it was demonstrated that an adequate level of mitigation would be provided for the potential polluting effects resulting from the proposed development.
- 7.28 On-site sewers and drainage features would be offered for adoption to WW. Any on-site sewers and drainage features that are not adopted would be managed through a SuDS Management and Maintenance Plan.
- 7.29 It is anticipated that the management and maintenance of the SuDS would be undertaken in accordance with the recommendations outlined in the CIRIA SuDS Manual, with extracts for the features of the SuDS train provided.
- 7.30 WW advised that there is a 150mm public foul sewer to the south of the site. A new 150mm offsite gravity sewer could run from the site boundary, to connect to the public foul sewer near the Upper Seagry pumping station.
- 7.31 For some sections, this may require private agreement, or a S98 sewer requisition application. This foul drainage connection has been shown on the drainage strategy layout.
- 7.32 In summary, the proposed development of the site is considered to be appropriate in terms of flood risk. A surface water drainage strategy would be incorporated to manage the drainage from the proposed development in an appropriate way. The use of SuDS would manage the surface water runoff and also provide additional community and environmental benefits.

Appendix A

Existing Site Layout



Do not scale. use only figured dimensions unless for planning purposes. Dimensions are displayed in millimetres unless stated otherwise. All dimensions and setting out are to be checked on site prior to starting work. report any discrepancies immediately. This drawing is not to be used for either the valuation or purchase of a property or building site.

Copyright of this drawing belongs solely to TEA Architects Ltd. This drawing must only be used for the purpose for which it is supplied and its contents must not be reproduced for any purpose without written permission.

Project Name:	Land South Of Seagry House
Drawing Title:	Location Plan
Project Number:	2386
Drawing No:	001
Revision:	B
Date:	28/07/2025
Status:	Planning
Scale @ A3	1:1250



Do not scale, use only figured dimension unless for planning purposes. Dimensions are depicted in millimetres unless stated otherwise. All dimensions and setting out are to be checked on site prior to starting work, report any discrepancies immediately. This drawing is not to be used for other the valuation or purchase of a property or building use.

Copyright of this drawing belongs solely to TEA Architects Ltd. This drawing must only be used for the purposes for which it is supplied and its contents must not be reproduced for any purpose without written permission.

Project Name:	Land South Of Seagry House
Drawing Title:	Site Plan - Existing
Project Number:	2386
Drawing No:	010
Revision:	A
Date:	28/07/2025
Status:	Planning
Scale @ A2	1:500



Headwall Chamber on East Side of Startley Road



WW Foul Pumping Station on East Side of Henn Lane



Drainage Ditch on West Side of Startley Road



Private Manhole Chamber for Surface Water

Appendix B

Proposed Development Layout



LEGEND

- Site Boundary
- Root protection areas
- Block paved surfaces
- Resin bound gravel surfaces
- Tarmac road surfaces
- Existing trees
- New trees - to Landscape Architect's spec.
- New hedgerows/shrubs/mix planting - to Landscape Architect's spec.
- Wildflower grass areas - to Landscape Architect's spec.
- Shady grass areas - to Landscape Architect's spec.
- Wetland grass areas - to Landscape Architect's spec.
- Existing fencing retained/upgraded
- New 1.8m high close boarded timber fence
- New 1.0m high black metal estate fencing

North

0 8m

Site Plan
Proposed

TEA ARCHITECTS
5 Argyle Street
Bath
BA2 4BA
www.tea-architects.co.uk

Do not scale: use only figured dimensions unless for planning purposes. Dimensions are displayed in millimetres unless stated otherwise. All dimensions and setting out are to be checked on site prior to starting work. Report any discrepancies immediately. This drawing is not to be used for other the valuation or purchase of a property or building site.

Copyright of this drawing belongs solely to TEA Architects Ltd. This drawing must only be used for the purpose for which it is supplied and its contents must not be reproduced for any purpose without written permission.

Project Name:	Land South Of Seagry House
Drawing Title:	Site Plan - Proposed
Project Number:	2386
Drawing No:	021
Revision:	E
Date:	28/07/2025
Status:	Planning
Scale @ A2	1:200



LEGEND

- Site Boundary
- Root protection areas
- Block paved surfaces
- Resin bound gravel surfaces
- Tarmac road surfaces
- Existing trees
- New trees - to Landscape Architect's spec.
- New hedgerows/shrubs/mix planting - to Landscape Architect's spec.
- Wildflower grass areas - to Landscape Architect's spec.
- Shadey grass areas - to Landscape Architect's spec.
- Wetland grass areas - to Landscape Architect's spec.
- Existing fencing retained/upgraded
- New 1.8m high close boarded timber fence
- New 1.0m high black metal estate fencing

North

0 20m

Site Plan - Whole Site

Proposed

TEA ARCHITECTS
5 Argyle Street
Bath
BA2 4BA
www.tea-architects.co.uk

Do not scale, use only figured dimension unless for planning purposes. Dimensions are depicted in millimetres unless stated otherwise. All dimensions and setting out are to be checked in situ prior to starting work, report any discrepancies immediately. This drawing is not to be used for other the valuation or purchase of a property or building use.

Copyright of this drawing belongs solely to TEA Architects Ltd. This drawing must only be used for the purposes for which it is supplied and its contents must not be reproduced for any purpose without written permission.

Project Name:	Land South Of Seagry House
Drawing Title:	Whole Site Plan - Proposed
Project Number:	2386
Drawing No:	020
Revision:	M
Date:	28/07/2025
Status:	Planning
Scale @ A2	1:500

Appendix C

Topographical Survey

Appendix D

Phase 1 and 2 Desk Study and Ground Investigation

Phase 1 & 2 Desk Study & Ground Investigation

Land Adjacent Seagry House, Upper Seagry



Imagery © 2024 Google Earth.

Contract No./Report Type: 24-025/P1&P2
Produced for Thala Family Investments Ltd

AG Geo-Consultants Ltd

Report Title
Phase 1 & 2 Desk Study & Ground Investigation

Project	Project No./Report Type
Land Adjacent Seagry House, Upper Seagry	24-025/P1&P2

Client Name
Thala Family Investments Ltd

Issue Date/Version	Status	Comments, Description of Amendments
10 th May 2024	Final	-

Report Prepared by:			
André Gilleard	Director SiLC QP CSci CEnv BEng(Hons) andre@ag-geoconsultants.co.uk Tel: 07395 100 727	 DoW CoP Sustainable Reuse of Soils  ACEAIRE Initiative	

Specialist in Land Condition (SiLC) No. A1201 Qualified Person (QP), No.086 (CL:AIRE Definition of Waste, Industry Code of Practice, DoWCoP)

This report is provided for the benefit of the Client. We do not accept responsibility in the event that the report contents are used in whole or in part by a third party and we exercise no duty of care to any such third party. © AG Geo-Consultants Ltd

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Contents

Executive Summary	3
1 Introduction	1
1.1 Introduction and Brief	1
1.2 Proposed Development.....	1
1.3 Scope of Works.....	1
1.4 Limitations.....	2
2 Phase 1 Desk Study (Inc Preliminary Risk Assessment)	3
2.1 Introduction.....	3
2.2 Desk Study.....	3
2.3 Preliminary Conceptual Model & Risk Assessment.....	5
2.3.1 General	5
2.3.2 Preliminary Conceptual Model & Risks	6
3 Phase 2 Site Investigation	8
3.1 General	8
3.2 Trial Pitting	8
3.3 In-Situ Testing.....	8
3.4 Sample Collection and Laboratory Analysis	9
4 Ground Conditions.....	10
4.1 General	10
4.2 Geotechnical Parameters	10
4.3 Groundwater	11
4.4 Contamination Indications	11
4.5 Underground Services Encountered	11
5 Geotechnical Assessment.....	12
5.1 Introduction.....	12
5.2 Excavations.....	12
5.3 Earthworks	12
5.4 Foundation Assessment	12
5.5 Floor Slabs	15
5.6 Roads and Pavements	16
5.6.1 California Bearing Ratio	16
5.6.2 Frost Susceptibility	16
5.6.3 General Information	16
5.7 Drainage	16
5.8 Chemical Attack on Buried Materials.....	17
6 Assessment of Contamination & Environmental Risks.....	18
6.1 Tier 1 Generic Quantitative Risk Assessment - Soil Risks to Humans	18
6.1.1 Metals.....	18
6.1.2 Organics – General	19
6.1.3 Organics – TPH.....	19
6.1.4 Organics – Polyaromatic Hydrocarbons (PAHs).....	20
6.1.5 Other.....	20
6.2 Tier 2 Detailed Quantitative Risk Assessment - Soil Risks to Humans	20
6.3 Soil Risks to Plants (Phytotoxicity).....	20
6.4 Soil Risks to Water Supply Pipes.....	21
6.5 Tier 1 Generic Quantitative Risk Assessment – Risks to Water Resources	22
6.6 Ground/Landfill Gas Risks to Humans	22

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

6.7	Radon Risk to Humans.....	22
6.8	Chemical Vapour Risks to Humans.....	22
6.9	Final Conceptual Model and Risk Assessment	22
6.10	Strategy for Risk Reduction & Remediation	26
6.10.1	Introduction.....	26
6.10.2	Pre-Commencement “Remediation” Requiring Validation.....	26
6.10.3	Post-Commencement Risk Reduction Measures Requiring Validation.....	27
6.10.4	Post-Commencement Risk Reduction Measures Not Requiring Validation.....	28
6.10.5	Summary of Risk Reduction and Remediation Measures and Validation	28
6.10.6	Validation Report.....	30
7	Other Aspects.....	31
7.1	“Site H&S File”	31
7.2	Soil/Materials Reuse & Disposal.....	31
7.2.1	General	31
7.2.2	Reuse on Site	32
7.2.3	Transfer for Reuse on Another Site	32
7.2.4	Soil Treatment Facilities	32
7.2.5	Disposal to Licensed Waste Sites.....	32
7.2.6	Asbestos Content to Soils	34

Appendices

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Executive Summary

Client	Thala Family Investments Ltd																																								
Site and Location	Land Adjacent Seagry House, Upper Seagry Approximate postcode = SN15 5JZ																																								
Proposed Development	Demolition of existing barn and replacement with a line of commercial units. Some landscaping is to be expected.																																								
Client Brief	The client's brief was to undertake soakaway testing, but then we advised, and the client accepted, assessments for contamination and geotechnics at the same time.																																								
History of Site & Surroundings	On Site In the past, fields, woods and footpaths. Currently an old derelict (former chicken) barn (appeared 1960-1983 and no chickens for past 30yrs) with asbestos cement roofing. Two garages lie W of the main barn and there is an above ground fuel tank E of the barn. E of the barn, extending to the road, has always been a field. In the Surroundings In the past, fields, woods and possible stables. <i>Wells</i> and <i>pumps</i> once existed just E and S of the site. Currently largely unchanged, except immediately E of the barn area, the stables(?) were redeveloped and include a line of private modern garages.																																								
Ground Conditions	BGS Mapping Suggests: • Fault Lines: None lie significantly close enough to the site. • Made ground (MG): None >1m thickness shown. • Drift Deposits: None. • Solid Geology: Kellaways Sand Member (Sandstone). Just beyond the W site edge lies Kellaways Clay Member (Mudstone, 15-18m thick)). The sandstone overlies the clay and dip could be to the SE and so the sand should be thickest in the E of the site. • The nearest BGS boreholes (on the same geology) suggests: - The Kellaways Sandstone to comprise clays, sands and silts. Our Investigation Found: <table border="1"> <thead> <tr> <th rowspan="2">Strata</th><th colspan="2">Depth (mBGL)</th><th rowspan="2">Typical Thickness (m)</th><th rowspan="2">Description & Comments</th></tr> <tr> <th>Top</th><th>Bottom</th></tr> </thead> <tbody> <tr> <td>MG Topsoil</td><td>0</td><td>0.2, 0.35</td><td></td><td>TP2 and TP6 only</td></tr> <tr> <td>Topsoil</td><td>0</td><td>0.25</td><td></td><td>TP4 and TP5 only</td></tr> <tr> <td>MG: clay</td><td>0 to 0.35</td><td>0.6 to 0.9</td><td></td><td>Very soft and soft, and contains fragments of concrete and brick, with rare metal and pipe.</td></tr> <tr> <td>Soft SILT</td><td>0.25 to 0.8</td><td>1.45 to 2.35</td><td></td><td>Grey and very sandy. TP1, TP2, TP4, TP5, TP6</td></tr> <tr> <td>Firm SILT</td><td>0.6, 0.9, 1.7</td><td>2.3, 2.45</td><td></td><td>Orangish Brown and very sandy. TP3, TP6 and TP7 only</td></tr> <tr> <td>Stiff CLAY</td><td>1.45 to 2.45</td><td>>2.45, >2.8, >3.2, >3.2, >3.35, >3.5</td><td></td><td>Grey and slightly or very, sandy and silty</td></tr> </tbody> </table>				Strata	Depth (mBGL)		Typical Thickness (m)	Description & Comments	Top	Bottom	MG Topsoil	0	0.2, 0.35		TP2 and TP6 only	Topsoil	0	0.25		TP4 and TP5 only	MG: clay	0 to 0.35	0.6 to 0.9		Very soft and soft, and contains fragments of concrete and brick, with rare metal and pipe.	Soft SILT	0.25 to 0.8	1.45 to 2.35		Grey and very sandy. TP1, TP2, TP4, TP5, TP6	Firm SILT	0.6, 0.9, 1.7	2.3, 2.45		Orangish Brown and very sandy. TP3, TP6 and TP7 only	Stiff CLAY	1.45 to 2.45	>2.45, >2.8, >3.2, >3.2, >3.35, >3.5		Grey and slightly or very, sandy and silty
Strata	Depth (mBGL)		Typical Thickness (m)	Description & Comments																																					
	Top	Bottom																																							
MG Topsoil	0	0.2, 0.35		TP2 and TP6 only																																					
Topsoil	0	0.25		TP4 and TP5 only																																					
MG: clay	0 to 0.35	0.6 to 0.9		Very soft and soft, and contains fragments of concrete and brick, with rare metal and pipe.																																					
Soft SILT	0.25 to 0.8	1.45 to 2.35		Grey and very sandy. TP1, TP2, TP4, TP5, TP6																																					
Firm SILT	0.6, 0.9, 1.7	2.3, 2.45		Orangish Brown and very sandy. TP3, TP6 and TP7 only																																					
Stiff CLAY	1.45 to 2.45	>2.45, >2.8, >3.2, >3.2, >3.35, >3.5		Grey and slightly or very, sandy and silty																																					
Hydrogeology & Hydrology	• Watercourses, Aquifers, Source Protection Zones (SPZ), Abstractions: Not checked as unlikely to be significant. • Groundwater (GW): Pits were up ~3.6m deep & no groundwater was found in any.																																								
Geotechnical Considerations	• The site lies in an area (potentially conservatively) deemed low risk, for UXO presence. Excavations • Should be possible with conventional earthmoving plant. • Should remain stable in the short term. • Groundwater could occur as seepages, but should be controllable by sump pumping. Foundations & Ground Floor Slabs • Sands (weathered Kellaways Sandstone (KS)) <u>had been expected</u> across the entire site. The closest thing to the KS was silty SAND found in TP3 and TP7 (All other pits found soft clays to 1.45m to 2.35m depth). These two pits appear to be outwith of a possible channel across the site, infilled with soft clays. This channel could run from the ditch on the opposite side of the road to TP5, through the site, to the ponds area, and could be steep sided. • The Clays/silts are of medium volume change potential.																																								

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

	- The made ground is unsuitable to bear within. We recommend footings be founded into either the firm or stiff, natural clays, of the following strengths and providing the following bearing capacities:<table><tr><th>Foundation Type</th><th>Onto Firm Clays (Cu=50kPa #) at >=0.9mbegl @</th><th>Onto Stiff Clays (Cu=80kPa #) at >=2.2mbegl @</th></tr><tr><td>0.45m wide strips</td><td>Qa>=115kPa @</td><td>Qa>=200kPa @</td></tr><tr><td>0.6m wide strips</td><td>Qa>=110kPa @</td><td>Qa>=200kPa @</td></tr><tr><td>1m square pads</td><td>Qa>=130kPa @</td><td>QA>=225kPa @</td></tr></table> #: Required strengths. @: capacity increases with depth. - Probable founding depths (or minimum 0.9mbegl) are shown on the plan in Appendix B, i.e. 0.9m at the new building's southern end, increasing to ~2.5m at the northern end. - Vibro-improvement might be a foundation option, but the ground is expected to be too soft for such. - Mini/pin piles could be another option. - Suspended ground floor slabs are recommended. Road Pavements - No CBR testing has been undertaken, but the equilibrium CBR value is suggested as CBR=3% to 4%. - Incorporation of a geogrid should be beneficial. - The soils should not be frost susceptible. Drainage - Conventional soakaway drainage is unlikely to be feasible. With test head of water of up to ~3m depth, no waters drained. Ground Aggressivity to Buried Concrete - Design Sulphate Class DS-1 and ACEC classes AC-1s and AC-1 above and below groundwater (>3.6m depth) respectively.	Foundation Type	Onto Firm Clays (Cu=50kPa #) at >=0.9mbegl @	Onto Stiff Clays (Cu=80kPa #) at >=2.2mbegl @	0.45m wide strips	Qa>=115kPa @	Qa>=200kPa @	0.6m wide strips	Qa>=110kPa @	Qa>=200kPa @	1m square pads	Qa>=130kPa @	QA>=225kPa @
Foundation Type	Onto Firm Clays (Cu=50kPa #) at >=0.9mbegl @	Onto Stiff Clays (Cu=80kPa #) at >=2.2mbegl @											
0.45m wide strips	Qa>=115kPa @	Qa>=200kPa @											
0.6m wide strips	Qa>=110kPa @	Qa>=200kPa @											
1m square pads	Qa>=130kPa @	QA>=225kPa @											
Contamination Considerations	- Potential risks were considered to be: - Probable made ground, with possible asbestos cement fragments. Note that everything on the chicken shed is asbestos and we spotted piles of asbestos sheets and ducting on site. Red diesel tank. - Other farm petroleum hydrocarbons. - Farm tipping. Chicken feed (heavy metals). - There were not considered to be any significant risks from: Chicken shed manure (ammonia, acidity); and the modern private garages just off site. - Anthropogenic components of the made ground comprise: fragments of concrete, brick, and rare metal and pipe. - There were no visual or olfactory indications of contamination. Exploratory holes near the fuel tanks and on-site garages found no contamination. - No significant risks to plants, nor groundwater have been found on site. - For risk to humans: - None of the test results exceeded the GAC for a commercial end use, meaning there is no risk. - PAHs in TP2 at 0.3m depth exceeded the GAC for a residential-with-plant-uptake end-use, showing that there could be risks to groundworkers (and in the absence of further assessment, then PAHs currently could pose risk to a <i>residential-with-plant-uptake</i> end-use if the end-use changed). - No asbestos was found in the soils tested, but such should be expected to exist. - PE and PVC water supply pipes should be acceptable. Ground Gases, Radon and Chemical Vapours - No potential sources of ground gas have been found under the site and none (including from historic or recent landfills) have been found close enough to the site to pose potential significant risk. - No risks have been found that require protection against Radon and chemical vapours.												

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation Land Adjacent Seagry House, Upper Seagry

Strategy for Remediation & Risk Reduction	The investigation has revealed the development site to only exhibit a risk from soil contamination, with such contamination being the same type and degree as found on most urban brownfield sites. Such risks are easily remedied and therefore this report concludes that the principle of commercial development is a suitable use for the site in terms of contamination. • No remediation is required. • No long-term monitoring and maintenance of remediation is required. • To remove the human health risks: ○ Site, landscape and maintenance workers should wear gloves, boots and overalls and wash their hands before eating, drinking and smoking. Excessive dust generation should be avoided. ○ Excavations or below ground voids should be checked for the presence of harmful vapours prior to personnel entry. • No other risk reduction measures are required (e.g. gas protection, special water supply pipe materials, etc). • A watching brief should be kept during siteworks for asbestos containing materials (ACM) in the soils and any other unforeseen/unsuspected contamination. If such is found, then work should stop and a competent person should be contacted for advice and assessment. Also watch for potential UXO. • A suitably insured consultant is expected to advise that any asbestos cement fragments spotted during groundworks, should be litter picked and removed off site. • Any recycled aggregates that are planned to be imported to site, should be assessed for contamination (especially asbestos) prior to import and relevant records retained for validation purposes. • Topsoil and subsoil should be assessed for contamination prior to import.
Reuse of Soils on or Off site	To avoid Landfill Tax reuse as much soil on site as possible (ensure legitimate reuse and only in the quantity required. Follow waste protocols). By following waste protocols, surplus natural soils can be exported to other development or construction sites. Contaminated Made ground can only be exported to soil treatment facilities, or other permitted/exempt sites. Clean made ground could go to other construction sites.

This is only a summary and should not be read in isolation from the main text.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

1 Introduction

1.1 Introduction and Brief

AG Geo-Consultants Ltd (AGGC) were commissioned by *DE Planning Ltd* on behalf of *Thala Family Investments Ltd* (the Client) to produce a Phase I & II Desk Study and Ground Investigation report for a site known as Land Adjacent Seagry House, Upper Seagry, SN15 5JZ (the “Site”).

The client’s brief was to undertake soakaway testing, but then we advised, and the client accepted, the extended scope below.

1.2 Proposed Development

The proposed development (there is no plan/drawing yet) comprises demolition of existing barn and replacement with a line of commercial units. Some landscaping is to be expected.

1.3 Scope of Works

The client accepted AGGC’s proposed detailed scope of work for a Phase 1 Desk Study, followed by a Phase 2 investigation (based on the findings of the desk study). The scope was designed to primarily undertake soakaway testing, but also identify foundation requirements and if any significant contamination could exist across the site, with recommendations on remediation measures considered necessary, should any material contamination risks be identified.

The objectives of the work were to determine the sub-surface conditions in respect of:

Contamination/Environmental Aspects:

- Contamination assessment to consider potential significant pollutant linkages arising from historic and current land uses, on and off site.

Geotechnical Aspects:

- Likely foundations for proposed structures.
- Likely ground floor slab types.
- Likely soakaway potential.
- Design guidance for access roads and car park construction.

This report should be submitted to the LPA to satisfy the relevant planning conditions, but also to seek their “**no objection**” to the potential employment of the **CL:AIRE Definition of Waste Code of Practice** (DoWCoP) at the site (i.e. in case there will be surplus natural soils and transfer of such soils to other development sites for reuse, is a consideration) (see Section 7.3).

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

1.4 Limitations

Until all invoices associated with the production of this report have been paid in full, then it remains the property of AGGC and not the client, and AGGC do not grant legal reliance upon it to satisfy (or remove) planning permission conditions, or to be used for engineering design, etc.

This report is provided for the benefit only of the party to whom it is addressed and their advisors. No other developer or party may use it without our express written permission (i.e. reassignment). We do not accept responsibility to any other third party for the whole or any part of the contents and we exercise no duty of care in relation to this report to any third party.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work and on the results of laboratory and field tests performed during the investigation. However, subsoils are inherently variable and hidden from view such that no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed as part of this assessment. In particular, it should be noted that groundwater levels vary due to seasonal and other effects, and may at times differ to those measured during the investigation.

This assessment has been based to some extent on data acquired from Third Parties. This data has been accepted as correct and has not been subjected to any additional validation.

Unless specifically noted to the contrary, it should be assumed that this report has not been submitted to any other regulatory authorities for approval. Redevelopment sites in particular may have planning conditions attached in respect of contaminated land assessment. Where we are made aware of such conditions in advance of scoping the works, we can tailor the report to the regulatory authority requirements. Where we are not made aware of any such requirements there can be no certainty that our investigation will meet any or all of the regulatory authority requirements.

2 Phase 1 Desk Study (Inc Preliminary Risk Assessment)

2.1 Introduction

The following research has been undertaken in order to aid accurate design of the subsequent **Phase 2 ground investigation** (which is always recommended).

2.2 Desk Study

Table 2.1: Desk Study

Planning conditions	There are no planning conditions for this site yet, but we expect there to be contaminated land conditions. Also, the NPPF reminds developers (CI 184) that they are responsible for providing developments that are free of significant risks (both contamination and geotechnical). Furthermore, there are ground assessment requirements within Building Regulations . Potential risks to groundworkers should also be considered.
Current Use of Site and Surroundings	On Site Old derelict (former chicken) barn with asbestos cement roofing . Two garages lie W of the main barn and there is an above ground fuel tank E of the barn. E of the barn, extending to the road, is a field. In the Surroundings Woods and farmland, with village to the SE. There is a line of private modern garages immediately E of our barn area.
Other	The client reported that the ground in this area can be very soft (he got a telehandler stuck). Also, when asked when the barn might last have had chickens in, he said <i>guess..... over 30 years since there were chickens there</i> . The above-ground tank on site was for <i>diesel</i> . DE Planning advised that a surface water sewer crosses at 2m depth, from E to W near our two garages.
Anticipated Ground Conditions	BGS Mapping Suggests: • Fault Lines: None lie significantly close enough to the site. • Made ground (MG): None >1m thickness shown. • Drift Deposits: None. • Solid Geology: Kellaways Sand Member (Sandstone). Just beyond the W site edge lies Kellaways Clay Member (Mudstone, 15-18m thick). The sandstone overlies the clay and dip could be to the SE and so the sand should be thickest in the E of the site. • The nearest BGS boreholes (on the same geology) suggests: - The Kellaways Sandstone to comprise clays, sands and silts. Other From our significant experience, we'd expect ~0.5m of man-made ground.
Hydrology and Hydrogeology	Watercourses, Aquifers, Source Protection Zones (SPZ), Abstractions: Not checked as unlikely to be significant. Groundwater (GW): perched water expected upon the Kellaways Clays at a few metres depth.
Historical Land Uses (see Appendix G)	On Site Fields, woods and footpaths. The barn appeared between 1960 and 1983. E of the barn, extending to the road, has always been a field.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

	<u>In the Surroundings</u> Fields, woods, Upper Seagry village and possible stables (E of the site) where a <i>pump</i> and <i>well</i> are shown. <i>Wells</i> also exist S of the site. Segary House exists just NNW of the site from before 1888. By 1983 there are 2no. ponds just W of the site. By 1998 the stables(?) E of the site had been redeveloped and the private garages have appeared.
Aerial Photographs	Show nothing extra or significant.
Environmental Datasheets (see Appendix F)	Flood risk data is contained herein, but a drainage engineer should be consulted to assess and comment upon sources of flood risk. No Radon protection is required for new buildings (<1% homes exceed action level). # There are no other potentially significant aspects. #: The probability result is only valid for properties above ground. All basement and cellar areas are considered to be at additional risk from high radon levels
Landfills?	No licensed ones shown on or significantly near to the site. No other potential unlicensed landfilling is evident.
Potential UXO Risk?	Unlikely. From a basic map search, the Site is assessed as low # risk of Unexploded Ordnance (UXO) being present. Bomb Map: n/a #: Low: Areas indicated as having 15 bombs per 1000acre or less
Potential Ground Risks	The following <i>Contaminated Land Type</i> risks could exist, which we recommend further assessment of: • Probable made ground, with possible asbestos cement fragments. • Red diesel tank. • Other farm petroleum hydrocarbons. • Farm tipping. • Chicken feed (heavy metals). There were not considered to be any significant risks from: Chicken shed manure (ammonia, acidity); and the modern private garages just off site. There is no significant recorded Radon risk. There could also be <i>Geotechnical Risks</i> (e.g. to foundations, etc) which one should consider assessment of: • Shrink/swell risks especially from removal or retention of trees (a tree survey is recommended and especially before any are removed), • Possible soft ground, • Possible sulphate attack on buried concrete.

2.3 Preliminary Conceptual Model & Risk Assessment

2.3.1 General

The assessment of contamination risks and other environmental risks uses the **Source-Pathway-Receptor** principle.

The site characterisation attempts to identify potential previous and existing **sources** of contamination (or environmental risk) on-site, as well as off-site ones sufficiently close to the site to potentially affect it. The conceptual model links the identified sources likely to cause harm, via **pathways** to identified critical **receptors**.

In the event of a change of land use to a more sensitive use, the town planning regime will require assessment of the new site development layout within the context of the sources of risk and introducing new exposure pathways. The assessment is also used to determine if the site, once developed, would be classed as “contaminated land” under the definition provided by the Part 2A of the Environment Act 1990 as defined in the Environment Protection Act 1995.

The conceptual model is therefore based on a number of identified source-pathway-receptor scenarios. For land to pose a risk (or be classified as “contaminated” under Part 2a) a significant pollutant linkage between source and receptor needs to be identified, which will include each component of the conceptual model.

Risk assessment is always based upon the current state of the site, in case the client does nothing with surfacing, potential hotspots, etc, during their (re)development. The risk assessment does not discuss the post-development risks at the site, because there are required to be no significant ones (Ref NPPF).

The absence or removal of a source, or interception of a pathway, will ‘break’ the pollutant linkage and remove the risk.

The conceptual model is characterised by identification of plausible pathways between the following:

- **On-site** sources, which may impact **on-site** receptors.
- **On-site** sources, which may impact **off-site** receptors.
- **Off-site** sources, which may impact **on-site** receptors.

The hazard, consequence and degree of risk all remain as ‘potential’ until assessed by intrusive investigation.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

2.3.2 Preliminary Conceptual Model & Risks

Table 2.2: Potential Risks

Feature	Potential Risks and Contaminants of Concern# (CoC)
On-Site: Localised	
Made ground (only expected around the barn)	Heavy Metals, hydrocarbons (TPH, PAHs), asbestos.
Asbestos containing materials (ACM): - As asbestos cement debris/fragments in soils around the barn, clad with asbestos.	Asbestos fragments and loose fibres in the soils. Such materials were just another building material when these buildings were built.
Potential for automotive hydrocarbons impacting soil around the barn area.	Oils, Petrol, Diesel (TPH, PAHs). Chemical vapours.
Above- ground diesel tank.	
On-Site: Site-wide	
Unexploded Ordnance.	Explosion. There is always a risk of UXO being present on any site, but for this site the potential presence, and risk to construction workers forming excavations, is considered very low.
Off-Site	
None.	-

#: From industry profiles, etc.

There are not considered to be any significant risks from:

- **Chicken shed manure** (ammonia, acidity) due it now being >~30yrs old (if it indeed was dumped on site); and
- the **private garages** just off site, due to them being fairly modern.
- **Ground or landfill, gases**, since there are no landfills, or significant infilled ground, near the site and no organic-rich soils # are expected on site (#: including made ground).
- **Radon Gas.**

A **preliminary** conceptual model is indicated in the following table (the model is finalised following intrusive site investigation, see Section 6).

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 2.3: On-Site to the On-Site Source – Pathway – Receptor Model

Source		Pathway	Receptor	Potential Linkage?
General	Hazard			
Total soils concentrations (e.g. heavy metals and hydrocarbons): General impact (made ground) from former site usage.	Contamination of groundwater.	Migration of leachate through unsaturated zone; Then Migration through saturated zone/groundwater.	Groundwater and/or surface waters, and/or eco-system	Yes, but only if relatively permeable soils.
	Impact on Human health.	Ingestion of and dermal contact with soil & household dust; Inhalation of dust (indoor household and outdoor fugitive).	Construction workers.	Yes
		Growing then eating food crops.	Site end-users.	Yes
	Vegetation poisoning.	Plant root uptake.	Plants.	Yes, but unlikely from experience.
Hydrocarbon vapours at hotspots. Ground Gases from degradation of petroleum hydrocarbons at hotspots.	Explosion (accumulation of methane and volatiles).	Preferential flow paths into buildings through unsaturated zone. Inhalation of indoor vapours/gases and possible explosion.	Site end-users.	Yes, but significant hotspots are not expected
	Asphyxiation (resulting from elevated levels of carbon dioxide, methane etc).	Preferential flow paths into buildings via piled foundations vibro columns, etc . Inhalation of indoor vapours/gases and possible explosion.		No. Such foundations are unlikely
		Inhalation of outdoor vapours/gases.	Groundworkers	Negligible risk Yes
Ground Gases from: - natural soils with organic content (e.g. peat, alluvium) - made ground with organic content. Landfill Gases from landfilled material within say 500m of the site.	Explosion (accumulation of methane). Asphyxiation (resulting from elevated levels of carbon dioxide, methane etc).	Preferential flow paths into buildings through unsaturated zone. Inhalation of indoor vapours/gases and possible explosion.	Site end-users.	No
		Preferential flow paths into buildings via piled foundations vibro columns, etc . Inhalation of indoor vapours/gases and possible explosion.		No
		Inhalation of outdoor gases.	Groundworkers	Negligible risk No
Liquid contaminants Hotspot: - Diesel at tank location - Oils at garages Hydrocarbons and/or solvents impact to soils	Contamination of groundwater.	Migration through unsaturated zone to groundwater .	Groundwater and/or ecosystem.	Yes, but only if relatively permeable soils.
		Via piled foundations.		No. Such foundations unlikely
	Impact on Human health.	Permeation into PE Water supply pipes.	Human drinking water.	Yes
		Ingestion of and dermal contact with soil.	Site end-users Groundworkers	Yes but unlikely Yes
Radon Gas from natural soils/rocks (radionuclides).	Damage to lung tissue and/or Carcinogenic effects.	Preferential flow paths into buildings (e.g. drains, service runs, wall cavities, piles etc.); Inhalation of indoor gases.	Site end-users.	No
UXO.	Explosion.	Hit during excavations.	Construction workers & Drillers.	Yes, but unlikely

Linkages: likely to exist, might exist, unlikely to exist

There are not considered to be any significant **on-site to off-site** pathways or risks.
There are not considered to be any significant **off-site to on-site** pathways or risks.

3 Phase 2 Site Investigation

3.1 General

An intrusive site investigation was carried out on 22nd April 2024, and employed trial pits. In-situ soakaway testing was also undertaken.

The holes are summarised as follows, with any targeted and non-targeted holes/sampling shown:

Table 3.1: Exploratory Hole Details

Exploratory Hole ID	Technique	Hole Depth (mBGL)		Targeted?	Comments & Reasons for Holes
		Target	Actual		
TP1	Mechanical Excavator	4m	2.80	Yes, for MG and asbestos in soils	Soak Test and to inform founding depth for 1-storey building. Target MG.
TP2		2m	3.35		To inform founding depth for 1-storey building. Target MG
TP3			3.20		
TP4		4.0	2.45	No	Soak test and for access road design
TP5		4.0	3.20	No	Soak test and for access road design
TP6		2m	3.50	The two garages	To inform founding depth for 1-storey building. Target garages.
TP7	Hand dug	1.0	1.00	Diesel tanks (one of top of other)	Target tanks

A plan showing the exploratory hole and test locations is presented as Appendix A. Such also shows the locations of the potential sources of contamination/risk.

Final hole locations are measured or estimated and were not surveyed.

3.2 Trial Pitting

6no. trial pits were excavated using a JCB 3CX excavator. 1no. trial pits was excavated by hand digging. The trial pits were logged by an onsite engineer and samples were taken from the resulting spoil for geotechnical and chemical laboratory analysis.

On completion the pits were backfilled with excavated spoil and compacted.

Detailed log sheets of the trial pits are included in Appendix B.

3.3 In-Situ Testing

Where possible, hand shear vane (HV) tests were undertaken on recovered soil samples that were as undisturbed as possible.

Soakaway tests were undertaken in the following pits in general accordance with recommended practice given in BRE Digest 365. The results are contained in Appendix C.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 3.2: Soakaway Tests

Pit Reference	Comments
TP1	3no. fillings of the pits were not undertaken due to slow infiltration rates
TP4	
TP5	

3.4 Sample Collection and Laboratory Analysis

Samples obtained during the investigation were subjected to a range of geotechnical and chemical testing at appropriate UKAS accredited laboratories.

Samples were submitted for **geotechnical laboratory testing** to characterise the engineering properties of the soil. The following testing was scheduled:

- Moisture Content.
- Classification tests (Atterberg Limits).

Geotechnical laboratory test data is presented in Appendix D.

Soil samples were sent for **chemical laboratory analysis** to be analysed for:

Table 3.3: Soil Sample Chemical Tests

Testing:	Number of Samples Tested	
	Made Ground	Natural Soils
AGGC Full suite comprising: arsenic, cadmium, copper, total chromium, chromium VI, lead, mercury, nickel, selenium, zinc, Speciated Polyaromatic Hydrocarbons (PAH), speciated Total Petroleum Hydrocarbons (TPH-CWG), soil organic matter content (SOM), pH and soluble sulphate.	5	0
AGGC Screen suite comprising: arsenic, cadmium, copper, chromium, lead, mercury, nickel, selenium, zinc, speciated Polyaromatic Hydrocarbons (PAH), banded Total Petroleum Hydrocarbons (TPH), soil organic matter content (SOM), pH and soluble sulphate.	0	1
Asbestos Screen & ID.	5	0
pH, soluble sulphate (for buried concrete design).	0	5

Generally, no natural soils were tested for **contamination**, as given the site usage and natural clays, etc, they were considered unlikely to be contaminated (also no visual or olfactory indications of contamination were found in our holes). One shallow sample was tested to show absence of any contamination.

All soil samples were collected using either clean stainless steel utensils or clean disposable gloves and placed directly into clean containers provided by the laboratory.

The chemical laboratory test results are presented in Appendix E.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

4 Ground Conditions

4.1 General

The following table provides a summary of the strata encountered in the exploratory holes and the depth to the base of each stratum. MG = man-made ground.

Table 4.1: Typical Strata

Strata	Depth (mBGL) Encountered		Typical Thickness (m)	Description & Comments
	Top	Bottom		
MG Topsoil	0	0.2, 0.35		TP2 and TP6 only
Topsoil	0	0.25		TP4 and TP5 only
MG: clay	0 to 0.35	0.6 to 0.9		Very soft and soft, and contains fragments of concrete and brick, with rare metal and pipe.
Soft silty CLAY #	0.25 to 0.8	1.45 to 2.35		Grey and very sandy. TP1, TP2, TP4, TP5, TP6
Firm silty CLAY #	0.6, 0.9, 1.7	2.3, 2.45		Orangish Brown and very sandy. TP3, TP6 and TP7 only
Stiff CLAY	1.45 to 2.45	>2.45, >2.8, >3.2, >3.2, >3.35, >3.5		Grey and slightly or very, sandy and silty

#: on site logging felt this was a silt, as shown on the logs, but lab testing confirmed the strata to be **silty CLAYS**.

Anthropogenic components of the made ground comprised concrete, brick, and rare metal and pipe.

Groundwater observations are detailed in Section 4.3.

4.2 Geotechnical Parameters

Under the entire site area there are just cohesive silts and clays (solid geology), to >3.5m depth.

Plasticity indices (Appendix D)(Liquid limits= 40% to 54%) indicate the silty clays to be of intermediate and high plasticity. The plasticity indices (PI) range from 23% to 35%.

Results are summarised as follows:

Table 4.2: Modified Plasticity Indices Summary (arranged in depth order)

Sample/Hole Reference	Depth (mbegl)	Plasticity index %	% Passing 0.425mm	Remarks (C=clay)	Modified Plasticity Index %	Shrinkability
TP3	1.00	28	100	CI Intermediate Plasticity	28	M
TP1	1.50	31	100	CH High Plasticity	31	M
TP6	1.50	30	100	CI Intermediate Plasticity	30	M
TP2	1.80	35	100	CH High Plasticity	35	M
TP1	2.50	23	100	CI Intermediate Plasticity	23	M
TP2	2.50	31	100	CH High Plasticity	31	M
TP3	2.50	24	100	CI Intermediate Plasticity	24	M
TP6	2.70	32	100	CI/CH Intermediate/ High Plasticity	32	M

L=Low M=Medium H=High

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation Land Adjacent Seagry House, Upper Seagry

The modified plasticity indices (MPI) indicate the clays to possess **medium** volume change potentials with changes in moisture content, according to the criteria of NHBC Standards, Chapter 4.2 (2023) Building Near Trees. Based on these results, it is recommended that a **medium volume change potential** be assumed for design purposes, with corresponding minimum founding depths of 0.9m (in areas away from existing and proposed trees).

and vane tests gave the following results, with engineer's site interpretation for comparison.

Table 4.3: Hand Vanes Results (Shear strength, kPa)

Test depth (mbegl)	TP1	TP2	TP6		
0.5	-	-	-		
1.0	20, "Soft"	-	20, "Soft"		
1.5	-	-	-		
2.0	42, "Soft"	-	38, "Firm"		
2.5	-	-	-		
3.0	-	38, "Stiff"	-		

4.3 Groundwater

Pits were up to be up to ~3.6m deep and no groundwater was found in any of them.

4.4 Contamination Indications

Everything on the chicken shed is asbestos. There were no visual or olfactory indications of contamination noted in the soils during the site works.

We especially did not observe any asbestos containing-materials (ACM) in the soils around the existing building (but such could still exist). We spotted piles of asbestos sheets and ducting.

4.5 Underground Services Encountered

None were found in the exploratory holes.

5 Geotechnical Assessment

5.1 Introduction

The current development proposals are discussed in Section 1.2.

Likely wall loadings are currently unknown, but we could assume loads could be no more than a single-storey house of standard construction, for which wall loadings could be as follows.

Table 5.1: Potential Building Loads

House Size	Potential Maximum Line Load (kN per m run of wall)	Corresponding Max' Bearing Pressure (kPa) for Footing Widths of:		
		0.45m	0.6m	1.0m
1-storey semi-detached	40	90	67	40

5.2 Excavations

Excavations should be suitable with conventional earthmoving plant.

It is unlikely that shallow excavations will encounter significant groundwater. Groundwater could occur as seepages and should this happen then it should be possible to keep excavations dry by pumping from a conveniently located sump to a nearby sewer. If this is required, a temporary discharge licence will be required from the water authority.

All of our trial pits remained stable and open during the short time of their formation. Temporary excavations are therefore expected to stand unsupported in the short term, either vertically, or with steep cut gradients. Excavations below approximately 1m depth will require sheeting and shoring for personnel to enter safely. The stability of all excavations could deteriorate on wetting either from groundwater or surface water. Excavations could therefore be protected from rain and surface water runoff.

Any areas of particularly poor quality underlying soils (i.e. wet, soft, loose materials) should be removed from beneath all proposed foundation and hardstanding areas, and the deficit made good with suitable compacted granular fill (placed to an engineering specification).

Carbon & Sustainability

Attempt to retain & reuse surplus soils on site, provided there is legitimate reason for reuse.

5.3 Earthworks

No significant earthworks are envisaged.

5.4 Foundation Assessment

General

Made Ground was present across the site (albeit of only **0.6m to 0.9m proven thickness** at the locations investigated) and should not be relied upon to form a suitable bearing stratum for buildings, due to the high potential for varying strengths/densities and compositions, that such soils usually have.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Based on the *Modified Plasticity Indices* range showing **medium volume change potentials** with changes in moisture content, then we recommend a **minimum founding depth of 0.9m** away from existing or former tree locations.

Sands (weathered Kellaways Sandstone) had been expected across the site, but no significant sands were found.

The drawing in Appendix B shows the distribution of soft silt across the site. It is possible that there is a **(steep sided) channel of softer material, running from the ditch on the opposite side of the road to TP5, through the site, to the ponds area.**

In TP3 and TP7 there was no soft found, just made ground, and these two holes showed the closest thing to the Kellaways Sand, being silty SAND.

The various options for foundations are discussed as follows, starting with an assessment of shallow foundations, then assessing other options of increasing complexity and cost.

Taking account of the strata revealed by this investigation we recommend that shallow/strip/pad/trench fill foundations are adopted for the proposed development.

The following foundation guidance should be reviewed if the ground conditions vary significantly from those highlighted in Section 4.

All foundation formations should be inspected and approved by a suitably qualified geotechnical engineer. Any 'soft' spots where exposed should be excavated and replaced with suitably compacted engineering fill.

Carbon & Sustainability

For sustainability, one should consider the following:

- Propose the use of cement-types with less impact than the classical Portland Cement. (use CEMII or CEMIII to replace CEMI).
- Earth Friendly Concrete (EFC): Replacement of Cement by the use of GGBS (Ground Granulated Blast Furnace Slag)(and fly ash geopolymers).
- Propose alternative materials. E.g. alkali activated materials (AAM's) and micro-macro synthetic fibre to replace steel reinforcement.
- Design cement-free ground improvement solutions and specify low Ordinary Portland Cement (OPC) mixes. For example, by cement replacement with Ground Granular Blast Furnace Slag (GGBS) / Pulverised Fly Ash (PFA) (e.g. CEMIII B) where locally available.
- Consider other, non/less- cement based techniques of ground improvement (e.g. stone columns or well-designed soil-mixing), or driven **timber piles** #.

#: One of the main drawbacks to using timber is that it is biodegradable. Decay occurs fastest when the timber is exposed to the air, which allows fungal decay and rot to occur. As such, a typical life span for timber placed in an **unsaturated environment is c. 25 years**. Timber placed **below groundwater level**, in a saturated, anoxic environment, will decay at a much slower rate and can have a design life of **up to 100 years** depending on the timber species used.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Shallow Strips, Pads and Trench Fill Foundations

We recommend that shallow **strip or pad foundations** be seated into the **stiff clays** of the *Kellaways Clay Member*, which lie at 2.2m to 2.45m depth in the current barn area.

One could also found in the overlying **firm clays** (TP3, TP6 & TP7, which could mean the southern half of the existing barn/new commercial unit) that lie at 0.6mBGL to 1.7mBGL.

Carbon & Sustainability

Foundation depths and widths should be assessed to find the minimum volume of soil arisings that could occur, and so minimise the amount of concrete used in foundations (if surplus soils need to go off site, such will also minimise the carbon footprint of exporting).

Founding depths for new foundations should be the greater of the following depths:

1. 0.9m below **finished** ground levels (mbfgl) (due to shrinkage potential) with no tree effects.
2. Deepened to comply with NHBC requirements if within the influence zones of trees.

The deeper founding depths will turn the strip footings into **deep trench fill** and so depending upon a number of factors (e.g. increased cost of mass concrete, landfill cost of increased soil volumes, etc), then it is possible that vibro-improvement, or mini piles, could be more cost-effective.

At the minimum foundation depth of 0.9mbfgl, or at least 0.1m into the founding level clays, the allowable bearing capacities are (adopting a factor of safety of 3 on the ultimate calculated value):

Table 5.2 Allowable Bearing Capacities (Qa)

Foundation Type	Onto Firm Clays (Cu=50kPa #) at >=0.9mbfgl @	Onto Stiff Clays (Cu=80kPa #) at >=2.2mbfgl @
0.45m wide strips	Qa>=115kPa @	Qa>=200kPa @
0.6m wide strips	Qa>=110kPa @	Qa>=200kPa @
1m square pads	Qa>=130kPa @	QA>=225kPa @

#: Required strengths.

@: capacity increases with depth.

Probable founding depths (or minimum 0.9mbfgl) are shown on the plan in Appendix B, i.e. 0.9m at the new building's southern end, increasing to ~2.5m at the northern end.

The above satisfies the aforementioned estimated maximum loads from semi-detached 1- storey houses (Table 6.1).

At the intensities of loading given above, total settlements should not exceed 25mm, with differential settlements between adjacent pad footings of approximately half this value. In the event that shallow foundations are employed for the development, the detailed design should include a serviceability check for settlement between differentially loaded foundation elements when foundation loads are determined.

Note that if detailed design causes individual foundations to be closer to one another than about 5x their width/breadth, then their pressure bulbs could interact and the above advice will need to be rechecked.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

The above values are based on a fresh cut formation for foundation level. If the formation is left exposed to the weather for a period of time, then further excavation may be required until the strengths/densities discussed above for the bearing stratum are obtained.

To avoid the risk of differential settlements then individual foundations should found upon the same strata type (for example, entirely onto firm clays, or entirely onto stiff clays).

Where two or more strata types are revealed at planned founding level, then footings shall be deepened to found onto whichever of those strata types underlies the other.

Foundations may need to be deepened **if underlain by cohesive soils** lying within ~3m of finished ground level and if they lie in the within the influencing distance of either existing trees that are to be retained, **ones that have been (or are to be) removed**, or new ones that are to be planted. Such could mean the use of deep trench fill foundations or other foundation options below. **The client should check for any significant trees that may have been removed in the last few years, as those locations could continue to heave as the soils recover.**

Vibro-Improvement

Such uses either **Vibro-Stone Columns (VSC)** or **Vibro-Concrete Columns (VCC)**, depending on the local availability of stone and upon the ground conditions being treated.

For VSC/VCC, the specialist piling contractor Keller usually requires at least 30kPa soil strength (if NHBC are involved, then they require developers to only use VCC/VSC in soils of > 40kPa strength). We have found soils strengths as low as 20kPa, and so VCC and VSC might not be feasible.

After the Vibro treatment it is usually possible to adopt bearing pressures of 100kN/m² to 125kN/m² to the foundations. Greater may be possible following discussions with a specialist contractor.

Vibro would not overcome any ground movements associated with swelling and shrinkage and so foundations would have to be founded at depths in line with NHBC requirements.

Traditional Piles

A further economical solution could be **pin piles** (small diameter, installed with 360° excavator).

A Foundation Works Risk Assessment may also be required for piling works, as may the design for a piling mat.

A copy of this report should be provided to suitable piling contractors and they should be asked to demonstrate the suitability of their equipment in these ground conditions. Furthermore, it is recommended that pile integrity and load testing be carried out as part of the quality assurance process.

5.5 Floor Slabs

Suspended floor slabs (designed in accordance with NHBC guidelines) are recommended at the site because made ground exceeds 0.6m thickness and the shallow soils are likely to be susceptible to volume change with changes in moisture content.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Any requirements for membranes to be placed within ground floor slabs to protect against ground/landfill gas, chemical vapours, or Radon, are discussed in later sections of this report.

5.6 Roads and Pavements

5.6.1 California Bearing Ratio

No CBR testing has been undertaken. Such should be carried out prior to construction, or when formation level has been reached.

Based on the general characteristics of the natural soils, the equilibrium CBR value for pavements, parking and hardstanding areas is suggested to be taken as CBR=3% to 4%.

5.6.2 Frost Susceptibility

The clays are of low permeability with a high clay fraction and are unlikely to suffer from heave under the action of frost.

5.6.3 General Information

Carbon & Sustainability

For **CBR values <~8%**, the incorporation of a geogrid at the base of the capping would reduce the required thickness of capping and therefore reduce the volume of imported engineering fill.

Due to silts/clays at the formation, such will degrade on exposure to wet weather and therefore it should be covered with 150mm of compact granular fill, as soon as possible following exposure.

5.7 Drainage

Surface Water

There are simple ways to approach a drainage design differently and provide multiple benefits, without increasing cost or build complexity to the scheme, e.g. **large rainwater harvesting tanks**, rain gardens, tree pits, swales, etc.

The long-term maintenance and ownership responsibility has advanced with the release of the *Design & Construction Guidance (Sewers for Adoption, 8th Edition, April 2020)* and the increasing use of new appointments and variations (NAVs), with the scope to adopt and maintain infrastructure not usually accepted by the water authorities.

Soakaway infiltration was undertaken in 3no. trial pits. The results are contained in Appendix C and are summarised as follows:

Table 5.3: Soakaway Results

Trial Pit	Test Depth range (mbegl)	Corresponding Stratum	Soil Infiltration Rate (m/s)
TP1	0.32-2.8 (2.48m head)	Silty CLAYS	No infiltration
TP4	0.3-2.45 (2.15m head)		No infiltration
TP5	0.28-3.2 (2.92m head)		No infiltration

The results suggest that conventional soakaway drainage is unlikely to be feasible.

Foul Water

Normally foul water would be discharged to nearby sewers.

If discharge to nearby **surface water courses**, or to the **ground**, is a consideration, then AGGC can assist with the assessment for such. We would recommend trying to avoid drainage fields. Previously we have obtained EA agreement to discharge to surface water type soakaways.

5.8 Chemical Attack on Buried Materials

Concrete

Carbon & Sustainability

See Section 5.4, General.

Samples were tested for sulphate suites as outlined in *BRE Special Digest 1, Concrete in Aggressive Ground: 2005* (SD1).

The site can be classed as Greenfield (not Brownfield¹) and with groundwater lying at >3.6m depth, water conditions are taken to be static above that depth and mobile below.

The water-soluble sulphate results for both the made ground and natural soils were all <92mg/l. The 'Characteristic Value' is therefore conservatively 100mg/l and this falls into Design Sulphate Class DS-1 in Table C1 of BRE Special Digest 1 (SD1).

The geology (Kellaways Clays) at the site may be potentially pyritic. **However**, such soils lie at >2.2-2.45m depth in the barn area and so buried concrete is unlikely to be exposed to disturbed ground in which pyrite may oxidize to sulphate and so the concrete classification need not be based on the pyrite test results.

Soil pH values varying from 5.8 to 8.0 were recorded and from these results a 'Characteristic Value' of 5.8 is derived.

From consideration of the sulphate, sulphur, pH and groundwater conditions it is concluded that the DS and Aggressive Chemical Environment for Concrete (ACEC) classes are:

- AC-1s if there is no risk of concrete being in contact with groundwater,
- and AC-1 where concrete could be contact with groundwater (e.g. >3.6 m depth).

The designer should utilise these classifications in order to produce the concrete specification.

Other Materials

The parties responsible for selecting all other materials that will be placed in the ground as part of this development, shall ensure that they are resistant to the chemical concentrations identified in the appendix of this report (e.g. pipe joint seals).

¹ The definition of "Brownfield" adopted by SD1 is one that has been *subject to industrial development, storage of chemicals, or deposition of waste, and which may contain aggressive chemicals in residual surface materials or in ground penetrated by leachates.*

6 Assessment of Contamination & Environmental Risks

6.1 Tier 1 Generic Quantitative Risk Assessment - Soil Risks to Humans

The proposed redevelopment of the Site is non-residential, therefore, to identify chemicals of potential concern, the analytical data has initially been compared against the relevant available guidelines for **commercial** end-use. **Residential with plant uptake** guidelines are given for information (e.g for risks to groundworkers).

The maximum results, have been used for subsequent comparison with the following 4no. sets of GAC:

1. Firstly against **Category 4 (Cat 4) Screening Levels**, SP1010, 24th September 2014, by CL:AIRE.
2. Then:
 - a. CL:AIRE/EIC/AGS **Soil Generic Assessment Criteria** (GAC) for Human Health Risk assessment, January 2010.
 - b. The LQM/CIEH **S4ULs** for Human Health Risk Assessment. Ref: S4UL3269, released January 2015 (with update in August 2015), Land Quality Press, Nottingham.
 - c. **EA Science Reports** SC050021, SR2 & SR3.

6.1.1 Metals

The CLEA model has separate Soil Guideline Values (SGVs) for different forms of mercury. However, the SGV report states that for general surface contamination, and to simplify the assessment, the chemical analysis results for total mercury content can just normally be compared with the SGVs for inorganic mercury (e.g. 40mg/kg for private gardens)(this is because the equilibrium concentrations of elemental and methyl mercury compounds are likely to be very low).

The following table summarises the results (**Bold** and/or **highlight** shows exceedances):

Table 6.1: Values for Metals in Soils

Compound	No. of samples	Maximum values (mg/kg)	SGV or GAC (1% SOM) mg//kg (Residential <u>with</u> plant uptake)	SGV or GAC (1% SOM) (Commercial) mg/kg
Arsenic	6	9.8	37	640
Cadmium	6	0.4	11	190
Chromium	6	7.9	910 #	8,600 #
Chromium VI	6	<0.8	6	33
Copper	6	11	2,400	68,000
Mercury (Inorganic)	6	0.2	40	1,100
Nickel	6	23.2	180	980
Lead	6	35.7	200	2,300
Selenium	6	<1	250	12,000
Zinc	6	161	3,700	730,000

#Chromium III

None of the results exceeded the GAC values for *residential with plant uptake*, nor *commercial*, end-uses.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

6.1.2 Organics – General

Soil Organic Matter (SOM) tests were undertaken on 6no. samples. The results ranged from 0.1% to 11% and so a conservative figure of 1% SOM has been adopted when selecting the Generic Assessment Criteria (GAC) screening values for organics in the following sections.

6.1.3 Organics – TPH

The following table summarises the results (**Bold** and/or **highlight** shows exceedances):

Table 6.2: Values for Speciated Hydrocarbons in Soils

Compound	No. of samples	Maximum values (mg/kg)	SGV or GAC (1% SOM) mg/kg (Residential <u>with</u> plant uptake)	SGV or GAC (1% SOM) (Commercial) mg/kg
Aliphatic				
EC 5-6	6	<0.01	42	3,200
EC> 6-8	6	<0.01	100	7,800
EC> 8-10	6	<1	27	2,000
EC> 10-12	6	<1	130	9,700
EC> 12-16	6	<1	1,100	59,000
EC> 16-35	6	19.8	65,000	None #
EC> 35-44	6	4.1	65,000	None #
Aromatic				
EC 5-7(benzene)	6	<0.01	70	26,000
EC> 7-8 (toluene)	6	<0.01	130	56,000
EC>8-10	6	<1	34	3,500
EC>10-12	6	<1	74	16,000
EC>12-16	6	<1	140	36,000
EC>16-21	6	1.5	260	28,000
EC>21-35	6	38.3	1,100	28,000
EC>35-44	6	13.2	1,100	28,000

#: Commercial: S4ULs of 1.6kg/kg are given and so these GAC are taken as N/A.

None of the results exceeded the GAC values for *residential with plant uptake* nor *commercial* end-uses.

All BTEX (petrol)(Benzene, Toluene, Ethylbenzene, Xylene) were below the limits of detection.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

6.1.4 Organics – Polyaromatic Hydrocarbons (PAHs)

The following table summarises the results (**Bold** and/or **highlight** shows exceedances):

Table 6.3: Values for Speciated PAH in Soils

Compound	No. of samples	Maximum values (mg/kg)	SGV or GAC (1% SOM) mg/kg (Residential <u>with</u> plant uptake)	SGV or GAC (1% SOM) (Commercial) mg/kg
Naphthalene	6	0.06	2.3	190
Acenaphthylene	6	0.04	170	83,000
Acenaphthene	6	0.04	210	84,000
Fluorene	6	0.04	170	6,3000
Phenanthrene	6	0.52	95	22,000
Anthracene	6	0.34	2,400	520,000
Fluoranthene	6	4.85	280	23,000
Pyrene	6	4.54	620	54,000
Benzo(a)anthracene	6	3.83	7.2	170
Chrysene	6	4.35	15	350
Benzo(b)fluorathene	6	5.18	2.6	44
Benzo(k)fluorathene	6	4.99	77	1,200
Benzo(a)pyrene	6	6.18	2.2	35
Indeno(123-ed)pyrene	6	3.99	27	500
Dibenzo(ah)anthracene	6	1.20	0.24	3.5
Benzo(ghi)perylene	6	4.69	320	3,900

3no. PAHs (all from TP2 at 0.3m depth) exceeded the GAC values for *residential with plant uptake*, but not *commercial*, end-uses.

6.1.5 Other

Asbestos was screened for in 5no. made ground samples (0.3-0.7m depth) and none was found.

6.2 Tier 2 Detailed Quantitative Risk Assessment - Soil Risks to Humans

The purpose of *detailed quantitative risk assessment* (DQRA) is to establish and use more detailed site-specific information and criteria to decide whether the elevated results do indeed pose unacceptable risks. Whether such further assessment is worthwhile can depend on a number of factors.

If the site were ever considered for residential end-use, then further assessment of BaP as a “surrogate marker” could show the PAH risks to be less, or even absent.

6.3 Soil Risks to Plants (Phytotoxicity)

It is not possible to produce a definitive list of phytotoxic substances on account of numerous variables. However, a number of metals are repeatedly cited as commonly occurring priority pollutants. As a result, the following list is adopted as indicators of the potential for phytotoxicity: As, B, Cr, Cu, Ni and Zn.

For the guideline values, the most authoritative source is the British Standard for topsoil (**BS3882**), but this only lists three elements. CLR 11 states that the **ICRCL Guidance Note 70/90** can be used for initial screening criteria. This approach has been adopted where BS3882 is lacking, but where an ICRCL 70/90 criterion is lacking, the next lowest criterion, has been adopted.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 6.4: GAC for Phytotoxic Risks

Compound	Generic Assessment Criteria (GAC)(mg/kg)				GAC Source
	pH 5.0 - <5.5	pH 5.5 - <6.0	pH 6.0 - <7.0	pH >7.0	
Boron	3				1987: ICRL 59/83 (also New Zealand)
Chromium VI	25				1990: ICRL 70/90
Chromium III	400				1998: MAFF Agricultural Practice for sewage sludge
Arsenic	250 ("applicable to plants")				
Copper (Cu)	80	100	135	200	2015: BS3882
Nickel (Ni)	50	60	75	110	&
Zinc (Zn)	200	200	200	300	1996: DoE #

#: Department of the Environment Publication, Code of Practice for Agricultural Use of Sewage Sludge, 1996

The pH results varied from 5.8 to 8.0 and so concentrations determined of Cu, Ni, Zn did not exceed the stated guidelines. Additionally, there were not any significant results for other heavy metals (which can also be potentially phytotoxic).

6.4 Soil Risks to Water Supply Pipes

The future routes of water supply pipes had not been provided at the time of this report, hence the investigation and sampling strategy may not be fully compliant with UK Water Industry Research (UKWIR) recommendations.

To assess possible risks to proposed water supply pipes, the laboratory test results have been subject to initial assessment against the GAC presented in UKWIR. Full testing has not been undertaken to determine the suitability of metallic pipe materials.

It is assumed that water pipes will be placed no deeper than 1m below existing ground level and results that relate to strata below 1m are not considered in the following table. Assessment of the results versus the GAC is summarised as follows:

Table 6.5: GAC for Water Supply Pipes

Parameter	GAC (mg/kg)		Results exceeding the GAC (mg/kg)	
	PE pipes	PVC pipes	PE pipes	PVC pipes
BTEX (<C11)	0.1	0.03	None	None
Mineral Oil C11-C20	10	Suitable	None	None
Mineral Oil C21-C40	500	Suitable	None	None

Other parameters within UKWIR have not been assessed since they are not potential contaminants of concern for this site.

Visual or olfactory indications of chemicals, or petroleum hydrocarbons (e.g. oil, petrol, diesel) were not noted on site.

Given the above, then we consider that the local water supply company should accept the use of PVC and PE water supply pipe materials on site.

It is recommended that this assessment be given to the relevant water supply company at an early stage (ideally prior to an application for planning permission being made) to confirm its requirements, which may not necessarily be the same as those recommended by UKWIR.

6.5 Tier 1 Generic Quantitative Risk Assessment – Risks to Water Resources

No significant contamination has been found that could migrate or leach to groundwater. Given this, then it is unlikely that any significant risk will be posed to groundwater under the site.

6.6 Ground/Landfill Gas Risks to Humans

No potential sources of ground gas have been found under the site (i.e. soils with significant organic content that could degrade) and none (including from historic or recent landfills) have been found close enough to the site to pose potential significant risk.

The site is therefore unlikely to be at significant risk from gases (Radon is discussed below).

6.7 Radon Risk to Humans

The chance of a property having a radon level that is at least as high as the **Action Level**, is called the **Radon Potential**.

For this area the environmental data sheets show the Radon Potential to be **0-1% (low risk)**(i.e. up to 1% of properties in this area could exceed the action level),for which **no radon protection** is required for new buildings or extensions on site.

Even though the Radon potential shows “no” Radon protection to be required, many developers are nonetheless adopting “Basic” protection and we would recommend such be considered here. The reason is that protection is obligatory only where >3% of properties exceed the Radon Action Level, but that still leaves 3% potentially at risk from Radon.

6.8 Chemical Vapour Risks to Humans

No olfactory indications that could suggest a vapour risk, have been found.

6.9 Final Conceptual Model and Risk Assessment

The preliminary conceptual model and risk assessment has been updated in light of the findings of the Phase 2 work as shown in the following table.

The method used for risk evaluation is qualitative based on interpretation of the available geoenvironmental and geotechnical data in order to provide an overall impression of the potential risks present at the site. This is described in terms of two variables as follows:

- **“Probability”** – being the likelihood that a hazard is present on site or in the surroundings.
- **“Consequence”** – being the potential outcome of the hazard.

The combination of these is used to define the risk. Clearly if a hazard is not present there can be no consequence. Similarly hazards that are potentially present will have different degrees of potential consequence. The combination of the presence of a hazard, and the potential severity of outcome of such a hazard within any event, can be used to manage the approach to management of the risk.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

The **probability** (likelihood) of an event can be classified on a four point system using the following terms and definitions based on CIRIA C552:

- **Highly likely:** The event appears 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:** It is probable that an event will occur, or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;
- **Low likelihood:** Circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term;
- **Unlikely:** Circumstances are such that it is improbable the event would occur even in the long term.

An extra class is added to those of C552, that of “**negligible likelihood**”, which is an amount or effect that is negligible, i.e. is so small that it is not worth considering or worrying about.

The **consequence** (severity) can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to consequence are:

- **Severe:** Short term (acute) risk to human health likely to result in ‘significant harm’¹. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short term risk to an ecosystem or organism forming part of that ecosystem¹;
- **Medium:** Chronic damage to human health (‘significant harm’¹), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem¹;
- **Mild:** Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (‘significant harm’¹). Damage to sensitive buildings, structures or the environment; and
- **Minor:** Harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

(¹ Defined in Defra Circular on “Contaminated Land”, EPA 1990 Part 2a”, 01/2006, September 2006.)

Once the probability of an event occurring and its consequence have been classified, a risk category can be assigned as in the following table.

Table 6.6: Risk Classification System (CIRA 552)

		Consequence			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

Risk Level	Action
Low to Very Low	None
Moderate to Moderate/Low	Undertake appropriate mitigation measures to reduce the risk level by appropriate on-site practice at little additional cost.
High to Very High	Designers should take such risks into account and avoid or reduce risk level to acceptable levels. Additional resources required.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

The following duplicates the **preliminary potential risks** from Table 2.2 and discusses whether they have now been proven to be risks.

Table 6.7: Proven Risks

Feature	Now proven to be a risk?
On-Site	
Unknown made ground.	Yes, primarily to groundworkers since most pathways will be cut to end-users.
Asbestos containing materials (ACM) in the near-surface soils across the entire site.	No, but we expect such to exist
Potential for automotive hydrocarbons and red diesel, in the soils around the garages and diesel tanks.	No, but such could exist as hotspots.
Unexploded Ordnance.	A risk could always exist
Radon from natural soils/rocks (radionuclides)	No
Off-Site	
None.	No change
Exists or likely to exist, might exist; unlikely to exist	

The table that follows provides a summary of the data reference points, together with an indication of the hazards, probabilities, consequences and degrees of risk.

Ground and landfill gases are not considered risks.

This assessment indicates the site and environs are considered as **Very Low** to **Moderate/Low** risk with respect to contamination. **Indicators above low risk** comprise:

- **Made ground** risks to groundworks.
- No **hydrocarbon hotspots** have been found, but such could still exist and pose risks to end-users and groundworkers.
- **UXO** could always be present and pose significant risks.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 6.8: On-Site to On-Site Source – Pathway Receptor Model

Source		Pathway	Receptor	Probability	Consequence	Potential Risk?
General	Hazard					
Total soils concentrations (e.g. heavy metals and hydrocarbons): General impact (made ground) from former site usage	Contamination of groundwater	Migration of leachate through unsaturated zone; Then Migration through saturated zone/groundwater.	Groundwater and/or surface waters, and/or eco-system	Unlikely	Mild	Very Low
	Human health	Ingestion of and dermal contact with soil & household dust; Inhalation of dust (indoor household & outdoor fugitive).	Construction workers	Likely	Medium	Moderate
		Growing then eating food crops.	Site end-users	Unlikely	Medium	Low
		Plant root uptake	Plants	n/a	Medium	n/a
	Vegetation poisoning.	Plant root uptake	Plants	Unlikely	Mild	Very Low
Hydrocarbon vapours at hotspots. Ground Gases from degradation of petroleum hydrocarbons at hotspots.	Explosion (accumulation of methane and volatiles)	Preferential flow paths into buildings through unsaturated zone Inhalation of indoor vapours/gases and possible explosion.	Site end-users	Unlikely	Medium (Inhalation of indoor vapours/gases)	Low
		Severe (possible explosion)				Moderate/Low
	Asphyxiation (resulting from elevated levels of carbon dioxide, methane etc).	Preferential flow paths into buildings via piled foundations vibro columns , etc Inhalation of indoor vapours/gases and possible explosion.	Site end-users	Low Likelihood	Medium	Low/moderate (but depends on foundation type)
		Inhalation of outdoor vapours/gases.			Medium	Low
			Groundworkers	Low likelihood	Medium	Low/moderate
Liquid contaminants Hotspot: - Diesel at tank location - Oils at garages Hydrocarbons and/or solvents impact to soils	Contamination of groundwater	Migration through unsaturated zone to groundwater	Groundwater and/or ecosystem	Unlikely	Mild	Very Low
		Via piled foundations		Low Likelihood	Mild	Low
	Impact on Human health	Permeation into PE Water supply pipes	Human drinking water	Low Likelihood	Mild	Low
		Ingestion of and dermal contact with soil	Site end-users	Low Likelihood	Medium	Low/moderate
			Groundworkers	Low Likelihood	Medium	Low/Moderate
UXO	Explosion	Hit during excavations, piling or borehole drilling	Construction workers & drillers	Unlikely	Severe	Low/moderate

There are not considered to be any significant **on-site to off-site** pathways or risks.
There are not considered to be any significant **off-site to on-site** pathways or risks.

6.10 Strategy for Risk Reduction & Remediation

6.10.1 Introduction

There are two ways to reduce contamination/environmental type risks:

- “**remediation**” of soil and/or groundwater.
- Other **risk reduction measures** (that can only be completed post-commencement, such as clean cover in final garden areas, gas protection, or special water supply pipe materials).

Carbon & Sustainability

Final site levels should be designed to accommodate as much surplus soils/materials[#] from construction, as is legitimately possible (without been seen to be trying to lose such on site, in which case they would class as “waste”).

Conduct a cut/fill assessment to establish any surpluses or deficits of soil/materials[#].

Any deficit can be resolved by obtaining surplus soils from other development sites by using a **U1 Waste Exemption** or the **Definition of Waste Code of Practice (DoWCoP)**.

It may be possible for any surplus soils/materials[#] posing hazards, to be reused in areas where they will not pose hazard.

[#]: e.g. brick, tiles, concrete and tarmac, crushed for reuse as fill, provided that tarmac/asphalt does not contain hazardous concentrations of **coal-tar**.

No unacceptable risks have been found that require **pre-commencement** soil or groundwater remediation.

No long-term monitoring and maintenance of remediation is required.

Timescales for the construction and implementation of risk-reduction measures, are unknown.

6.10.2 Pre-Commencement “Remediation” Requiring Validation

The following measures require implementation before the “development” can proceed.

Above-Ground Tanks

Remove such tanks and their contents, from site.

Impacted Soils

None has been found but any impacted soils around and below the above features, shall be removed until soils show no visual or olfactory indications of petroleum hydrocarbons.

A contaminated land consultant should attend site immediately that the above features are removed. They will direct the **removal of any significantly contaminated soils** around and below them (i.e. grey/black stained, or exhibiting (strong) hydrocarbon odours) and will take samples to prove (validation) that remaining soils are not significantly contaminated and no longer pose significant risks.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

General

Provided undertaken correctly, and that currently clean soils on site are prevented from becoming contaminated, then it may be possible to retain hydrocarbon-impacted soils on site and treat them (e.g. windrow) and then safely reuse the resulting clean soils on site (e.g. to backfill voids).

Given the existence of made ground on the site and the site's past usage, vigilance should be maintained during site clearance, in case any further areas of suspected contamination are encountered. If areas are found, then work will stop in that area, a suitably qualified and experienced geo-environmental engineer will be contacted to assess the situation and potentially undertake appropriate sampling, testing and further risk assessment. The Engineer may also contact the Local Authority (LA) Environmental Health Officer (EHO) to discuss the situation and agree a way forward.

If any amendments to this Remediation Method Statement are required as a result of unforeseen contamination, then these will be agreed in writing with the Contaminated Land Officer before being carried out on site.

6.10.3 Post-Commencement Risk Reduction Measures Requiring Validation

General:

The following measures are undertaken as part of the development/construction and are "post-commencement".

Measures to overcome unacceptable risks identified in the previous sections are as follows.

All validation shall be undertaken by a suitably qualified and experienced geo-environmental engineer.

Risks from Imported Materials and Recycled Aggregates

For **sustainability**, recycled aggregates should be considered. Any recycled aggregates that are planned to be imported to site, and **any derived from on-site**, shall be assessed for asbestos content (and any other contaminants that might be present at the source site), prior to import.

All imported fill, topsoil and sub-soil shall be tested for a general suite of contaminants (e.g. "AGGC's Full Suite" herein, plus asbestos if derived from brownfield or recycling. Target concentrations shall be as per the targets given in Tables 6.1-6.3 for **commercial** end-use. For topsoil and subsoil, chemical test results shall be obtained from the supplier prior to import. **Once imported the topsoil/subsoil shall be sampled and tested in order to prove that the import is not significantly different (worse) than as promised.**

Topsoil and subsoil can contain naturally occurring contamination such as arsenic and lead. The results shall be assessed for any exceedances of guidelines.

Prior to import, test results should be obtained and checked. Once imported, and prior to placement, the material shall be tested at a rate of 1no. sample per 100m³ (with a minimum of 2 samples per soil source). This is to ensure that the soils are as promised by the supplier.

It may make commercial sense to import soils that are surplus on other development (donor) sites. Surplus soils become waste as soon as they leave donor sites, unless they are being

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

transferred to another “development” or “construction” (receiver) site for reuse. Such transfer means that such soils do not class as waste, provided that an assessment (Definition of Waste: Industry Code of Practice (DoWCoP), or waste exemption) is completed (see Section 7). There must be a pre-determined use at the receiving site and the soils must be proven, via the assessment, not to pose any unacceptable risks at the receiving site (and not to class as “waste”).

Unforeseen Contamination

A site investigation samples a very small portion of the overall site soils. Given the existence of made ground on the site, vigilance should be maintained during site clearance and construction, in case any areas of suspected **unforeseen contamination** are encountered. If areas are found then a suitably qualified person (e.g. AGGC) should undertake appropriate sampling, testing and further risk assessment.

6.10.4 Post-Commencement Risk Reduction Measures Not Requiring Validation

Asbestos cement fragments have not yet been found on site, but are to be expected. **Risks from asbestos can be reduced by removing such fragments from site.** Although we have past experience of offering advice to reduce asbestos-in-soils risks, we are now not insured to do so and so **you should seek advice from a suitably qualified and insured consultant.** We expect however that they might advise the following:

- Before any heavy plant tracks the site (i.e. before site clearance), fragments lying at ground level should be litter picked and disposed of off-site.
- Litter picking should be repeated once the site is cleared and again for any fragments spotted during all excavations and groundworks.

Site, landscape and maintenance workers should wear gloves, boots and overalls and wash their hands before eating, drinking and smoking. Excessive dust generation should be avoided.

Excavations or below ground voids should be checked for the presence of harmful gases and vapours prior to personnel entry.

A watch should be kept for potential UXO.

6.10.5 Summary of Risk Reduction and Remediation Measures and Validation

The measures required, the data that will be gathered to prove correct implementation and parties to validate them are as follows:

Of the aforementioned measures, there is no “remediation” that can feasibly be undertaken pre-commencement, all is post-commencement, as follows:

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 6.9: Pre-Commencement Validation

Measure:	Data to be gathered:	Party to validate:
Remove Fuel tank.	Supply sheets showing removal of tanks and any contents and fuel/vent lines.	Tank contractor to supply to Contaminated Land Engineer (e.g. AGGC).
Remove any grossly h/c impacted soils from around and below tank.	Direct the removal of any grossly contaminated soils. Take and test soil samples to prove none such remains. Take at least one sample from each side of the resulting void and at least one from the base (more if the excavation size warrants).	Contaminated Land Engineer (e.g. AGGC).

Table 6.10: Post-Commencement Validation

Measure:	Data to be gathered:	Party to validate:
Test any imported topsoil and subsoil and any recycled aggregates.	- Information on the history of the donor site(s). - Estimate on the volume of soil/aggregate imported. Contamination concentration required for imported soils/aggregates <u>prior to import</u>. Confirmatory sampling and testing of: 3no. samples per soil type <u>after delivery to site</u>. - recycled aggregates, 1no. sample per 100m³ <u>after delivery to site</u>.	Client/Supplier to provide history, volume and test results to Contaminated Land Engineer (e.g. AGGC) for assessment prior to import.
Assess any unforeseen/new contamination found	Not possible to determine scope at present.	Contaminated Land Engineer (e.g. AGGC).

Once all of the above risk reduction measures have been completed, and then a Validation Report will be prepared to confirm that such measures have been undertaken in accordance with the requirements herein.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

6.10.6 Validation Report

If planning conditions require such, then in order to achieve sign-off by the Regulators, a final Validation Report will be established for their review and agreement, following substantial completion of the development (but prior to first occupation). Validation might still be prudent in order to satisfy lenders or site purchasers. The report's aim is to validate the measures in Section 6.10.2 and 6.10.3 as having been completed, and completed correctly.

Validation shall be undertaken by a suitably qualified and experienced geo-environmental engineer. Any Validation Report shall include the following information as a minimum:

- Validation of the aforementioned measures (where required).
- Copies of all chemical testing results of soils and for all materials tested.
- Figures and drawings (or discussion) detailing the locations of all samples retrieved for chemical testing.
- Copies of any correspondence with the Regulators.

The client shall separately maintain copies of all Duty of Care Consignment Notes for off-site treatment, re-use and/or disposal of materials. Information regarding such materials and their volumes will be required to validate any DoWCoP *Materials Management Plan* (MMP). This information is usually provided within a final Verification report and such can be one in-the-same as the Validation report for contamination risks.

A copy of the final Validation Report (following sign-off by the Regulators if applicable) shall be incorporated within the Site File in accordance with the CDM Regulations (2015).

7 Other Aspects

7.1 “Site H&S File”

The remediation and risk-reduction measures discussed earlier are designed to protect **end-users** of the site. Others at risk compromise **post-construction groundworkers** and **utilities workers**, etc, for which it is not usually economically viable to remove all risks.

Accordingly, and as with most sites, some sources of risk will, or could, remain as follows. **Such should be added to, and discussed in, the “Site H&S File” (or similar document):**

- Made ground remaining in place that contains elevated contaminants (including, potentially, small amounts of asbestos cement fragments and likely corresponding loose asbestos fibres).

7.2 Soil/Materials Reuse & Disposal

7.2.1 General

Carbon & Sustainability

Final site levels should be designed to accommodate as much surplus soils/materials[#] from construction, as is legitimately possible (without been seen to be trying to lose such on site, in which case they would class as “waste”).

Conduct a cut/fill assessment to establish any surpluses or deficits of soil/materials[#].

Any deficit can be resolved by obtaining surplus soils from other development sites by using a **U1 Waste Exemption** or the **Definition of Waste Code of Practice** (DoWCoP).

It may be possible for any surplus soils/materials[#] posing hazards, to be reused in areas where they will not pose hazard.

[#]: e.g. brick, tiles, concrete and tarmac, crushed for reuse as fill, provided that tarmac/asphalt does not contain hazardous concentrations of **coal-tar**.

In order to prevent excessive costs and reduce the environmental impact of the development (**sustainability**), it is recommended that removal of wastes from the site, including waste soils, is kept to a minimum by:

- firstly trying to balance cut/fill earthworks operations to retain soils on site,
- or removing from site for reuse at other construction/development sites, that require soil:
 - by employing *U1 Waste Exemptions (use of waste in construction)*,
 - and/or *Definition of Waste: Industry Code of Practice* (DoWCoP) assessment,
 - and/or exporting to a soil treatment hub,
- with the last resort being disposal to a licensed waste disposal site (subject to Landfill Tax).

To avoid the risk that any surplus soils remain classed as waste, then a *Materials Management Plan* (MMP) is required before employing the DoWCoP and is strongly recommended for all other situations (e.g. in case it is later decided to employ the DoWCoP).

A MMP must be drafted to show the intent for surplus soils, before they are excavated otherwise the client may have to landfill natural soils that had been planned for reuse off-site, or made ground soils that had been planned for reuse on site.

AGGC’s DoWCoP *Qualified Person* can assist with these assessments.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

If removing to a licensed disposal site, then **Waste Acceptance Criteria** (WAC) test results and other chemical test results should be given to the waste disposal site for classification, along with the exploratory hole logs (which show sample locations and depths) to show which soils are natural and which are man-made. **Note that WAC alone cannot classify waste soils.**

The lab results to enable *Initial Waste Characterisation*, are contained in Appendix E.

If this report is presented to the Local Authority Environmental Health/Contaminated Land Officer, then we hereby notify the local authority of our potential intent to employ the CL:AIRE DoWCoP in order to import and export/transfer surplus soils from/to other development sites. By accepting this report, the LA provide “*no objection*” to this potential proposal.

7.2.2 Reuse on Site

There is unlikely to be any scope for legitimate reuse on site.

7.2.3 Transfer for Reuse on Another Site

Surplus soils become waste as soon as they leave site, unless they are being transferred to another “development” or “construction” site for reuse. Such transfer means that such soils do not class as waste, provided that a waste assessment is completed (e.g. by a DoWCoP Qualified Person) to prove compliance with the 4no. (DoWCoP type) factors.

Soil types can be transferred as follows:

- **Utilising DoWCoP:** Currently only natural soils can be transferred via a DoWCoP.
- **Utilising U1 Waste Exemption:** Limited quantities of both natural soils and made ground can be transferred via a U1, provided that they pose no risks to humans, nor the environment.

Certain other materials may also be reused on other “Construction” sites by employing a *U1 Waste Exemption*.

7.2.4 Soil Treatment Facilities

Made ground and a wide range of hazardous wastes (including Waste Acceptance Criteria (WAC) failing materials), can avoid landfill disposal by being treated at a number of *Soil Treatment Facilities* around the UK. Such disposal is exempt from Landfill Tax.

7.2.5 Disposal to Licensed Waste Sites

To evaluate the various on-site soils for potential off-site disposal, soils are classified in accordance with the Hazardous Waste Directive (HWD) that enables the provision of a European Waste Catalogue (EWC) Code for use during offsite disposal and a Hazardous or Non-Hazardous Classification.

- **Non-Hazardous** material is suitable for disposal in a Non-Hazardous landfill;
- however, disposal to an **Inert** Landfill requires further Waste Acceptance Criteria (WAC) testing in accordance with BS EN 12457–3.
- Material classed as **Hazardous** also requires WAC testing to assign a suitable hazardous classification.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

The Landfill Regulations require that all Hazardous and Non-Hazardous solid waste must be treated prior to offsite disposal to landfill. You can define 'treatment' by using the following 'three-point test'. All three criteria must be satisfied for all of the waste to qualify as being treated:

1. It must be a physical, thermal, chemical or biological process including sorting.
2. It must change the characteristics of the waste.
3. It must do so in order to:
 - a. Reduce its volume; or
 - b. Reduce its hazardous nature; or
 - c. Facilitate its handling; or
 - d. Enhance recovery.

It should be noted that a site investigation is unable to identify all below ground conditions at a site and therefore, if during construction works soils that require offsite disposal are identified as being different to what has been preliminarily tested in this report, additional testing will be required by a suitably qualified environmental consultant prior to disposal or recovery at a licensed offsite facility.

It is also recommended that prior to offsite disposal or recovery of any waste soils; the receiving licensed treatment/landfill facility should be sent copies of all relevant chemical analysis, plus exploratory hole logs showing the engineering descriptions of the soils to which the sample depths relate.

All producers of waste have a **duty of care** to ensure that any waste they produce is handled safely and within the law. They must **check** that anyone they pass waste on to is **authorised** to take it. This includes the authorised site earmarked to handle the waste and any haulier (licensed waste carrier) used to transport the waste between the sites.

All waste holders must act to keep waste safe against:

1. Corrosion or wear of waste containers;
2. Accidental spilling or leaking or inadvertent leaching from waste unprotected from rainfall;
3. Accident or weather breaking open contained waste and allowing it to escape;
4. Waste blowing away or falling while stored or transported;
5. Scavenging of waste by vandals, thieves, children, trespassers or animals.

Holders should protect waste against the above risks while it is in their possession and they should also protect it for its future handling requirements. Waste should reach not only its next holder but a licensed facility or other appropriate destination without escape. It is recommended that the container used to transport the waste is suitable not only to prevent solid and liquid residues escaping, but also any potentially dangerous vapours or odours associated with the waste.

Segregation of different categories of waste where they are produced may be necessary to prevent the mixing of incompatible wastes. Segregation may assist the disposal of waste to specialist outlets. Where segregation is practiced on sites, the waste holder should ensure that his employees and anyone else handling waste there are aware of the locations and uses of each segregated waste container.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Waste handed over to another person should be in some sort of container, which might include a skip. The only reasonable exception would be loose material loaded into a vehicle and then covered sufficiently to prevent escape before being moved. Waste containers should suit the material put in them.

A waste transfer note (WTN) is a document that must accompany any transfer of waste between different holders. The purpose of a WTN is to allow other people who handle your waste to know what they are dealing with so that they can manage it safely and properly. A WTN must be created for each load of waste that leaves the site and must contain enough information about the waste to enable anyone coming into contact with it to handle it safely, and either dispose of it or allow it to be recovered within the law. If insufficient information is given on the WTN the responsible party may liable to be prosecuted.

Records of all waste transferred or received must keep for at least two years.

7.2.6 Asbestos Content to Soils

Since **asbestos cement fragments** contain greater than 0.1 % asbestos by weight, then any waste consignment of soil that contains any obvious asbestos cement fragments will automatically class as hazardous waste (hence the recommendation to litter pick any fragments observed).

If **Loose asbestos fibres** concentrations are all below 0.1% by weight, then any man-made ground will be classed as non-hazardous waste (provided that it contains no obvious asbestos cement fragments).

Any litter picked asbestos cement fragments disposed of separately from the man-made ground would be classed individually as Hazardous Waste.

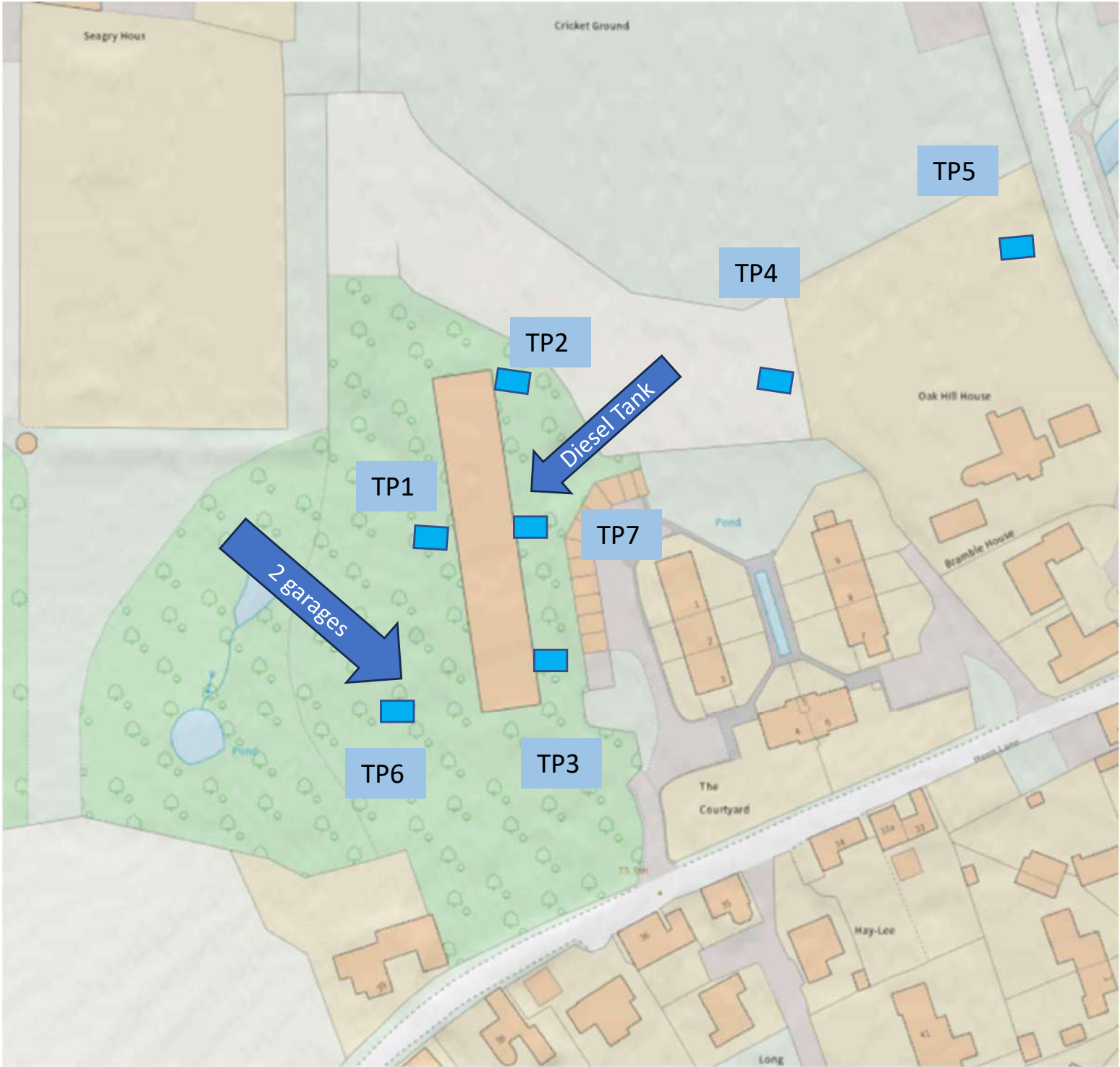
The man-made ground that contains asbestos/ACM would be classed as a mixed waste (hazardous or non-hazardous, as discussed above) and the waste code would be 17-06-05.

Appendices

- A. Exploratory Hole Locations
- B. Exploratory Hole Logs
- C. In-situ Test Results: Soakaways
- D. Geotechnical Laboratory Results
- E. Chemical Laboratory Results
- F. Environmental Datasheets
- G. Historic Mapping

Appendix A

Exploratory Hole
Location Plan

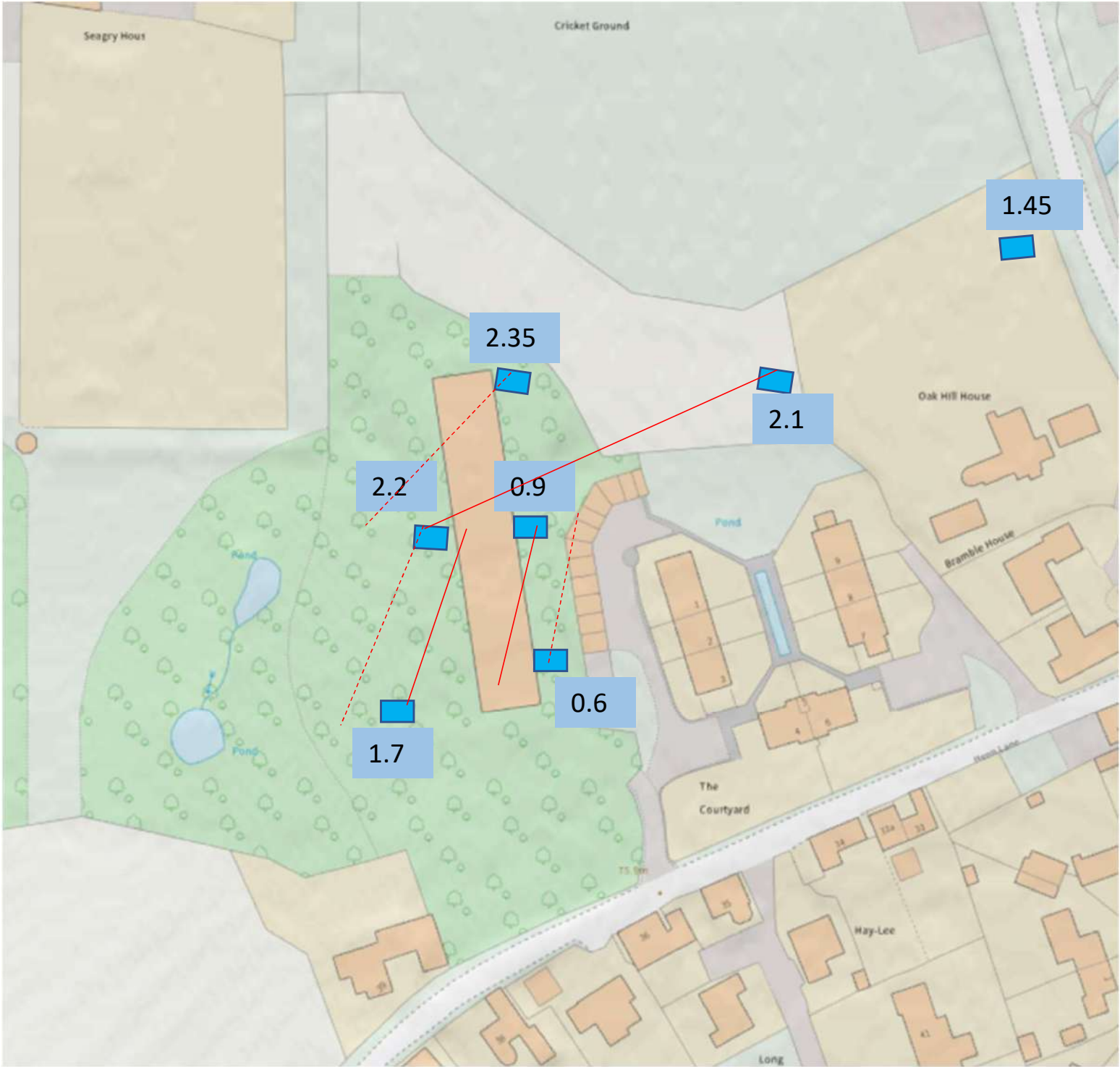


Version	Date
0	19/03/24
1	18/04/24
2	22/04/24
3	23/04/24
4	09/05/24

AG Geo-Consultants Ltd

Appendix B

Depth to base of
soft (mbegl)



Version	Date
0	11/05/24

Key to Exploratory Hole Symbols and Abbreviations

SAMPLE TYPES

B	Bulk disturbed sample	ES	Environmental soil sample	U	Undisturbed sample
C	Core sample	EW	Environmental water sample	UT	Undisturbed thin wall sample
CBR-D	Disturbed sample from CBR test area	G	Gas sample	W	Water sample
CBR-U	Undisturbed sample from CBR test area	L	Liner sample		
D	Small disturbed sample	SPT	SPT split spoon sample		

IN-SITU TESTING

SPTs	Standard Penetration Test (using a split spoon sampler)
SPTc	Standard Penetration Test (using a solid 60 degree cone)
N	Recorded SPT 'N' Value *
-/-	Blows/Penetration (mm) after seating blows totalling 150 mm
MX	Mexi Probe Test (records CBR as %)
HV	Hand Shear Vane Test (undrained shear strength quoted in kPa)
HP	Hand Penetrometer Test (kg/m ³)
()	Denotes residual test value
PID	Photo Ionisation Detector (ppm) *
Kf/Kr	Permeability Test (f = falling head, r = rising head quoted in ms ⁻¹)
HPD	High Pressure Dilatometer Test (pressure meter)
PKR	Packer / Lugeon Permeability Test
CBR	California Bearing Ratio Test

ROTARY CORE DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation (% of intact core >100 mm)
FI	Fracture Spacing (average fracture spacing; in mm, over indicated length of core) **
NI	Non-Intact Core
AZCL	Assumed Zone of Core Loss

GROUNDWATER



Groundwater strike



Standing water level after 20 minutes; 1st, 2nd etc (number denotes level order)

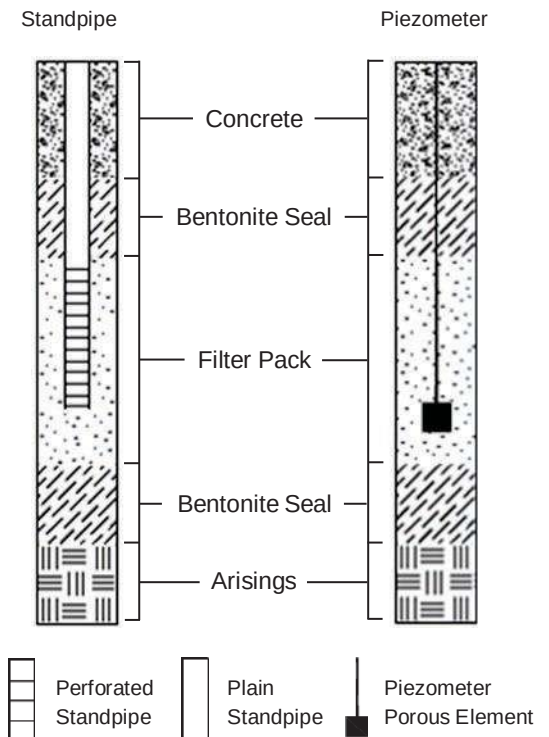
STRATA LEGENDS - Note: Composite strata types are shown by combining symbols

	Made Ground		Silt		Peat		Limestone
	Concrete		Sand		Void		Chalk
	Bituminous Bound Materials		Gravel		Mudstone		Coal
	Topsoil		Cobbles		Siltstone		Metamorphic Rock
	Clay		Boulders		Sandstone		Fine Grained Igneous Rock

* Where a single value is quoted this is the uncorrected 'N' value for a full 300 mm test drive following a seating drive of 150mm. Where the full test drive penetration is not achieved the number of blows is quoted for the penetration below the test total of 300mm, e.g.: 50/75.

** The minimum, average and maximum are shown e.g. 5/45/125.

INSTALLATION & BACKFILL DETAILS



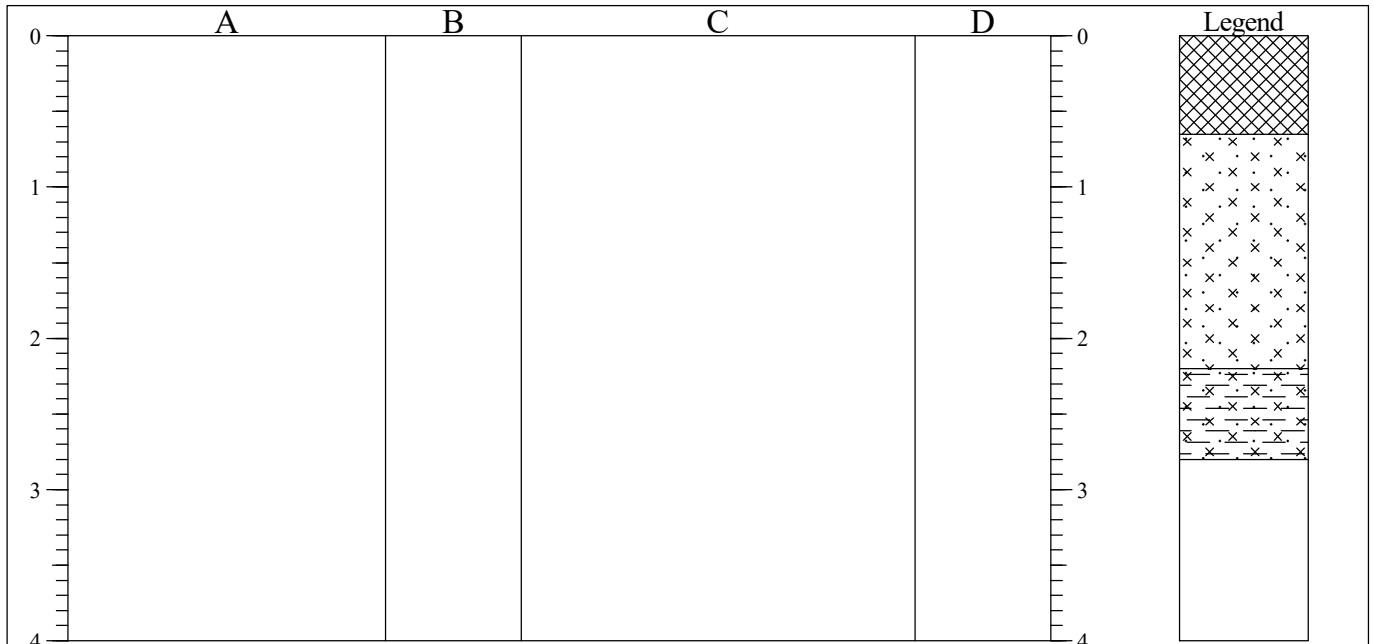
STRATUM BOUNDARIES

Unit boundary



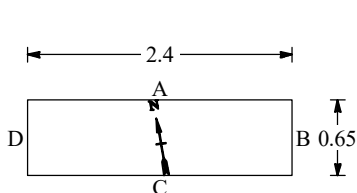
TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP1
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,65		MADE GROUND: Very soft dark brown sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick.				
0,65-2,20		Soft grey and orangish brown very sandy SILT.	0,50-0,55	ES		
			1,00	D		
			1,00	HV	20(8)	
2,20-2,80		Stiff grey slightly sandy silty CLAY.	1,50-2,00	B		
			2,00	HV	42(14)	
			2,50	D		

Shoring/Support: None
Stability: Stable



GENERAL REMARKS

Soakaway test undertaken following pitting. Groundwater not encountered.

All dimensions in metres
Scale 1:50

Client AG Geo

Plant

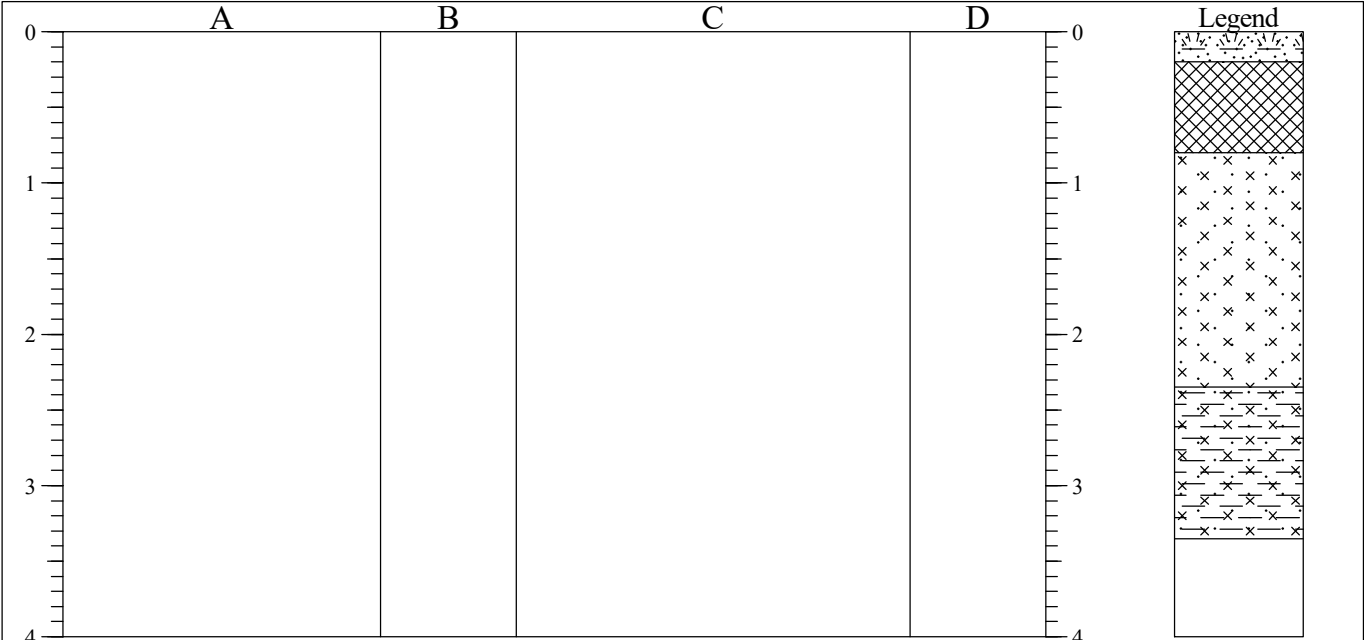
JCB 3CX

Logged By
IP



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP2
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,20		Soft dark brown sandy CLAY with frequent roots and rootlets (TOPSOIL)				
0,20-0,80		MADE GROUND: Soft brown sandy very gravelly CLAY. Gravel is angular fine to coarse concrete, brick, metal and pipe.	0,30-0,40	ES		
0,80-2,35		Soft grey and orangish brown very sandy SILT.	1,00	D		
			1,80	D		
2,35-3,35		Stiff grey very sandy silty CLAY.	2,20-2,70	B		
			2,50	D		
			3,00	HV	38(18)	

Shoring/Support: None Stability: Stable				GENERAL REMARKS	
				Groundwater not encountered.	

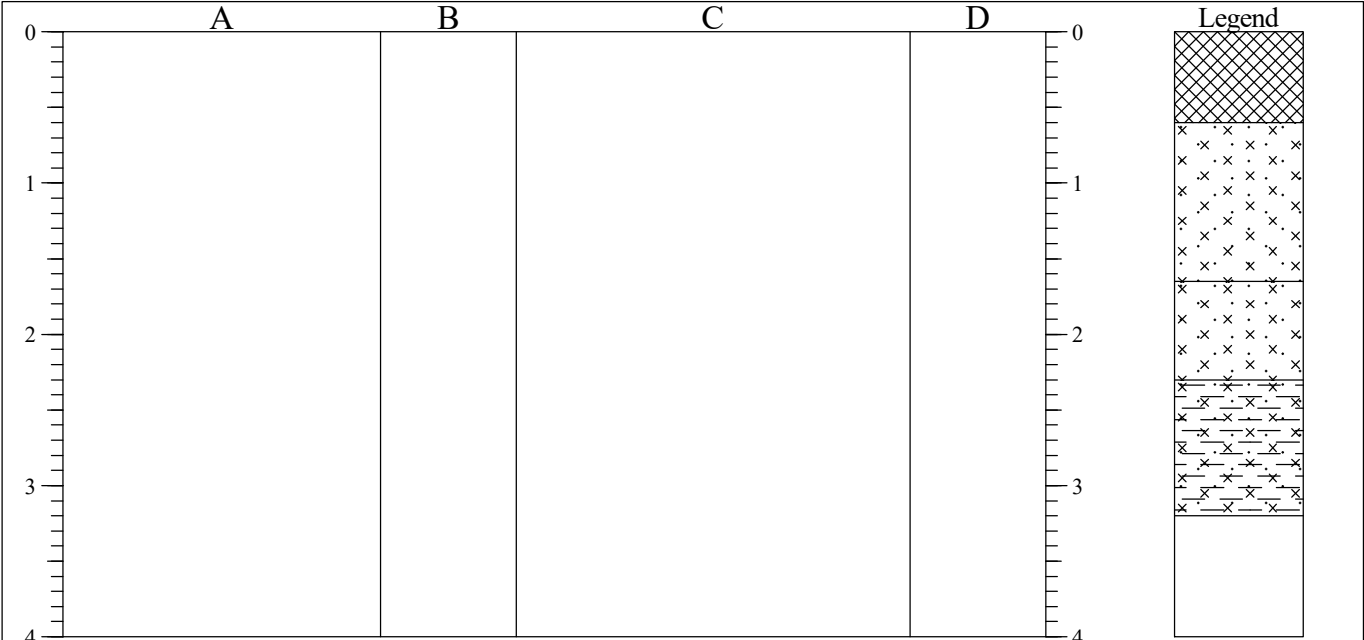
All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	---------------	---------------	--------------

Report ID: AGS4 UK TP || Project: F0401 - UPPER SEAGRY.GPJ || Library: GINT STD AGS 4_0.GLB || Date: 22 April 2024

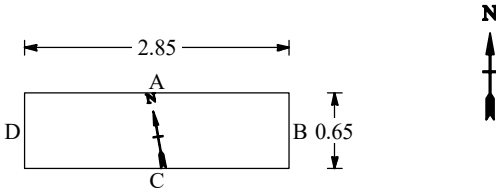


TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP3
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,60		MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick.	0,40-0,50	ES		
0,60-1,65		Firm dark orangish brown very sandy SILT locally tending to very silty SAND.	1,00-1,20	B		
1,65-2,30		Firm orangish brown very sandy SILT.	2,00	D		
2,30-3,20		Stiff grey slightly sandy silty CLAY.	2,50	D		

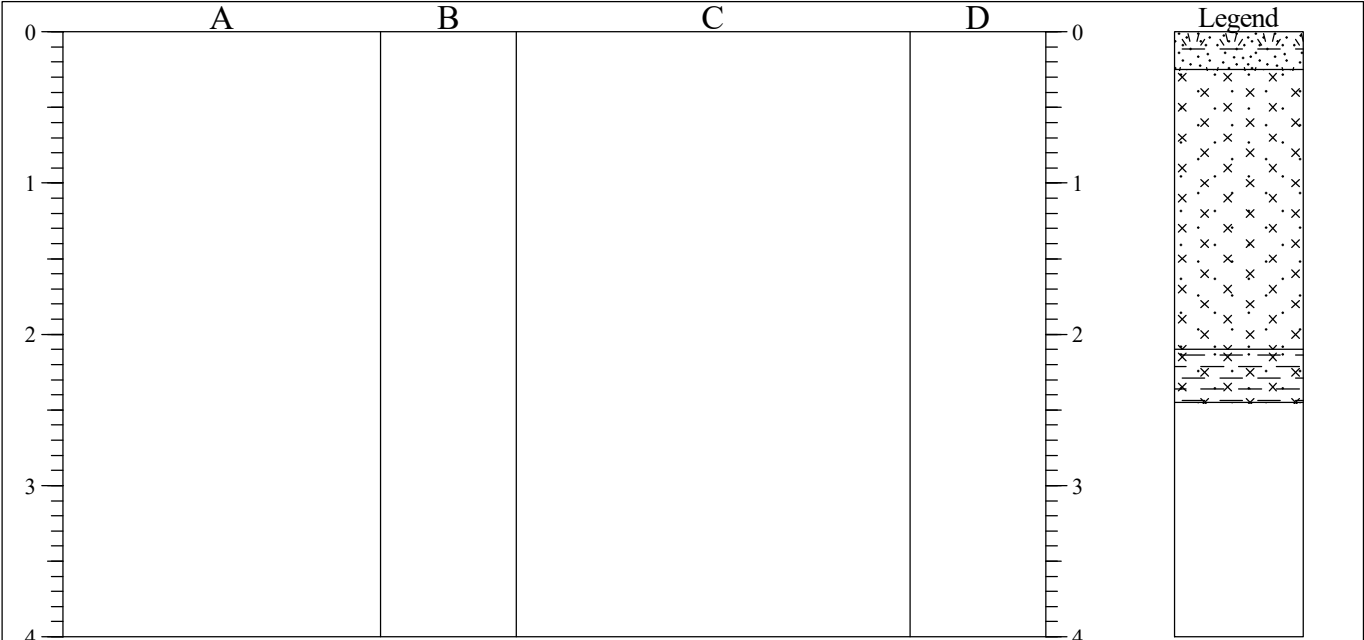
Shoring/Support: None Stability: Stable 	GENERAL REMARKS
	Groundwater not encountered.

All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	------------------	------------------	-----------------



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP4
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,25		Soft dark brown sandy CLAY with frequent roots and rootlets (TOPSOIL)				
0,25-2,10		Soft grey and orangish brown very sandy SILT.	0,50	ES		
			1,00-1,50	B		
2,10-2,45		Stiff grey very sandy silty CLAY.	2,00	D		

Shoring/Support: None
Stability: Stable

All dimensions in metres
Scale 1:50

GENERAL REMARKS

Soakaway test undertaken following pitting. Groundwater not encountered.

All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	------------------	------------------	-----------------

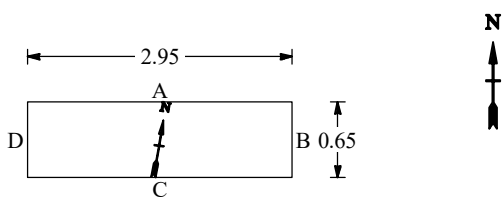


TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP5
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

A		B		C		D		Legend
0							0	
1							1	
2							2	
3							3	
4							4	

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0,00-0,25		Soft dark brown sandy CLAY with frequent roots and rootlets (TOPSOIL)	1,20 1,60 2,00-2,50	D D B	
0,25-1,45		Soft grey and orangish brown very sandy SILT.			
1,45-3,20		Stiff grey very sandy silty CLAY.			

Shoring/Support: None Stability: Stable		

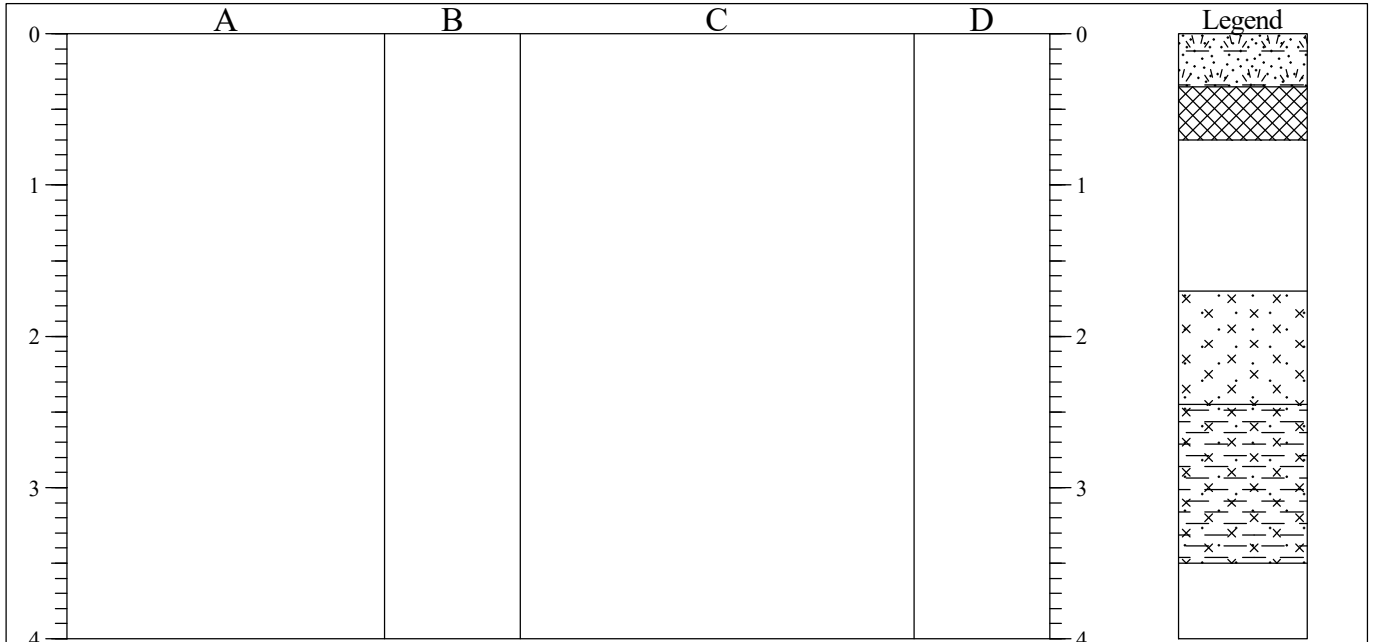
GENERAL REMARKS	
Soakaway test undertaken following pitting. Groundwater not encountered.	

All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	---------------	---------------	--------------



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP6
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,35		Soft dark brown sandy CLAY with frequent roots and rootlets (TOPSOIL)	0,30-0,35	ES	20(8)	
0,35-0,70		MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick.	0,70	D		
0,70-1,70		Soft grey and orangish brown very sandy SILT.	1,00	HV		
			1,50-2,00	B		
1,70-2,45		Firm orangish brown very sandy SILT.	2,00	D	38(16)	
			2,00	HV		
2,45-3,50		Stiff grey slightly sandy silty CLAY.	2,70	D		

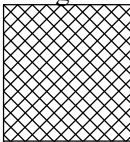
Shoring/Support: None Stability: Stable		<
--	--	---

All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	------------------	------------------	-----------------



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP7
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

A		B		C		D		Legend	
0									
1									
2									
3									
4									

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0,00-0,90		MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick.	0,70-0,80	ES	
0,90-1,00		Firm dark orangish brown very sandy SILT locally tending to very silty SAND.			

Shoring/Support: None Stability:		</
-------------------------------------	--	--

All dimensions in metres Scale 1:50	Client AG Geo	Plant Hand Tools	Logged By IP
--	------------------	---------------------	-----------------

AG Geo-Consultants Ltd

Appendix C

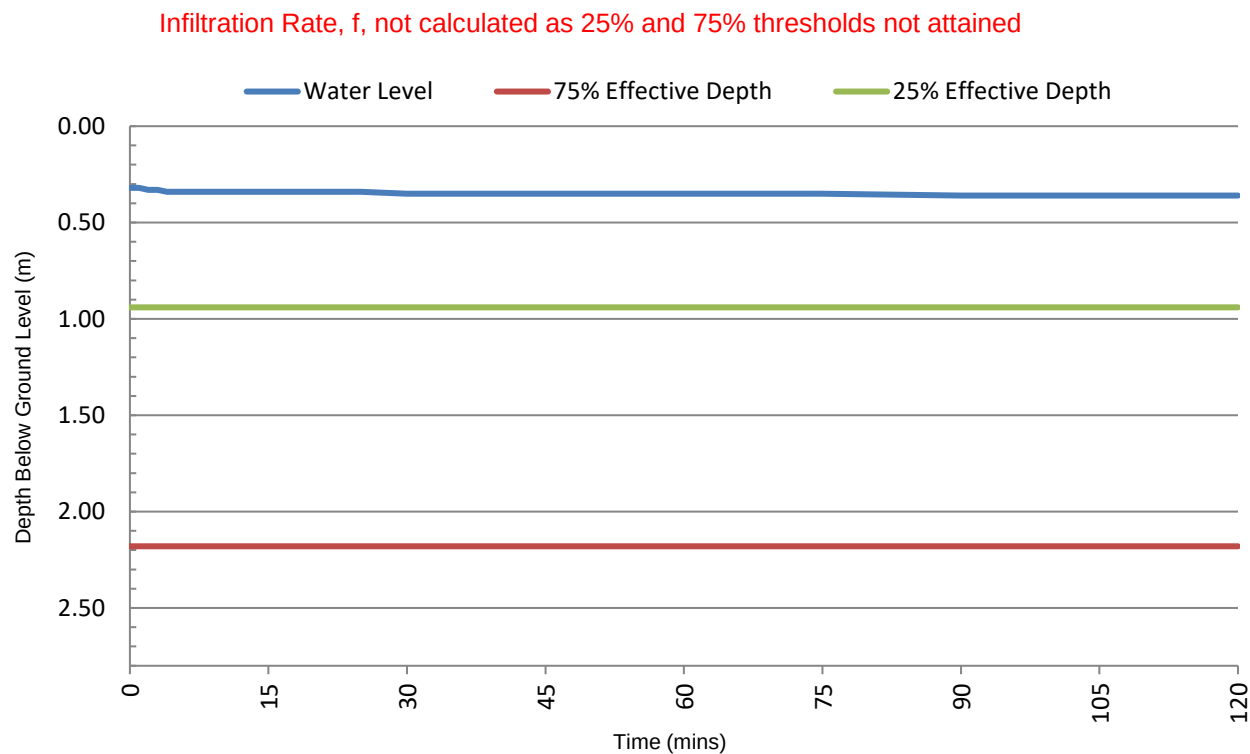
SOAKAWAY INFILTRATION TEST

Project Upper Seagry				Trial Pit No TP1
Job No. F0401	Date 22/4/24	Easting	Northing	
Client: AG Geoconsultants Ltd				Sheet 1 of 1

Dimension Prior To Test		Dimension After Test	
Length	2.40	Length	2.40
Width	0.65	Width	0.65
Depth	2.80	Depth	2.80

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.32	75	0.35
1	0.32	90	0.35
2	0.33	120	0.35
3	0.33		
4	0.34		
5	0.34		
10	0.34		
15	0.34		
20	0.34		
25	0.34		
30	0.35		
45	0.35		
60	0.35		

Infiltration Graph



All dimensions in metres	Remarks Infiltration Rate, f , not calculated as 25% and 75% thresholds not attained	Logged by IP
--------------------------	---	-----------------

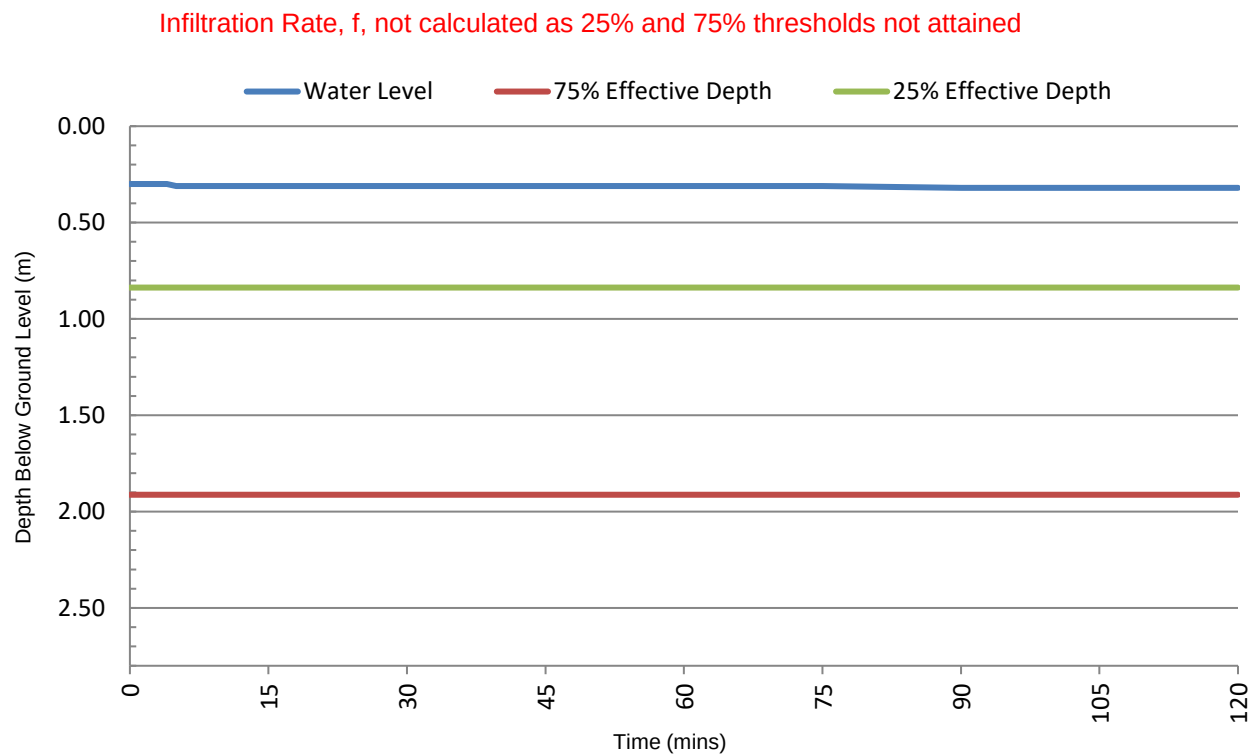
SOAKAWAY INFILTRATION TEST

Project Upper Seagry				Trial Pit No TP4
Job No. F0401	Date 22/4/24	Easting	Northing	
Client: AG Geoconsultants Ltd				Sheet 1 of 1

Dimension Prior To Test		Dimension After Test	
Length	2.45	Length	2.45
Width	0.65	Width	0.65
Depth	2.45	Depth	2.45

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.30	75	0.31
1	0.30	90	0.32
2	0.30	120	0.32
3	0.30		
4	0.30		
5	0.31		
10	0.31		
15	0.31		
20	0.31		
25	0.31		
30	0.31		
45	0.31		
60	0.31		

Infiltration Graph



All dimensions in metres	Remarks Infiltration Rate, f , not calculated as 25% and 75% thresholds not attained	Logged by IP
--------------------------	---	-----------------

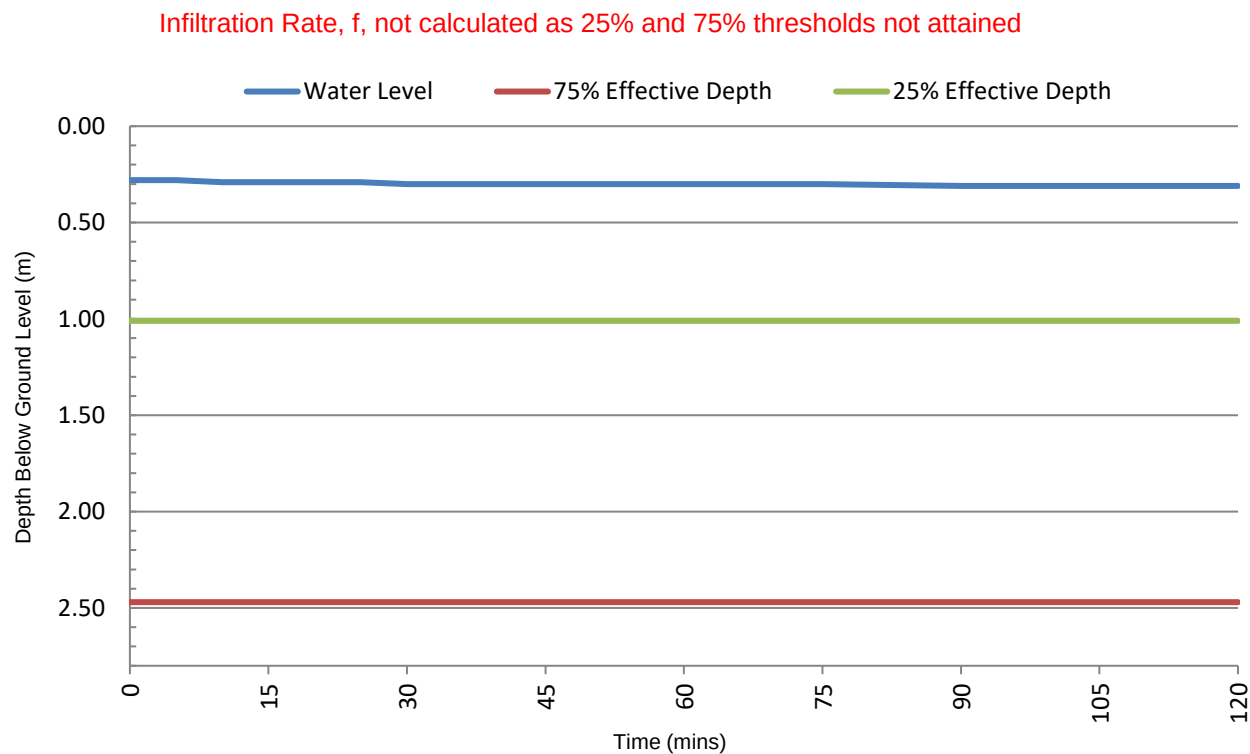
SOAKAWAY INFILTRATION TEST

Project Upper Seagry				Trial Pit No TP5
Job No. F0401	Date 22/4/24	Easting	Northing	
Client: AG Geoconsultants Ltd				Sheet 1 of 1

Dimension Prior To Test		Dimension After Test	
Length	2.75	Length	2.75
Width	0.65	Width	0.65
Depth	3.20	Depth	3.20

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.28	75	0.30
1	0.28	90	0.31
2	0.28	120	0.31
3	0.28		
4	0.28		
5	0.28		
10	0.29		
15	0.29		
20	0.29		
25	0.29		
30	0.30		
45	0.30		
60	0.30		

Infiltration Graph



All dimensions in metres	Remarks Infiltration Rate, f , not calculated as 25% and 75% thresholds not attained	Logged by IP
--------------------------	---	-----------------

AG Geo-Consultants Ltd

Appendix D



Laboratory Report



Contract Number: 72423

Client Ref: **24-025**

Client PO: **24-025**

Date Received: **29-04-2024**

Date Completed: **10-05-2024**

Report Date: **10-05-2024**

Client: **AG Geo-Consultants Ltd**

This report has been checked and approved by:

Contract Title: **Land Adj, Upper Seagry Ho**
For the attention of: **Andre Gilleard**

Brendan Evans
Office Administrator

Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	8
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	8
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

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 test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:

Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)

Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)

Wayne Honey (HR & HSE Manager)

**NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND
PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.4 & 5.3)**

Contract Number	72423	
Project Name	Land Adj, Upper Seagry Ho	
Date Tested	08/04/2024	
	DESCRIPTIONS	

[illegible]

Operator
Clayton Jenkins

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

2788

AG Geo-Consultants Ltd

Appendix E



Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

Certificate of Analysis

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 24-53468

Issue: 1

Date of Issue: 01/05/2024

Contact: Andre Gilleard

Customer Details: AG Geo-Consultants Ltd
58 Church Road
Horfield
Bristol
BS7 8SE

Quotation No: Q24-04200

Order No: Not Supplied

Customer Reference: 24-025

Date Received: 24/04/2024

Date Approved: 01/05/2024

Details: Land adj Upper Seagry Ho

Approved by:

Tim Reeve, Technical Coordinator



Sample Summary

Report No.: 24-53468, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
359095	TP1 0.50	22/04/2024	24/04/2024	Loamy sand	
359096	TP1 1.00	22/04/2024	24/04/2024	Loamy sand	
359097	TP2 0.30	22/04/2024	24/04/2024	Sandy silty loam	
359098	TP2 1.00	22/04/2024	24/04/2024	Loamy sand	
359099	TP3 0.40	22/04/2024	24/04/2024	Sandy silty loam	
359100	TP3 2.00	22/04/2024	24/04/2024	Loamy sand	
359101	TP4 0.50	22/04/2024	24/04/2024	Sand	
359102	TP4 2.00	22/04/2024	24/04/2024	Loamy sand	
359103	TP5 1.60	22/04/2024	24/04/2024	Sand	
359104	TP6 0.30	22/04/2024	24/04/2024	Sandy loam	
359105	TP6 0.70	22/04/2024	24/04/2024	Sandy Silty clayey loam	
359106	TP7 2.00	22/04/2024	24/04/2024	Sandy loam	
359107	TP7 0.70	22/04/2024	24/04/2024	Loamy sand	



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359095	359096	359097	359098	359099	359100	359101
Customer Reference							
Sample ID							
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP1	TP1	TP2	TP2	TP3	TP3	TP4
Sample Depth (m)	0.50	1.00	0.30	1.00	0.40	2.00	0.50
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD							
Soil sample preparation parameters										
Moisture Content	N	%	0.1	13.8	15.1	16.1	15.8	16.9	13.4	15.0
Material removed	N	%	0.1	< 0.1	< 0.1	9.2	< 0.1	< 0.1	8.0	< 0.1
Description of Inert material removed	N		0	None	None	Stones	None	None	Stones	None
Metals										
Arsenic	M	mg/kg	0.5	9.8	n/t	4.5	n/t	6.8	n/t	3.5
Cadmium	M	mg/kg	0.2	< 0.2	n/t	0.4	n/t	< 0.2	n/t	< 0.2
Chromium	M	mg/kg	1	7.6	n/t	5.9	n/t	6.6	n/t	3.7
Copper	M	mg/kg	4	< 4.0	n/t	11.0	n/t	7.7	n/t	< 4.0
Lead	M	mg/kg	1	8.4	n/t	22.2	n/t	35.7	n/t	6.3
Mercury	M	mg/kg	0.1	< 0.1	n/t	< 0.1	n/t	0.2	n/t	< 0.1
Nickel	M	mg/kg	1	3.4	n/t	4.4	n/t	5.0	n/t	23.2
Selenium	M	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	< 1.0
Zinc	M	mg/kg	4.5	12.7	n/t	161	n/t	50.3	n/t	43.5
Anions										
Water Soluble Sulphate	M	mg/l	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Inorganics										
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	n/t	< 0.8	n/t	< 0.8	n/t	n/t



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359095	359096	359097	359098	359099	359100	359101
Customer Reference							
Sample ID							
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP1	TP1	TP2	TP2	TP3	TP3	TP4
Sample Depth (m)	0.50	1.00	0.30	1.00	0.40	2.00	0.50
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD							
Miscellaneous										
pH	M	pH units	0.1	8.0	7.9	7.6	7.8	7.9	6.9	7.8
Soil Organic Matter	U	%	0.1	0.2	n/t	11	n/t	3.2	n/t	0.1
Polyaromatic hydrocarbons										
Naphthalene GCMS	N	mg/kg	0.01	0.01	n/t	0.06	n/t	0.02	n/t	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01	< 0.01	n/t	0.04	n/t	< 0.01	n/t	< 0.01
Acenaphthene GCMS	N	mg/kg	0.01	< 0.01	n/t	0.04	n/t	< 0.01	n/t	< 0.01
Fluorene GCMS	N	mg/kg	0.01	< 0.01	n/t	0.04	n/t	< 0.01	n/t	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01	< 0.01	n/t	0.52	n/t	0.07	n/t	< 0.01
Anthracene GCMS	N	mg/kg	0.01	< 0.01	n/t	0.34	n/t	0.03	n/t	< 0.01
Fluoranthene GCMS	N	mg/kg	0.01	< 0.01	n/t	4.85	n/t	0.31	n/t	< 0.01
Pyrene GCMS	N	mg/kg	0.01	< 0.01	n/t	4.54	n/t	0.29	n/t	< 0.01
Benzo(a)anthracene GCMS	N	mg/kg	0.01	< 0.01	n/t	3.83	n/t	0.20	n/t	< 0.01
Chrysene GCMS	N	mg/kg	0.01	< 0.01	n/t	4.35	n/t	0.26	n/t	< 0.01
Benzo(b)fluoranthene GCMS	N	mg/kg	0.01	< 0.01	n/t	5.18	n/t	0.35	n/t	< 0.01
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01	< 0.01	n/t	4.99	n/t	0.32	n/t	< 0.01
Benzo(a)pyrene GCMS	N	mg/kg	0.01	< 0.01	n/t	6.18	n/t	0.37	n/t	< 0.01
Indeno(1,2,3-cd)pyrene GCMS	N	mg/kg	0.01	< 0.01	n/t	3.99	n/t	0.29	n/t	< 0.01
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	< 0.01	n/t	1.20	n/t	0.07	n/t	< 0.01
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01	< 0.01	n/t	4.69	n/t	0.38	n/t	< 0.01
Total PAH(16) GCMS	N	mg/kg	0.04	0.04	n/t	44.8	n/t	2.98	n/t	< 0.04



Results Summary

Report No.: 24-53468, issue number 1

				ELAB Reference	359095	359096	359097	359098	359099	359100	359101
				Customer Reference							
				Sample ID							
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Location	TP1	TP1	TP2	TP2	TP3	TP3	TP4
				Sample Depth (m)	0.50	1.00	0.30	1.00	0.40	2.00	0.50
				Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024
Determinand	Codes	Units	LOD								
BTEX											
Benzene	M	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
Toluene	M	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
Ethylbenzene	M	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
Xylenes	M	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
MTBE	N	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
TPH CWG											
>C5-C6 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	< 0.01	n/t	< 0.01	n/t	< 0.01	n/t	n/t	n/t
>C6-C8 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	< 0.01	n/t	< 0.01	n/t	< 0.01	n/t	n/t	n/t
>C8-C10 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C10-C12 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C12-C16 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C16-C21 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	1.0	n/t	n/t	n/t
>C21-C35 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	7.9	n/t	18.8	n/t	n/t	n/t
>C35-C40 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	3.0	n/t	4.1	n/t	n/t	n/t
Total (>C5-C40) Aliphatic (HS_1D_MS+EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	10.9	n/t	22.9	n/t	n/t	n/t
>C5-C7 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	< 0.01	n/t	< 0.01	n/t	< 0.01	n/t	n/t	n/t
>C7-C8 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	< 0.01	n/t	< 0.01	n/t	< 0.01	n/t	n/t	n/t
>C8-C10 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C10-C12 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C12-C16 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C16-C21 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	1.4	n/t	1.5	n/t	n/t	n/t
>C21-C35 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	29.0	n/t	38.3	n/t	n/t	n/t
>C35-C40 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	7.4	n/t	13.2	n/t	n/t	n/t
Total (>C5-C40) Aromatic (HS_1D_MS+EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	37.7	n/t	53.0	n/t	n/t	n/t
Total (>C5-C40) Ali/Aro (HS_1D_MS+EH_CU_1D_Total)	N	mg/kg	1	< 1.0	n/t	48.6	n/t	75.9	n/t	n/t	n/t

Tests marked N are not UKAS accredited.
The Environmental Laboratory Ltd. Reg. No. 3882193



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference				359095	359096	359097	359098	359099	359100	359101
Customer Reference										
Sample ID										
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				TP1	TP1	TP2	TP2	TP3	TP3	TP4
Sample Depth (m)				0.50	1.00	0.30	1.00	0.40	2.00	0.50
Sampling Date				22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024
Determinand	Codes	Units	LOD							
Total Petroleum Hydrocarbons										
Total TPH (>C8-C40) (EH_1D_Total)	N	mg/kg	5	n/t	n/t	n/t	n/t	n/t	n/t	< 5



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359102	359103	359104	359105	359106	359107
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6	TP6	TP7	TP7
Sample Depth (m)	2.00	1.60	0.30	0.70	2.00	0.70
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	13.5	12.3	< 0.1	14.8	14.3	14.1
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None	None	None	None
Metals									
Arsenic	M	mg/kg	0.5	n/t	n/t	3.6	n/t	n/t	6.6
Cadmium	M	mg/kg	0.2	n/t	n/t	< 0.2	n/t	n/t	< 0.2
Chromium	M	mg/kg	1	n/t	n/t	3.5	n/t	n/t	7.9
Copper	M	mg/kg	4	n/t	n/t	< 4.0	n/t	n/t	5.8
Lead	M	mg/kg	1	n/t	n/t	25.2	n/t	n/t	6.5
Mercury	M	mg/kg	0.1	n/t	n/t	< 0.1	n/t	n/t	< 0.1
Nickel	M	mg/kg	1	n/t	n/t	2.1	n/t	n/t	6.4
Selenium	M	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
Zinc	M	mg/kg	4.5	n/t	n/t	23.5	n/t	n/t	21.4
Anions									
Water Soluble Sulphate	M	mg/l	20	27	73	< 20	^ < 20	92	< 20
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	n/t	n/t	< 0.8	n/t	n/t	< 0.8



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359102	359103	359104	359105	359106	359107
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6	TP6	TP7	TP7
Sample Depth (m)	2.00	1.60	0.30	0.70	2.00	0.70
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD						
Miscellaneous									
pH	M	pH units	0.1	7.2	7.3	7.9	^ 7.7	5.8	7.1
Soil Organic Matter	U	%	0.1	n/t	n/t	2.0	n/t	n/t	0.3
Polyaromatic hydrocarbons									
Naphthalene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Acenaphthene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Fluorene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Anthracene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Fluoranthene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Pyrene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(a)anthracene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Chrysene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(b)fluoranthene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(a)pyrene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Indeno(1,2,3-cd)pyrene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Total PAH(16) GCMS	N	mg/kg	0.04	n/t	n/t	< 0.04	n/t	n/t	< 0.04



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359102	359103	359104	359105	359106	359107
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6	TP6	TP7	TP7
Sample Depth (m)	2.00	1.60	0.30	0.70	2.00	0.70
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD						
BTEX									
Benzene	M	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
Toluene	M	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
Ethylbenzene	M	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
Xylenes	M	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
MTBE	N	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
TPH CWG									
>C5-C6 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
>C6-C8 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
>C8-C10 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C10-C12 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C12-C16 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C16-C21 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C21-C35 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	6.2
>C35-C40 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
Total (>C5-C40) Aliphatic (HS_1D_MS+EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	6.2
>C5-C7 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
>C7-C8 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
>C8-C10 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C10-C12 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C12-C16 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C16-C21 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C21-C35 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	1.1
>C35-C40 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
Total (>C5-C40) Aromatic (HS_1D_MS+EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	1.1
Total (>C5-C40) Ali/Aro (HS_1D_MS+EH_CU_1D_Total)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	7.2

Tests marked N are not UKAS accredited.
The Environmental Laboratory Ltd. Reg. No. 3882193



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359102	359103	359104	359105	359106	359107
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6	TP6	TP7	TP7
Sample Depth (m)	2.00	1.60	0.30	0.70	2.00	0.70
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD						
Total Petroleum Hydrocarbons									
Total TPH (>C8-C40) (EH_1D_Total)	N	mg/kg	5	n/t	n/t	n/t	n/t	n/t	n/t



Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY

Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 24-53468, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

In accordance with procedures, a 1kg soil sample should be analysed. For amounts less than this caution should be used when analysing the data as sample size is smaller than the recommended amount, therefore samples could be deemed as not being representative of the materials present on site.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)	F/mm2 (l)
359095	0.50	TP1	Brown Sandy Soil,Stones	No asbestos	n/t	n/t	n/t	n/t	n/t
359097	0.30	TP2	Brown Sandy Soil,Stones	No asbestos	n/t	n/t	n/t	n/t	n/t
359099	0.40	TP3	Brown Sandy Soil,Stones, Clinker, Concrete	No asbestos detected	n/t	n/t	n/t	n/t	n/t
359104	0.30	TP6	Brown Sandy Soil,Stones	No asbestos	n/t	n/t	n/t	n/t	n/t
359107	0.70	TP7	Brown Sandy Soil,Stones	No asbestos	n/t	n/t	n/t	n/t	n/t



Method Summary

Report No.: 24-53468, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
PAH (GC-MS)	N	As submitted sample	25/04/2024		GC-MS
Hexavalent chromium	N	As submitted sample	25/04/2024	110	Colorimetry
pH	M	Air dried sample	25/04/2024	113	Electromeric
Total Petroleum Hydrocarbons in solids	N	As submitted sample	25/04/2024	117	GC-FID
Water soluble anions	M	Air dried sample	25/04/2024	172	Ion Chromatography
Low range Aliphatic hydrocarbons soil	N	As submitted sample	25/04/2024	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	25/04/2024	181	GC-MS
BTEX in solids	M	As submitted sample	25/04/2024	181A	GC-MS
Aliphatic hydrocarbons in soil	N	As submitted sample	25/04/2024	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	26/04/2024	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	26/04/2024	214	GC-FID
Asbestos identification	U	Air dried sample	01/05/2024	281	Microscopy
Aqua regia extractable metals	M	Air dried sample	25/04/2024	300	ICPMS
Soil organic matter	U	Air dried sample	25/04/2024	BS1377:P3	Titrimetry

Tests marked N are not UKAS accredited

Report Information

Report No.: 24-53468, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination. Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed. ELAB are unable to provide an interpretation or opinion on the content of this report. The results relate only to the sample received. PCB congener results may include any coeluting PCBs Uncertainty of measurement for the determinands tested are available upon request Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
 All water samples will be retained for 7 days following the date of the test report
 Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

End of Report

AG Geo-Consultants Ltd

Appendix F

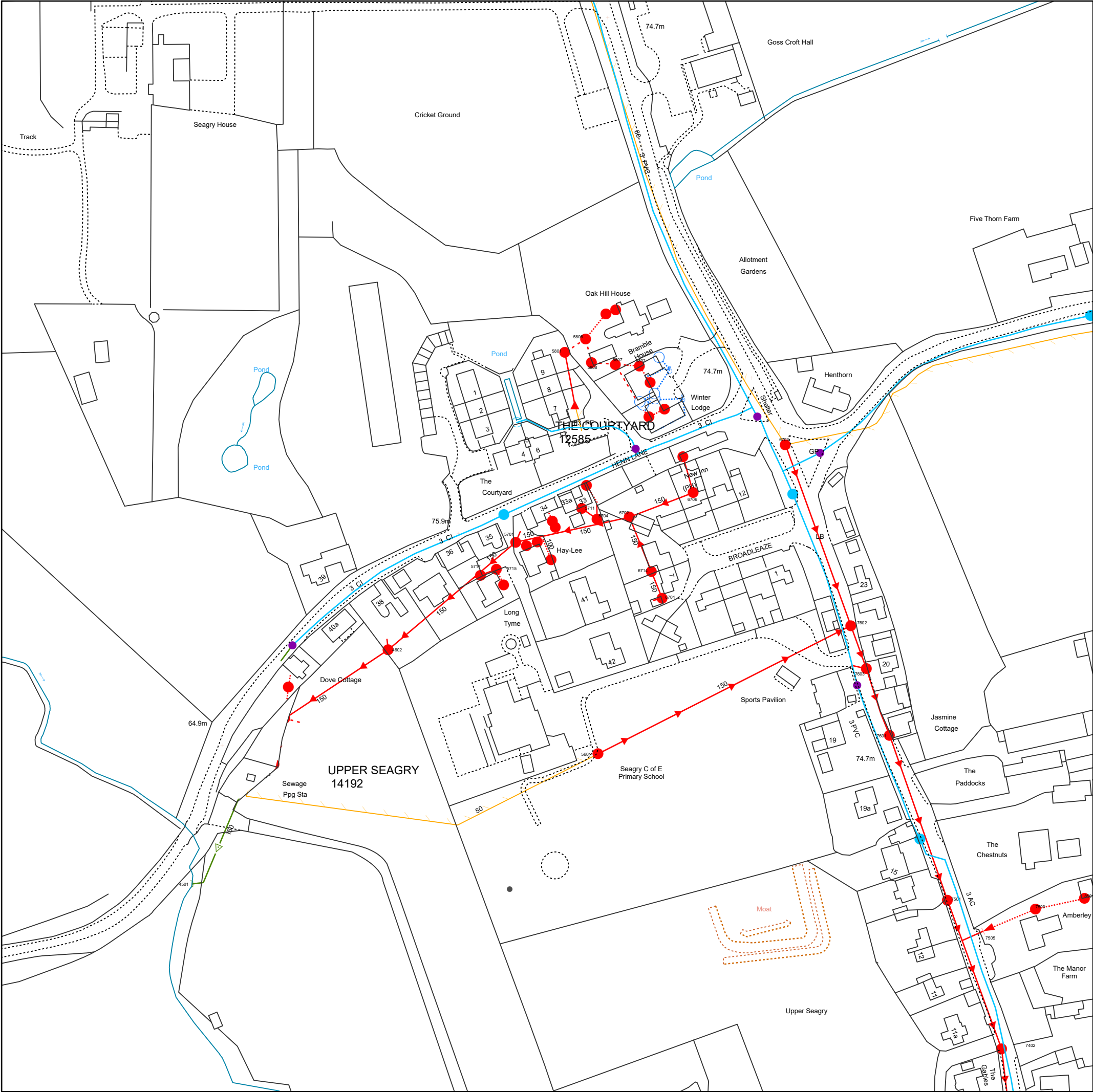
AG Geo-Consultants Ltd

Appendix G

Appendix E

Information from Wessex Water

Upper Seagry, Wiltshire



Reproduced from the Ordnance Survey map by permission on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright . Licence 100019539.

WATER MAINS	SEWERS	STRATEGIC	PUBLIC	PRIVATE	SECTION 104	OTHER WESSEX PIPES	NON-WESSEX / UNKNOWN
Distribution	Foul	Surface	Surface	Private	Section 104	Rising Mains	Private Rising Mains
Washout	Surface	Surface	Surface	Private	Section 104	Standby Rising Mains	Culverted Watercourse
Raw Water	Combined	Combined	Combined	Private	Section 104	Effluent Disposal	Highway Drain
Abandoned	Abandoned	Abandoned	Abandoned	Private	Section 104	Overflow	Use Unknown
Private	Abandoned	Abandoned	Abandoned	Private	Section 104	Syphon	Status Unknown
FITTINGS	STRUCTURES	STRUCTURES	STRUCTURES	STRUCTURES	STRUCTURES	OTHER STRUCTURES	OTHER STRUCTURES
Hydrant	Manhole - Foul	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column	Attenuation Tank	Chamber
Other	Manhole - Surface	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column	Storage Tank	Tunnel
	Manhole - Combined	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column		Interceptor
	Inlet	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column		
	Lamphole	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column		
	Bifurcation - Foul	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column		
	Bifurcation - Surface	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column		
	Bifurcation - Combined	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column		
	Combined Sewage Overflow	Pumping Station - Surface	Pumping Stn - Foul/Combined	Gully	Vent Column		
		Non Return Valve	Non Return Valve	Non Return Valve	Non Return Valve		
		Air Valve	Air Valve	Air Valve	Air Valve		
		Hatch Box	Hatch Box	Hatch Box	Hatch Box		
		Washout	Washout	Washout	Washout		

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526333 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

Date: 28/01/2025
Centre: 394568E, 180727N
Scale: 1:1,768
(when printed at A3 size)

Planning Liaison <planning.liaison@wessexwater.co.uk >

Wed, 29 Jan 2025 9:07:52 AM +0000

To "andy.clay@sustainenviro.co.uk"<andy.clay@sustainenviro.co.uk>

Cc "Alison Kurobasa"<Alison.Kurobasa@wessexwater.co.uk>

1 Attachment(s)

WWMap Upper Seagry.pdf

936.4 KB

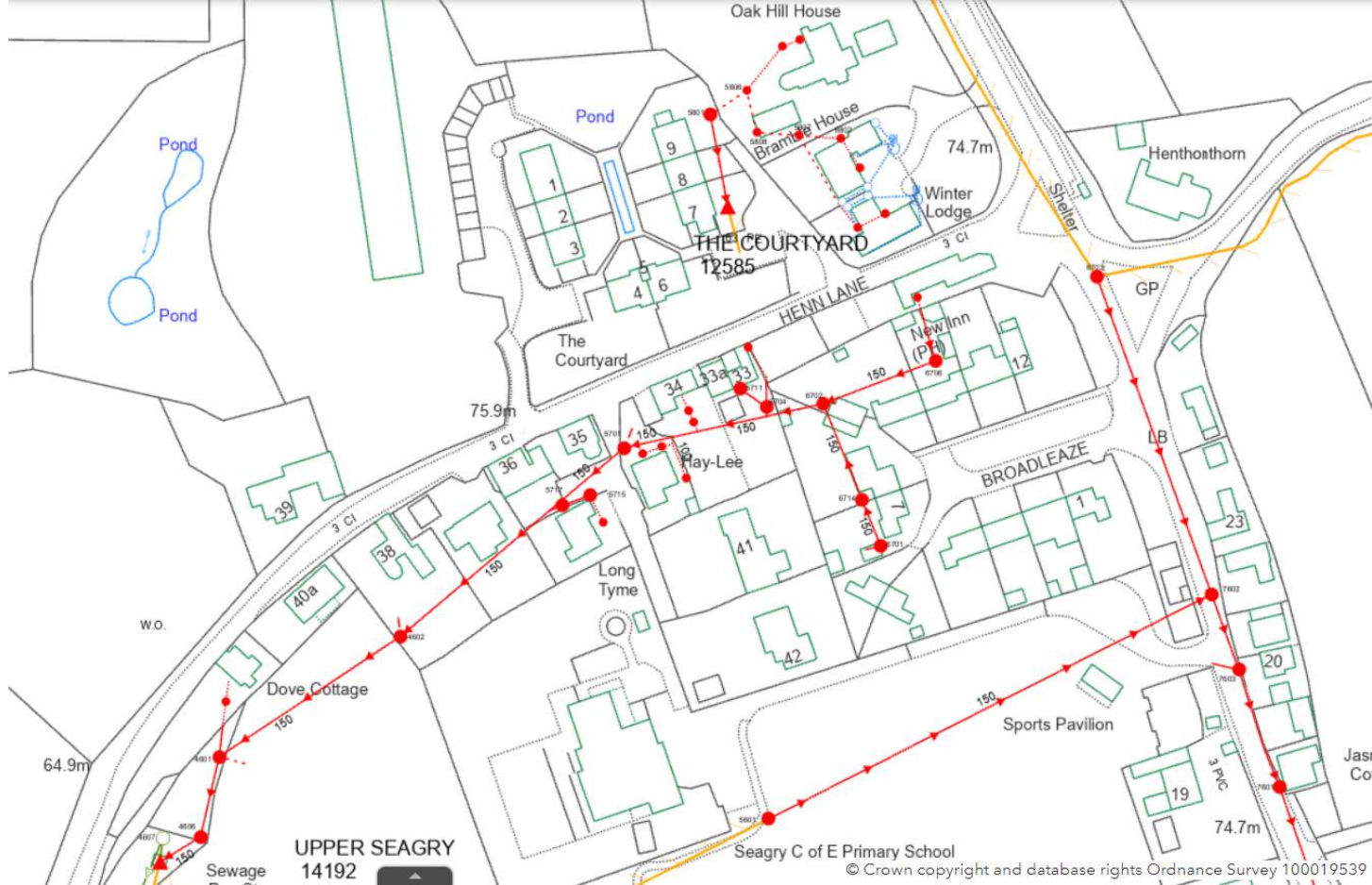
Hello Andrew

Site in Upper Seagry
2 dwellings + 1 commercial unit

Thank you for your pre-development drainage enquiry.

Below is an extract from our sewer mapping. In answer to your query - the orange line to the east is a foul rising main. The large red triangles denote sewage pumping stations (SPS) , in this instance it refers to The courtyard SPS.

I have also attached a copy of our sewer and water supply mapping for the area which has a full key list for all our apparatus.



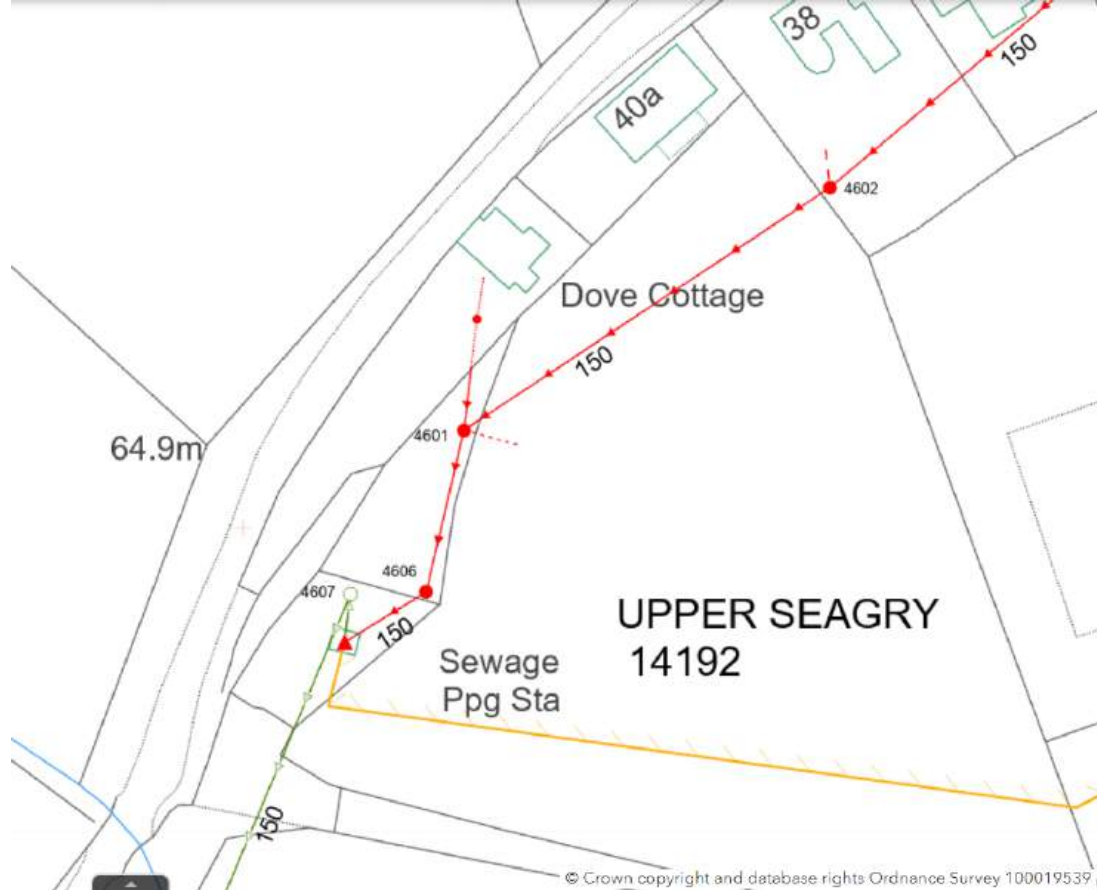
Foul Sewerage – Point of Discharge

Land contours indicate the site levels fall in a south westerly direction. There does not appear to be a point of connection readily available in open access area or public highway in the immediate vicinity of the site.

There is a 150mm public foul sewer that runs to the south of the site behind properties on Henn Lane. This sewer runs through third party land to the Upper Seagry sewage pumping station.

A new 150mm offsite gravity sewer could run from the site boundary, in a westerly direction along Henn Lane to a point where it can connect to the public foul sewer in the vicinity of manhole ST94804606 near the Upper Seagry pumping station.

It would require private agreement, or a S98 sewer requisition application to lay a new sewer across third party land to achieve a foul connection closer to the site. As part of a S98 sewer requisition application to cross third party land, we would have to look at all options for connection. When seeking to use our statutory powers to lay pipes in third party land, there is a requirement to prove that there isn't a viable alternative to connect to the public foul sewer.



The point of connection to the public foul network is by application and agreement and Wessex Water will accommodate domestic type foul flows in the public foul sewer with connections made on a 'size for size' basis, Developers fund the cost of connecting to the nearest 'size for size' foul sewer and Wessex Water will manage the foul sewer network to accommodate foul flows from granted development. We fund this through our infrastructure charging arrangements.

Separated systems of drainage are required: Wessex Water will not accept surface water or land drainage flows to the public foul sewer and treatment works, either directly or indirectly.

Surface Water Drainage

Surface Water to be disposed of in accordance with SUDS Hierarchy and NPPF Guidelines and should be discharged to local land drainage systems.

Surface water strategy is subject to the approval of the Lead Local Flood Authority and drainage arrangements and discharge rates must be discussed and agreed with the Wiltshire Council drainage engineer.

No surface water runoff, land drainage or ground water will be accepted into the public foul sewer either directly or indirectly.

This initial response is based on the level of information provided.

Note: These comments are based upon known circumstances prevailing at the time of writing. A review of the contents of this email is required where 18 months or more have elapsed since issue or in the light of significant changes likely to impact upon the response (e.g. changes in development numbers or phasing). Please email review requests to planning.liaison@wessexwater.co.uk

Regards

Alison Kurobasa
Planning Liaison



Wessex Water

Operations Centre, Claverton Down, Bath BA2 7WW

Email alison.kurobasa@wessexwater.co.uk

Web ytl.com | wessexwater.co.uk



Disclaimer

This email (and any attachment) is intended solely for the addressee, is confidential and may be legally privileged. If you have received this email in error, please let us know immediately and delete it without reading, copying or disseminating it. We have taken every reasonable precaution to ensure that any attachment to this email has been swept for viruses. We cannot accept liability for any damage sustained as a result of software viruses or any other harmful code. You should ensure that it is virus free before opening it.

This email is being sent to you on behalf of Wessex Water Limited, a company registered in England and Wales with number 02366633. Its registered office is Wessex Water Operations Centre, Claverton Down Road, Claverton Down, Bath, BA2 7WW.

From: Andrew Clay <andy.clay@sustainenviro.co.uk> .

Sent: 21 January 2025 10:46

To: Georgia Turner <Georgia.Turner@wessexwater.co.uk>

Subject: Re: WW resp PL51859 Drainage Advice - Site in Upper Seagry, SN15 5JZ

Hi Georgia

The current proposals are for two residential units - and there would be a toilet associated with the commercial unit.

Many thanks, Andy

From: Andrew Clay <andy.clay@sustainenviro.co.uk>

Sent: Monday, January 20, 2025 9:22 PM

To: Planning Liaison <planning.liaison@wessexwater.co.uk>

Subject: Drainage Advice - Site in Upper Seagry, SN15 5JZ

Good afternoon,

I'm providing flood and drainage advice to a potential development proposal in Upper Seagry - see below (rough site outline in orange).

The central post code of the site is SN15 5JZ and the NGR is X: 394490, Y: 180778.

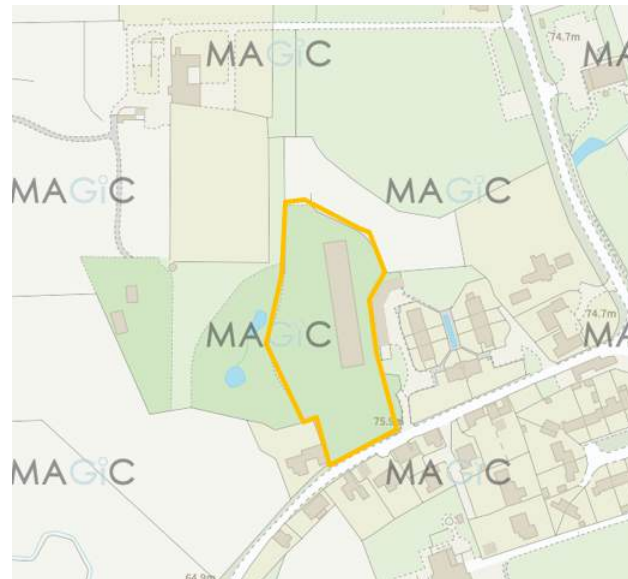
The land is currently occupied by an old farm building. The proposals are for a new commercial and possibly some residential buildings.

I've attached the WW sewer map for the area surrounding the site (map number 1 to the east and map number 4 to the south-west).

We can see that there are some foul sewers in the area - however, I'm unclear if or where a point of foul connection from the site could be made. Can you advise?

Also - there are some lines on the maps that I can not see on the key. What is the thick orange line - to the east of the site? Is the red triangle a pumping station?

Many thanks, Andy



Andy Clay BSc MSc PhD
Flood and Drainage Consultant

Mobile: 07900600140

Email: andy.clay@sustainenviro.co.uk

This email and any associated files is intended for the exclusive use of the addressee only. If you are not the intended recipient, you should not use the contents nor disclose them to any other person. If you have received this message in error, please notify us immediately.

This email is confidential. If you are not the intended recipient, you must not copy, distribute, disclose or use the information contained in it. If you have received this communication in error, please tell us immediately by return email and then delete the email and any copies of it from your computer system. Thank you.

Wessex Water Services Limited, Registered in England No 2366648. Registered Office – Wessex Water Operations Centre, Claverton Down Road, Claverton Down, Bath, BA2 7WW

Andy Clay BSc MSc PhD
Flood and Drainage Consultant

Mobile: 07900600140

Email: andy.clay@sustainenviro.co.uk



This email and any associated files is intended for the exclusive use of the addressee only. If you are not the intended recipient, you should not use the contents nor disclose them to any other person. If you have received this message in error, please notify us immediately.

This email is confidential. If you are not the intended recipient, you must not copy, distribute, disclose or use the information contained in it. If you have received this communication in error, please tell us immediately by return email and then delete the email and any copies of it from your computer system. Thank you.

Wessex Water Services Limited, Registered in England No 2366648. Registered Office – Wessex Water Operations Centre, Claverton Down Road, Claverton Down, Bath, BA2 7WW

Appendix F

EA Flood Map for Planning

Flood map for planning

Your reference
Upper Seagry

Location (easting/northing)
394527/180818

Created
23 July 2025 15:18

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2025 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference
Upper Seagry

Location (easting/northing)
394527/180818

Scale
1:2,500

Created
23 Jul 2025 15:18

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area

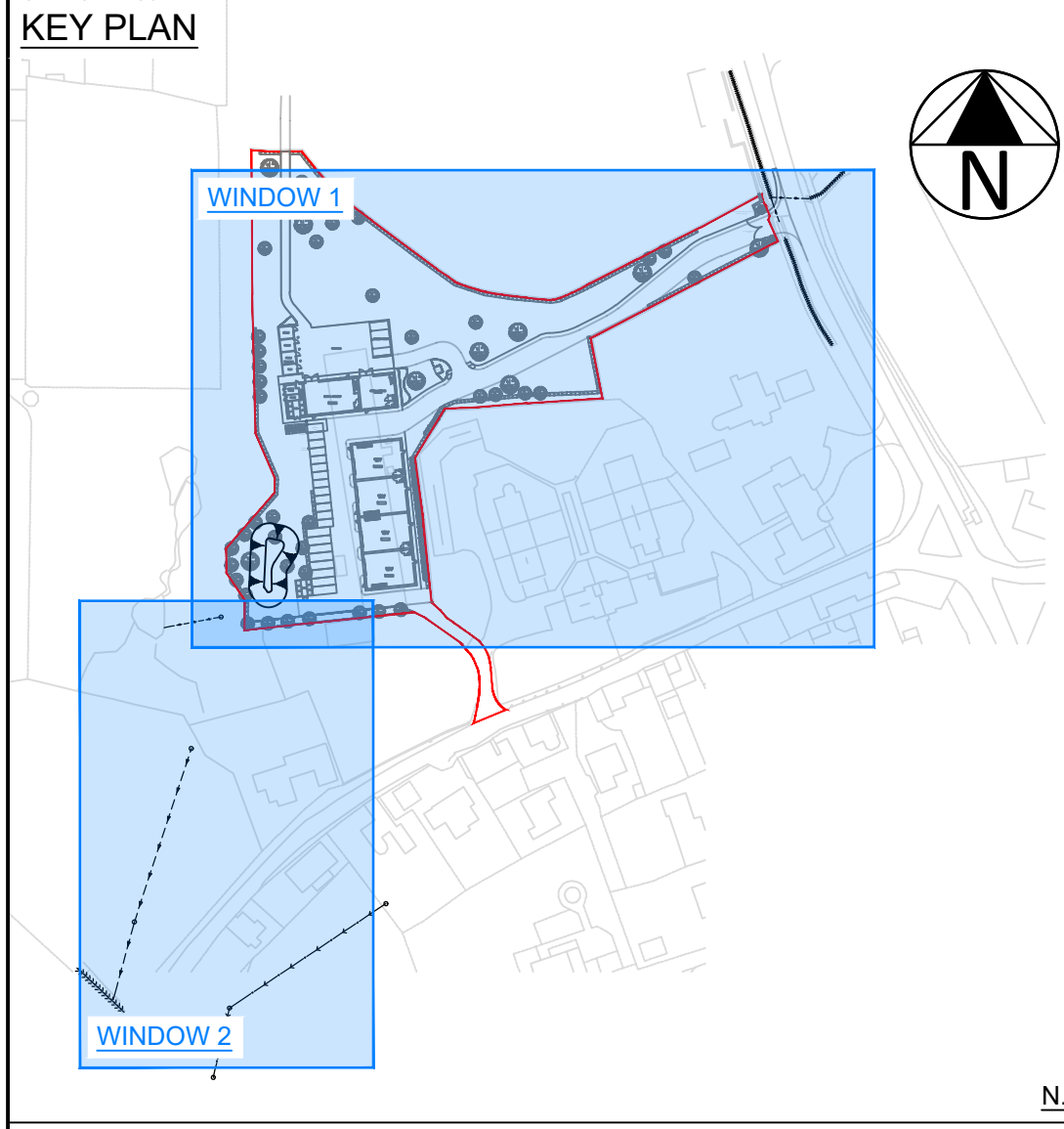


0 20 40 60m

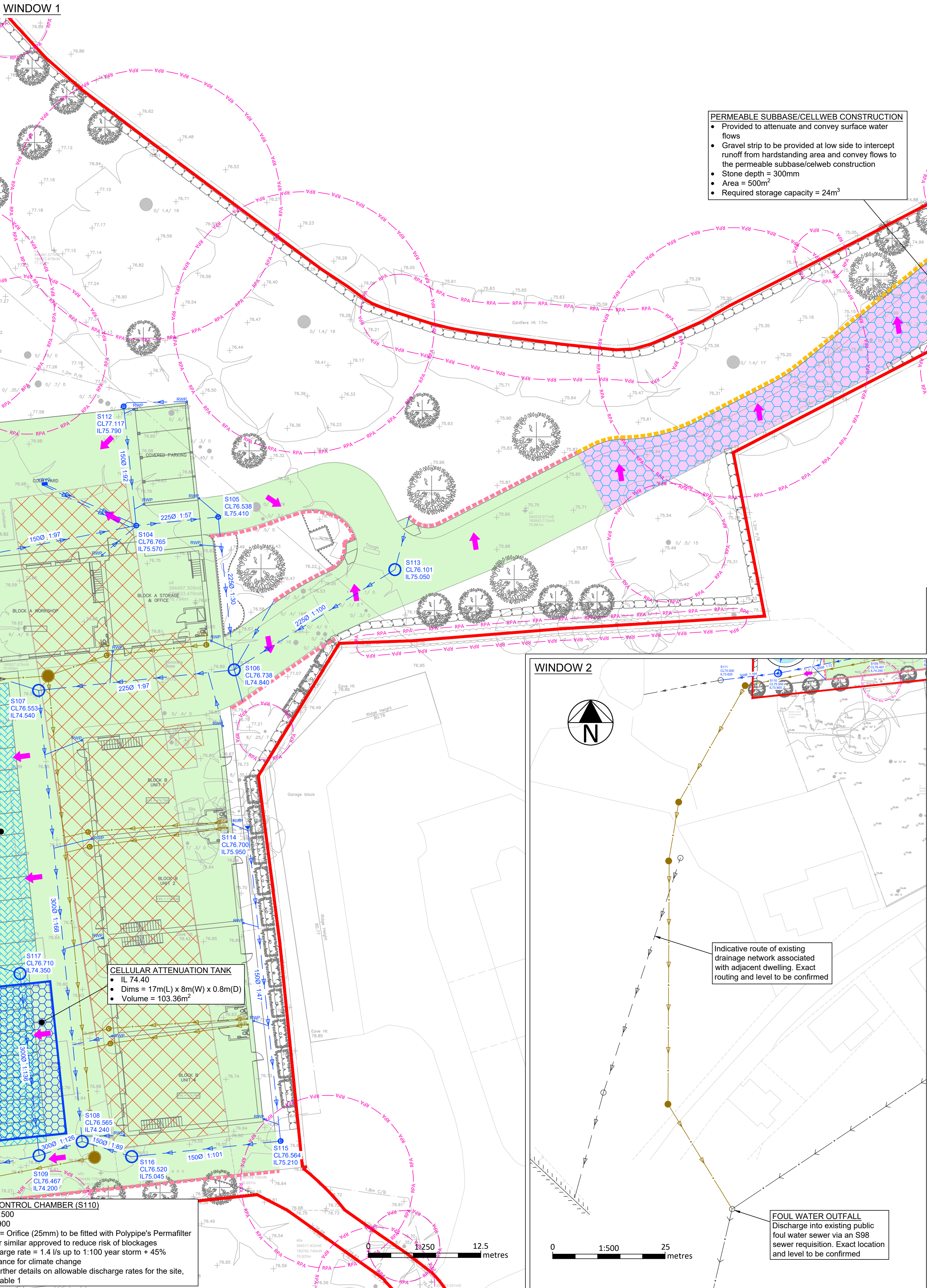
Appendix G

Drainage Strategy Layout and Calculations

KEY PLAN



WINDOW 1



FLOW CONTROL CHAMBER (S202)

- CL74.400
- IL73.930
- Type = Orifice (26mm) to be fitted with Polypipe's Permafilter unit or similar approved to reduce risk of blockages
- Discharge rate = 0.9 l/s up to 1:100 year storm + 45% allowance for climate change
- For further details on allowable discharge rates for the site, see Table 1

SURFACE WATER OUTFALL (NETWORK 2)
Discharge into existing ditch. It is understood that this ditch falls within the site ownership extent to enable a connection here. Exact level and location to be confirmed

Existing culvert to be extended to accommodate revised access arrangement. Existing diameter to be retained

TABLE 1: EXISTING GREENFIELD/BROWNFIELD DISCHARGE RATES

Storm	Greenfield runoff rate
:1 year storm	1.1 l/s
:2 year storm	1.4 l/s
:30 year storm	2.8 l/s
:100 year storm	3.4 l/s
Above rate is based on a catchment area of 0.27 ha (total impermeable area minus existing impermeable area)	
Storm	Brownfield runoff rate
:2 year storm	1.5 l/s
:30 year storm	3.6 l/s
:100 year storm	4.5 l/s

PROPOSED DISCHARGE RATES

Storm	Discharge rate
All storm events (QBAR)	2.9 l/s (see note 1 & 2)

Note:

c) Rate is based on the greenfield QBAR runoff rate + brownfield 2 year rate (approximate QBAR rate).

d) When considering the proposed discharge rate for the brownfield area isolation, this results in the 1:2 year rate being matched, 1:30 year rate = 8% betterment & 1:100 year rate = 67 % betterment.

NOTES

1. This drawing has been developed to support gaining planning approval only and is subject to confirmation at the detailed design stage.
2. This drawing is to be read in conjunction with Sustain Environmental's Flood Risk Assessment and Drainage Strategy Report.
3. All building drainage works shall be carried out in accordance with the current British/European Standards BS EN 752, the current Building Regulations and the Local Authority Building Control specifications and requirements.
4. Exact location of rainwater downpipes and all internal drainage points to be confirmed by architect. Following confirmation all drainage proposals are to be reviewed and updated as required.
5. All drainage works to be constructed from the outfall towards the head of run to ensure the outfall can be achieved.
6. Contractor to verify location & level of receiving existing drainage prior to commencement of any works.
7. Contractor to verify locations of all existing drainage and services prior to commencement and arrange for any necessary protection, diversion or lowering works as required.
8. Proposed finished levels to be designed by others. As a result all proposed finished levels shown are to be reviewed in line with the proposed external works plan produced by others. Once confirmed the drainage proposals must be reviewed and adjusted as required.
9. All proposals shown are based on information available at the time.
10. Prior to the commencement of any works all required agreements must be in place with the relevant authority (i.e. S106 to communicate with the public sewer, S98 sewer requirement, etc)

B	Existing drainage routing amended	28/07/25	JH	AC
A	First Issue	17/07/25	JH	AC
REV.	DESCRIPTION	Date	BY	CHK

DRAWING STATUS:

FOR INFORMATION ONLY

DESIGN BY:



CLIENT

ARCHITECT

PROJECT:

Upper Seagry

Drainage Strategy

SCALE @ A1

AS SHOWN

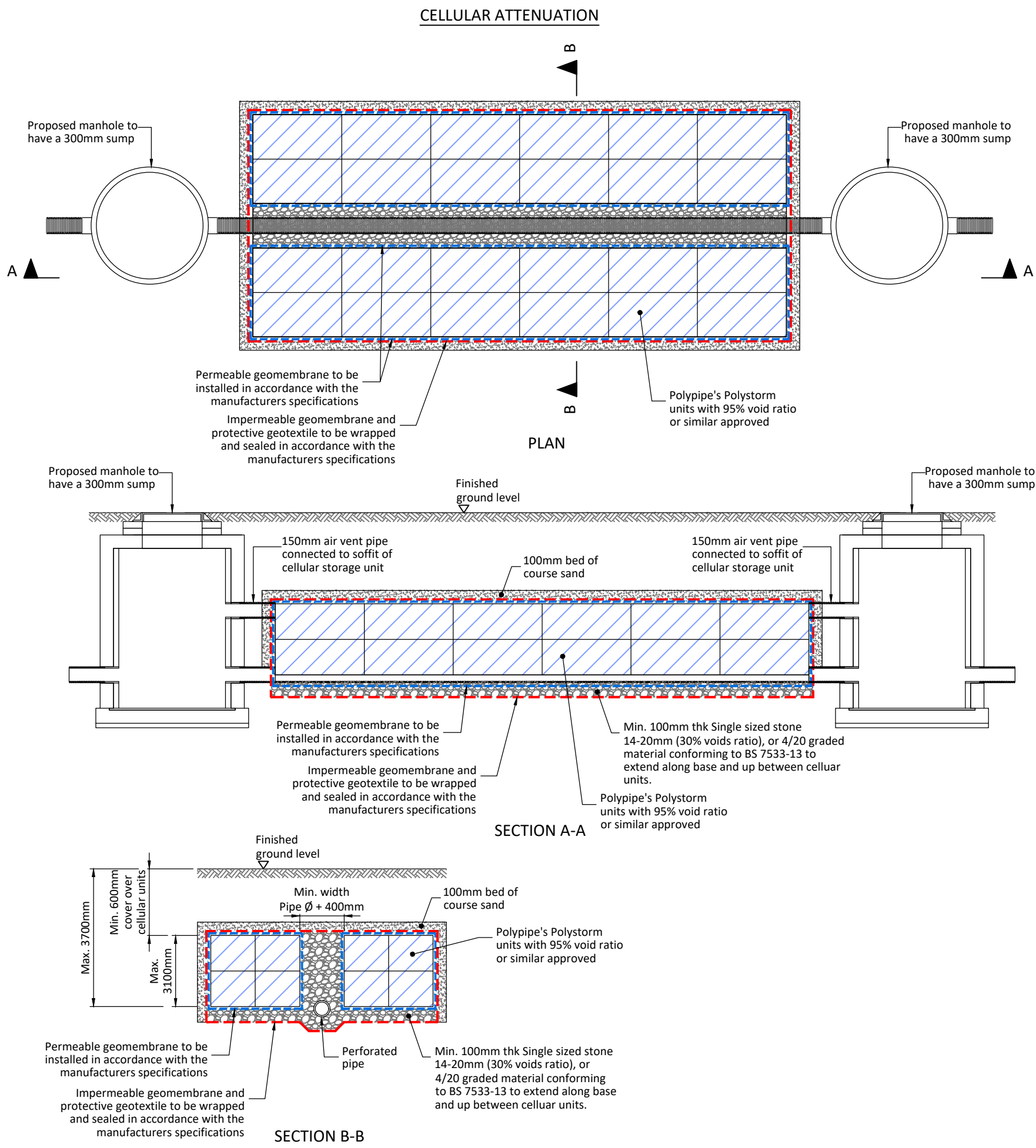
PROJECT No.

23075

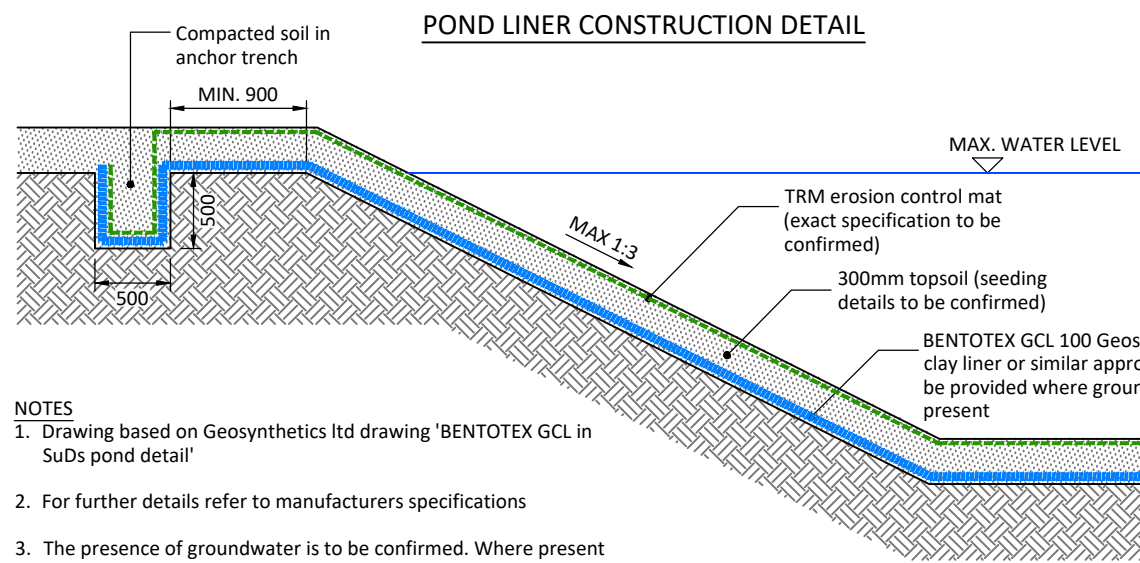
Living No:

PDL-01

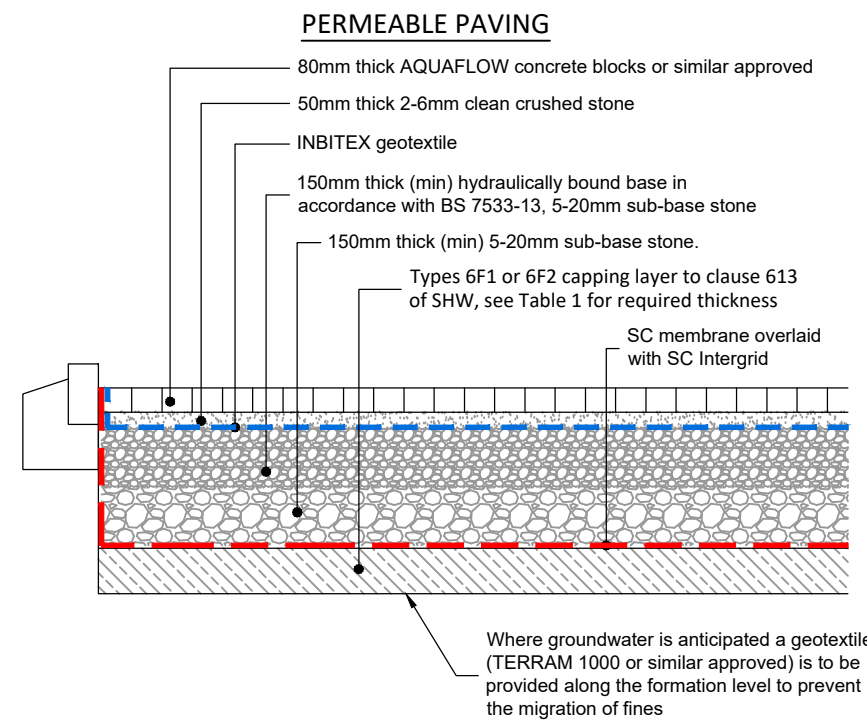
E



NOTE:
1. This detail is to be read in conjunction with manufacturers specifications.



NOTES
1. Drawing based on Geosynthetics ltd drawing 'BENTOTEX GCL in Suds pond detail'
2. For further details refer to manufacturers specifications
3. The presence of groundwater is to be confirmed. Where present clay liner is to be provided. Floatation must also be assessed and relevant measure put in place to resist uplift forces on the liner.

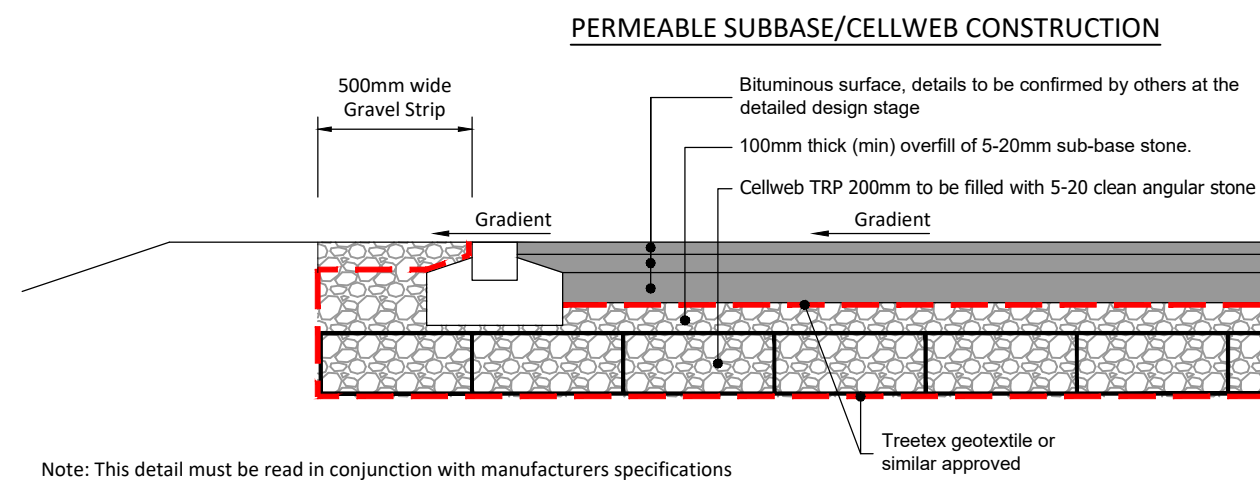
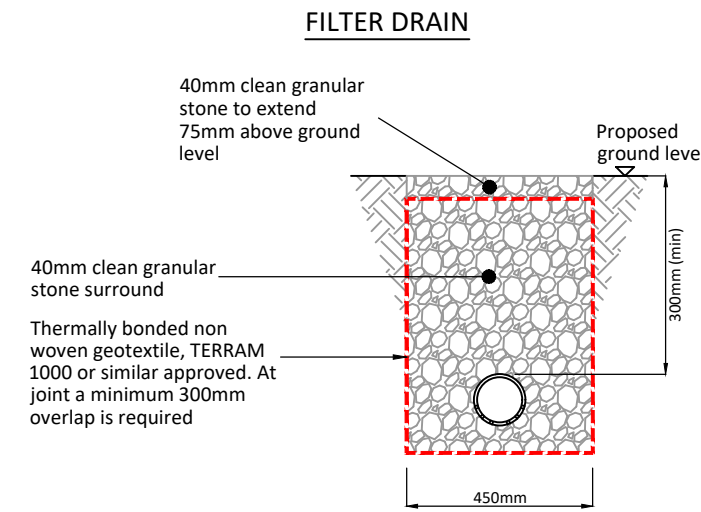
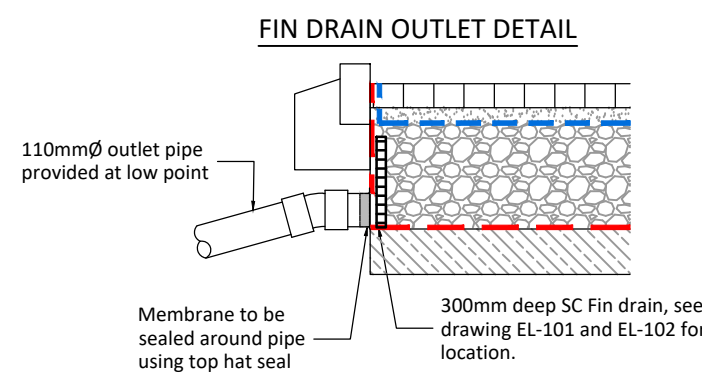


NOTE:
1. The subgrade must achieve a CBR value of 15% or greater.
2. This detail is to be read in conjunction with manufacturers specifications

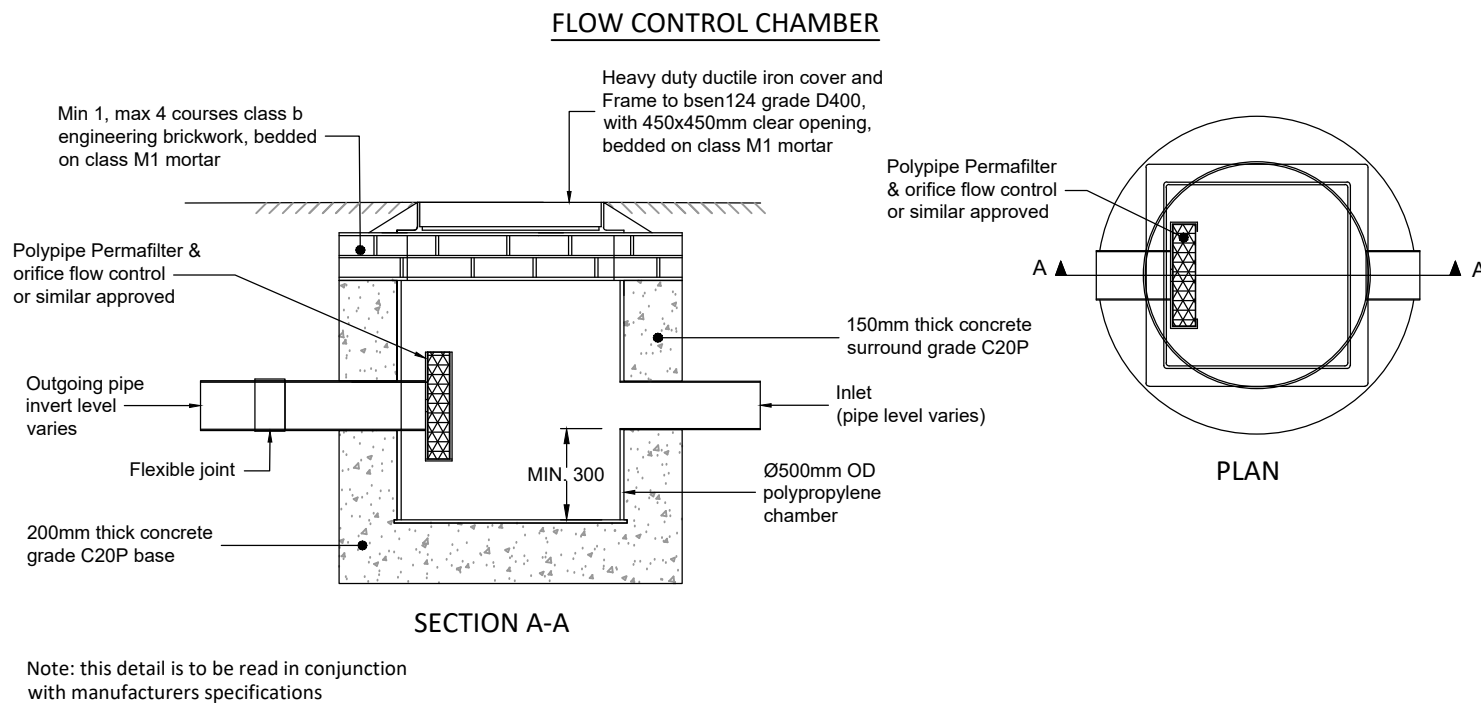
TABLE 1
TOTAL THICKNESS OF CAPPING MATERIAL (EXTRACTED FROM BS7533-13:2009)

SUBGRADE CBR (%)	THICKNESS (mm) (CAPPING)
1	600 (SEE NOTE)
2	350
3	250
4	200
5 or above	150

Note: where CBR values are 1% or below expert advice is to be sought



Note: This detail must be read in conjunction with manufacturers specifications



Note: this detail is to be read in conjunction with manufacturers specifications

- NOTES:
- This drawing has been developed to support gaining planning approval only and is subject to confirmation at the detailed design stage.
 - This drawing is to be read in conjunction with Sustain Environmental's Flood Risk Assessment and Drainage Strategy Report.

A	First issue	17/07/25	JH	AC
REV.	DESCRIPTION	Date	BY	CHK

DRAWING STATUS: **FOR INFORMATION ONLY**

DESIGN BY:



CLIENT:

ARCHITECT:

PROJECT:

Upper Seagry

TITLE:

Drainage Strategy
Typical SuDs Details

SCALE @ A1:

AS SHOWN

PROJECT No:	DRAWING No:	REV:
23075	PDL-02	A

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.900
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
101	0.022	5.00	77.284	450	394461.133	180853.327	1.084
102	0.022	5.00	77.218	450	394462.816	180837.315	1.178
103	0.022	5.00	76.912	450	394470.776	180838.151	1.052
112	0.022	5.00	77.117	450	394489.323	180855.321	1.327
104	0.022	5.00	76.765	450	394490.716	180842.062	1.195
105	0.021	5.00	76.538	450	394499.834	180843.020	1.128
113	0.021	5.00	76.101	1200	394519.484	180837.165	1.051
106	0.021	5.00	76.738	1200	394501.621	180826.018	1.898
107	0.021	5.00	76.553	1200	394479.861	180823.732	2.013
114	0.021	5.00	76.700	450	394503.149	180808.141	0.750
115	0.021	5.00	76.564	1200	394506.777	180773.618	1.354
116	0.021	5.00	76.520	1200	394490.218	180771.878	1.475
108	0.021	5.00	76.565	1200	394484.708	180773.565	2.325
117	0.021	5.00	76.710	1200	394477.793	180792.233	2.360
109	0.021	5.00	76.467	1200	394479.919	180772.000	2.267
110			75.500	1500	394458.675	180767.791	1.600
111			75.500	1200	394445.638	180766.265	1.680

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	101	102	16.100	0.600	76.200	76.040	0.160	100.6	150	5.27	32.9
1.001	102	103	8.004	0.600	76.040	75.860	0.180	44.5	150	5.36	32.6
1.002	103	104	20.320	0.600	75.860	75.650	0.210	96.8	150	5.69	31.7
2.000	112	104	13.332	0.600	75.790	75.645	0.145	91.9	150	5.21	33.0
1.003	104	105	9.168	0.600	75.570	75.410	0.160	57.3	225	5.78	31.5
1.004	105	106	17.096	0.600	75.410	74.840	0.570	30.0	225	5.89	31.1
3.000	113	106	21.056	0.600	75.050	74.840	0.210	100.3	225	5.27	32.9
1.005	106	107	21.880	0.600	74.840	74.615	0.225	97.2	225	6.17	30.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.001	17.7	2.0	0.934	1.028	0.022	0.0	34	0.661
1.001	1.513	26.7	3.9	1.028	0.902	0.044	0.0	38	1.078
1.002	1.021	18.1	5.7	0.902	0.965	0.066	0.0	58	0.906
2.000	1.048	18.5	2.0	1.177	0.970	0.022	0.0	33	0.685
1.003	1.731	68.8	9.4	0.970	0.903	0.110	0.0	56	1.219
1.004	2.397	95.3	11.1	0.903	1.673	0.131	0.0	51	1.612
3.000	1.305	51.9	1.9	0.826	1.673	0.021	0.0	29	0.625
1.005	1.326	52.7	14.3	1.673	1.713	0.173	0.0	80	1.129

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.006	107	108	50.401	0.600	74.540	74.240	0.300	168.0	300	6.86	28.9
4.000	114	115	34.713	0.600	75.950	75.210	0.740	46.9	150	5.39	32.5
4.001	115	116	16.650	0.600	75.210	75.045	0.165	100.9	150	5.67	31.8
4.002	116	108	5.762	0.600	75.045	74.980	0.065	88.7	150	5.76	31.5
1.007	108	109	5.038	0.600	74.240	74.200	0.040	126.0	300	6.92	28.7
5.000	117	109	20.344	0.600	74.350	74.200	0.150	135.6	300	5.25	32.9
1.008	109	110	21.657	0.600	74.200	73.900	0.300	72.2	300	7.12	28.3
1.009	110	111	13.126	0.600	73.900	73.820	0.080	164.1	300	7.30	28.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.006	1.210	85.5	15.2	1.713	2.025	0.194	0.0	85	0.920
4.000	1.473	26.0	1.9	0.600	1.204	0.021	0.0	27	0.857
4.001	1.000	17.7	3.6	1.204	1.325	0.042	0.0	46	0.788
4.002	1.068	18.9	5.4	1.325	1.435	0.063	0.0	55	0.922
1.007	1.399	98.9	21.6	2.025	1.967	0.278	0.0	95	1.125
5.000	1.348	95.3	1.9	2.060	1.967	0.021	0.0	29	0.537
1.008	1.852	130.9	24.6	1.967	1.300	0.320	0.0	88	1.431
1.009	1.224	86.6	24.3	1.300	1.380	0.320	0.0	108	1.054

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	0.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node 110 Online Orifice Control

Flap Valve	x	Invert Level (m)	73.900	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.025		

Node 110 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	74.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	49.8	49.8	1.500	286.5	294.9

Node 109 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	74.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	136.0	136.0	0.800	136.0	169.1	0.801	0.0	169.1

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.46%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	101	10	76.233	0.033	1.9	0.0052	0.0000	OK
15 minute winter	102	10	76.078	0.038	3.8	0.0060	0.0000	OK
15 minute winter	103	10	75.918	0.058	5.6	0.0092	0.0000	OK
15 minute winter	112	10	75.823	0.033	1.9	0.0052	0.0000	OK
15 minute winter	104	10	75.629	0.059	9.1	0.0094	0.0000	OK
15 minute winter	105	10	75.461	0.051	10.8	0.0081	0.0000	OK
15 minute winter	113	10	75.078	0.028	1.8	0.0320	0.0000	OK
15 minute winter	106	11	74.923	0.083	14.3	0.0938	0.0000	OK
15 minute winter	107	11	74.627	0.087	16.0	0.0978	0.0000	OK
15 minute winter	114	10	75.977	0.027	1.8	0.0042	0.0000	OK
15 minute winter	115	11	75.255	0.045	3.6	0.0510	0.0000	OK
15 minute winter	116	11	75.103	0.058	5.2	0.0659	0.0000	OK
480 minute winter	108	456	74.416	0.176	3.9	0.1987	0.0000	OK
480 minute winter	117	456	74.416	0.066	0.3	0.0743	0.0000	OK
480 minute winter	109	456	74.416	0.216	5.2	2.3347	0.0000	OK
480 minute winter	110	456	74.416	0.516	4.5	35.2731	0.0000	SURCHARGED
480 minute winter	111	456	73.842	0.022	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	101	1.000	102	1.9	0.589	0.105	0.0508	
15 minute winter	102	1.001	103	3.7	0.766	0.138	0.0389	
15 minute winter	103	1.002	104	5.4	0.884	0.299	0.1242	
15 minute winter	112	2.000	104	1.8	0.662	0.099	0.0370	
15 minute winter	104	1.003	105	9.0	1.208	0.131	0.0686	
15 minute winter	105	1.004	106	10.7	1.115	0.112	0.1706	
15 minute winter	113	3.000	106	1.8	0.241	0.034	0.1696	
15 minute winter	106	1.005	107	14.3	1.110	0.272	0.2823	
15 minute winter	107	1.006	108	15.8	0.805	0.185	0.9926	
15 minute winter	114	4.000	115	1.8	0.554	0.068	0.1129	
15 minute winter	115	4.001	116	3.5	0.649	0.197	0.0896	
15 minute winter	116	4.002	108	5.2	0.871	0.277	0.0346	
480 minute winter	108	1.007	109	4.6	0.692	0.046	0.2445	
480 minute winter	117	5.000	109	0.3	0.107	0.003	0.6674	
480 minute winter	109	1.008	110	4.5	0.282	0.034	1.3497	
480 minute winter	110	1.009	111	0.9	0.402	0.011	0.0299	32.1

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	101	10	76.267	0.067	7.0	0.0107	0.0000	OK
15 minute winter	102	11	76.126	0.086	13.9	0.0136	0.0000	OK
15 minute winter	103	11	76.066	0.206	20.4	0.0327	0.0000	SURCHARGED
15 minute winter	112	10	75.857	0.067	7.0	0.0106	0.0000	OK
15 minute winter	104	10	75.696	0.125	33.8	0.0200	0.0000	OK
15 minute winter	105	10	75.511	0.101	40.4	0.0161	0.0000	OK
15 minute winter	113	10	75.104	0.054	6.7	0.0610	0.0000	OK
15 minute winter	106	11	75.050	0.210	53.5	0.2377	0.0000	OK
1440 minute winter	107	1380	74.721	0.181	3.6	0.2052	0.0000	OK
15 minute winter	114	10	76.002	0.052	6.7	0.0082	0.0000	OK
15 minute winter	115	10	75.306	0.096	13.3	0.1082	0.0000	OK
15 minute winter	116	11	75.213	0.168	19.8	0.1903	0.0000	SURCHARGED
1440 minute winter	108	1380	74.721	0.481	5.2	0.5444	0.0000	SURCHARGED
1440 minute winter	117	1380	74.721	0.371	0.4	0.4200	0.0000	SURCHARGED
1440 minute winter	109	1380	74.721	0.521	6.2	42.1735	0.0000	SURCHARGED
1440 minute winter	110	1380	74.721	0.821	3.5	78.4488	0.0000	SURCHARGED
1440 minute winter	111	1380	73.844	0.024	1.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	101	1.000	102	6.9	0.796	0.393	0.1421	
15 minute winter	102	1.001	103	13.5	0.952	0.505	0.1121	
15 minute winter	103	1.002	104	20.3	1.157	1.124	0.3435	
15 minute winter	112	2.000	104	6.9	0.946	0.373	0.0974	
15 minute winter	104	1.003	105	33.7	1.686	0.489	0.1838	
15 minute winter	105	1.004	106	40.2	1.470	0.422	0.4779	
15 minute winter	113	3.000	106	6.6	0.307	0.127	0.4815	
15 minute winter	106	1.005	107	52.4	1.462	0.995	0.8137	
1440 minute winter	107	1.006	108	3.6	0.402	0.042	2.8970	
15 minute winter	114	4.000	115	6.6	0.770	0.254	0.2988	
15 minute winter	115	4.001	116	13.1	0.842	0.740	0.2453	
15 minute winter	116	4.002	108	19.5	1.120	1.031	0.0968	
1440 minute winter	108	1.007	109	5.6	0.503	0.057	0.3548	
1440 minute winter	117	5.000	109	0.4	0.079	0.004	1.4326	
1440 minute winter	109	1.008	110	3.5	0.124	0.027	1.5251	
1440 minute winter	110	1.009	111	1.2	0.432	0.013	0.0354	93.3

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	101	12	76.982	0.782	13.0	0.1243	0.0000	SURCHARGED
15 minute winter	102	12	76.922	0.882	22.6	0.1402	0.0000	FLOOD RISK
15 minute winter	103	12	76.786	0.926	31.9	0.1473	0.0000	FLOOD RISK
15 minute winter	112	12	76.173	0.383	13.0	0.0609	0.0000	SURCHARGED
15 minute winter	104	12	76.115	0.545	51.3	0.0867	0.0000	SURCHARGED
15 minute winter	105	12	75.986	0.576	61.7	0.0915	0.0000	SURCHARGED
15 minute winter	113	12	75.698	0.648	12.4	0.7334	0.0000	SURCHARGED
15 minute winter	106	12	75.689	0.849	80.0	0.9600	0.0000	SURCHARGED
960 minute winter	107	915	75.138	0.598	8.6	0.6763	0.0000	SURCHARGED
15 minute winter	114	10	76.022	0.072	12.4	0.0115	0.0000	OK
15 minute winter	115	11	75.741	0.531	24.7	0.6010	0.0000	SURCHARGED
15 minute winter	116	11	75.427	0.382	33.6	0.4322	0.0000	SURCHARGED
960 minute winter	108	915	75.138	0.898	12.0	1.0156	0.0000	SURCHARGED
960 minute winter	117	915	75.138	0.788	0.9	0.8911	0.0000	SURCHARGED
960 minute winter	109	915	75.138	0.938	13.7	96.4655	0.0000	SURCHARGED
960 minute winter	110	915	75.138	1.238	8.5	161.0367	0.0000	SURCHARGED
960 minute winter	111	915	73.847	0.027	1.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	101	1.000	102	9.9	0.781	0.560	0.2834	
15 minute winter	102	1.001	103	19.8	1.127	0.742	0.1409	
15 minute winter	103	1.002	104	29.8	1.692	1.650	0.3577	
15 minute winter	112	2.000	104	12.0	1.027	0.650	0.2347	
15 minute winter	104	1.003	105	50.1	1.707	0.728	0.3646	
15 minute winter	105	1.004	106	59.9	1.548	0.629	0.6799	
15 minute winter	113	3.000	106	10.0	0.342	0.193	0.8374	
15 minute winter	106	1.005	107	79.9	2.010	1.516	0.8702	
960 minute winter	107	1.006	108	8.4	0.457	0.098	3.5492	
15 minute winter	114	4.000	115	12.3	0.822	0.472	0.4518	
15 minute winter	115	4.001	116	22.2	1.260	1.255	0.2931	
15 minute winter	116	4.002	108	33.3	1.894	1.767	0.1004	
960 minute winter	108	1.007	109	12.0	0.617	0.121	0.3548	
960 minute winter	117	5.000	109	0.9	0.095	0.009	1.4326	
960 minute winter	109	1.008	110	8.5	0.217	0.065	1.5251	
960 minute winter	110	1.009	111	1.4	0.461	0.017	0.0409	82.1

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
201	0.050	5.00	74.400		394610.140	180888.178	0.430
202			74.400	500	394609.439	180890.552	0.470
203			74.400		394610.828	180892.190	0.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	201	202	2.475	0.600	73.970	73.930	0.040	61.9	100	5.04	33.5
1.001	202	203	2.148	0.600	73.930	73.900	0.030	71.6	100	5.08	33.4

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.980	7.7	4.5	0.330	0.370	0.050	0.0	55	1.019
1.001	0.911	7.2	4.5	0.370	0.400	0.050	0.0	57	0.962

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s) x
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume x
Winter CV	0.840	Additional Storage (m³/ha)	0.0	

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node 202 Online Orifice Control

Flap Valve	x	Invert Level (m)	73.930	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.026		

Node 201 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	73.970	Slope (1:X)	220.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.300
Safety Factor	2.0	Width (m)	5.800	Inf Depth (m)	
Porosity	0.30	Length (m)	86.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	201	128	74.091	0.121	1.4	2.1513	0.0000	SURCHARGED
180 minute winter	202	128	74.090	0.160	1.6	0.0315	0.0000	SURCHARGED
180 minute winter	203	128	73.918	0.018	0.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	201	1.000	202	1.6	0.383	0.214	0.0194	
180 minute winter	202	1.001	203	0.5	0.524	0.074	0.0022	5.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.15%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	201	188	74.235	0.265	3.1	10.3328	0.0000	FLOOD RISK
240 minute winter	202	188	74.235	0.305	1.3	0.0597	0.0000	FLOOD RISK
240 minute winter	203	188	73.922	0.022	0.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	201	1.000	202	1.3	0.401	0.171	0.0194	
240 minute winter	202	1.001	203	0.7	0.578	0.105	0.0028	17.1

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	201	288	74.369	0.399	4.4	23.3594	0.0000	FLOOD RISK
360 minute winter	202	288	74.368	0.438	1.3	0.0858	0.0000	FLOOD RISK
360 minute winter	203	288	73.924	0.024	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	201	1.000	202	1.3	0.215	0.170	0.0194	
360 minute winter	202	1.001	203	0.9	0.610	0.127	0.0032	26.8

Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	FEH
Positively Drained Area (ha)	0.270
SAAR (mm)	741
Host	1
BFIHost	0.365
Region	8
QBar/QMed conversion factor	1.075
Betterment (%)	0
	Calc
QMed (l/s)	1.3
QBar (l/s)	1.4

Load

OK

Cancel

Note: FEH point descriptors can be downloaded from fehweb.ceh.ac.uk

Only XML file format can be used

FEH-22 is the current FEH data and this should be used for new development

ReFH2 legacy – Doesn't contain the new BFIHOST19 descriptor

ReFH2 – Contains the new BFIHOST19 descriptor

Return Period (years)	Growth Factor	Q (l/s)
1	0.78	1.1
30	1.98	2.8
100	2.42	3.4

Pre-development discharge

Site Makeup	Brownfield
Brownfield Method	MRM
Contributing Area (ha)	0.100
PIMP (%)	100
CV	1.000
Time of Concentration (mins)	5.00
Betterment (%)	0
	Calc

OK

Cancel

Note: FEH point descriptors can be downloaded from fehweb.ceh.ac.uk

Only XML file format can be used

FEH-22 is the current FEH data and this should be used for new development

ReFH2 legacy – Doesn't contain the new BFIHOST19 descriptor

ReFH2 – Contains the new BFIHOST19 descriptor

Return Period (years)	Q (l/s)
2	1.5
30	3.6
100	4.5