

BROOKBANKS

Land at East of Showell Farm, Chippenham

13143 FRA01 Rv3

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Hallam Land

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Executive Summary

Development Summary and Existing Conditions Overview		Section
Development Summary	Outline Planning Application for up to 400 dwellings (Class C3 use), land for a local centre accommodating commercial business and service uses (Class E use), drinking establishment and hot food takeaway (Sui Generis); and local community uses (Class F2); open space and landscaping to include natural green space, amenity green space, area of formal play, allotments and community orchard, sustainable drainage infrastructure including attenuation basins; cycle and pedestrian routes; parking; utilities infrastructure and ground remodelling. All matters reserved except for the formation of a new vehicular access and cycle and pedestrian access including emergency access, onto B4528.	1
Existing Land Use	The Site is currently undeveloped agricultural land, which is not thought to have been historically subject to any significant built development.	3

Baseline Conditions		Section
Existing Watercourses	The closest Environment Agency (EA) main river is River Avon, which is located along the eastern boundary of the Site. There is also an existing drainage channel located along the north of the Site, which flows from the west into the River Avon.	2
Topography	A topographical survey of the Site was undertaken by Greenhatch Group in February 2023. A review of the levels across the Site indicates a moderate fall west to east, with a high point of circa 51.23m above ordnance survey (AOD) in the south west corner of the Site and a low of circa 40.03m AOD along the north eastern boundary of the Site.	3
Geology	With reference to the British Geological Survey (BGS) mapping, the Site is shown to be underlain by limestone bedrock geology belonging to the Cornbrash Formation in the western third of the Site and sandstone, siltstone and mudstone in the eastern two thirds belonging to the Kellaways Formation. There are superficial deposits of alluvium (clay, silt, sand and gravel) adjacent to the River Avon and river terrace deposits (sand and gravel) in the north and east.	3
Hydrogeology	Groundwater vulnerability for the Site is shown to be situated within an unproductive to medium-low risk, with only part of the western area being medium to high risk. The west of the Site is shown to be situated within a Zone II (Outer Protection Zone) Source Protection Zone being either 25% of the source area or a 400 day travel time, whichever is greater. In addition the west of the Site is also shown to be situated within a Zone III (Total Catchment), being the total area needed to support the discharge from the protected groundwater source.	3

Flood Risk		
Mechanisms	Comment	Section
Coastal & Tidal	The Site lies approximately 40km southeast from the nearest tidal watercourse and lies at a minimum of circa 41mAOD and therefore, has a very low risk of coastal flooding.	4
Fluvial	The EA mapping shows that the west of the Site lies within Flood Zone 1; being an area of Low Probability of flooding and outside both the 1 in 100 (1% AEP) and 1 in 1,000 (0.1% AEP) year flood events. The east of the Site, along with the onsite drainage channel is located within Flood Zones 2 and 3.	4
Overland Flow (Pluvial)	The EA mapping illustrates areas of very low to high risk of surface water flooding. The majority of the Site is referenced to have a very low risk of flooding across the majority of the Site, and those areas that have a higher risk of flooding will be managed through the carefully considered design of development levels and the new SuDS system. In line with current guidance, exceedance flows will be considered and safely routed through development via defined flow paths. On this basis, residual risk from overland flow is considered to be appropriately managed through design, ensuring that flows can be safely conveyed through the Site without increasing flood risk to buildings or elsewhere.	4
Groundwater	Wiltshire County Council's SRFA states that: The groundwater flooding in Wiltshire is primarily due to flooding mechanisms in the chalk and occurs mainly in the south and south-east of the county. The Level 2 Site assessment has identified that the Site: *varies from low to high risks of groundwater flooding. The west corner of the land within the site, east of Showell Farm, has predicted 1% AEP groundwater levels either at or very near (within 0.025m of) the ground surface. Closer the east of River Avon the groundwater levels are between 0.025m and 5m below the ground surface.* Winter groundwater monitoring undertaken between December 2023 and May 2024 across 10 boreholes has provided a more robust understanding of seasonal high groundwater conditions across the Site, informing the drainage strategy and associated mitigation measures. The monitoring confirmed that groundwater remains below the surface across the developable areas, averaging approximately 0.6m below ground level, with higher levels generally associated with the lower-lying land adjacent to the River Avon. These findings have informed the suitability and design of the proposed SuDS strategy across the Site.	4
Reservoirs, Canals etc	There is a risk of reservoir flooding in the east and north of the Site. In the east, and majority of the north, the full extent of flooding is located within the area of Flood Zone 2.	4
Sewers	Wessex Water sewer records identified that there are no sewers identified within the Site boundary. Given the local topography, flood risk associated with sewer flooding is therefore considered to be a low probability.	4

Drainage Strategy		Section
Surface Water Drainage		
Discharge Method	Surface water will discharge through a series of conveyance swales and detention SuDS basins and into the existing drainage ditches which discharge into the existing drainage channel, which flows into the River Avon.	8
Pre Development Conditions	The existing runoff rate for the Site (29.97ha) is 201.40 l/s for the 100 year storm event and 64.70 l/s for the 1 year storm event.	8
Post Development Conditions	Surface water will be restricted to the 1 in 1 year event, which is equivalent to 2.16 l/s/ha and 15.43 l/s for the development area of 10.77 ha.	8
Foul Drainage		
Discharge Method	Discussions with Wessex Water will need to be undertaken to confirm that the development can connect into their existing foul drainage infrastructure, where that connection will be located and if an onsite pumping station will be required.	10

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1 Introduction

1.1.1.1 Brookbanks is appointed by Hallam Land to complete a Flood Risk Assessment (FRA) for a proposed residential development for Land at East of Showell Farm, Chippenham, which is hereafter referred to as "the Site".

1.1.1.2 The proposed development (illustrated in **Appendix A**) is to comprise of:

"Outline Planning Application for up to 400 dwellings (Class C3 use), land for a local centre accommodating commercial business and service uses (Class E use), drinking establishment and hot food takeaway (Sui Generis); and local community uses (Class F2); open space and landscaping to include natural green space, amenity green space, area of formal play, allotments and community orchard, sustainable drainage infrastructure including attenuation basins; cycle and pedestrian routes; parking; utilities infrastructure and ground remodelling. All matters reserved except for the formation of a new vehicular access and cycle and pedestrian access including emergency access, onto B4528."

1.1.1.3 This document forms an FRA, to accord with current guidance and addresses national, regional and local policy requirements in demonstrating that the proposed development lies within the acceptable flood risk parameters. The objective of the study is to demonstrate the development proposals are acceptable from a flooding risk and drainage viewpoint.

1.1.1.4 This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:

- Flood risk
- Surface water drainage
- Foul water drainage

1.1.1.5 The **National Planning Policy Framework** (NPPF), updated in December 2024 (with an alteration in February 2025), sets out Governmental Policy on a range of matters, including Development and Flood Risk. The policies were largely carried over from the former PPS25: Development & Flood Risk, albeit with certain simplification. The allocation of development sites and local planning authorities' development control decisions must be considered against a risk-based search sequence, as provided by the document.

1.1.1.6 NPPF key objectives related to drainage and summary of flood risk:

- The NPPF encourages the use of SuDS to manage surface water runoff and reduce flood risk. SuDS will be integrated into new developments to mimic natural drainage and manage water at the source.
- Sequential, Risk-Based Approach: Development plans will use a sequential, risk-based approach to avoid flood risk, considering all sources of flood risk and the impacts of climate change.
- Avoiding Increased Flood Risk: New developments will not increase flood risk elsewhere. They will be designed to manage and mitigate any potential impacts on flooding in other areas.
- Climate Change Mitigation and Adaptation: Plans will proactively address climate change, considering long-term implications for flood risk, coastal change, water supply, biodiversity, and landscapes. Policies will support measures to ensure the resilience of communities and infrastructure.
- Development will be designed so that any residual flood risk can be safely managed, and appropriate mitigation measures incorporated where required.
- Development will be supported by appropriate drainage strategies and flood risk assessments, demonstrating compliance with NPPF requirements, including Paragraph 181, which requires that flood risk

is not increased elsewhere and that developments incorporate SuDS, safe access and egress, and appropriate resilience measures where development in areas of risk is necessary.

1.1.1.7 Chapter 14: Meeting the challenge of climate change, flooding and coastal change of the NPPF reviews how new development should plan around flood risk and future climate change.

1.1.1.8 Paragraph 170 states that:

Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

1.1.1.9 Paragraph 172 states that:

All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property.

1.1.1.10 Paragraph 181 states that:

When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

1.1.1.11 The Planning Practice Guidance (PPG) flood risk and coastal change, updated September 2025, sets out tests that have been set out to protect people and property from flooding. In accordance with the PPG:

"Flood risk is a combination of the probability and the potential consequences of flooding. Areas at risk of flooding are those at risk of flooding from any source, now or in the future. Sources include rivers and the sea, direct rainfall on the ground surface, rising groundwater, overwhelmed sewers and drainage systems, reservoirs, canals and lakes and other artificial sources. Flood risk also accounts for the interactions between these different sources."

1.1.1.12 When building within a flood zone, the vulnerability of the development must be taken into consideration. The impacts of flooding will affect types of development differently.

1.1.1.13 The EA's vulnerability classification table is illustrated below in **Figure 1-1**. The table outlines the PPG technical guidance for flood risk vulnerability and flood zone compatibility assessment to propose which type of development is appropriate for which sites.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	X	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	X	X	X	✓

Table 1-1: Environment Agency's Flood Risk Vulnerability Classification Table

1.1.1.14 Allocation and planning of development must be considered against a risk-based search sequence, as provided by the PPG. In terms of fluvial flooding, the guidance categorises flood zones in three principal levels of risk, as follows in **Table 1-2**.

Flood Zone	Annual Exceedance Probability (AEP) of Flooding
Zone 1: Low probability	< 0.1 %
Zone 2: Medium probability	0.1 – 1.0 %
Zone 3a / 3b: High probability	> 1.0 %

Table 1-2: PPG Flood Risk Parameters

1.1.1.15 In accordance with the PPG, residential development, being designated as "More Vulnerable" classifications, should lie outside the envelope of the predicted 1 in 100-year (1%) flood, with preference given to sites lying outside the 1 in 1,000 (0.1%) year events and within Flood Zone 1.

1.2 Planning Application

1.2.0.16 This FRA has been produced in order to provide information for an outline planning application, with all matters reserved with the exception of access.

1.2.0.17 This FRA demonstrates that a suitable drainage strategy can be successfully designed and applied for the development Site.

1.2.0.18 The Site will be the subject of reserved matters applications where detailed design layouts and criteria will be provided, informed by the FRA.

2 Site Context

2.1 Location

2.1.0.1 The proposed development lies to the south of Chippenham, Wiltshire.

2.1.0.2 The Site is agricultural fields used as a mix of arable and crop cultivation. The Site is shown to be bound by the B4258 to the west with Showell Farm beyond and the River Avon to the east. To the south of the Site are bound by agricultural field boundaries, whilst to the north there is Showell Nurseries (for which planning permission has been granted for residential development for 120 dwellings), as well as an historic landfill. Further to the north, the development at Rowden Park is being constructed.

2.2 Existing Site Drainage

2.2.0.3 The closest Environment Agency (EA) main river is River Avon, which is located along the eastern boundary of the Site. There is also an existing drainage channel located along the north of the Site, which flows from the west into the River Avon.

2.2.0.4 The Site location and drainage features are shown indicatively on **Figure 2-1.**

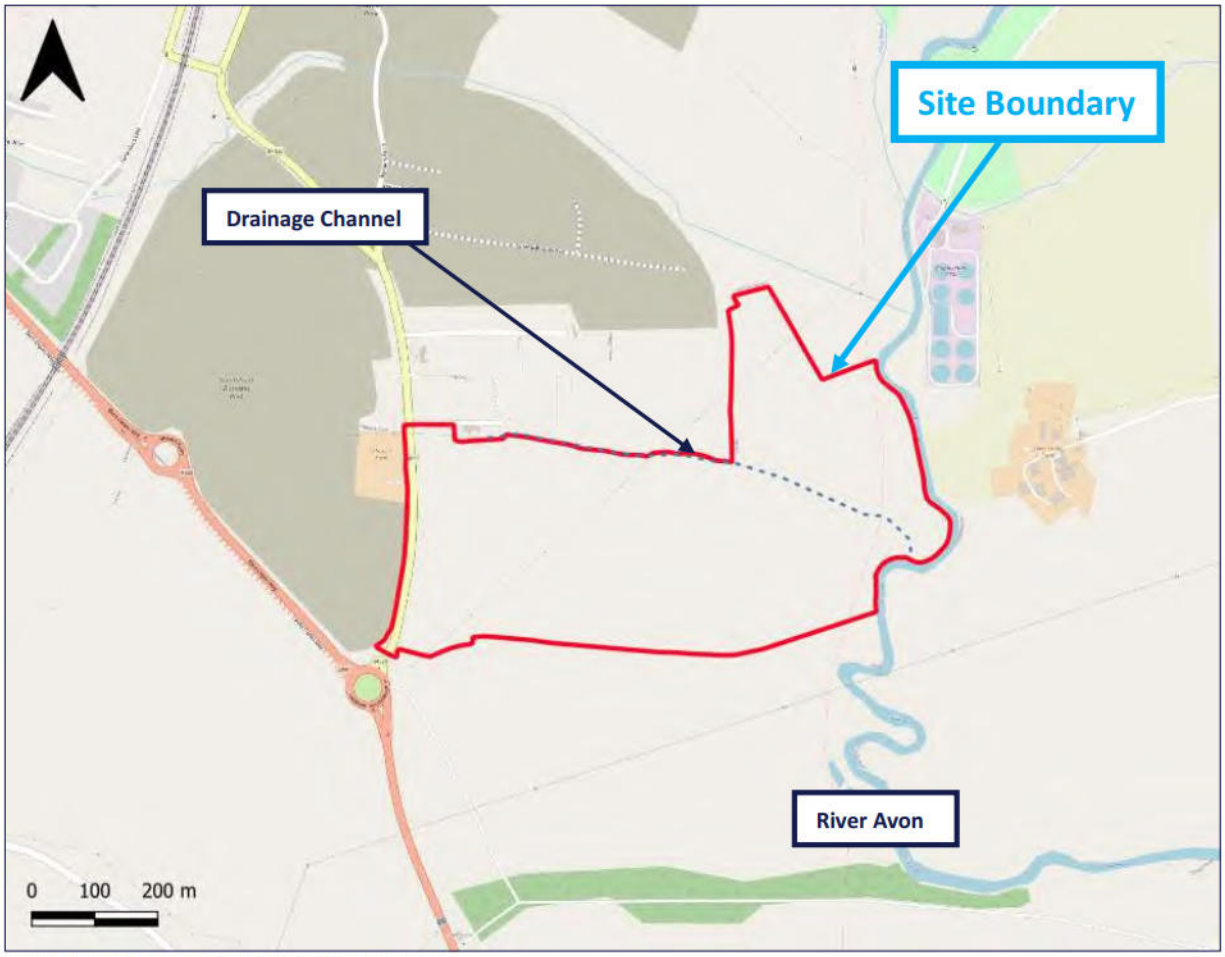


Figure 2-1: Site Location and Existing Drainage

3 Baseline Conditions

3.1 Present Day

3.1.0.1 The Site is currently undeveloped agricultural land, which is not thought to have been historically subject to any significant built development.

3.2 Topography

3.2.0.2 A topographical survey of the Site was undertaken by Greenhatch Group in February 2023. A review of the levels across the Site indicates a moderate fall west to east, with a high point of circa 51.23m above ordnance survey (AOD) in the south west corner of the Site and a low of circa 40.03m AOD along the north eastern boundary of the Site.

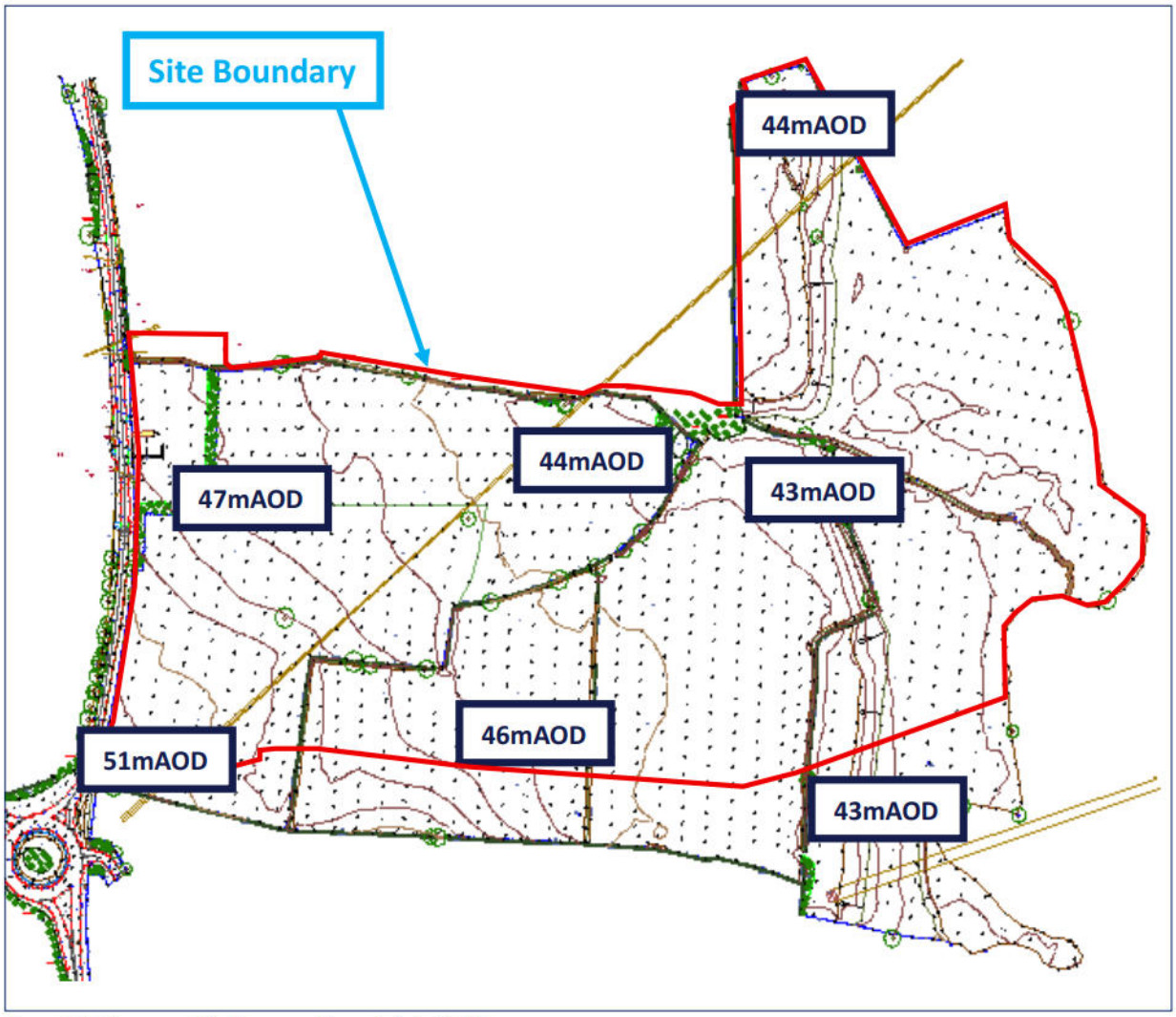


Figure 3-1: Topographic Survey – Greenhatch, 2023

3.3 Geology

3.3.0.3 With reference to the British Geological Survey (BGS) mapping, the Site is shown to be underlain by limestone bedrock geology belonging to the Cornbrash Formation in the western third of the Site and sandstone, siltstone and mudstone in the eastern two thirds belonging to the Kellaways Formation.

3.3.0.4 There are superficial deposits of alluvium (clay, silt, sand and gravel) adjacent to the River Avon and river terrace deposits (sand and gravel) in the north and east.

3.3.0.5 The Site Geology is illustrated below on **Figures 3-2 and 3-3**.

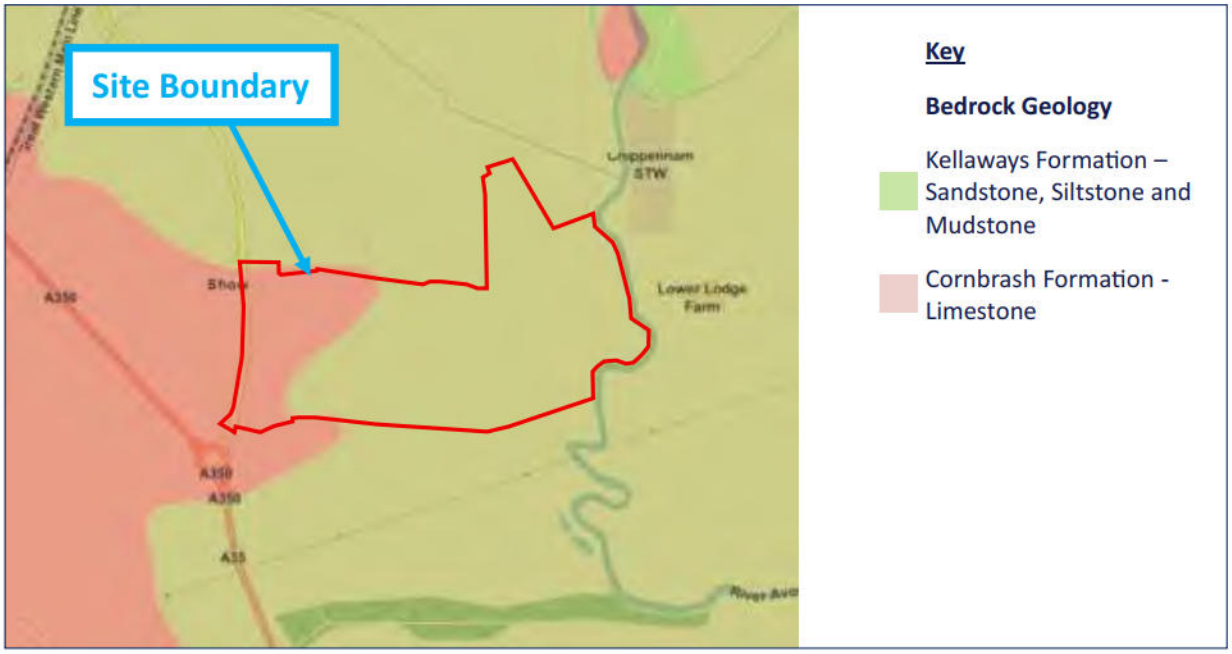


Figure 3-2: BGS Published Bedrock Geology (2026)

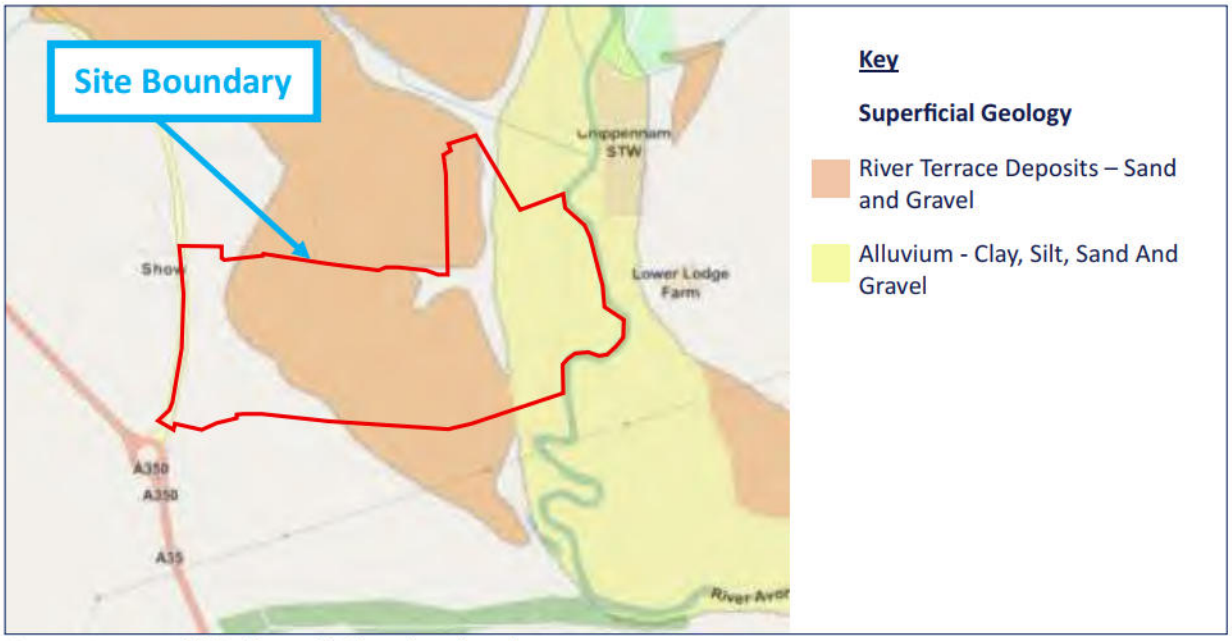


Figure 3-3: BGS Published Superficial Geology (2026)

3.4 Hydrogeology

3.4.1 Aquifers

3.4.1.6 Aquifers form a body of porous rock which can contain or transmit groundwater and are categorised into four types. The type of aquifer is defined by the "geological characteristics, how much groundwater it is possible to extract, and how easily and how much they support river flows and habitats."

3.4.1.7 The underlying bedrock geology forms an unproductive aquifer; the EA provides the following definitions:

Unproductive Strata *- These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.*

3.4.1.8 The underlying superficial geology partially forms a Secondary A aquifer; the EA provides the following definitions:

Secondary Aquifers *- These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:*

Secondary A *- permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.*

3.4.2 Groundwater Vulnerability

3.4.2.9 The vulnerability of groundwater is determined by its risk of pollution. The risk of pollution is determined by the:

- *physical, chemical and biological properties of the underlying soil and rocks*
- *depth and quality of soil*
- *presence of glacial sediment and other materials – known as 'drift'*
- *depth of the unsaturated zone*

3.4.2.10 The EA Groundwater Vulnerability Zones (GVZ) Mapping summarises the overall risk to groundwater, taking into account groundwater vulnerability, the types of aquifer present (superficial and/or bedrock) and their designation status, as discussed previously.

3.4.2.11 Groundwater vulnerability for the Site is shown in **Figure 3-4** to be situated within an unproductive to medium-low risk, with only part of the western area being medium to high risk.

3.4.2.12 The EA provides the following definition for the underlying GVZ:

High - *"These are high priority groundwater resources that have very limited natural protection. This results in a high overall pollution risk to groundwater from surface activities. Operations or activities in these areas are likely to require additional measures over and above good practice pollution prevention requirements to ensure that groundwater isn't impacted.*

Medium - *these are medium priority groundwater resources that have some natural protection resulting in a moderate overall groundwater risk. Activities in these areas should as a minimum follow good practice to ensure they do not cause groundwater pollution.*

Medium-low *- these are lower priority groundwater resources that have some natural protection resulting in a moderate to low overall groundwater pollution risk. Activities in these areas should follow good practice to ensure they do not cause groundwater pollution.*

Low *- these are low priority groundwater resources that have a high degree of natural protection. This reduces their overall risk of pollution from surface activities. However, activities in these areas may be a risk to surface water due to increased run-off from lower permeability soils and near-surface deposits. Activities in these areas should be adequately managed.*

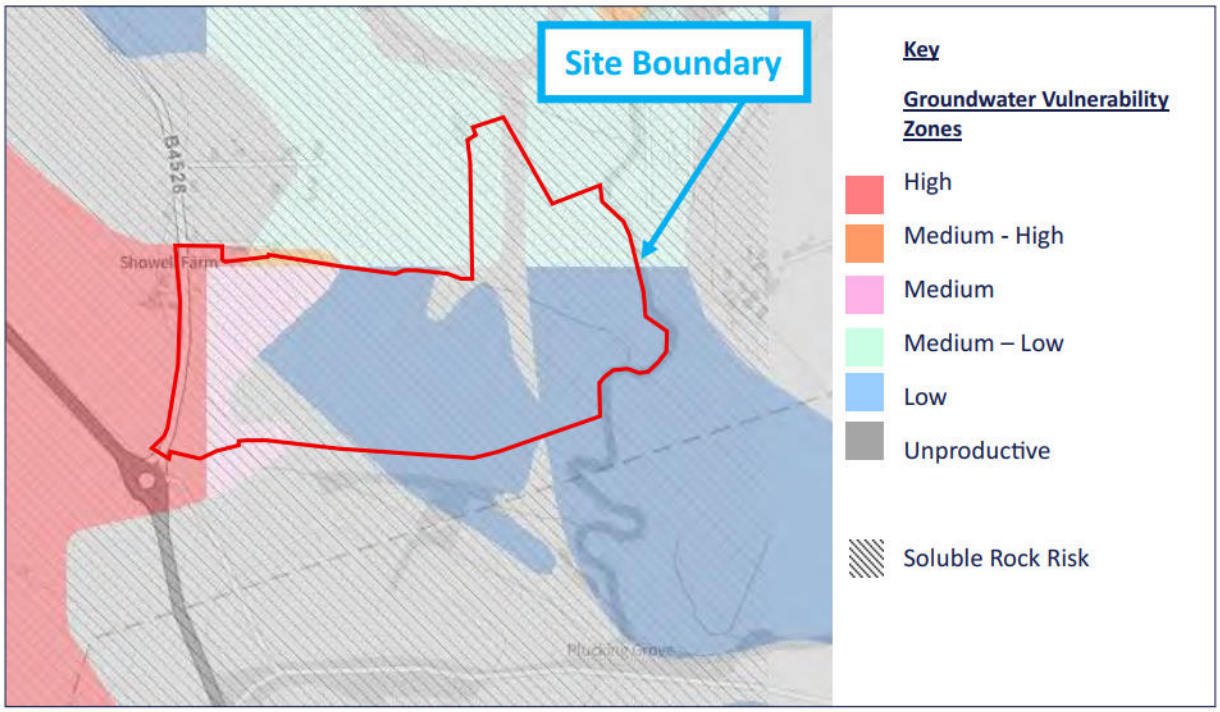


Figure 3-4: Groundwater Vulnerability Zones Map (Magic Maps, 2026)

3.4.2.13 Six months of groundwater monitoring was completed, between December 2023 and May 2024. Further details of the monitoring has been provided in Section 4.5

3.5 Source Protection Zone

3.5.2.14 The west of the Site is shown to be situated within a Zone II (Outer Protection Zone) Source Protection Zone being either 25% of the source area or a 400 day travel time, whichever is greater.

3.5.2.15 The mapping from Magic Maps (**Figure 3-5**) illustrates the extent of Zone II within the south of the Site.

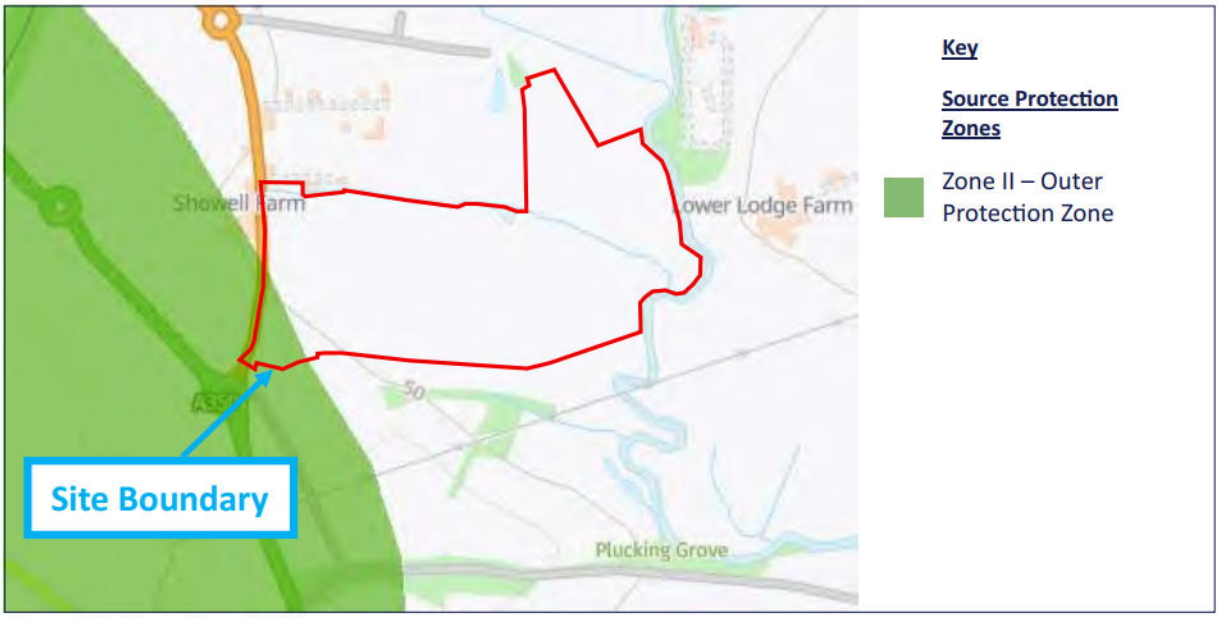


Figure 3-5: Magic Maps (2026)

4 Flood Risk

4.1.1.1 Having completed a site hydrological desk study, the possible flooding mechanisms at the Site are identified as follows.

4.2 Coastal Flooding

4.2.0.2 Coastal flooding affects low-lying coastal land which becomes submerged by seawater through high tides, storm surges or rising sea levels.

4.2.0.3 The Site lies approximately 40km southeast from the nearest tidal watercourse and lies at a minimum of circa 41mAOD and therefore, has a negligible risk of coastal flooding.

4.3 Fluvial Flooding

4.3.0.4 The EA mapping illustrated on **Figure 4-1** shows that the west of the Site lies within Flood Zone 1; being an area of Low Probability of flooding and outside both the 1 in 100 (1% AEP) and 1 in 1,000 (0.1% AEP) year flood events. The east of the Site, along with the onsite drainage channel is located within Flood Zones 2 and 3.

4.3.0.5 The area of Flood Zone 2; being an area which lies within High Probability of flooding, inside the 1 in 1000 (0.1% AEP) flood event. Flood Zone 3; being an area which lies within High Probability of flooding, inside the 1 in 100 (1% AEP) flood event.



Figure 4-1: EA Flood Map for Planning – Fluvial Flooding (April 2026)

4.4 Pluvial Flooding

4.4.0.6 Overland flow mechanisms result from the inability of unpaved ground to infiltrate rainfall or due to inadequacies of drainage systems in paved areas to accommodate flow directed to gullies, drainage downpipes or similar. In minor cases, local ponding may occur. In more extreme events, flows accumulate and may be conveyed across land following the topography.

4.4.0.7 The mapping on **Figure 4-2** illustrates areas of very low to high risk of surface water flooding. Initial investigations suggest that the risk of overland flow relates primarily to the topography of the Site; low areas of the Site naturally store water limiting the surface runoff in concentrated areas and the drainage channel along the northern boundary and extending east towards the River Avon.

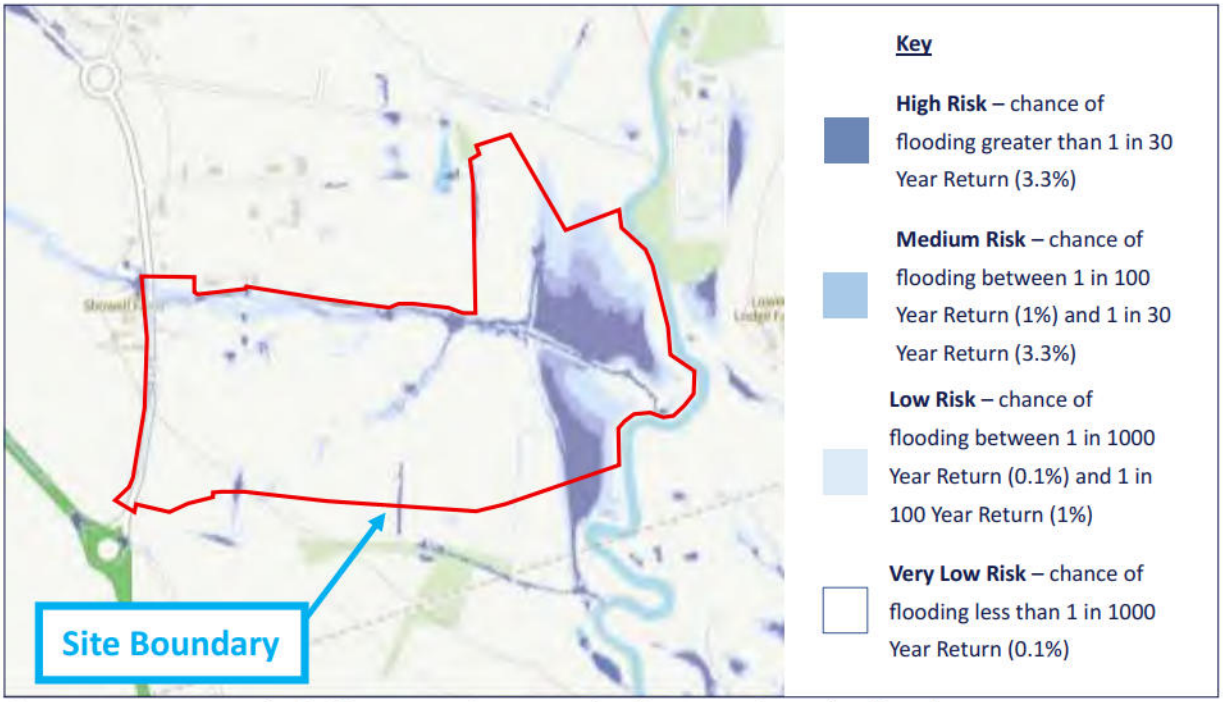


Figure 4-2: EA Long Term Flood Risk Maps – Surface Water Flooding 2040 and 2060 (April 2026)

4.4.0.8 The pluvial flood modelling that forms the basis of the EA's surface water flood mapping does not include high capacity drainage features such as culverts or the details of any local/existing drainage systems and is therefore the areas shown at risk are conservative. Notwithstanding this, the mapping provides a useful indication of potential overland flow paths and areas of ponding, which will been used to inform the development layout, including the setting of finished floor levels and external site levels.

4.4.0.9 In line with current guidance, exceedance flows will be considered and safely routed through development via defined flow paths. The proposed drainage strategy therefore incorporates appropriate exceedance routing and retention of existing drainage features, including ditches, alongside new surface water drainage infrastructure. On this basis, residual risk from overland flow is considered to be appropriately managed through design, ensuring that flows can be safely conveyed through the Site without increasing flood risk to buildings or elsewhere.

4.5 Groundwater

4.5.0.10 Groundwater flooding is characterised by low-lying areas often associated with shallow unconsolidated sedimentary aquifers which overly non-aquifers. These aquifers are reported to be susceptible to flooding, especially during the winter months, due to limited storage capacity.

4.5.0.11 Where groundwater flooding is present, persistent issues can arise that are problematic to resolve. Such mechanisms often develop due to construction activities that may have an unforeseen effect on the local geology or hydrogeology.

4.5.2 Level 1 Strategic Flood Risk Assessment (SFRA, 2024) JBA Consulting

4.5.2.12 The SFRA states:

The groundwater flooding in Wiltshire is primarily due to flooding mechanisms in the chalk and occurs mainly in the south and south-east of the county. Wiltshire Council define groundwater flooding as the following:

- *The emergence of groundwater at the ground surface away from perennial river channels, under conditions where the "normal" ranges of groundwater level and groundwater flow are exceeded;*
- *Exceptionally large flows from perennial springs or large flows from intermittent or dormant springs, which can cause both localised flooding in the vicinity of the springs and down gradients where surface water channels may not be adequate.*

High groundwater levels can also have a large impact on many rivers within the catchment causing higher than normal base flow, increasing the risk of fluvial flooding, although impacts from this increase in fluvial flow are not considered as groundwater flooding.

4.5.2.13 The groundwater emergence mapping provided as Appendix G of the Level 1 SFRA (Figure 4-3) illustrates that the east of the Site is at no risk of groundwater flooding, with levels increasing towards the west of the Site where levels are shown to be at within 0.025m of the ground surface during a 1% AEP (or a 1 in 100-year return period) event.

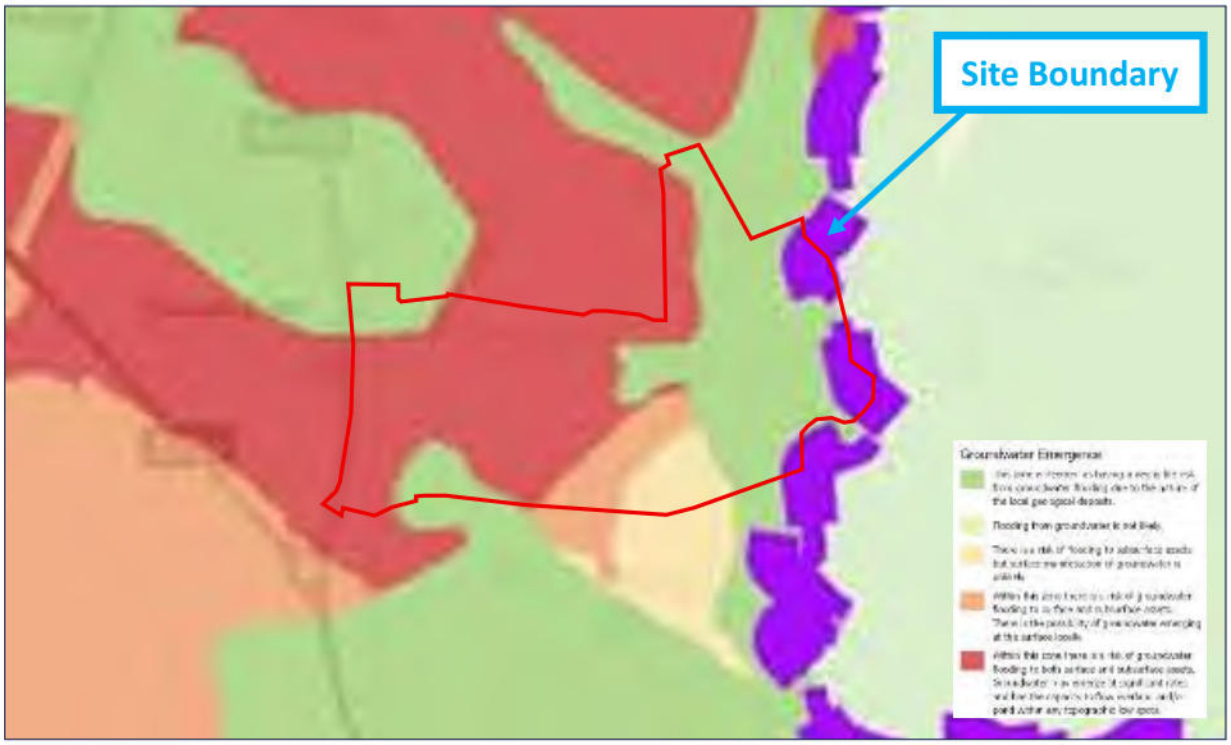


Figure 4-3: Extract from Wiltshire Level 1 SFRA Appendix G – Groundwater Emergence Mapping

4.5.3 Level 2 Strategic Flood Risk Assessment (SFRA, 2025) JBA Consulting

4.5.3.14 The Level 2 SFRA has provided a detailed assessment for 8 Sites across Wiltshire identified for planning by Wiltshire County Council, including the Site, a previous allocation for a larger site, at Land at East of Showell Farm in conjunction with Land South of Chippenham (Pol7), **Figure 4-4**.

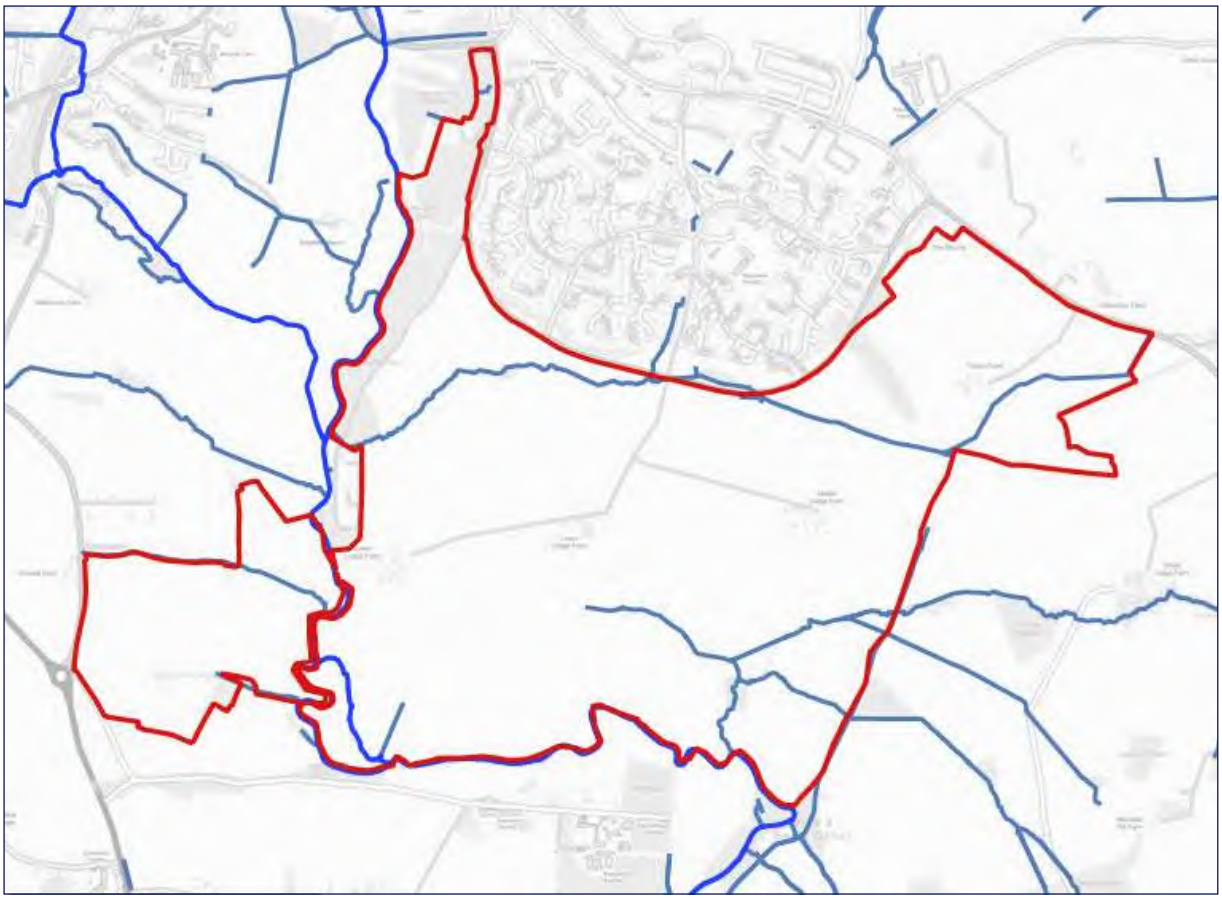


Figure 4-4: Pol7 Land South of Chippenham and East of Showell Farm

4.5.3.15 In regards to groundwater flooding the Level 2 SFRA assessment states that:

The extension of the site, west of River Avon the site varies from low to high risks of groundwater flooding. The west corner of the land within the site, east of Showell Farm, has predicted 1% AEP groundwater levels either at or very near (within 0.025m of) the ground surface. Closer the east of River Avon the groundwater levels are between 0.025m and 5m below the ground surface.

4.5.3.16 And provides the same mapping as provided in Appendix G of the Level 1 SFRA (**Figure 4-5**):

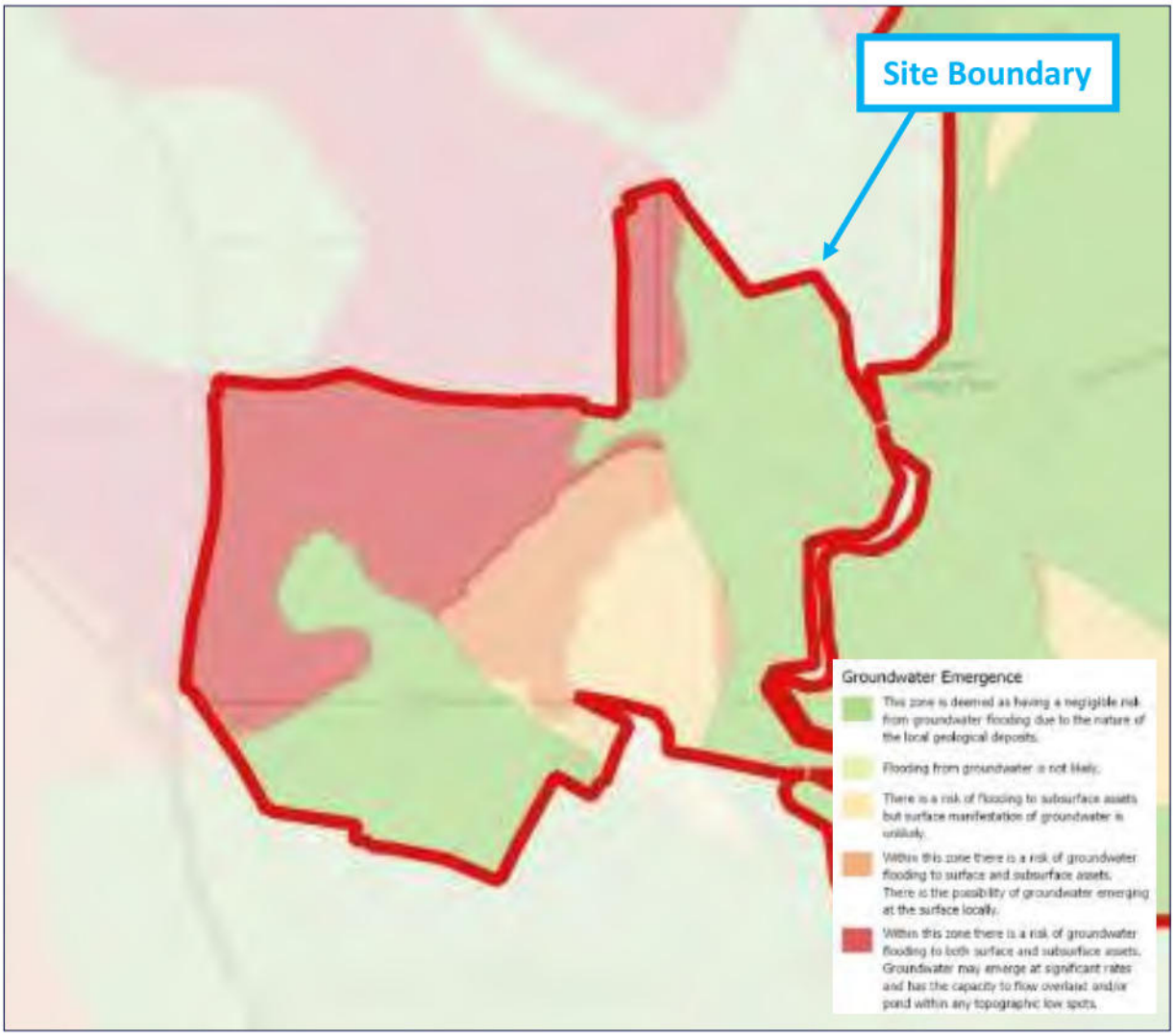


Figure 4-5: Extract from Wiltshire Level 2 SFRA– Groundwater Emergence Mapping Pol7 (which includes the boundary for this planning application in its western extent)

4.5.4 Groundwater Monitoring

4.5.4.17 Six months of groundwater monitoring was completed, between December 2023 and May 2024, within 10 boreholes located across the Site, focusing with the areas of proposed development and SuDS.

4.5.4.18 Groundwater monitoring locations were focused within the proposed development parcels and areas of proposed SuDS infrastructure in order to inform the drainage strategy and identify where mitigation measures may be required.

4.5.4.19 **Figure 4-6**, illustrates the location of the Boreholes, while **Table 4-1** provides the results of this monitoring. **Appendix C** presents the logs within the full Groundwater Monitoring Report.



Figure 4-6: Location of Groundwater Monitoring

Date of Monitoring	Groundwater Levels (m bgl)									
	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10
08.12.23	0.28	0.62	0.25	0.39	0.60	0.78	0.45	0.83	0.97	0.63
08.01.24	0.38	0.66	0.31	0.37	0.54	0.74	0.43	0.80	0.71	0.68
06.02.24	0.48	0.91	0.59	0.79	1.02	DRY	0.70	DRY	1.32	DRY
07.03.24	0.45	0.74	0.36	0.40	0.71	0.91	0.48	0.85	0.86	DRY
05.04.24	0.22	0.38	0.13	0.29	0.40	0.42	0.20	0.39	0.54	DRY
07.05.24	0.61	0.63	N/A*	N/A*	N/A*	DRY	0.65	DRY	1.29	DRY

*Unable to locate borehole – likely destroyed/buried by recent ploughing activity

Table 4-1: Groundwater Monitoring Results

4.5.4.20 The results of the monitoring show that groundwater did not reach the surface or rise within 0.1m of existing ground levels during the monitoring period, with the shallowest recorded groundwater level being 0.13m bgl in BH03 in April 2024. This is broadly consistent with the Level 2 SFRA groundwater emergence mapping, which identifies parts of the wider western extent of the POL7 allocation as having groundwater levels predicted to be at or within 0.025m of the ground surface during a 1% AEP event. While the SFRA mapping indicates a potential for very shallow groundwater under extreme conditions, the site-specific monitoring undertaken during the winter and spring period indicates that groundwater levels across the proposed development parcels remained below ground level throughout the monitoring period.

4.5.4.21 Spatially across the Site, there are no significant trends, although groundwater levels are generally higher across the centre of the Site and towards the River Avon, adjacent to the east, following the natural lower topography of the Site. In addition, according to the British Geological Survey, this is consistent to where superficial deposits are recorded as Principal A Aquifers. Borehole 10, which is the furthest west and within the highest parts of the Site, remaining dry in the last four visits.

4.5.4.22 While the SFRA mapping and the site-specific monitoring do not identify the highest groundwater risk in exactly the same locations, both datasets are comparable inasmuch as they show a variation in groundwater levels across the Site.

4.5.4.23 To put the Site into a wider context and understand if it is similar to the surrounding area, the adjacent Rowden Park site application (Patterdown Road, PL/2021/10406) and the submitted groundwater information was reviewed. JPB completed groundwater monitoring between May 2019 and February 2020 in 19 locations across the Rowden Park development site. However, groundwater was also located in 41 of the excavated trial pits and 23 of the windowless sampler holes.

4.5.4.24 The results of the groundwater monitoring in Parcel 5 (closest to the River Avon), had groundwater levels ranging from 2.20mAOD (June 2019) to 0.03mAOD (February 2020). While the results from Parcel 3A (higher area in the west), had groundwater levels ranging from 1.87mAOD (May 2019) to 0.52mAOD (November 2019).

4.5.4.25 The Rowden Park monitoring provides a broadly comparable dataset to the Site, although with greater variability in the recorded groundwater levels. However, as with this Site, and as would be expected the groundwater levels are generally higher closer to the River Avon compared to the higher western areas.

4.5.4.26 The Rowden Park development has been consented and, as part of that process, flood risk would have been assessed and appropriate mitigation measures, such as lined basins with overburden to avoid floatation during high groundwater conditions, have been identified to ensure that groundwater flood risk is appropriately managed and minimised.

4.5.4.27 Potential Mitigation Options

4.5.4.28 Upon review of the adjacent development at Rowden Park, and the agreed design mitigation measures that have been employed, it is considered that similar measures will be effective in managing any potential flood risk from ground water.

- All storage and conveyance SuDS will be lined to prevent groundwater egress and ingress. In order to mitigate the potential risk of buoyance and the floatation of such lining under high groundwater conditions detailed calculations will be carried out in order to establish the depth of required overburden above the liner. This would dictate the required depth of the liner to manage the risk of floatation and thereby ensure that the SuDS basins/conveyance features would remain intact, resilient and available to receive surface water runoff from the proposed development – which they will be designed to serve. A typical basin section along with a typical highway cross section with a membrane has been provided in **Appendix E** in order to illustrate the aforementioned mitigation, which it is worth noting has also been employed on the adjacent Rowden Park site, for which the design details would need to be submitted and approved at Reserved Matters Stage.
- A review of building foundation options will be undertaken to determine the most appropriate and efficient for the Site and its potential for high groundwater, alongside a full ground investigation which will include further groundwater monitoring.
- Basement structures are not proposed.
- The modification of ground levels, introduction of below ground structures such as building foundations and utilities/drainage infrastructure could have an impact on the groundwater regime but with the carefully

considered design of development levels, below ground infrastructure and land drainage systems this can be managed such that the risk of flooding is considered acceptable to future residents, visitors and properties. This includes the design of exceedance routing so that in the event groundwater were to emerge at the surface, at what is likely to be a low flow rate, it can be channelled safely through the site.

- Finished Floor Levels will be a set a minimum of 600mm above highest measured groundwater level, but also 300mm above the adjacent highway or exceedance route level.

4.5.4.29 With the implementation of the mitigation measures outlined above, any residual risk associated with groundwater flooding can be appropriately managed such that the proposed development will remain safe and resilient for its lifetime, without increasing flood risk elsewhere. The proposed drainage strategy, development levels and foundation design will ensure that groundwater emergence, where it may occur, can be safely controlled and routed through the Site while maintaining the functionality and integrity of the development and associated SuDS infrastructure.

4.6 Artificial Water Bodies

4.6.4.30 Non-natural or artificial sources of flooding comprise of reservoirs, canals and lakes where water is retained at or above the natural ground level. Artificial water bodies have the potential to cause flooding due to the release of large volumes of water, resulting from a dam, bank or lock failure.

4.6.4.31 There is a risk of reservoir flooding in the east and north of the Site. In the east, and majority of the north, the majority of flooding extent is also located within the area of Flood Zone 2, so all development has been located away from this extent. Where there is a wider extent of flooding, mainly in the north west of the Site, all development has remained outside of this area.

4.6.4.32 However, flooding from reservoirs is extremely unlikely. We have an excellent reservoir safety record in the UK.

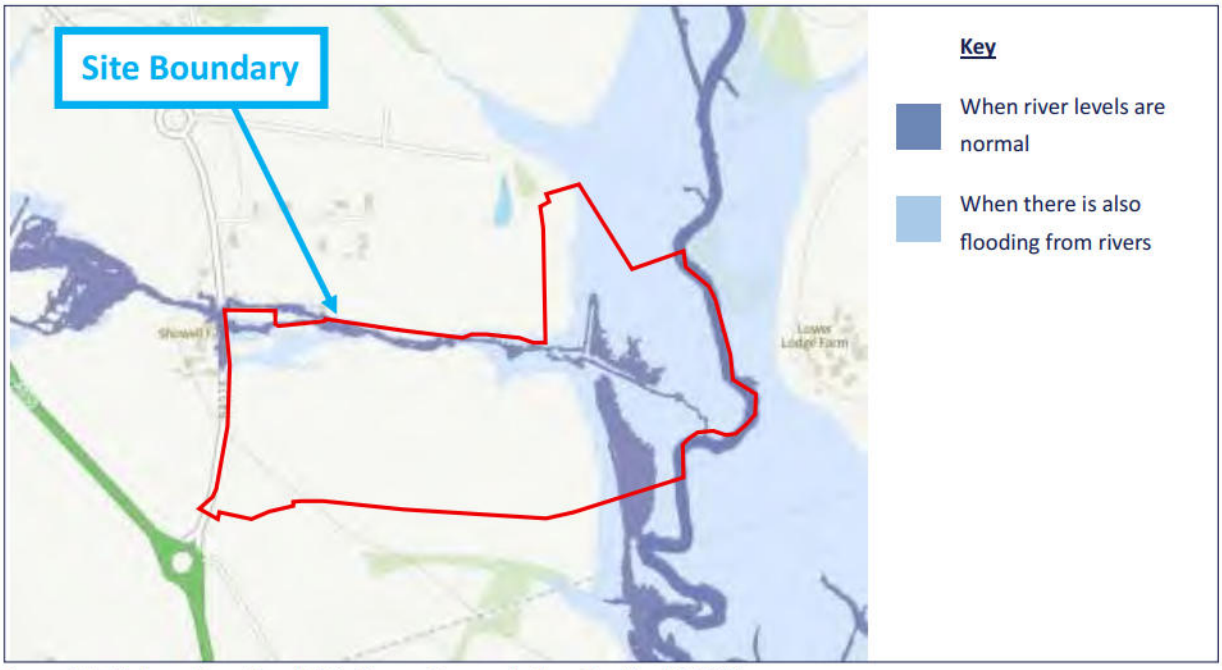


Figure 4-7: EA Long Term Flood Risk Maps – Reservoir Flooding (April 2026)

4.7 Sewerage Systems

4.7.4.33 Flooding related to sewerage systems is a result of there being insufficient capacity within an existing sewerage system (combined and surface water sewers) or from there being a blockage within the system.

4.7.4.34 Wessex Water sewer records identified that there are no sewers identified within the Site boundary, and given the local topography even if off-site sewers were to block/flood then the resulting overland flow would be no greater than the pluvial flood risk identified for the site.

4.7.4.35 Positive drainage measures incorporated on site, coupled with SuDS and a new foul and surface water sewer network will ensure that the risk of sewer flooding across the Site will be low.

4.7.4.36 Flood risk associated with sewer flooding is therefore considered to be a low probability.

5 Local Planning Policy

5.1 Catchment Flood Management Plans (CFMP)

5.1.0.1 A CFMP is a high-level strategic plan through which the Environment Agency seeks to work with other key-decision makers within a river catchment to identify and agree long-term policies for sustainable flood risk management.

5.1.0.2 The Bristol Avon Catchment Flood Management Plan (June 2012), outlines that the catchment has been divided into 10 sub-areas. The Site is shown to be situated within Wiltshire Towns catchment which is covered by the following policy:

"Policy 4: Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

This policy will tend to be applied where the risks are currently deemed to be appropriately-managed, but where the risk of flooding is expected to significantly rise in the future. In this case we would need to do more in the future to contain what would otherwise be increasing risk. Taking further action to reduce risk will require further appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options."

5.2 Strategic Flood Risk Assessment (SFRA)

5.2.1 Level 1 Strategic Flood Risk Assessment (SFRA, 2024) JBA Consulting

5.2.1.3 To support local planning policy, NPPF guidance recommends that local planning authorities produce a SFRA. The SFRA should be used to help define the Local Plan and associated policies; considering potential development zones in the context of the sequential test defined in the guidance.

5.2.1.4 JBA produced the Level 1 Strategic Flood Risk Assessment for Wiltshire Council, which was published in November 2024.

5.2.1.5 The key objectives of the SFRA are to:

- *Inform the preparation of development documents prepared by Wiltshire Council and assist town and parish councils in the preparation of neighbourhood plans by assessing flood risk from all sources, current and future using updated information sources.*
- *Identify which locations are most and least vulnerable to flooding from all relevant sources, including a review of the proposed allocations in the draft Local Plan and draft Gypsies and Travellers Plan.*
- *Produce a comprehensive set of maps presenting flood risk from all sources, including historic records, that can be used as an evidence base for flood management purposes.*
- *Identify areas where further assessment of flood risk is needed and provide sufficient detail to enable the Sequential Test to be applied to inform allocations of land for development.*
- *Provide clear advice based on the type and intensity of flood risk for developers undertaking site-specific Flood Risk Assessments (FRAs).*
- *Assess or identify existing and proposed flood defences and the maintenance requirements of these defences.*
- *Summarise the role that the Lead Local Flood Authority (LLFA) will play in the management of flood risk.*
- *Consider outputs from the Preliminary Flood Risk Assessment (PFRA) and any local flood risk strategies.*

- *Take into account climate change.*
- *Assess the cumulative impact that development will have on flood risk.*
- *Produce clear and specific recommendations and guidance identifying responsible agencies and actions where appropriate, in order for Wiltshire Council to implement recommendations effectively.*

5.2.1.6 The SFRA has been reviewed and utilised where necessary throughout the report.

5.2.2 Level 2 Strategic Flood Risk Assessment (SFRA, 2025) JBA Consulting

5.2.2.7 The objectives of the Level 2 SFRA are to:

1. Provide individual flood risk analysis for site options using the latest available flood risk data, thereby assisting the Council in applying the Exception Test to their proposed site options in preparation of their Local Plan.
2. Using available data, provide information and comprehensive mapping presenting flood risk from all sources for the site.
3. Where the Exception Test is required, provide recommendations for making the site safe throughout its lifetime.
4. Take into account most recent policy and legislation in the NPPF, PPG and LLFA SuDS guidance.
5. Consider whether the catchments may be sensitive to new development in flood risk terms using the Level 1 SFRA Cumulative Impact Assessment (CIA).

5.2.2.8 The Level 2 assessment for the Site has been summarised in Chapter 4: Flood Risk and Chapter 6: Flood Risk Vulnerability.

5.3 Local Flood Risk Management Strategy (LFRMS)

5.3.2.9 WCC published the LFRMS in April 2015. The LFRMS offers Guiding Principles in managing flood risk and a structure of managing strategy, in addition to that provided in the SFRA. The LFRMS outlines local flood risk, description of historic flood impacts and potential future flood risk in Wiltshire.

5.3.2.10 The Local Flood Risk Management Strategy Objectives are outlined below:

- Improve knowledge regarding flood risk.
- Improve protection from flooding.
- Improve resilience to flooding.
- Improve the environment.
- Improve communications about flooding issues.

5.3.2.11 The objectives detailed above will be delivered through a series of local measures and actions. Site level Specific Management Actions are introduced so they could be implemented within locally important flood risk areas in order to translate the aims of the overall strategic actions onto a local scale.

5.4 Core Strategy

5.4.2.12 Wiltshire Council adopted their Core Strategy in January 2015. The following policies, quoting only relevant aspects, relate directly to flood risk and drainage.

Core Policy 67: Flood Risk

Flood Risk Development proposed in Flood Zones 2 and 3 as identified within the Strategic Flood Risk Assessment will need to refer to the Strategic Housing Land Availability Assessment when providing evidence to the local planning authority in order to apply the sequential test in line with the requirements of national policy and established best practice. All new development will include measures to reduce the rate of rainwater run-off and improve rainwater infiltration to soil and ground (sustainable urban drainage) unless site or environmental conditions make these measures unsuitable.

Core Policy 68: Water Resources

Development must not prejudice the delivery of the actions and targets of the relevant River Basin or Catchment Management Plan, and should contribute towards their delivery where possible.

Non-residential development will be required to incorporate water efficiency measures. Developers will be expected to submit details of how water efficiency has been taken into account during the design of proposals.

Development proposals within a Source Protection Zone, Safeguard Zone or Water Protection Zone must assess any risk to groundwater resources and groundwater quality and demonstrate that these would be protected throughout the construction and operational phases of development.

6 Storm Drainage

6.1 Current Surface Water Drainage

6.1.0.1 The Site is currently undeveloped agricultural fields where storm water collects within depressions and flows either directly into the River Avon or via an on-site drainage channel that runs along the northern boundary of the site and continues through the Site and into the River Avon which forms the eastern boundary of the Site.

6.2 SuDS Components

6.2.0.2 It is proposed to implement a SuDS scheme consistent with local and national policy at the proposed development.

6.2.0.3 The nature of source control measures to be implemented will need to remain flexible, at the outline stage, in order to provide each house builder with a 'toolkit' of options to reach an agreed target for peak discharge reduction and water treatment.

6.2.0.4 However, a variety of SuDS features, both at source and catchment wide, will be reviewed and proposed within this strategy.

6.2.0.5 **Table 6-1** is an extract of Table 7.1 from the CIRIA SuDS Manual C753 which outlines a number of options available.

Component Types	Description	Collection Mechanism	Design Criteria					
			Water Quantity			Water Quality	Amenity	Biodiversity
			Peak Runoff Rate	Runoff Volumes				
				Small Events	Large Events			
Rainwater Harvesting Systems	Systems that collect runoff from the roof of a building or other paved surface for use	P		●	●		●	
Green Roofs	Planted soil layers on the roof of buildings that slow and store runoff	S	○	●		●	●	●
Infiltration Systems	Systems that collect and store runoff, allowing it to infiltrate into the ground	P	●	●	●	●	●	●
Proprietary Treatment System	Subsurface structures designed to provide treatment of runoff	P				●		
Filter Strips	Grass strips that promote sedimentation and filtration as runoff is conveyed over the surface	L		●		●	○	○

Filter Drains	Shallow stone filled trenches that provide attenuation, conveyance and treatment of runoff	L	●	○		●	○	○
Swales	Vegetated channels (sometimes planted) used to convey and treat runoff	L	●	●	●	●	●	●
Bioretention Systems	Shallow landscaped depressions that allow runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils	P	●	●	●	●	●	●
Trees	Trees within soil-filled tree pots, tree planters or structural soils used to collect, store and treat runoff	P	●	●		●	●	●
Pervious Pavements	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	S	●	●	●	●	○	○
Attenuation Storage Tanks	Large, below ground voided spaces used to temporarily store runoff before infiltration, controlled release or use	P	●					
Detention Basins	Vegetated depressions that store and treat runoff	P	●	●		●	●	●
Ponds and Wetlands	Permanent pools of water used to facilitate treatment runoff – runoff can also be stored in an attenuation zone above the pool	P	●			●	●	●

* Key
P – Point (collected where rainfall lands), L – Lateral (rainfall runoff collected in a drain or channel),
S – Surface (collected where rainfall lands over a surface)
○ Likely Valuable Contribution ● Some Potential Contribution to Delivery of Design Criterion

Table 6-1: Ciria Guidance Table 7.1 (SuDS Component Delivery of Design Criteria)

6.3 Drainage Hierarchy

6.3.0.6 The following paragraphs in this section outline the proposed drainage strategy to meet national and local design requirements and guidance.

6.3.0.7 The NPPG and the latest National Standards for SuDS (July 2025) requires new development to implement means of storm water control, known as SuDS, to maintain flow rates discharged to the surface water receptor at the pre-development 'baseline conditions' and improve the quality of water discharged from the land.

6.3.0.8 When appraising suitable storm water discharge options for a development site, the National Standards provide the following search sequence for identification of the most appropriate drainage methodology.

- priority 1: collected for non-potable use
- priority 2: infiltrated to ground
- priority 3: discharged to an above ground surface water body

- priority 4: discharged to a surface water sewer, or another piped surface water drainage system
- priority 5: discharged to a combined sewer

6.3.0.9 Dealing with the search order in sequence:

6.3.0.10 As a primarily residential scheme there is not sufficient demand for non-potable water to include a larger scale collection. However, on parcel SuDS will be incorporated throughout the development to collected and treat the initial few mm of rainfall and reuse can be incorporated where possible within the local centre.

6.3.0.11 Infiltration testing was completed by GEG in 2021 which found that there was no to very little presence of infiltration across the Site (7.63×10^{-6} to N/A), along with the high groundwater levels across the Site, infiltration SuDS are not suitable for this development.

6.3.0.12 There is an existing drainage ditch that flows along the northern boundary in the west and continues through the Site and into the River Avon which forms the eastern boundary of the Site. As such both the existing ditch and the River Avon represents an appropriate receptor for storm water discharge and has the potential to receive flows from the proposed development once restricted to the pre-existing 'greenfield' rates of run-off.

6.3.0.13 **Table 6-2** outlines which options will be used within the outline application and which will be considered at the detailed design stage.

Component Types	Used at Outline	To be Considered at Detailed Design
Rainwater Harvesting Systems		✓
Infiltration Systems		
Filter Strips		✓
Filter Drains		✓
Swales	✓	✓
Tree Pits		✓
Pervious Pavements		
Detention Basins	✓	✓

Table 6-2: Types of SuDS Components to be Considered

6.3.0.14 The search sequence outlined above indicates that the onsite drainage channel within the north of the Site, which discharges into the River Avon, is the most appropriate receptor of storm water from the proposed development, having the potential to employ source control measures and on-line SuDS to control peak discharges to no greater than the baseline conditions.

6.3.0.15 Proposals have been developed to inform the strategic drainage network across the development. It is proposed that the drainage system for the Site utilises a SuDS system as the primary storm water management scheme. Accordingly, a plan showing the conceptual drainage strategy for the Site is contained within **Appendix D** as drawing 13143-DR-01 B.

6.3.0.16 Coupled with the storm water control benefits, the use of SuDS can also provide betterment on water quality. National guidance in the form of CIRIA 753 outlines that by implementing SuDS, storm water from the Site can be treated to an improved standard thus ensuring the development proposals have no adverse effects on the wider hydrology.

7 Preliminary Drainage Proposals

7.1.1.1 The common aims of a Primary Drainage System are:

- Reduction in peak discharges to the agreed site wide run-off rate from the development areas.
- Provide water quality treatment where appropriate

7.1.1.2 Preliminary assessment of the requirements for storm drainage have been based on the following criteria as shown in **Table 7-1**.

Criteria	Measure/Rate/Factor
Application Site Area	29.97 ha
Developed Area	10.77 ha
Existing Highways (B4528)	0.63 ha
Landscaped Area	18.57 ha
Impermeability – Residential	0.60
Impermeability – Local Centre	0.85
Sewer design return period	1 in 1 year
Sewer flood protection	1 in 30 years
Fluvial / Development flood protection	1 in 100 years
BFIHOST	0.573
BFIHOST19	0.588
PROPWET	0.34
SAAR9120	787mm
Minimum cover to sewers	1.2 m
Minimum velocity	1.0 m/sec
Pipe ks value	0.6 mm
Allowance for climate change	45%

Table 7-1: Drainage Criteria and Measure

7.2 Outline Surface Water Drainage Strategy

7.2.0.3 For this Site a SuDS strategy comprising of conveyance swales and detention basins which will outfall surface water into the existing drainage ditches within the Site, has been designed.

7.2.0.4 Our surface water outfall will discharge into the adjacent watercourse, which is located within Flood Zone 3. As such, the outfall will be designed to operate under surcharged conditions at the detailed design stage, with the final structural arrangement and outfall type to be confirmed as the design progresses.

7.2.0.5 In accordance with the national SuDS guidance, the first 5mm of rainfall will be accommodated for within on parcel SuDS such as rain gardens in the development parcels. These on parcel features will be designed at the reserved matters stage, once the parcel layout has been fixed as the features needs to remain flexible at this stage as it not clear what the most viable SuDS options will be.

7.3 Detention basins

7.3.0.6 National policy requires that new developments control the peak discharge of storm water from a site to the baseline, undeveloped, site conditions.

7.3.0.7 The baseline IoH124 run-off rates are shown on **Table 7-2** below:

Event	IoH 124 (29.97ha)	IoH 124 Scaled to 1ha
1 in 1 year (l/s)	64.70	2.16
Qbar (l/s)	82.90	2.77
1 in 100 year (l/s)	201.40	6.72

Table 7-2: IoH124 Baseline Discharge Rates

7.3.0.8 In order to determine the permitted rates of run-off from the development, the future impermeable catchment areas must be derived.

7.3.0.9 The development will comply with the requirements set out in paragraph 9 of the Technical Guide to the National Planning Policy Framework (NPPF), with the discharge of surface water from the proposed developments not exceeding that of the existing greenfield sites, thus ensuring that there is no material increase in the flood risk to surrounding areas. As such the drainage designed has be restricted to the 1 in 1 year runoff rates for all storm events up to and including the 1 in 100 year plus climate change storm event.

7.3.0.10 The catchment areas and runoff rates for the Site are provided in **Table 7-3**.

Catchment	Land Use	Developable Area (ha)	Total Impermeable Area (ha) *	Design Run-off (l/s) – 1 Year
A	Local Centre	0.21	0.18	0.39
B1	Residential	2.00	1.32	2.85
B2	Residential	1.20	0.79	1.71
C	Residential	1.02	0.67	1.45
D	Residential	1.05	0.69	1.50
E	Residential	0.49	0.32	0.70
F	Residential	1.50	0.99	2.14
G	Residential	1.80	1.19	2.56
H	Residential	1.50	0.99	2.14
		10.77	**7.15**	**15.44**

* Impermeable Area has been calculated by using the impermeability parameters in Table 8-1

Table 7-3: Catchment Areas and Runoff Rates

7.3.0.11 The detention proposals have been assessed for the potential effects of climate change. The 1 in 100 year (1% AEP) return events have been modelled for 45% climate change (including peak rainfall intensity). Calculations for the climate change scenarios are contained within **Appendix F**.

7.3.0.12 The proposed strategic drainage masterplan is shown illustratively on drawing 13143-DR-01 B provided in **Appendix D**.

7.3.2 Catchment A and C

7.3.2.13 Calculations demonstrate that storm water detention storage extending to maximum 1,109m^3 will be required to attenuate storm water discharges from the site during the critical 1 in 100 year plus 45% climate change event storm. This will limit the peak discharges to 1.84 l/s.

Catchment Area (ha)	Impermeable Area (ha)	Designed Run-off (l/s)	Total Detention Volume for 1 in 100 Year Event (m^3)	Approx 5mm (m^3) On Parcel	Basin Storage Volume (m^3)
1.23	0.85	1.84	1,109	61.50	1,047.50

Table 7-4: Catchment A and C - Summary Runoff & Detention Assessment Output

7.3.3 Catchment B1

7.3.3.14 Calculations demonstrate that storm water detention storage extending to maximum 1,728m^3 will be required to attenuate storm water discharges from the site during the critical 1 in 100 year plus 45% climate change event storm. This will limit the peak discharges to 2.85 l/s.

Catchment Area (ha)	Impermeable Area (ha)	Designed Run-off (l/s)	Total Detention Volume for 1 in 100 Year Event (m^3)	Approx 5mm (m^3) On Parcel	Basin Storage Volume (m^3)
2.00	1.32	2.85	1,728	100	1,628

Table 7-5: Catchment B1 - Summary Runoff & Detention Assessment Output

7.3.4 Catchment B2 and D

7.3.4.15 Calculations demonstrate that storm water detention storage extending to maximum 1,953m^3 will be required to attenuate storm water discharges from the site during the critical 1 in 100 year plus 45% climate change event storm. This will limit the peak discharges to 3.21 l/s.

Catchment Area (ha)	Impermeable Area (ha)	Designed Run-off (l/s)	Total Detention Volume for 1 in 100 Year Event (m^3)	Approx 5mm (m^3) On Parcel	Basin Storage Volume (m^3)
2.25	1.49	3.21	1,953	112.50	1,841

Table 7-6: Catchment B2 and D - Summary Runoff & Detention Assessment Output

7.3.5 Catchment E, F and H

7.3.5.16 Calculations demonstrate that storm water detention storage extending to maximum 3,015m^3 will be required to attenuate storm water discharges from the site during the critical 1 in 100 year plus 45% climate change event storm. This will limit the peak discharges to 4.97 l/s.

Catchment Area (ha)	Impermeable Area (ha)	Designed Run-off (l/s)	Total Detention Volume for 1 in 100 Year Event (m^3)	Approx 5mm (m^3) On Parcel	Basin Storage Volume (m^3)
3.49	2.30	4.97	3,015	175	2,840

Table 7-7: Catchment E, F, H - Summary Runoff & Detention Assessment Output

7.3.6 Catchment G

7.3.6.17 Calculations demonstrate that storm water detention storage extending to maximum 1,559m^3 will be required to attenuate storm water discharges from the site during the critical 1 in 100 year plus 45% climate change event storm. This will limit the peak discharges to 2.56 l/s.

Catchment Area (ha)	Impermeable Area (ha)	Designed Run-off (l/s)	Total Detention Volume for 1 in 100 Year Event (m^3)	Approx 5mm (m^3) On Parcel	Basin Storage Volume (m^3)
1.80	1.19	2.56	1,559	90	1,469

Table 7-8: Catchment G - Summary Runoff & Detention Assessment Output

8 SuDS Management

8.1 Water Quantity

8.1.0.1 No long term storage is currently proposed for surface water within the SuDS design.

8.1.0.2 The suitability of the types of rainwater harvesting systems that can be incorporated within the Site will be investigated further at the detailed design stage.

8.2 Water Quality

8.2.0.3 Impermeable surfaces collect pollutants from a wide variety of sources including cleaning activities, wear from car tyres, vehicle oil and exhaust leaks and general atmospheric deposition (source: CIRIA C609). The implementation of SuDS in development drainage provides a significant benefit in removal of pollutant from development run-off.

8.2.0.4 The SuDS Manual C753 describes a 'Simple Index Approach' for assessing the pollution risk of surface run-off to the receiving environment using indices for likely pollution levels for different land uses and SuDS performance capabilities.

8.2.0.5 CIRIA document C753 Table 26.2, as shown in **Table 8-1** below, indicates the minimum treatment indices appropriate for contributing pollution hazards for different land use classifications. To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index.

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day	Medium	0.7	0.6	0.7
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05

Table 8-1: CIRIA 753 Table 26.2 Pollution Hazard Indices

8.2.0.6 For a residential type development, roof water requires a very low treatment of 0.2 for total suspended solids, 0.2 for heavy metals and 0.05 for hydrocarbons, and run-off from low traffic roads such as cul-de-sacs and individual property driveways requires medium treatment of 0.7 for total suspended solids, 0.6 for heavy metals and 0.7 for hydrocarbons.

8.2.0.7 To provide the correct level of treatment, an assessment needs to be made of the mitigation provided by each SuDS feature. Table 26.3 of The SuDS Manual CIRIA document C753 shown as **Table 8-2** for discharges to surface waters indicate the treatment mitigation indices provided by each SuDS feature.

Type of SuDS component	Total suspended solids (TSS)	Metals	Hydro-carbons
Swale	0.5	0.6	0.6
Detention basin	0.5	0.5	0.6

Table 8-2: CIRIA 753 Table 26.3 SuDS Mitigation Indices for Discharges to Surface Waters

8.2.0.8 Where more than one mitigation feature is to be used, CIRIA guidance states that the total mitigation index shall be calculated as follows:

Total SuDS mitigation index = Mitigation Index 1 + 0.5 x Mitigation Index 2

8.2.0.9 At present, the Site does not benefit from any additional measures of stormwater treatment.

8.2.0.10 Due to the need to provide wider sustainability benefits and view the development at a strategic level, SuDS will be implemented to passively treat run off from the development so as to have a positive impact on the surrounding natural environment.

8.2.0.11 The Site will employ SuDS features, such as formal swales and detention basins. These are widely accepted to be of high pollutant removal efficiency (CIRIA C753). This provides for at least two stages of treatment onsite. Coupled with this however, the unknown watercourse should also be seen as an additional stage of treatment as the sedimentation process is not limited to artificial drainage systems but is taken from the natural processes observed within the water cycle. This gives three stages of treatment, providing an extensive system by which to effectively decrease pollutant load within stormwater run-off.

8.2.0.12 As the Site is not presently served by any means of storm water treatment mechanisms, by providing the afore mentioned SuDS within the proposed development it will be possible to maintain present water quality in the area and thus the development can be seen to be having no significant environmental impact in relation to water.

8.3 Amenity

8.3.0.13 A proposed SuDS strategy will be incorporated into the landscaping of the Site to provide open space, recreational areas, areas of open water and habitat areas.

8.4 Biodiversity

8.4.0.14 The SuDS will provide new habitats for fauna and flora across the Site, as well as enhancing the existing space.

8.4.0.15 The type and location of planting within the SuDS can shelter, food, foraging and breeding opportunities for a variety of wildlife. Further details of how SuDS will improve the ecology and BNG is provided within the Ecology report.

8.5 Exceedance Flows

8.5.0.16 Careful regard has to be made in respect of potential exceedance flows, being events that are more extreme than current design criteria. Various national guidance has been published on the matter of exceedance flows and measures that should be incorporated into a development to ensure the safety of occupiers and those using the infrastructure.

8.5.0.17 The principal aim is to direct any exceedance flows away from properties and along defined corridors. At a local level, this may mean water being conveyed along a length of highway, as long as the predicted flow depths and velocities are acceptable. More strategically, the implementation of conveyance corridors is important in avoiding deep and high velocity flows that present a high risk. The drainage system being promoted for the Site will provide a good opportunity to incorporate exceedance flow routes into the design.

8.5.0.18 Many of the measures for dealing with exceedance flows must be dealt with at the detailed design stage. However, the strategic layout can provide the framework of a network that can effectively deal with any future exceedance problems.

8.6 Implementation Proposals

8.6.0.19 The conceptual drainage proposals have been developed in a manner that will allow the site wide system to be designed to encourage passive treatment of discharged flows and to improve the water quality by removing the low-level silts, oils which could be attributed to track/parking area run off of this nature. Final design will provide for appropriate geometry and planting to maximise this benefit.

8.6.0.20 The storm water management features will be constructed and operational prior to the first use of the site, derived on a phase-by-phase requirement.

8.6.0.21 It has previously been the case that the functionality of the storm water management system would be ensured by ongoing maintenance, completed by the Local Authority, Drainage Authority, or a private maintenance company as appropriate.

8.6.0.22 Depending on the ecological proposals for the basin which can require specialised maintenance, it is usual for the following regime to be implemented (final details will be linked to ecological enhancements):

Frequency	Operation
Post major storm events	Inspection and removal of debris.
Every two months	Grass mowing (growing season) & litter removal.
Annual	Weeding & vegetation maintenance. Minor swale clearance. Sweeping of permeable pavements.
2 years	Tree pruning.
5-10 years	Desilting of channels. Remove silt around inlet and outlet structures.
15-20 years	Major vegetation maintenance and watercourse channel works.

Table 8-3: Framework Maintenance of Detention System

9 Foul Drainage

9.1.1.1 To understand the baseline provision for foul drainage in the area, a copy of Wessex Water network records (**Appendix G**) has been obtained. There are no foul water or combined sewers within the Site boundaries or along the B4258.

9.1.1.2 There is a potable distribution main that runs along the B4258.

9.1.1.3 The proposed development area lies approximately 300m south west from the Chippenham Water Recycling Centre, on the eastern bank of the River Avon.

9.2 Design Criteria

9.2.0.4 Peak design discharges have been calculated based on the current development criteria as described in Section 1 of this report and for the following:

*Domestic peak = 4,000 litres * dwelling / day (peak)*

9.2.0.5 Assessed in accordance with the Design and Construction Guidance for Foul and Surface Water Sewers requirements, the development will have a residential design peak discharge of approximately 18.50l/s.

9.3 Network Requirements

9.3.0.6 Discussions with Wessex Water will need to be undertaken to confirm that the development can connect into their existing foul drainage infrastructure, where that connection will be located and if an onsite pumping station will be required.

9.3.0.7 Following these discussions, it can be reviewed whether or not a foul water pumping station may be required for the development.

9.4 Treatment Requirements

9.4.0.8 Water companies have a statutory obligation through the Water Industry Act 1991, to provide capital investment in strategic treatment infrastructure to meet development growth. This investment planning is managed and regulated by OFWAT through the Asset Management Plan (AMP) process. The five yearly cyclical process requires that water companies allocate finances to a range of strategic projects to meet their statutory obligations.

9.4.0.9 Where development programming requirements necessitate the reinforcement of facilities ahead of allocation in an AMP period, mechanisms are available to ensure the infrastructure can be delivered in a timely fashion, to meet the development programme.

9.5 Implementation Proposals

9.5.0.10 Any new foul sewers across the Site will be designed to current Design and Construction Guidance for Foul and Surface Water Sewers standards, employing a point of connection agreed with Wessex Water.

9.5.0.11 The system will be offered for the adoption of Wessex Water under S104 of the Water Industry Act 1991.

10 Summary

10.1.1.1 The FRA demonstrates that all sources of flood risk have been assessed and the site and development as proposed is acceptable from a flood risk perspective.

10.1.1.2 The proposed development has been designed in accordance with the NPPF and PPG together with associated local and national policy guidance.

10.1.1.3 The majority of the Site lies within Flood Zone 1, a preferable location for development when considered in the context of the NPPF, with all built development located within this area. There are areas of Flood Zones 2 and 3 associated with the River Avon and onsite drainage network which have remained as open space, with no proposed built development other than surface water drainage outfalls to the existing watercourse.

10.1.1.4 Assessment of other potential flooding sources shows the land to have a low probability of flooding from overland flow and sewer flooding and a medium to high risk from groundwater flooding.

10.1.1.5 Site-specific groundwater investigations have been undertaken to understand the groundwater flood risk within the proposed development and SuDS areas. The monitoring confirmed that groundwater remains below the surface across the developable areas of the Site, averaging approximately 0.6m below ground level, whilst also identifying areas where groundwater levels may seasonally rise closer to the surface. The results have directly informed the proposed drainage strategy and mitigation measures, including lined SuDS features, consideration of foundation design, exceedance routing and the setting of finished floor levels, a minimum of 600mm above recorded groundwater levels. The assessment therefore demonstrates that groundwater flood risk can be appropriately managed through the proposed design, ensuring the development will remain safe and resilient for its lifetime without increasing flood risk elsewhere.

10.1.1.6 This document outlines how surface water flood risk will be managed across the Site in accordance with relevant national, regional and local policy, alongside non-statutory SuDS standards for the 100-year design life of the development. The proposed drainage strategy incorporates SuDS measures to attenuate and restrict runoff rates, ensuring post-development peak flows do not exceed existing greenfield rates (at either Qbar or 3l/s/ha) while also delivering water quality, amenity and biodiversity benefits in line with the four pillars of SuDS guidance and the NPPF.

10.1.1.7 The Site is currently greenfield and does not connect into an existing surface water sewer network.

10.1.1.8 An outline drainage strategy is proposed to manage runoff from the increase in impermeable area associated with the development through a positive drainage network and SuDS management train approach. The strategy includes swales and detention basins located within the lower-lying areas of the Site to provide attenuation, flow control and water quality treatment prior to discharge to the local land drainage network. The incorporation of on parcel features such as tree pits and rain gardens will be investigated as the design progresses and updated drainage drawings and calculations will be provided at the appropriate stage.

10.1.1.9 Overall, the proposed drainage strategy and supporting mitigation measures ensure compliance with Paragraph 181 of the NPPF, such that flood risk is not increased elsewhere and any residual risk is appropriately managed. The development is therefore considered to be safe, resilient, and acceptable from a flood risk perspective for its lifetime.

10.1.1.10 Any new sewers (foul or surface water) across the Site will be designed to current Design and Construction Guidance for Foul and Surface Water Sewers standards.

10.1.1.11 Means to discharge foul water drainage will be established that comply with current guidance and requirements of Wessex Water. Once development is complete, the network conveying flows from the site will be offered for adoption to Wessex Water to be maintained as part of their statutory duties.

11 Disclaimer

11.1.1.1 The conclusions and recommendations contained herein are limited to those given the general availability of background information and the planned usage of the site.

11.1.1.2 Third party information has been used in the preparation of this report, which Brookbanks, by necessity assumes is correct at the time of writing. While all reasonable checks have been made on data sources and the accuracy of data, Brookbanks accepts no liability for same.

11.1.1.3 The benefits of this report are provided solely to Hallam Land for the proposed development at Land at East of Showell Farm, Chippenham only.

11.1.1.4 Brookbanks excludes third party rights for the information contained in the report.

11.2 Sources of Information

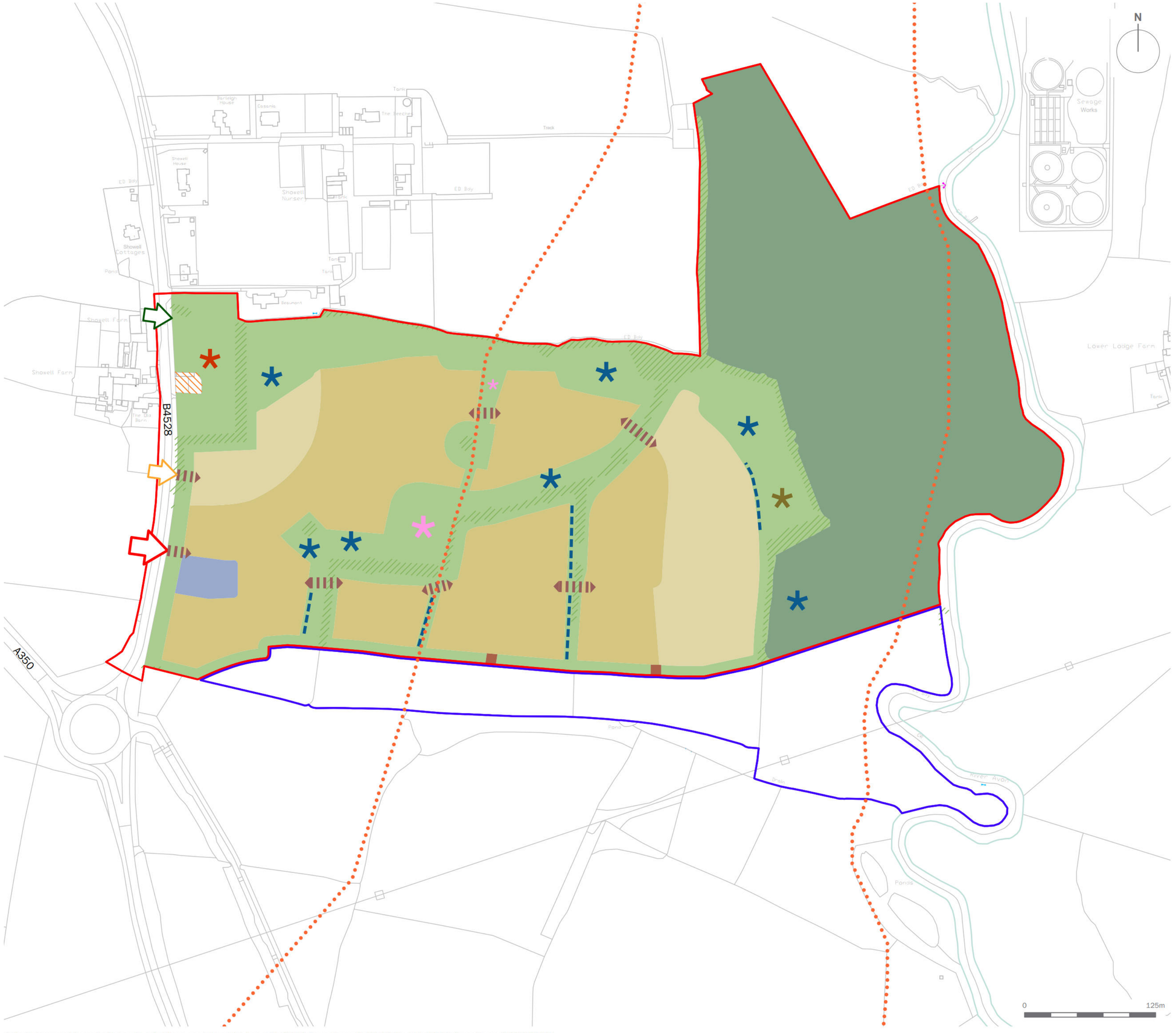
11.2.0.5 The following bodies have been consulted while completing the study:

- Wessex Water - Storm & foul water drainage
- Wiltshire Council - Local Policy
- Environment Agency - Flood risk and storm drainage
- Mastermap Data - Ordnance Survey
- Published Geology - British Geological Survey
- Magic Maps - Hydrogeology

12 Glossary of Terms

- **Aquifer** - a body of permeable rock which can contain or transmit groundwater.
- **Flood Risk Vulnerability** - the extent of harm, which can be expected under certain conditions of exposure, susceptibility and resilience.
- **Groundwater Vulnerability Zone** – how easily areas can transmit pollution to groundwater.
- **Hydrogeology** - the branch of geology concerned with water occurring underground or on the surface of the earth.
- **Infiltration** - the flow of water from aboveground into the subsurface.
- **Ordinary Watercourse** - include every river, stream, ditch, drain, cut, dyke, sluice, sewer and passage through which water flows and which does not form part of a main river.
- **Main River (watercourse**)- A large river or stream that is maintained by the Environment Agency, any water course that isn't a main river is an ordinary water course.
- **Primary Drainage System** - a network of lateral drains or swales that carry water to an attenuation basin or SuDS and away from the playing surface.
- **Sustainable Drainage System** – Features designed to manage stormwater locally (as close its source as possible), to mimic natural drainage and encourage its infiltration, attenuation and passive treatment.

Appendix A – Parameter Plan



client
Hallam Land

project title
Land East of Showell Farm, Chippenham

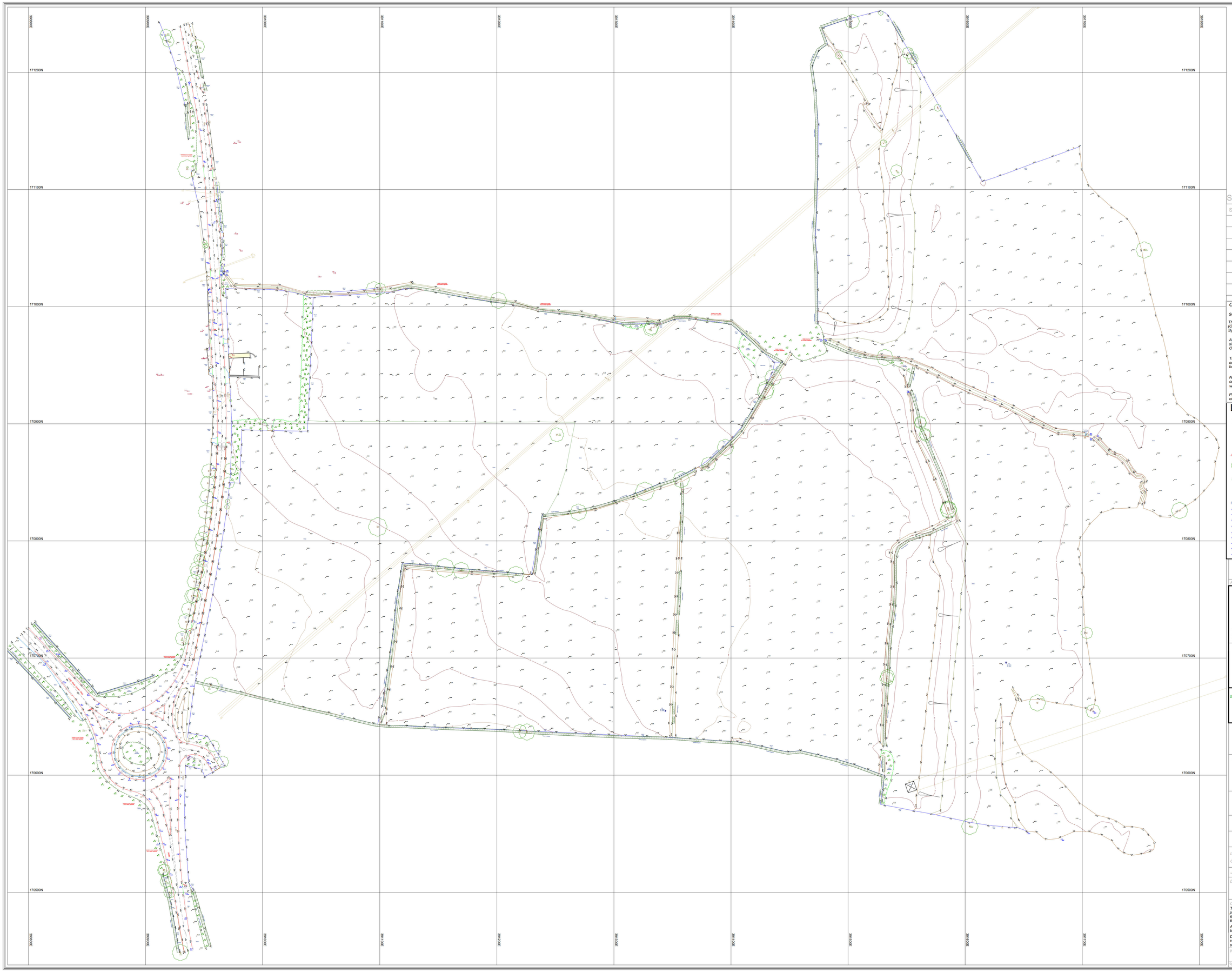
drawing title
Parameter Plan

date	**15 APRIL 2026**	drawn by	**NBo**
drawing number	**edp2272_d024ab**	checked	**PWi**
scale	**1:2,500 @ A2**	QA	**OSh**

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Appendix B – Site Topographical Survey



N

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	390932.684	170506.791	55.183
GH2	390929.023	170630.215	53.045
GH3	390853.907	170656.483	53.689
GH4	390937.786	170723.532	51.333
GH5	390969.690	170883.979	49.218
GH6	390957.594	170980.115	47.906
GH7	390957.481	171118.463	49.687

OS Note:

Some services may have been omitted due to parked vehicles.

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigation Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid and datum.

Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Top of bank, Station and Name, 100.000 Station Level, Ridge Level, Eaves Level, Flat Roof Level, Gate

Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge, Bottom of bank, Tree / Bush / Sapling, Area of Undergrowth, Woodland

Fence types: TW Interwoven, IR Iron Railings, WM Wire Mesh, PVR Post & Rail, PW Post & Wire, CL Chain Link, WP Wooden Panels, CB Close Boarded, SP Steel Palisade

CVR	Cover (generic)	DrDuct	Drainage duct
IC	Inspection chamber	Bo	Bollard
Pinv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
By	Back gully	Vp	Vent pipe
Dp	Down pipe	Gn	Ground light
Ppa	Pipe above ground	Lbox	Letter box
MH	Manhole	Stmp	Tree Stump
WL	Water level	Sty	Stile
Fl	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trialhole
Tl	Traffic light	BH	Borehole
Bus	Bus stop	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	Ctrex	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gav	Gas valve	CPS	Concrete paving slabs
Av	Air valve	CVR	Cover
ICU	Unidentified inspection	Rwall	Retaining wall
Wsl	Wash out	TTW	Top of Wall Level
Rs	Rodding eye	TCL	Tree canopy level
BB	Bolisha beacon	G	Girth
CTV	Cable tv	MG	Multi girth
Mkr	Marker post	IC	Inspection chamber
Gmkr	Gas marker post	CL	Cover level
Sc	Soffit	IL	Invert level
Fh	Fire hydrant	UTR	Unable to raise

Rev	Date	Description	Drawn	Ckd

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

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CLIENT

Hallam Land Management Ltd

PROJECT

Showell Chippenham SN15 2NU

TITLE

Topographical Survey

SCALE	DATE
A0@ 1: 1000	09.02.23
DRAWN	QUALITY REF
BG	GH16146

Level datum	See note
Grid orientation	See note
Job number	46287
Drawing No.	Rev.
46287_T	0

Comments

This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

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Appendix C – Ground Investigation Report

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Geotechnical, Environmental & Ecological Consultants

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INFILTRATION TESTING REPORT



LAND AT CHIPPENHAM
WILTSHIRE
SN15 2NU

NOVEMBER 2021

Prepared for:

Hallam Land Management

BROOKBANKS

Registered Company - GEG Ltd
Registered in England No 6469985
Registered Office: Granta Lodge, 71 Graham Rd, Malvern, WR14 2JS

REPORT TITLE: INFILTRATION TESTING REPORT

Site Address:

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Showell
Near Chippenham
Wiltshire
SN15 2NU

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Project Reference: GEG-21-705

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1. INTRODUCTION

1.1 General

Geo Environmental Group (GEG) were commissioned by Brookbanks on behalf of their client, Hallam Land Management (HLM), to undertake infiltration testing at the site known as 'Land at Chippenham,' for the purpose of determining infiltration rates of the strata and the suitability for soakaway drainage.

1.2 Available Information

The following information was supplied by Brookbanks:

- 'Infiltration Test Locations,' Brookbanks, Drawing No. 10741-SI-01, dated 29th March 2021.

GEG also purchased various utility company service drawings of the site.

1.3 Proposed Site Development

The site is being considered for residential development.

1.4 Scope

The works performed by GEG included:

- Trial pitting with infiltration testing in accordance with a specification supplied by Brookbanks.
- Calculation of infiltration rates, subject to ground conditions encountered.

Limitations to the scope of the report are outlined in Section 7.

2. SITE SETTING

2.1 Site Location

The site is located on land east of Showell Farm, approximately 3km south of Chippenham town centre, Wiltshire, at the approximate National Grid Reference 391166E, 170943N. It lies on land to the east of the B4528 and covers an area of approximately 34 hectares.

A section of the 1:25,000 Ordnance Survey (OS) map identifying the site location is shown in Figure 1 of Appendix A. The site layout plan is presented in Figure 3 (Appendix A).

2.2 Site Description

The site comprised agricultural land (currently arable across the majority and pasture along the eastern margins) with associated hedged boundaries. It fell very

gently towards the east from a level of approximately 50m AOD in the west to 45m AOD in the east. The southward flowing River Avon ran adjacent to the eastern boundary of the site, and the B4528 lay adjacent to the west with Showell Farm beyond. A small drain also ran along the north western boundary of the site (with a small nursery beyond), continuing eastwards across the site to join with the River Avon.

3. GEOLOGY & HYDROGEOLOGY

3.1 Published Geology

Reference to the 1:50,000 scale British Geological Survey digital mapping of the area (solid and drift) (and Figure 2) indicates that the solid geology beneath the site comprises the Cornbrash Formation of the Jurassic period across approximately the western quarter of the site, which lies stratigraphically below the Kellaways Formation (also of the Jurassic), conjectured across the remainder. The Cornbrash Formation is described as medium- to fine-grained, predominantly bioclastic limestone. The Kellaways Formation is described as grey sandstone, with beds of generally calcareous siltstone and mudstone.

The solid geology is conjectured to be overlain by superficial deposits of River Terrace Deposits 1 - sand and gravel locally across the central sections of the site. Locally Alluvium is indicated in the east associated with the River Avon. It is described as a normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may also be present.

No faults are conjectured to intersect the site at the surface.

3.2 Hydrogeology

3.2.1 Groundwater Designation

Environment Agency data indicates that the solid geology of the Cornbrash Formation and the superficial deposits beneath the site are designated as a Secondary A Aquifers, and the Kellaways Formation as Unproductive strata.

Secondary A Aquifers are defined as permeable layers capable of supporting water supplies at a local rather than a strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Unproductive Strata - are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

3.3 Potential Water Infiltration Properties of the Strata

In terms of water infiltration, the strata of the Cornbrash Formation and River Terrace Deposits are considered most likely to be sufficiently permeable for soakaway drainage (depending on the presence of shallow groundwater and the degree of fines), and the Kellaways Formation is likely to be relatively impermeable unless significant clean sandstone is present. The Alluvium is located within the floodplain and is therefore unlikely to be suitable for infiltration purposes.

3.4 Groundwater Source Protection Zone

The majority of the site does not lie within a currently defined Groundwater Source Protection Zone (GWSPZ). The south western corner of the site, however, falls within Outer Zone (Zone 2) of a GWSPZ. As such, should soakaway drainage be adopted in this area it is recommended that any specific Environment Agency restrictions associated with the GWSPZ are adhered to.

3.5 Surface Water Flooding

According to the Environment Agency online 'Flood Map for Planning', the majority of the western and central sections of the site lie within Flood Zone 1, being land that lies outside the 1 in 1000 year (0.1%AEP) flood risk area and hence has a low probability of flooding.

However, the eastern part of the site adjacent to the River Avon lies within Flood Zone 3, and a smaller northern fringe of the site (along the course of the small watercourse) is also indicated to lie in Flood Zones 2 and 3.

Flood Zone 2: This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Flood Zone 3: This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

4. INTRUSIVE INVESTIGATION

The following section outlines the scope of the intrusive investigation undertaken by GEG and details the ground conditions encountered and the infiltration testing carried out.

4.1 Scope of Works

The intrusive investigation was undertaken on the 14th to 16th September 2021 and comprised the excavation of 8 No. infiltration test trial pits (TP01-TP08) at the locations initially determined by Brookbanks (as shown on Figure 3). It should be noted that infiltration testing of TP05 was abandoned due to the presence of a fast inflow of groundwater encountered at 1.50m and associated instability of the trial pit.

All works were carried out in accordance with current British Standard guidance (BS: 5930 and BS: 10175) and infiltration testing in general accordance with BRE Digest 365 (Soakaway Design).

The ground conditions were logged by an experienced geo-environmental engineer from GEG. The strata encountered, groundwater levels/seepages, stability of excavations and depths of sampling are recorded on the trial pit logs presented in Appendix C. A photographic record is provided in Appendix B.

4.1.1.1 *Limitations of the Intrusive Investigation*

No significant limitations were encountered during the intrusive investigation with the exception of TP03 and TP04 which were relocated slightly westwards from a field grazed by sheep into the adjacent cropped field.

4.2 Strata Encountered

The ground conditions encountered are described below and broadly confirmed the published geology.

4.2.1 *Topsoil*

Soft to firm CLAY topsoil was encountered across the site to depths of 0.10m to 0.30m.

4.2.2 *Alluvium*

The Alluvium was not encountered in any of the exploratory holes.

4.2.3 *River Terrace Deposits*

The River Terrace Deposits were encountered underlying the topsoil in all of the exploratory holes to depths of 0.40m to >2.10m, and typically comprised horizons of firm to stiff CLAY, loose to dense very gravelly SAND or SAND & GRAVEL locally with a low cobble content.

4.2.4 *Kellaways Formation*

The Kellaways Formation was encountered underlying the River Terrace Deposits in 5 No. exploratory holes (TP01-TP04 & TP07) from depths of 0.40m to 1.80m to the base of the trial pits and typically comprised firm to stiff CLAY.

4.2.5 *Cornbrash Formation*

The Cornbrash Formation was not encountered in any of the exploratory holes.

4.2.6 *Groundwater*

Groundwater was encountered locally in 3 No. trial pits (TP03, TP05 & TP08) at depths of 1.50m to 2.10m as seepage to fast inflows.

4.2.7 *Stability of Trial Pits*

The sides of all trial pit excavations were stable with the exception of instability of the side from 1.50m within the River Terrace Deposits in TP05.

4.2.8 *Reinstatement*

On completion of the measurements, the infiltration pits were emptied of residual water and backfilled with arisings.

4.3 Infiltration Tests

A total of 8 No. infiltration tests were undertaken in the 7 No. trial pits suitable for infiltration testing (TP01-TP04, TP07 & TP08). The tests were undertaken in general accordance with BRE Digest 365.

Clean water was dispensed from a bowser at a rapid rate to fill each excavation as quickly as possible to the proposed depth of the invert levels and/or the most permeable strata. The excavations took less than 5 minutes to fill to their maximum capacity. Each test pit was filled to give a head of water of approximately 1.00m.

Measurements were then taken of the fall of water at suitable time increments to allow the infiltration rate to be calculated from the time taken for the water level to drop from 75% to 25% effective depth (where possible). If there was sufficient time, the tests were repeated a maximum of three times in accordance with BRE Digest 365.

4.4 Calculated Infiltration Rates

The water level measurements from the infiltration tests are tabulated and graphically depicted on Figures D-1 to D-8 in Appendix D.

The effective depths reached during the tests and associated times are summarised in Table 1 below.

Table 1. Infiltration Test Results

Location (Depth Range of Test)	Test No.	Strata*	Effective Depth Reached	Time (mins)	Infiltration Rate (m/s)
TP01 (0.77-1.80m)	1	RTD / KF	66%	1539	N/A
TP02 (1.18-2.20m)	1	RTD / KF	89%	1528	N/A
TP03 (0.86-1.90m)	1	RTD / KF	32%**	305	N/A**
TP04 (1.03-2.10m)	1	KF	100%	276	N/A
TP06 (0.74-2.10m)	1	RTD	25%	234	1.08×10^{-5}
TP06 (0.62-2.10m)	2		25% [1]	250	1.12×10^{-5} [1]
TP07 (0.73-1.80m)	1	RTD / KF	102%	165	N/A

Location (Depth Range of Test)	Test No.	Strata*	Effective Depth Reached	Time (mins)	Infiltration Rate (m/s)
TP08 (0.89-2.10m)	1	RTD	25% [2]**	340	7.63×10^{-6} [2]**

N/A = not applicable
* RTD = River Terrace Deposits; KF = Kellaways Formation.
** Not strictly in compliance with BRE365 due to the presence of groundwater.
[1] Based on extrapolated data (due to time constraints of running a second test).
[2] Based on extrapolated data (due to time constraints).

5. CONCLUSIONS

Infiltration rates could not be calculated in the majority of cases due to insufficient soakage during the tests, where either the River Terrace Deposits were relatively shallow (i.e. 0.40m to 1.50m in TP01, TP02, TP04 & TP07) or where perched groundwater was encountered (i.e. at 1.50m in TP05 & 1.70m in TP03). Both cases indicated that the ground conditions are unsuitable for traditional soakaway drainage.

The infiltration tests undertaken in the River Terrace Deposits of TP06 yielded infiltration rates of 1.08×10^{-5} and 1.12×10^{-5} m/s. The River Terrace Deposits of TP08 yielded an infiltration rate of 7.63×10^{-6}, although perched groundwater was encountered at 2.10m.

Whilst the results indicate that soakaways may be suitable for the site at least locally (in particular where deeper River Deposits were encountered), or shallow soakaways or SUDs may be suitable in other parts, confirmation of the groundwater regime by monthly monitoring over the winter months is recommended. Infiltration testing of the western site section (targeting the Cornbrash Formation if present) may also be beneficial. However, in view of the Zone 2 GWSPZ in part of this area, any specific EA requirements with respect to soakaway drainage should be considered.

6. REFERENCES

1. British Standard Institute, BS 1377-Parts 1-9: 1990-2016. Methods of Tests for Soils for Civil Engineering Purposes.

2. British Standard Institute, BS 5930:2015 + A1:2020. Code of Practice for Site Investigations.

3. BRE Digest 365, 2016. Soakaway Design.

7. LIMITATIONS

As with all intrusive site investigations, there is a possibility that there are local variations in ground conditions not identified by the current investigation.

The conclusions and recommendations stated herein are based on information available at the time of production. These may not necessarily apply if the site is to

be utilised for a more or less sensitive purpose in the future, or if operational procedures or management alter over time.

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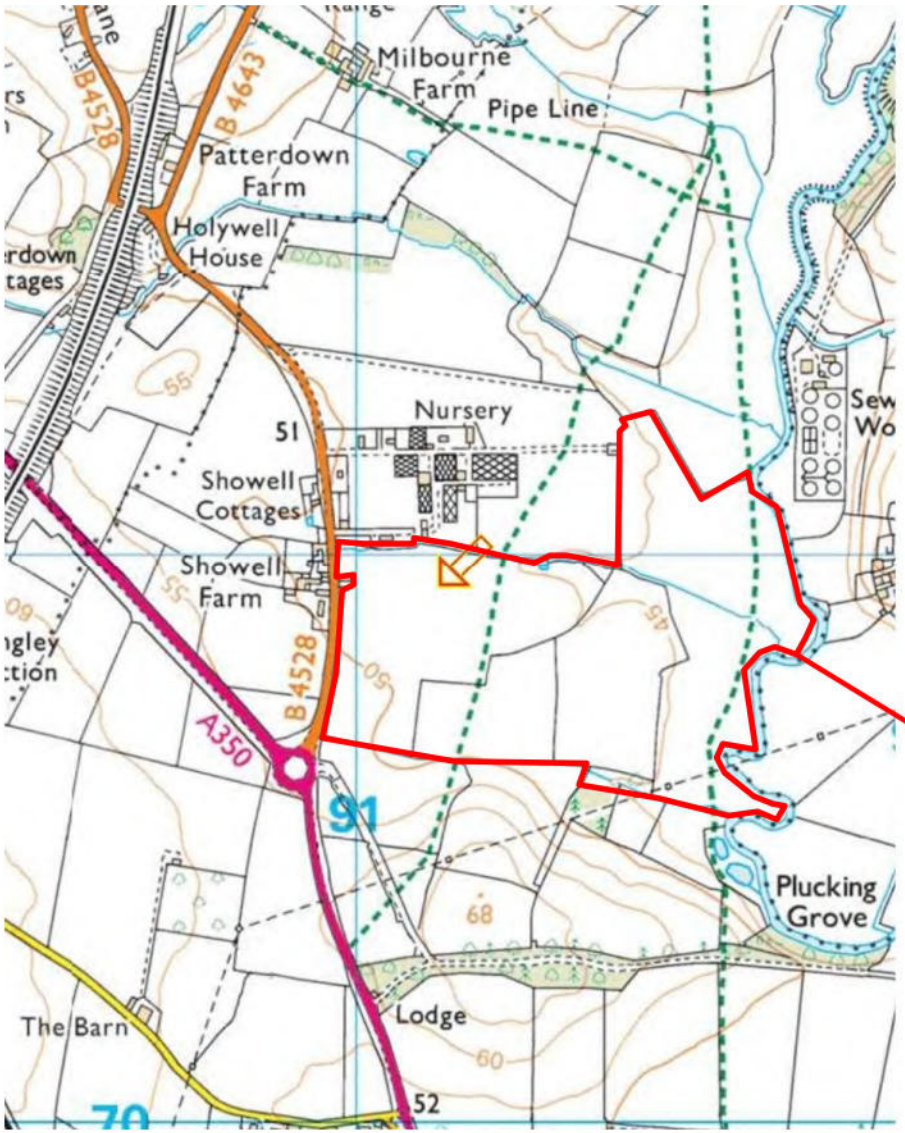
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APPENDIX A

FIGURES AND PLANS

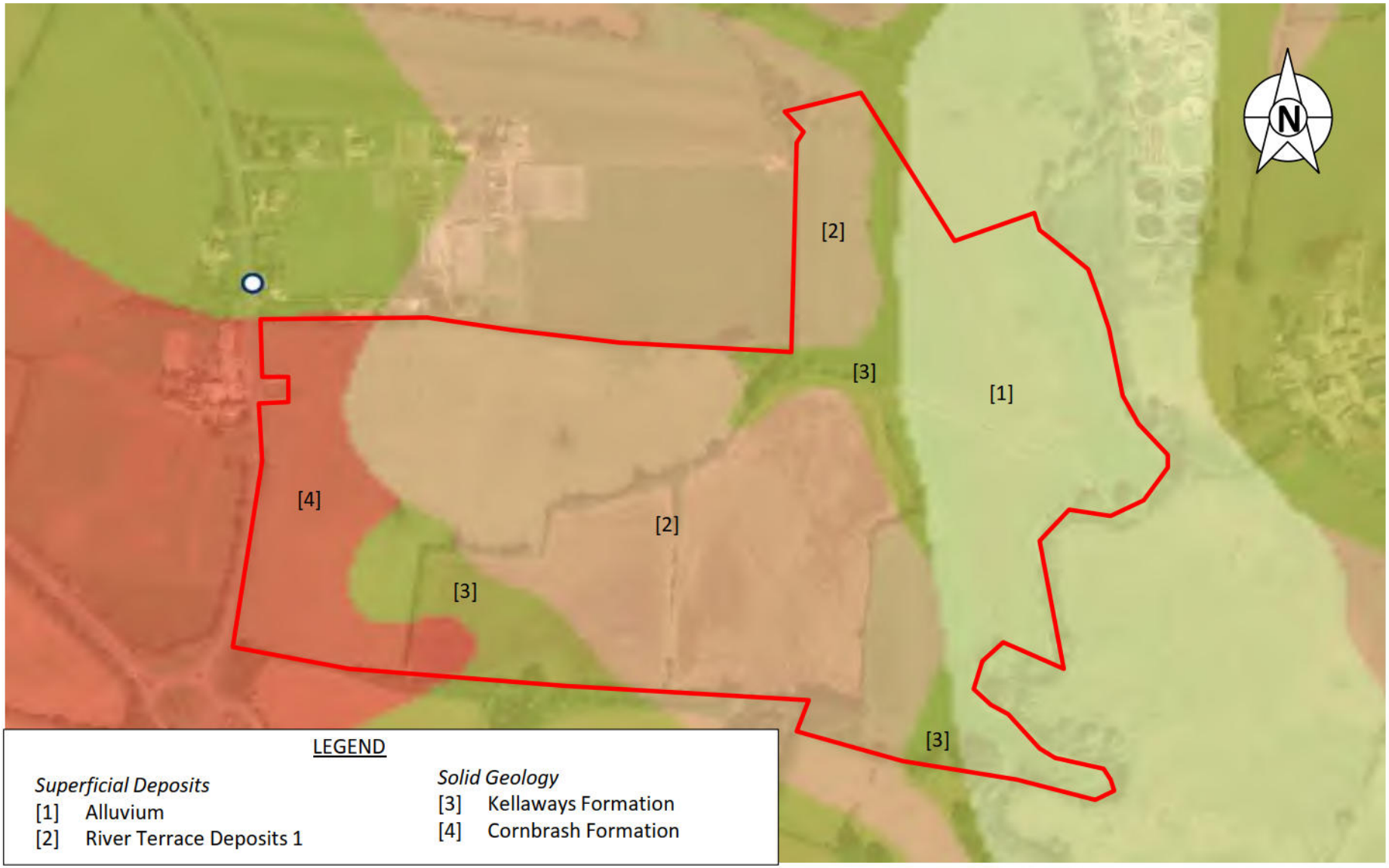




SITE LOCATION

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TITLE: FIGURE 1: SITE LOCATION PLAN	**CLIENT:** BROOKBANKS / HLM		**DRAWN/CHECKED:** MP / MR		GEG House, 17 Graham Road Malvern, WR14 2HR Tel. 01684 212526 Fax 01684 576917 admin@g-eg.co.uk, www.g-eg.co.uk Geo Environmental Group
SITE: LAND AT CHIPPENHAM	**PROJECT No.:** GEG-21-705	**SCALE:** NTS	**DATE:** 04/10/21	**REVISION:** A	



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TITLE: FIGURE 2: PUBLISHED GEOLOGY	**CLIENT:** BROOKBANKS / HLM		**DRAWN/CHECKED:** MP / MR		GEG House, 17 Graham Road Malvern, WR14 2HR Tel. 01684 212526 Fax 01684 576917 admin@g-eg.co.uk, www.g-eg.co.uk Geo Environmental Group
SITE: LAND AT CHIPPENHAM	**PROJECT No.:** GEG-21-705	**SCALE:** AS SHOWN	**DATE:** 04/1021	**REVISION:** A	



TITLE: FIGURE 3: EXPLORATORY HOLE LOCATION PLAN	**CLIENT:** BROOKBANKS / HLM		**DRAWN/CHECKED:** MP / MR		GEG House, 17 Graham Road Malvern, WR14 2HR Tel. 01684 212526 Fax 01684 576917 admin@g-eg.co.uk, www.g-eg.co.uk Geo Environmental Group
SITE: LAND AT CHIPPENHAM	**PROJECT No.:** GEG-21-705	**SCALE:** NTS	**DATE:** 04/10/21	**REVISION:** A	

APPENDIX B

PHOTOGRAPHIC RECORD



Photo 1: Excavation of trial pit IT01.



Photo 2: Arisings from trial pit IT01.



Photo 3: Excavation of trial pit IT02.



Photo 4: Arisings from trial pit IT02.

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Client: Brookbanks / HLM

Project: Land at Chippenham

Project No.: GEG-21-705

No Photograph Available	No Photograph Available	Geo Environmental Group Geotechnical, Environmental & Ecological Consultants **Geo Environmental Group** **GEG House** **17 Graham Road** **Malvern** **WR14 2HR** **Client: Brookbanks / HLM** **Project: Land at Chippenham** **Project No.: GEG-21-705**
Photo 5: Excavation of trial pit IT03.	**Photo 6:** Arisings from trial pit IT03.	
No Photograph Available		
Photo 7: Excavation of trial pit IT04.	**Photo 8:** Arisings from trial pit IT04.	



Photo 9: Excavation of trial pit IT05.



Photo 10: Arisings from trial pit IT05.



Photo 11: Arisings from trial pit IT06.



Photo 12: Arisings from trial pit IT06.

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Project: Land at Chippenham

Project No.: GEG-21-705

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Photo 13: Excavation of trial pit IT07.	**Photo 14:** Arisings from trial pit IT07.	
No Photograph Available	No Photograph Available	
Photo 15: Excavation of trial pit IT08.	**Photo 16:** Arisings from trial pit IT08.	

APPENDIX C

EXPLORATORY HOLE LOGS

Geo Environmental Group

Trial Pit Log

TrialPit No **TP01** Sheet 1 of 1

Project Name: Land at Chippenham	Project No. GEG-21-705	Co-ords: 391496.00 - 171070.00 Level:	Date 14/09/2021
Location: Chippenham, Wiltshire, SN15 5NU		Dimensions (m): 2.10 × 0.50 Depth 1.80	Scale 1:25
Client: Brookbanks / HLM			Logged AT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Soft light brown silty CLAY. (TOPSOIL)
				0.30			Firm light brown slightly gravelly CLAY. Gravel is fine to coarse sub-rounded quartzite. (RIVER TERRACE DEPOSITS)
				0.70			Medium dense light brown gravelly fine to coarse SAND. Gravel is fine to coarse sub-rounded quartzite. (RIVER TERRACE DEPOSITS)
				1.10			Firm grey CLAY. (WEATHERED KELLWAYS FORMATION)
				1.80			End of Pit at 1.800m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Remarks: 1. No groundwater encountered. 2. Infiltration test carried out in pit. 3. Upon completion trial pit backfilled with arisings. 4. Equipment: JCB-3CX excavator.

Stability: Stable

Geo Environmental Group

Trial Pit Log

TrialPit No **TP02** Sheet 1 of 1

Project Name: Land at Chippenham	Project No. GEG-21-705	Co-ords: 391542.00 - 170835.00 Level:	Date 14/09/2021
Location: Chippenham, Wiltshire, SN15 5NU		Dimensions (m): 2.30 x 0.50 Depth 2.20	Scale 1:25
Client: Brookbanks / HLM			Logged AT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Soft light brown silty CLAY. (TOPSOIL)
				0.30			Firm light brown slightly gravelly CLAY. Gravel is fine to medium sub-rounded quartzite. (RIVER TERRACE DEPOSITS)
				0.90			Medium dense light brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular quartzite. (RIVER TERRACE DEPOSITS)
				1.50			Firm grey CLAY. (WEATHERED KELLWAYS FORMATION)
				2.20			End of Pit at 2.200m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Remarks: 1. No groundwater encountered. 2. Infiltration test carried out in pit. 3. Upon completion trial pit backfilled with arisings. 4. Equipment: JCB-3CX excavator.

Stability: Stable

Geo Environmental Group

Trial Pit Log

TrialPit No **TP03** Sheet 1 of 1

Project Name: Land at Chippenham	Project No. GEG-21-705	Co-ords: 391550.00 - 170689.00 Level:	Date 15/09/2021
Location: Chippenham, Wiltshire, SN15 5NU		Dimensions (m): 3.00 × 0.40 Depth 1.90	Scale 1:25
Client: Brookbanks / HLM			Logged AS

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Soft to firm friable light brown silty CLAY with numerous rootlets. (TOPSOIL)
				0.10			Firm to stiff friable orangish brown silty low cobble content CLAY with occasional rootlets and black organic sand sized particles. Cobbles are sub-rounded flint. (RIVER TERRACE DEPOSITS)
				1.15			Medium dense creamy greyish brown slightly clayey low cobble content SAND AND GRAVEL. Gravel and cobbles are fine to coarse sub-angular to sub-rounded flint. (RIVER TERRACE DEPOSITS)
▼				1.80			Stiff bluish grey CLAY. (KELLAWAYS FORMATION)
				1.90			End of Pit at 1.900m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Remarks: 1. Groundwater encountered at 1.70m as fast inflow. 2. Infiltration test carried out in pit. 3. Upon completion trial pit backfilled with arisings. 4. Equipment: JCB-3CX excavator.

Stability: Stable

Geo Environmental Group

Trial Pit Log

TrialPit No **TP04** Sheet 1 of 1

Project Name: Land at Chippenham	Project No. GEG-21-705	Co-ords: 391591.00 - 170577.00 Level:	Date 15/09/2021
Location: Chippenham, Wiltshire, SN15 5NU		Dimensions (m): 2.50 × 0.40 Depth 1.90	Scale 1:25
Client: Brookbanks / HLM			Logged AS

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Soft friable dark brown slightly gravelly silty CLAY with numerous rootlets. Gravel is fine to medium sub-rounded flint. (TOPSOIL)
				0.30			Loose yellowish orange very clayey SAND AND GRAVEL. Gravel is fine to medium sub-angular tabular flint and limestone. (RIVER TERRACE DEPOSITS)
				0.50			Firm to stiff bluish grey CLAY with rare rootlets. (KELLAWAYS FORMATION)
				1.90			End of Pit at 1.900m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Remarks: 1. No groundwater encountered. 2. Infiltration test carried out in pit. 3. Upon completion trial pit backfilled with arisings. 4. Equipment: JCB-3CX excavator.

Stability: Stable

Geo Environmental Group

Trial Pit Log

TrialPit No **TP05** Sheet 1 of 1

Project Name: Land at Chippenham	Project No. GEG-21-705	Co-ords: 391431.00 - 170870.00 Level:	Date 14/09/2021
Location: Chippenham, Wiltshire, SN15 5NU		Dimensions (m): 2.30 x 0.50 Depth 1.70	Scale 1:25
Client: Brookbanks / HLM			Logged AT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Soft brown silty CLAY. (TOPSOIL)
				0.30			Firm light brown slightly gravelly CLAY. Gravel is fine to coarse sub-rounded quartzite. (RIVER TERRACE DEPOSITS)
▼				1.20			Medium dense light brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse sub-rounded quartzite. (RIVER TERRACE DEPOSITS)
				1.70			End of Pit at 1.700m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Remarks: 1. Groundwater encountered at 1.50m as fast inflow. 2. Infiltration test not carried out due to shallow groundwater encountered and instability in pit. 3. Upon completion trial pit backfilled with arisings. 4. Equipment: JCB-3CX excavator.

Stability: Unstable below 1.50m

Geo Environmental Group

Trial Pit Log

TrialPit No
TP06
Sheet 1 of 1

Project Name: Land at Chippenham	Project No. GEG-21-705	Co-ords: 391374.00 - 170657.00 Level:	Date 15/09/2021
Location: Chippenham, Wiltshire, SN15 5NU		Dimensions (m): 3.00 × 0.40 Depth 2.10	Scale 1:25
Client: Brookbanks / HLM			Logged AS

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Soft to firm friable brown slightly silty CLAY. (TOPSOIL)
				0.25			Stiff friable mottled brown and greenish brown silty CLAY with occasional rootlets. (RIVER TERRACE DEPOSITS)
				1.60			Medium dense to dense grey and and brown clayey gravelly SAND. Gravel is fine to to coarse sub-angular to well rounded tabular flint. (RIVER TERRACE DEPOSITS)
				2.10			End of Pit at 2.100m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Remarks: 1. No groundwater encountered. 2. Infiltration test carried out in pit. 3. Upon completion trial pit backfilled with arisings. 4. Equipment: JCB-3CX excavator.

Stability: Stable

Geo Environmental Group

Trial Pit Log

TrialPit No
TP07
Sheet 1 of 1

Project Name: Land at Chippenham	Project No. GEG-21-705	Co-ords: 391341.00 - 170947.00 Level:	Date 14/09/2021
Location: Chippenham, Wiltshire, SN15 5NU		Dimensions (m): 2.30 × 0.50 Depth 1.80	Scale 1:25
Client: Brookbanks / HLM			Logged AT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Soft light brown silty CLAY. (TOPSOIL)
				0.30			Medium dense light orangish brown very clayey gravelly fine to coarse SAND. Gravel is fine to medium sub-rounded quartzite. (RIVER TERRACE DEPOSITS)
				0.80			Firm grey CLAY. (WEATHERED KELLWAYS FORMATION)
				1.80			End of Pit at 1.800m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Remarks: 1. No groundwater encountered. 2. Infiltration test carried out in pit. 3. Upon completion trial pit backfilled with arisings. 4. Equipment: JCB-3CX excavator.

Stability: Stable

Geo Environmental Group

Trial Pit Log

TrialPit No **TP08** Sheet 1 of 1

Project Name: Land at Chippenham	Project No. GEG-21-705	Co-ords: 391258.00 - 170796.00 Level:	Date 15/09/2021
Location: Chippenham, Wiltshire, SN15 5NU		Dimensions (m): 3.00 x 0.40 Depth 2.10	Scale 1:25
Client: Brookbanks / HLM			Logged AS

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Firm friable dark brown silty CLAY with frequent rootlets. (TOPSOIL)
				0.25			Firm to stiff friable orangish brown slightly sandy slightly gravelly CLAY with occasional rootlets and black sand sized particles. Gravel is fine to medium sub-angular flint. (RIVER TERRACE DEPOSITS)
				0.90			Loose to medium dense orange and grey very clayey SAND AND GRAVEL. Gravel is fine to coarse angular to sub-angular flint. (RIVER TERRACE DEPOSITS)
				1.20			Medium dense brown slightly clayey SAND AND GRAVEL with frequent pockets of clay. Gravel is fine to coarse angular to sub-angular flint. (RIVER TERRACE DEPOSITS)
▼				2.10			End of Pit at 2.100m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Remarks: 1. Groundwater encountered at 2.10m as seepage. 2. Infiltration test carried out in pit. 3. Upon completion trial pit backfilled with arisings. 4. Equipment: JCB-3CX excavator.

Stability: Stable

APPENDIX D

INFILTRATION TEST DATA

Appendix D
Infiltration Tests

Project Name:	**Land at Chippenham**	Depth of Pit (cm):	180.00
Project Ref.:	**GEG-21-705**	Depth of Water at Start of Depth (cm):	77.00
Trial Pit:	**TP01**	Date of Test:	14 September 2021
Test No.:	**Test 1 of 1**		

Time (min)	Depth from Surface (cm)	% Effective Depth
0	77	100.0%
2	79	98.1%
9	80	97.1%
15	81	96.1%
85	89	88.3%
136	92	85.4%
190	95	82.5%
279	99	78.6%
1484	108	69.9%
1539	112	66.0%
End of Test		

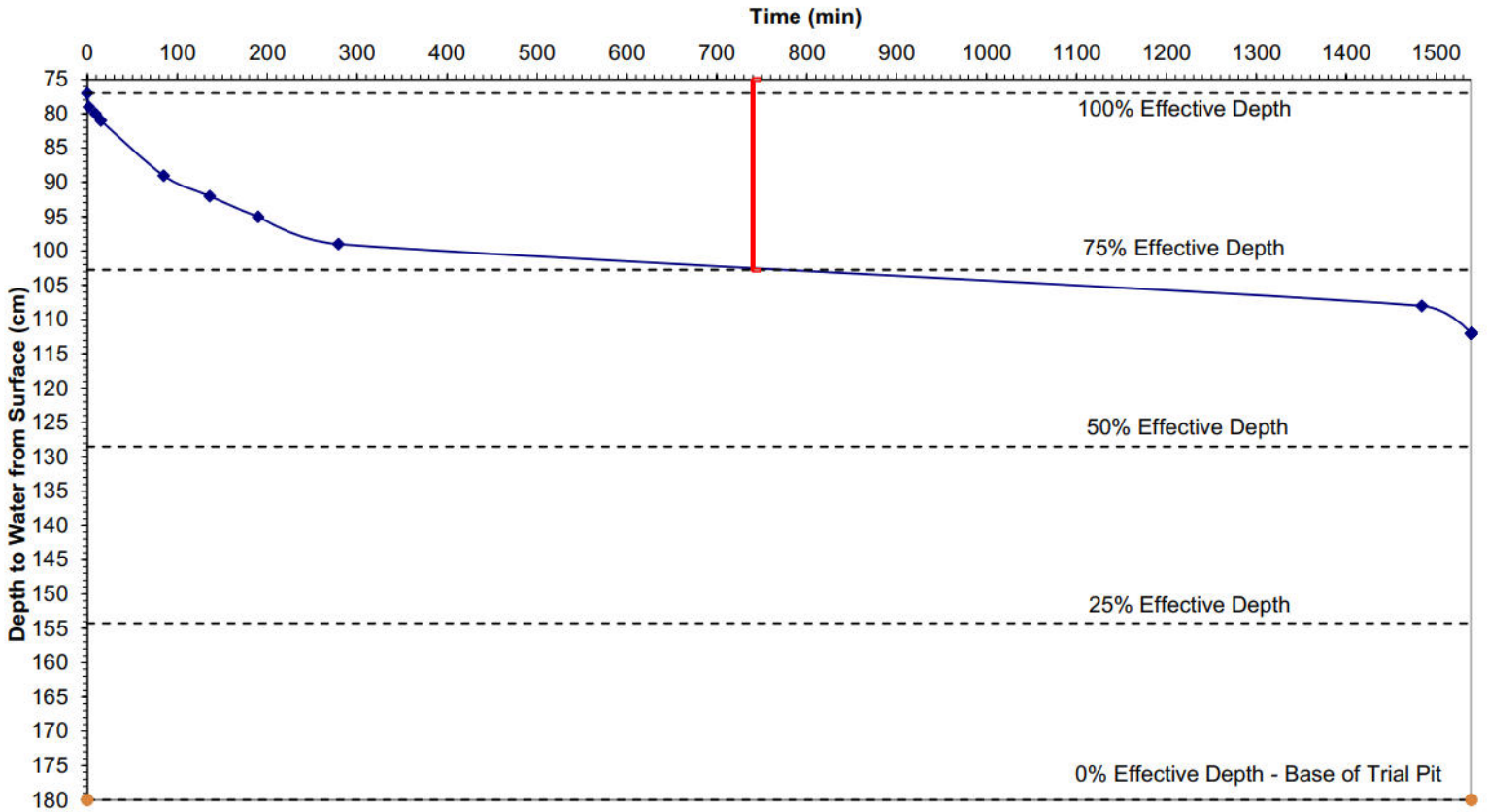
With Reference to: **Figure D-1**

Parameter	Symbol	Calculation	Units	TP01
Effective Depth of Trial Pit	d_p		m	1.03
Width of Trial Pit	w		m	0.50
Length of Trial Pit	l		m	2.10
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.08
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.54075
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	3.73
Time to reach 75% Effective Depth	$T_{p75\%}$		min	740.00
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 25% - 75%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	**N/A**

*To 50% Effective Depth (including base)

Engineer: AT
Checked by: MP

Figure D-1 **GEG-21-705** **Land at Chippenham** **TP01**



Appendix D
Infiltration Tests

Project Name:	**Land at Chippenham**	Depth of Pit (cm):	220.00
Project Ref.:	**GEG-21-705**	Depth of Water at Start of Depth (cm):	118.00
Trial Pit:	**TP02**	Date of Test:	14 September 2021
Test No.:	**Test 1 of 1**		

Time (min)	Depth from Surface (cm)	% Effective Depth
0	118	100.0%
4	119	99.0%
30	120	98.0%
101	122	96.1%
143	123	95.1%
196	124	94.1%
229	124	94.1%
282	124	94.1%
1339	128	90.2%
1500	129	89.2%
1528	129	89.2%
End of Test		

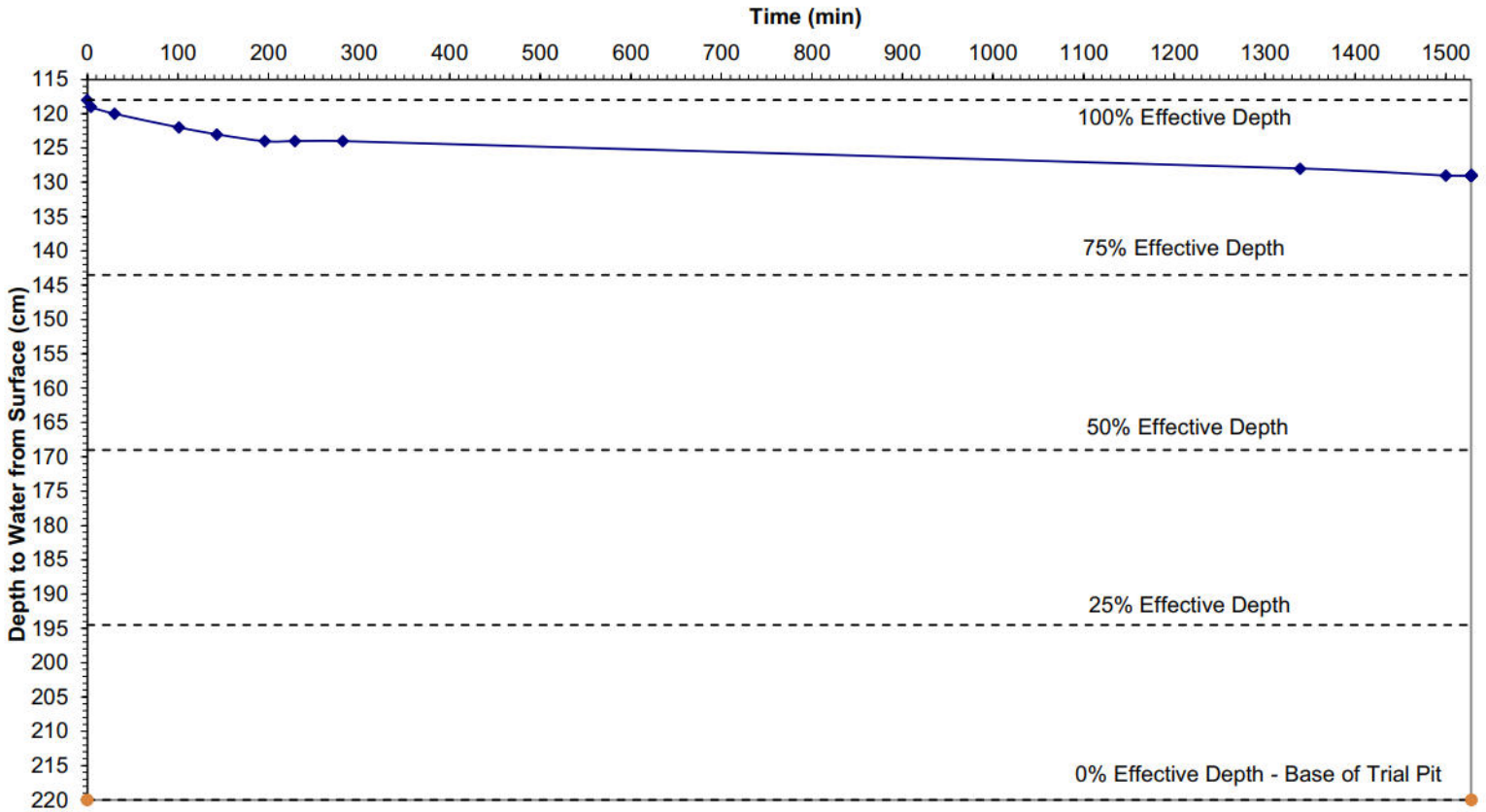
With Reference to: **Figure D-2**

Parameter	Symbol	Calculation	Units	TP02
Effective Depth of Trial Pit	d_p		m	1.02
Width of Trial Pit	w		m	0.50
Length of Trial Pit	l		m	2.30
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.17
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.5865
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.01
Time to reach 75% Effective Depth	$T_{p75\%}$		min	740.00
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 25% - 75%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	**N/A**

*To 50% Effective Depth (including base)

Engineer: AT
Checked by: MP

Figure D-2 **GEG-21-705** **Land at Chippenham** **TP02**



Appendix D
Infiltration Tests

Project Name:	**Land at Chippenham**	Depth of Pit (cm):	190.00
Project Ref.:	**GEG-21-705**	Depth of Water at Start of Depth (cm):	86.00
Trial Pit:	**TP03**	Date of Test:	15 September 2021
Test No.:	**Test 1 of 1**		

Time (min)	Depth from Surface (cm)	% Effective Depth
0	86	100.0%
5	103	83.7%
9	113	74.0%
53	142	46.2%
75	149	39.4%
100	151	37.5%
121	152	36.5%
163	155	33.7%
193	155	33.7%
209	155	33.7%
248	156	32.7%
305	156	32.7%
End of Test		

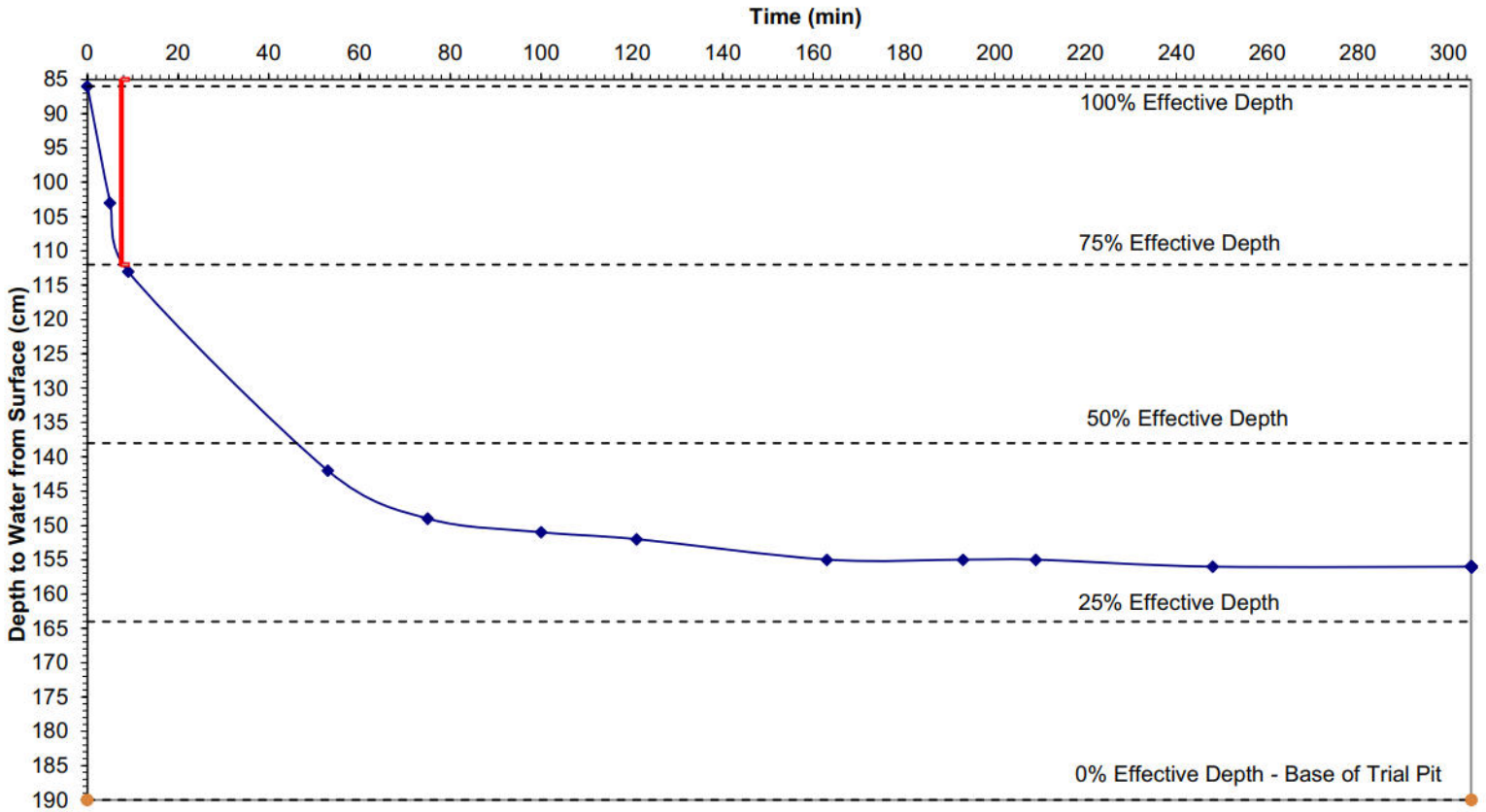
With Reference to: **Figure D-3**

Parameter	Symbol	Calculation	Units	TP03
Effective Depth of Trial Pit	d_p		m	1.04
Width of Trial Pit	w		m	0.40
Length of Trial Pit	l		m	3.00
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.25
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.624
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.74
Time to reach 75% Effective Depth	$T_{p75\%}$		min	7.50
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 25% - 75%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	**N/A**

*To 50% Effective Depth (including base)

Engineer: AS
Checked by: MP

Figure D-3 **GEG-21-705** **Land at Chippenham** **TP03**



Appendix D
Infiltration Tests

Project Name:	**Land at Chippenham**	Depth of Pit (cm):	210.00
Project Ref.:	**GEG-21-705**	Depth of Water at Start of Depth (cm):	103.00
Trial Pit:	**TP04**	Date of Test:	14 September 2021
Test No.:	**Test 1 of 1**		

Time (min)	Depth from Surface (cm)	% Effective Depth
0	103	100.0%
39	103	100.0%
82	103	100.0%
190	103	100.0%
276	103	100.0%
End of Test		

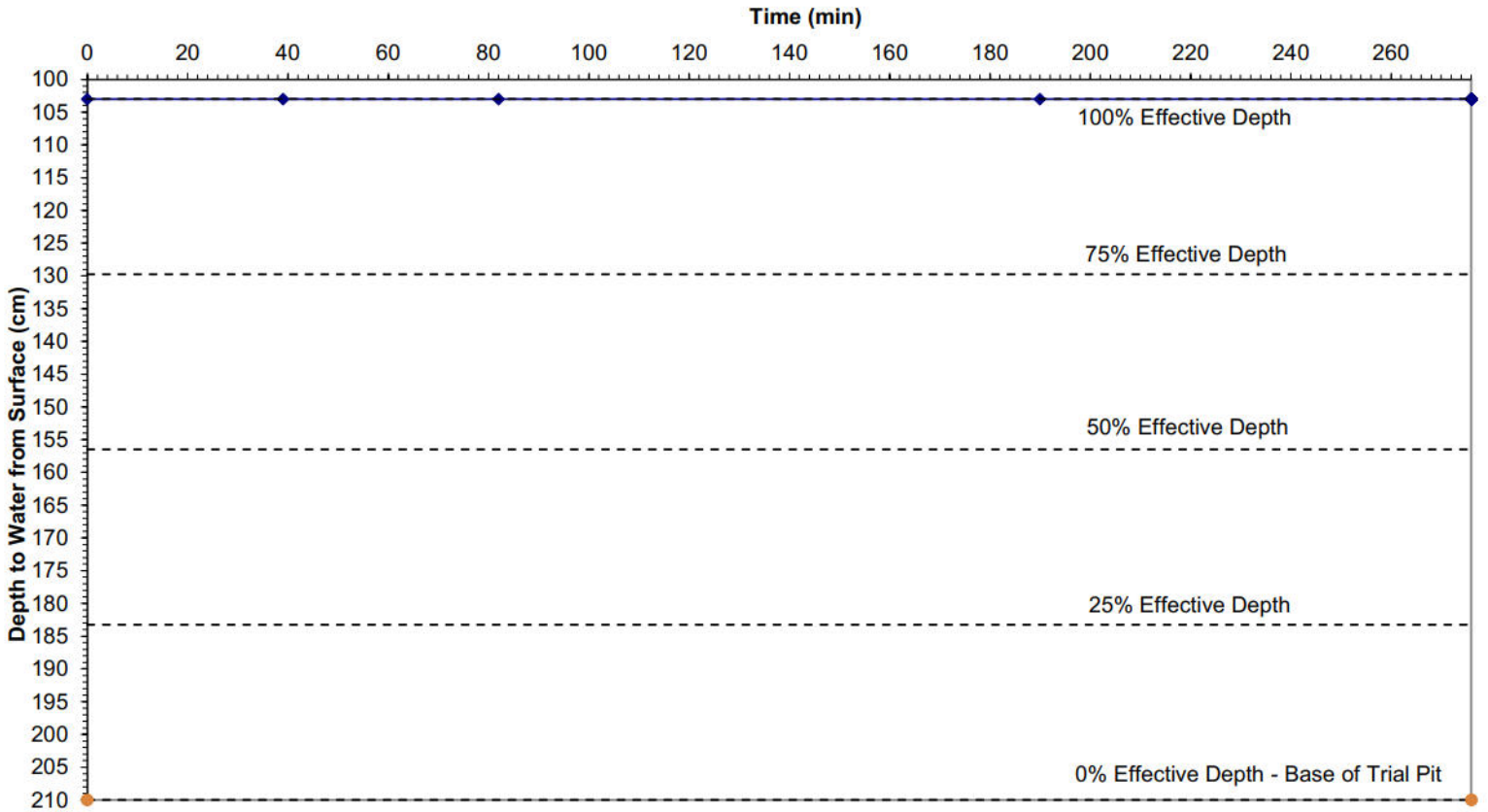
With Reference to: **Figure D-4**

Parameter	Symbol	Calculation	Units	TP04
Effective Depth of Trial Pit	d_p		m	1.07
Width of Trial Pit	w		m	0.40
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.07
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.535
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.10
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 25% - 75%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	**N/A**

*To 50% Effective Depth (including base)

Engineer: AT
Checked by: MP

Figure D-4 **GEG-21-705** **Land at Chippenham** **TP04**



Appendix D
Infiltration Tests

Project Name:	**Land at Chippenham**	Depth of Pit (cm):	210.00
Project Ref.:	**GEG-21-705**	Depth of Water at Start of Depth (cm):	74.00
Trial Pit:	**TP06**	Date of Test:	15 September 2021
Test No.:	**Test 1 of 2**		

Time (min)	Depth from Surface (cm)	% Effective Depth
0	74	100.0%
5	87	90.4%
10	97	83.1%
14	104	77.9%
34	123	64.0%
74	144	48.5%
111	157	39.0%
136	162	35.3%
152	166	32.4%
183	170	29.4%
193	171	28.7%
218	174	26.5%
234	176	25.0%
End of Test		

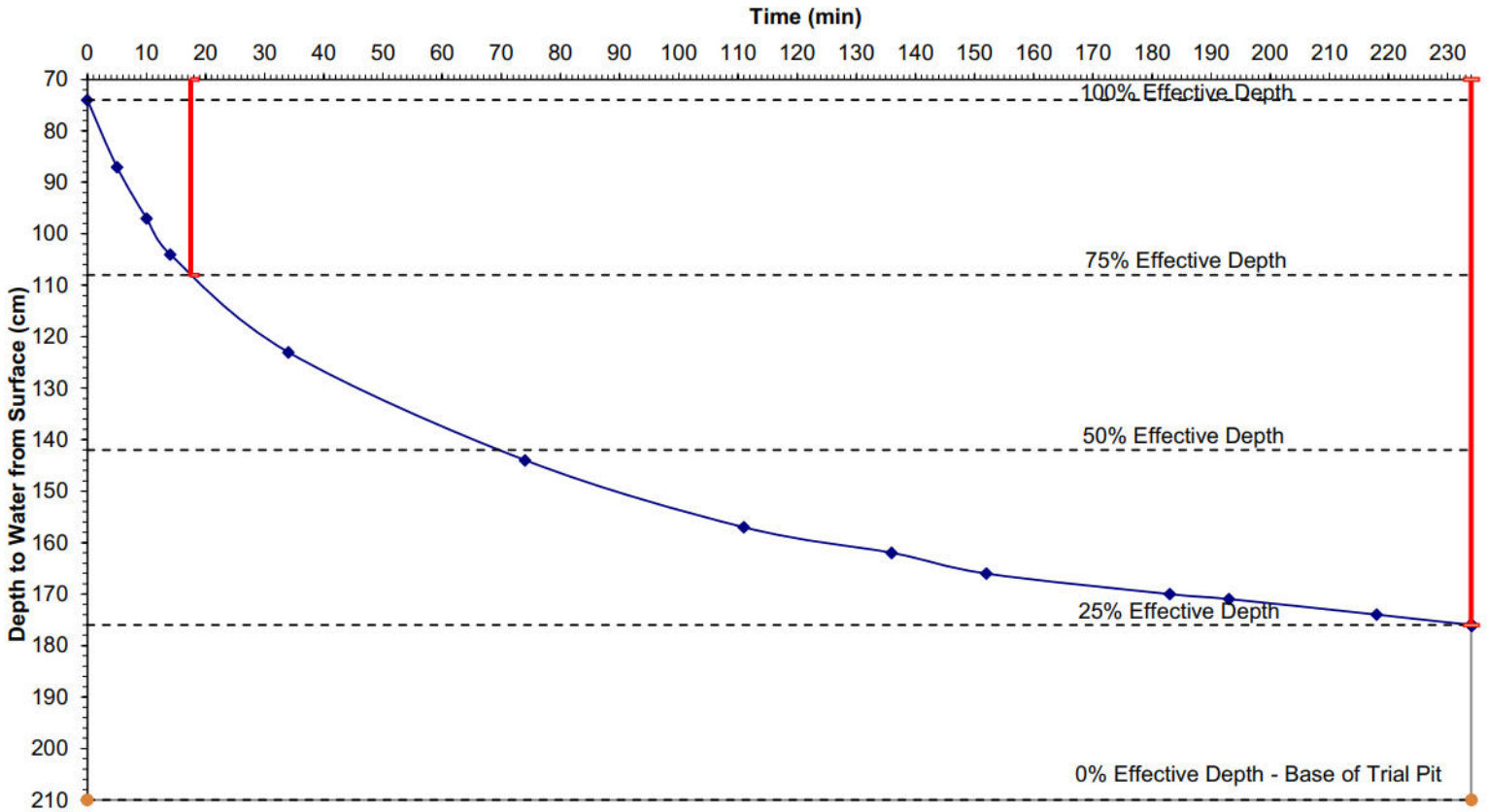
With Reference to: **Figure D-6**

Parameter	Symbol	Calculation	Units	TP06
Effective Depth of Trial Pit	d_p		m	1.36
Width of Trial Pit	w		m	0.40
Length of Trial Pit	l		m	3.00
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.63
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.816
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	5.82
Time to reach 75% Effective Depth	$T_{p75\%}$		min	17.50
Time to reach 25% Effective Depth	$T_{p25\%}$		min	234.00
Time 25% - 75%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	216.5
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	**1.08E-05**

*To 50% Effective Depth (including base)

Engineer: AS
Checked by: MP

Figure D-6 **GEG-21-705** **Land at Chippenham** **TP06**



Appendix D
Infiltration Tests

Project Name:	**Land at Chippenham**	Depth of Pit (cm):	210.00
Project Ref.:	**GEG-21-705**	Depth of Water at Start of Depth (cm):	62.00
Trial Pit:	**TP06**	Date of Test:	15 September 2021
Test No.:	**Test 2 of 2**		

Time (min)	Depth from Surface (cm)	% Effective Depth
0	62	100.0%
10	77	89.9%
35	97	76.4%
55	109	68.2%
79	120	60.8%
99	129	54.7%
119	134	51.4%
131	137	49.3%
157	147	42.6%
250	172.5	25.3%
End of Test		

With Reference to: **Figure D-7**

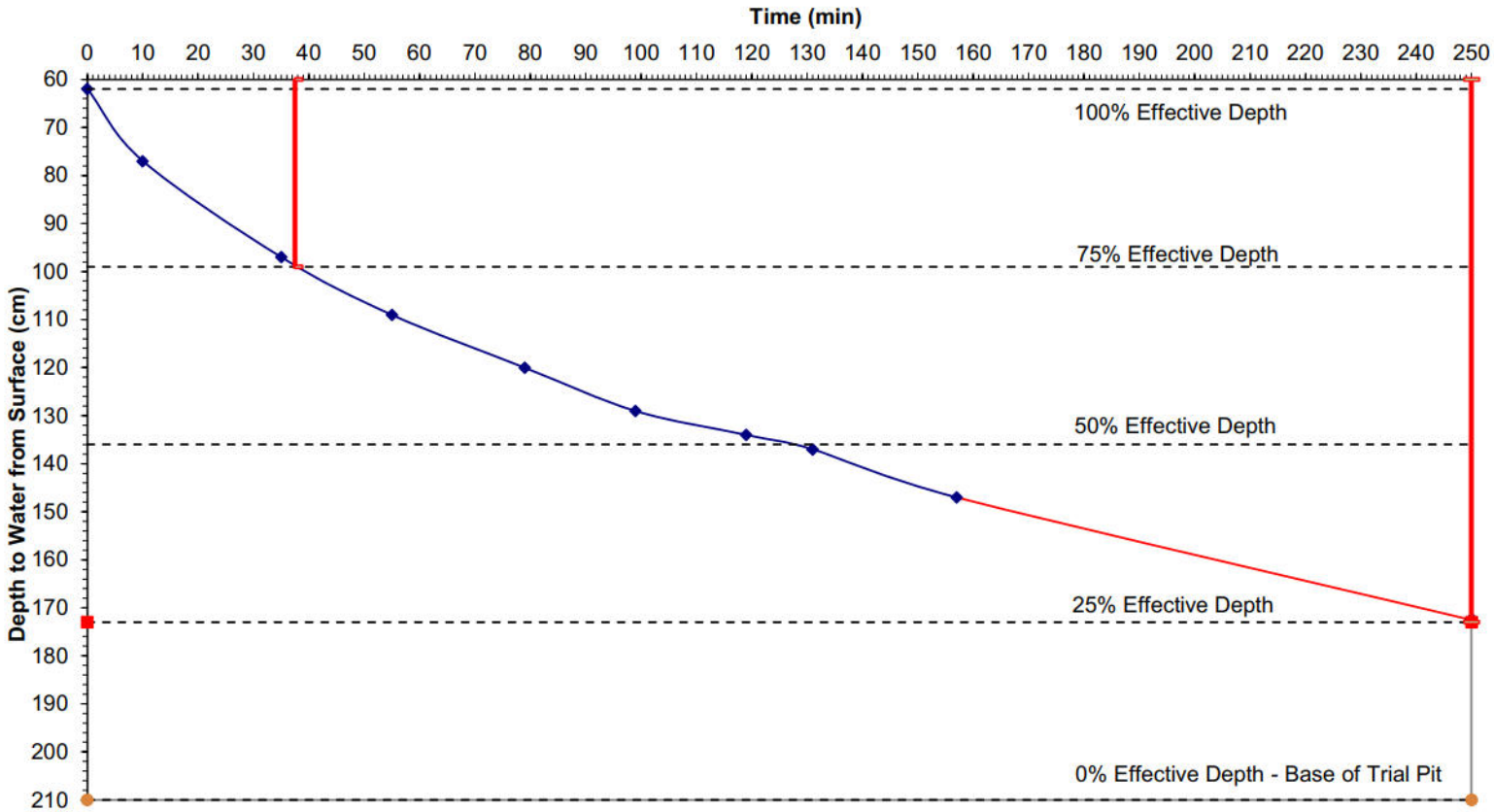
Parameter	Symbol	Calculation	Units	TP06
Effective Depth of Trial Pit	d_p		m	1.48
Width of Trial Pit	w		m	0.40
Length of Trial Pit	l		m	3.00
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.78
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.888
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	6.23
Time to reach 75% Effective Depth	$T_{p75\%}$		min	37.50
Time to reach 25% Effective Depth	$T_{p25\%}$		min	250.00
Time 25% - 75%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	212.5
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	**1.12E-05**

*To 50% Effective Depth (including base)

Note: Last data point is based on extrapolated data due to time constraints.

Engineer: AS
Checked by: MP

Figure D-7 **GEG-21-705** **Land at Chippenham** **TP06**



Appendix D
Infiltration Tests

Project Name:	**Land at Chippenham**	Depth of Pit (cm):	180.00
Project Ref.:	**GEG-21-705**	Depth of Water at Start of Depth (cm):	73.00
Trial Pit:	**TP07**	Date of Test:	14 September 2021
Test No.:	**Test 1 of 1**		

Time (min)	Depth from Surface (cm)	% Effective Depth
0	73	100.0%
5	73	100.0%
64	72	100.9%
165	71	101.9%
End of Test		

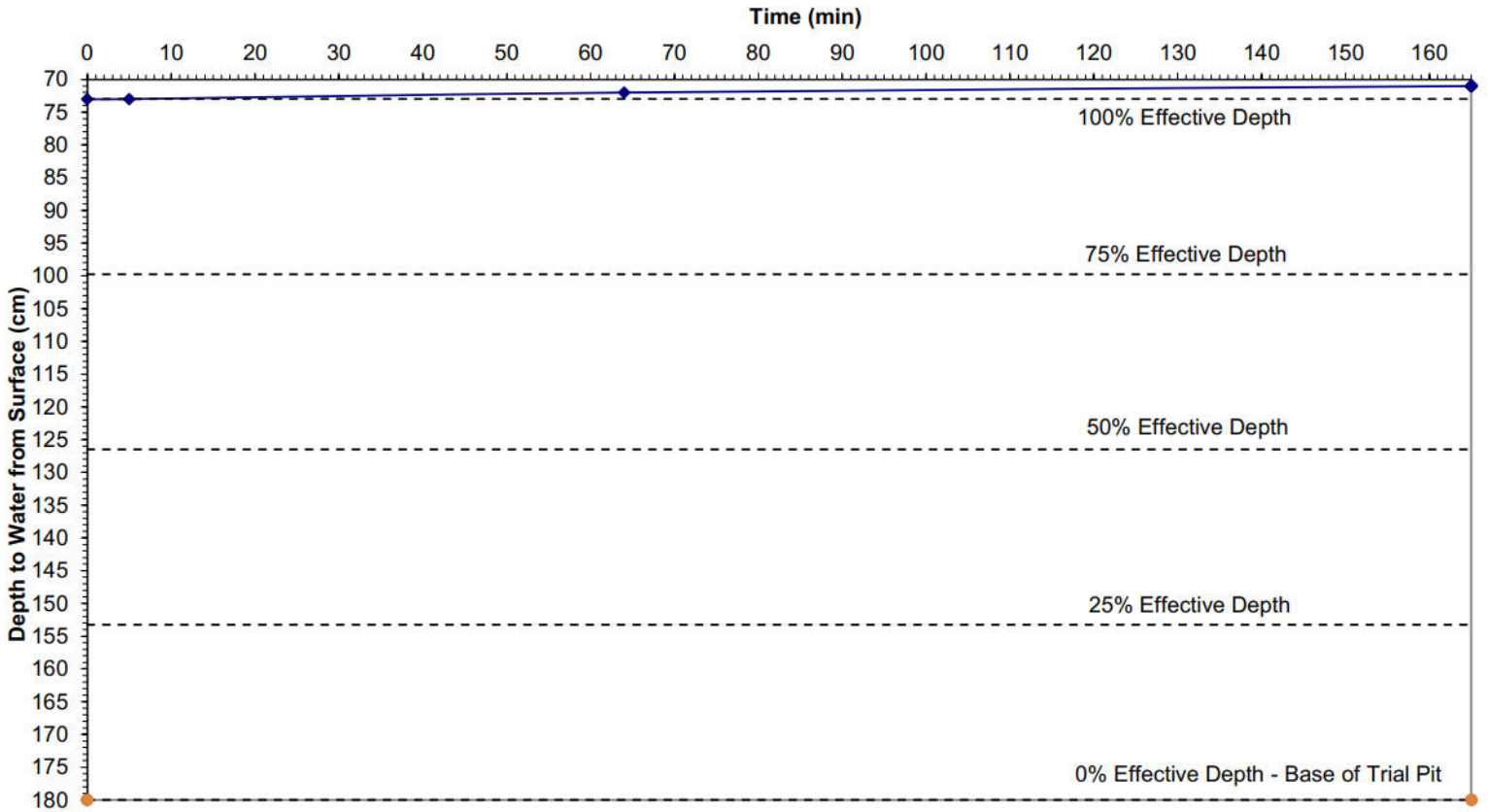
Parameter	Symbol	Calculation	Units	TP07
Effective Depth of Trial Pit	d_p		m	1.07
Width of Trial Pit	w		m	0.50
Length of Trial Pit	l		m	2.30
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.23
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.61525
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.15
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 25% - 75%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	**N/A**

*To 50% Effective Depth (including base)

With Reference to: **Figure D-8**

Engineer: AT
Checked by: MP

Figure D-8 **GEG-21-705** **Land at Chippenham** **TP07**



Appendix D
Infiltration Tests

Project Name:	**Land at Chippenham**	Depth of Pit (cm):	210.00
Project Ref.:	**GEG-21-705**	Depth of Water at Start of Depth (cm):	89.00
Trial Pit:	**TP08**	Date of Test:	15 September 2021
Test No.:	**Test 1 of 1**		

Time (min)	Depth from Surface (cm)	% Effective Depth
0	89	100.0%
5	96	94.2%
10	100	90.9%
15	105	86.8%
45	121	73.6%
55	125	70.2%
127	144	54.5%
207	160	41.3%
263	169	33.9%
280	171	32.2%
317	177	27.3%
340	180	24.8%
End of Test		

With Reference to: **Figure D-9**

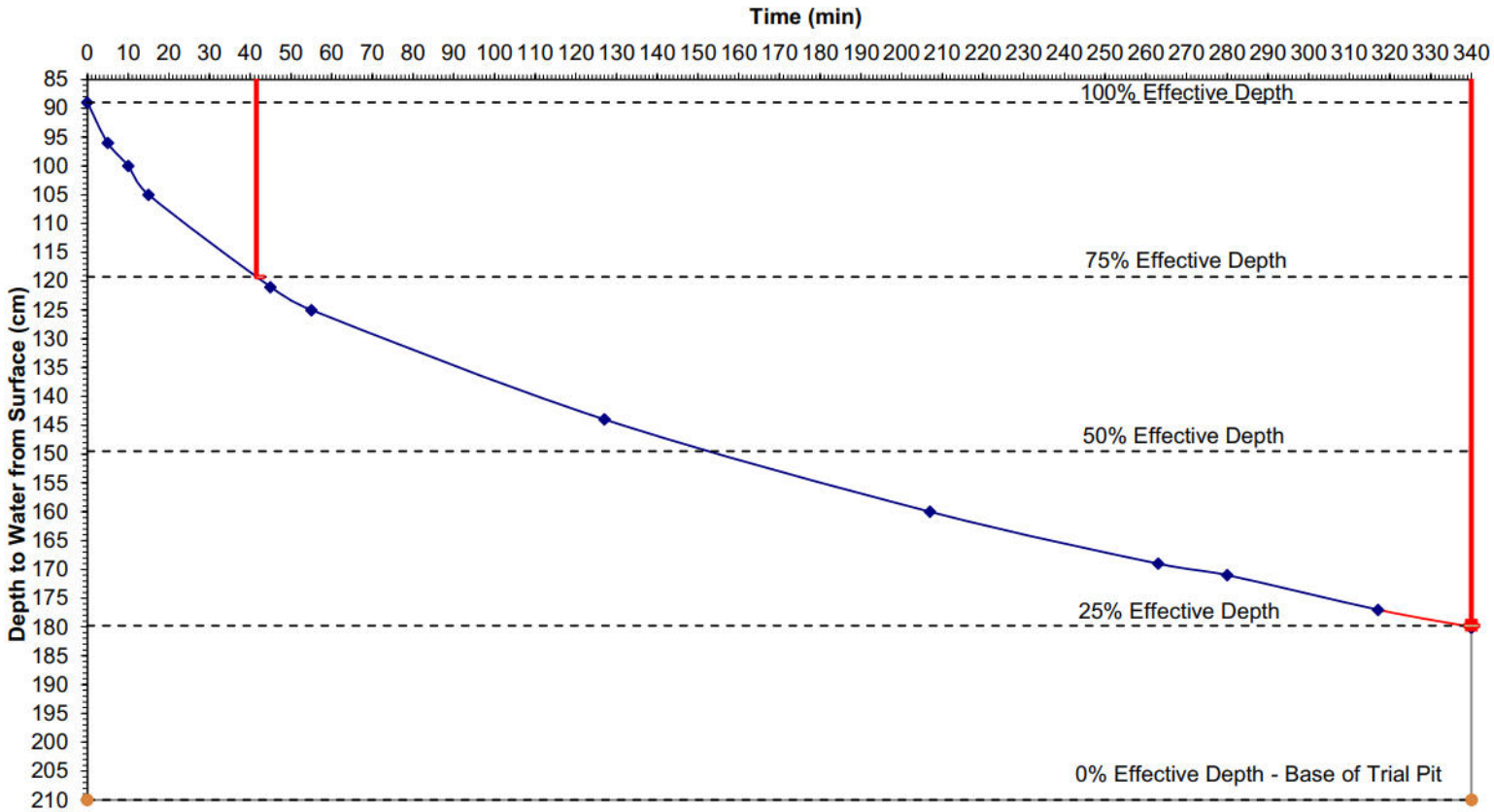
Parameter	Symbol	Calculation	Units	TP08
Effective Depth of Trial Pit	d_p		m	1.21
Width of Trial Pit	w		m	0.40
Length of Trial Pit	l		m	3.00
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.45
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.726
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	5.31
Time to reach 75% Effective Depth	$T_{p75\%}$		min	41.50
Time to reach 25% Effective Depth	$T_{p25\%}$		min	340.00
Time 25% - 75%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	298.5
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	**7.63E-06**

*To 50% Effective Depth (including base)

Note: Last data point is based on extrapolated data due to time constraints.

Engineer: AS
Checked by: MP

Figure D-9 **GEG-21-705** **Land at Chippenham** **TP08**



CHIPPENHAM, WILTSHIRE



GROUND INVESTIGATION REPORT

STATUS	REV 0 ISSUE
DATE OF ISSUE	JUNE 2024

Our Ref: XB620-01/MP/DOP/SAG/MAK

Chippenham

GROUND INVESTIGATION REPORT

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Date	Revision	Details of Amendment	Authorised by:
June 2024	Rev 0	-	MAK

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Drawings Appendix 1

XB620-01/R/F/01	Site Location Plan
XB620-01/R/F/02	Extract from the British Geological Survey Map – Sheet 265 Solid & Drift
XB620-01/R/F/03	Existing Site Plan Indicating Borehole Locations

EXECUTIVE SUMMARY

Hallam Land Management Ltd are assessing the potential of a site located within the Showell area, to the south of Chippenham, Wiltshire (JPB Drawing XB620-01/R/F/01). The purpose of this investigation was to determine the groundwater levels and hydrogeological setting beneath the site. It should be noted that the scope of the investigation was designed by Brookbanks Consulting Limited.

This section provides a brief summary of the investigation findings in relation to the ground conditions and groundwater regime beneath the site.

Historical Background

On Site	Off Site
Greenfield	Plant Nurseries/ Beauty Salon/ Auction Yard/ Residential development/ Greenfield

Invasive Plants

An invasive plant survey was not carried out during the investigation works and a survey of the site by an ecologist is recommended prior to commencement of works at the site.

Geology

The investigation has indicated the site to be underlain by topsoil down to between 0.30m and 0.40m bgl. This generally comprised of grass over clayey very silty fine to coarse sand. This was generally underlain by brown clayey sandy gravel to between 0.40m and 2.30m bgl with some lenses of soft to firm very sandy clay. Given the nature of this strata, it is considered that this is likely to represent the superficial river terrace deposits/alluvium.

The Kellaways Formation was encountered in BH07 at 2.3m bgl down to the termination depth of the borehole at 3.0m bgl. This stratum comprised stiff becoming very stiff dark grey slightly silty slightly sandy clay.

The Cornbrash Formation was encountered in the western area of the site, within borehole BH09 and TP01 to TP03 at between 0.4m to 1.9m down to the termination depths of the exploratory holes at between 1.7m and 2.5m bgl. This stratum generally comprised grey and brown slightly clayey slightly silty gravelly sub-angular to sub-rounded cobbles of limestone.

Groundwater

Water was recorded in the boreholes during drilling/excavation as follows.

Borehole	Groundwater Depth (m bgl)	Groundwater Level (mAOD)	Comment
BH01	0.30	43.64	-
BH02	0.60	43.51	-
BH03	0.40	43.40	-
BH04	0.65	43.49	-
BH05	0.90	43.79	-
BH06	1.00	44.73	-
BH07	1.00	43.68	-
BH08	0.90	45.38	-
BH09	1.00	45.65	-
BH10	No groundwater encountered	-	-
TP01	No groundwater encountered	-	Strata was wet below 0.7m bgl.
TP02	1.50	44.29	-
TP03	1.05	46.84	-

The standpipes installed during the investigation were subsequently monitored and the results are summarised in the following table.

Borehole	Approx Level (mAOD)	Response Zone	Response Materials	Water Depths Recorded (m) Water level [mAOD]					
				08/12/23	08/01/24	06/02/24	07/03/24	05/04/24	07/05/24
BH01	43.943	0.35 – 1.05	River Terrace Deposits	0.28 [43.663]	0.38 [43.563]	0.48 [43.463]	0.45 [43.493]	0.22 [43.723]	0.61 [43.333]
BH02	44.943	0.35 – 1.05	River Terrace Deposits	0.62 [43.494]	0.66 [43.454]	0.91 [43.204]	0.74 [43.374]	0.38 [43.734]	0.63 [43.484]
BH03	43.801	0.40 – 1.00	River Terrace Deposits	0.25 [43.551]	0.31 [43.491]	0.59 [43.211]	0.36 [43.441]	0.13 [43.671]	N/A*
BH04	44.136	0.30 – 0.95	River Terrace Deposits	0.39 [43.746]	0.37 [43.766]	0.79 [43.346]	0.40 [43.736]	0.29 [43.846]	N/A*
BH05	44.688	0.30 – 1.10	River Terrace Deposits	0.60 [44.088]	0.54 [44.148]	1.02 [43.688]	0.71 [43.978]	0.40 [44.288]	N/A*
BH06	45.721	0.40 – 1.15	River Terrace Deposits	0.78 [44.951]	0.74 [44.991]	DRY	0.91 [44.821]	0.42 [45.311]	DRY
BH07	44.679	1.00 – 2.00	River Terrace Deposits	0.45 [44.229]	0.43 [44.249]	0.70 [43.979]	0.48 [44.199]	0.20 [44.479]	0.65 [44.029]
BH08	46.278	0.40 – 1.15	River Terrace Deposits	0.83 [45.448]	0.80 [45.478]	DRY	0.85 [45.428]	0.39 [45.888]	DRY
BH09	46.653	0.80 – 1.80	Cornbrash Formation	0.97 [45.683]	0.71 [45.943]	1.32 [45.333]	0.86 [45.793]	0.54 [46.113]	1.29 [45.363]
BH10	50.076	0.30 – 1.10	River Terrace Deposits	0.63 [49.446]	0.68 [49.396]	DRY	DRY	0.73 [49.346]	DRY

*Unable to locate borehole – likely destroyed/buried by recent ploughing activity.

Soil Infiltration

JPB was required to assess percolation rates in the underlying soils at three locations in the general spirit of BRE Digest 365. The pits were located at positions to test the suitability of the soils for soakaway trenches. Percolation testing was undertaken in the pits (Appendix 8).

BRE Digest 365 recommends calculation of infiltration rate from the time taken for the water volume to fall from 75% to 25% of the effective storage depth of the pit. It should be noted that only one complete cycle (TP02) was completed during the testing at the site. **It is considered that soakaway drainage is not suitable at the site due to the presence of a high groundwater table beneath the site.**

1.0 INTRODUCTION AND OBJECTIVES

1.1 Introduction

Hallam Land Management Ltd are assessing the potential of a site located in the Showell area, to the south of Chippenham, Wiltshire (JPB Drawing XB620-01/R/F/01). The purpose of this investigation was to determine the hydrogeological setting beneath the site, in addition to assessing the permeability of the underlying soils.

This report has been prepared and written on behalf of Hallam Land Management Ltd in the context of the purpose stated above and should not be used in any differing context. No duty of care extends to any third party that may make use of the information unless written confirmation has been provided by Johnson Poole & Bloomer. In addition, new information, improved practices and legislation may necessitate an alteration to the report in whole or in part after its submission. Therefore, with any change in circumstances, or after the expiry of one year from the date of the report, it should be referred to us for reassessment and, if necessary, amendment. No action or proceedings can be commenced against JPB after the expiry of 6 years from the date of this report.

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1.2 Objectives

JPB were commissioned by Brookbanks Consulting Limited, on behalf of Hallam Land Management Ltd to undertake site investigation works. The aim of the investigation was to determine the underlying ground conditions, groundwater regime and permeability of the soils beneath the site. It should be noted that the scope of the investigation was designed by Brookbanks Consulting Limited.

The ground investigation and subsequent groundwater monitoring is now complete, and this report presents the factual investigation data and JPB's interpretation of the existing conditions.

2.0 SITE RECONNAISSANCE

2.1 Site Walkover

The site is located to the south of Chippenham and is approximately centred on Ordnance Survey National Grid Reference 391372, 170837 and covers an area of approximately 31.5 hectares. A selection of site photographs is presented in Appendix 2.

At the time of the site walkover on Thursday 9th November 2023 the site comprised agricultural fields. The site was bounded by B4528, an auction rooms and agricultural fields to the west. A stream was located within the north-eastern area of the site, which flowed to the south-east, joining into the River Avon immediately to the east of the site. To the north of the site was a beauty clinic, some residential houses, and some glass greenhouses. To the south of the site was the continuation of agricultural fields.

The site topography gently slopes downward towards the east.

2.2 Invasive Plant Survey

An invasive plant survey was not carried out during the investigation works and a survey of the site by an ecologist is recommended prior to commencement of works at the site.

3.0 APPRAISAL OF EXISTING INFORMATION

3.1 General

Initial research undertaken prior to the site investigation works included a routine examination of available geological maps, past and present editions of the Ordnance Survey and relevant in-house data. A summary of information obtained from our researches is presented in the following section.

3.2 UXO Assessment

A Zetica Map has been obtained with regards to the assessment of any risks which may or may not be posed by Unexploded Ordnance (UXO) at the site. The map indicates the site to be in an area of low risk which are areas indicated as having 15 bombs per 1000 acres or less. A copy of this map can be found in Appendix 3.

3.3 History of Land Use

An investigation of the past usage of the site can often provide an indication of former land uses. These researches can help to identify any potential constraints to developments upon which physical investigations can then concentrate. Past copies of Ordnance Survey Maps and air photos were examined, and a brief summary of the historical land uses identified on and adjacent to the site are described below.

Ordnance Survey Edition	On Site	Surrounding Area
1886	Greenfield	A road runs along the western boundary and the river Avon runs along the eastern boundary. There is a farm located immediately north-west of the site. There is another farm approximately 100 m west of the site across the river Avon.
1889	No significant changes.	No significant changes.
1900	No significant changes.	No significant changes.
1901	No significant changes.	No significant changes.
1926	No significant changes.	A sewage works built approximately 60 m northeast of the site.
1947	No significant changes.	No significant changes.
1960	No significant changes.	No significant changes.
2021	No significant changes.	No significant changes.
2023	No significant changes.	Building is shown to the north of site.

3.4 Geology

An initial appreciation of the general geological conditions underlying the site was made from the available Geological Survey sheets (JPB Drawing XB629-01/R/F/02) and BGS supplied borehole logs (Appendix 4). The following is a summary of the indicated conditions as interpreted from the above information by JPB.

Made Ground	The site is greenfield therefore no significant made ground deposits are anticipated.
Natural Superficial Deposits	River terrace deposits comprising clay, silt, sand and gravel are indicated to underlie the central, northern and north-western areas of the site. In addition, Alluvium associated with the River Avon comprising clay, silt sand and gravel is indicated in the eastern area of the site.
Rock Strata	The majority of the site is indicated to be underlain by the Kellaways Formation, comprising mudstone which is commonly silici-silty or silici-sandy (mostly in the upper part) beds of generally calcareous siltstone and sandstone. The western area of the site is indicated to be underlain by the Cornbrash Formation, which comprises bluish grey limestone when fresh or an olive or yellowish brown when weathered which is fine to medium grained which is predominantly bioclastic wackestone and packstone. The Cornbrash Formation is poorly bedded with arenaceous units in some places with some interbedded mudstones in some places. Bedrock is indicated to lie at between 0.30m and 2.30m depth below ground level.

3.5 Hydrology and Hydrogeology

The available information, including the Environment Agency Catchment Data Explorer (Appendix 5), indicates that the following hydrological and hydrogeological conditions are present at the site.

Surface Water Features	A stream is located immediately north of the site, which flows south-east through the north-eastern area of the site and joins the River Avon immediately to the east of the site boundary. The Environment Agency Catchment Data Explorer classifies the River Avon as being of "Moderate" ecological potential, with a chemical status of "Fail".
Superficial Deposits	River Terrace and Alluvium deposits are indicated to be present and may comprise granular materials.
Rock Strata	The Kellaways Formation is indicated to comprise predominantly clays, and therefore it is considered that this will likely be of low permeability and resource potential. Available online mapping information indicates that the Cornbrash Formation is classified as a 'Secondary A' aquifer by the Environment Agency.

4.0 SITE INVESTIGATIONS

4.1 Programme of Works and Investigation Rationale

All aspects of the investigation were designed by Brookbanks Consulting Limited. The investigation points were located where access, ground conditions and underground services allowed. It should be noted that soil and rock conditions are highly variable and may differ between sampling points and this may affect interpretation. Additional features may exist buried at depth beyond the scope of the drilling and could have therefore been undetected by investigation. The approximate locations of the boreholes is shown on JPB Drawing XB629-01/R/F/03.

Work Item	Description	Appendix
Window Sample Boreholes	**Ten soils boreholes** (BH01 to BH10) to depths of between 0.95m and 3.00m, were sunk by Geospek Limited across the site on Wednesday 8th and Thursday 9th November 2023 It should be noted that due to the soft ground conditions, it was not possible to access boreholes BH01-BH06, BH08 and BH10 with the drilling rig, therefore hand dug inspection pits were undertaken at these locations, as instructed by Brookbanks Ltd.	Appendix 6
Rationale	To investigate the nature and extent of the soil and rock underlying the site and install groundwater monitoring installation standpipes.	
Trial Pitting	**Three trial pits** (TP01 to TP03), to between 1.70m and 2.00m depth on, undertaken by a Johnson Poole & Bloomer Engineering Geologist on Thursday 9th November 2023.	Appendix 7
Rationale	To investigate the nature and extent of the underlying soils and to facilitate soakaway testing.	
Soakaways	**Undertaken in three trial pits** (TP01, TP02 and TP03) in general accordance with BRE Digest 365.	Appendix 8
Rationale	To investigate the permeability of the soils and rock underlying the site.	
Groundwater monitoring	**Groundwater monitoring** at standpipes installed in the boreholes (BH01 to BH10) was carried out on six occasions between December 2023 and May 2024 at monthly intervals, as specified by Brookbanks Consulting Limited.	Appendix 9
Rationale	To determine the groundwater regime at the site.	

5.0 SITE GEOLOGY

5.1 General

The general geological conditions beneath the site were assessed from the available information including a review of geological maps and boreholes. This provided an indication of the general thickness of the superficial cover.

The recent investigations appear to confirm the anticipated geological conditions with topsoil overlying River Terrace deposits and Alluvium, which is in turn underlain clay of the Kellaways Formation or Cornbrash Formation in the western area of the site.

5.2 Made Ground

Made ground was not encountered in any of the boreholes at the site, however topsoil which was likely disturbed by farming/ploughing activities was present from ground level down to between 0.30m and 0.40m. This generally comprised of clayey very silty fine to coarse sand.

5.3 Natural Deposits

The topsoil was generally underlain by brown clayey sandy gravel to between 0.40m and 2.30m bgl with some lenses of soft to firm very sandy clay. Given the nature of this stratum, it is considered that this is likely to represent the superficial river terrace deposits/alluvium.

5.4 Solid Geology

The Kellaways Formation was encountered in BH07 at 2.3m bgl down to the termination depth of the borehole at 3.0m bgl. This stratum comprised stiff becoming very stiff dark grey slightly silty slightly sandy clay.

The Cornbrash Formation was encountered in the western area of the site, within borehole BH09 and TP01 to TP03 at between 0.4m to 1.9m down to the termination depths of the exploratory holes at between 1.7m and 2.5m bgl. This stratum generally comprised grey and brown slightly clayey slightly silty gravelly sub-angular to sub-rounded cobbles of limestone.

5.5 Groundwater

Water was recorded in the boreholes during drilling/excavation as follows.

Borehole	Groundwater Depth (m bgl)	Groundwater Level (mAOD)	Comment
BH01	0.30	43.64	-
BH02	0.60	43.51	-
BH03	0.40	43.40	-
BH04	0.65	43.49	-
BH05	0.90	43.79	-
BH06	1.00	44.73	-
BH07	1.00	43.68	-
BH08	0.90	45.38	-
BH09	1.00	45.65	-
BH10	No groundwater encountered	-	-
TP01	No groundwater encountered	-	Stratum was wet below 0.7m bgl.
TP02	1.50	44.29	-
TP03	1.05	46.84	-

The standpipes installed during the investigation were subsequently monitored and the results are summarised in the following table.

Borehole	Approx Level (mAOD)	Response Zone	Response Materials	Water Depths Recorded (m) Water level [mAOD]					
				08/12/23	08/01/24	06/02/24	07/03/24	05/04/24	07/05/24
BH01	43.943	0.35 – 1.05	River Terrace Deposits	0.28 [43.663]	0.38 [43.563]	0.48 [43.463]	0.45 [43.493]	0.22 [43.723]	0.61 [43.333]
BH02	44.943	0.35 – 1.05	River Terrace Deposits	0.62 [43.494]	0.66 [43.454]	0.91 [43.204]	0.74 [43.374]	0.38 [43.734]	0.63 [43.484]
BH03	43.801	0.40 – 1.00	River Terrace Deposits	0.25 [43.551]	0.31 [43.491]	0.59 [43.211]	0.36 [43.441]	0.13 [43.671]	N/A*
BH04	44.136	0.30 – 0.95	River Terrace Deposits	0.39 [43.746]	0.37 [43.766]	0.79 [43.346]	0.40 [43.736]	0.29 [43.846]	N/A*
BH05	44.688	0.30 – 1.10	River Terrace Deposits	0.60 [44.088]	0.54 [44.148]	1.02 [43.688]	0.71 [43.978]	0.40 [44.288]	N/A*
BH06	45.721	0.40 – 1.15	River Terrace Deposits	0.78 [44.951]	0.74 [44.991]	DRY	0.91 [44.821]	0.42 [45.311]	DRY
BH07	44.679	1.00 – 2.00	River Terrace Deposits	0.45 [44.229]	0.43 [44.249]	0.70 [43.979]	0.48 [44.199]	0.20 [44.479]	0.65 [44.029]
BH08	46.278	0.40 – 1.15	River Terrace Deposits	0.83 [45.448]	0.80 [45.478]	DRY	0.85 [45.428]	0.39 [45.888]	DRY
BH09	46.653	0.80 – 1.80	Cornbrash Formation	0.97 [45.683]	0.71 [45.943]	1.32 [45.333]	0.86 [45.793]	0.54 [46.113]	1.29 [45.363]
BH10	50.076	0.30 – 1.10	River Terrace Deposits	0.63 [49.446]	0.68 [49.396]	DRY	DRY	0.73 [49.346]	DRY

*Unable to locate borehole – likely destroyed/buried by recent ploughing activity.

5.6 Percolation Testing

JPB was required to assess percolation rates in the underlying soils at three locations in the general spirit of BRE Digest 365. The pits were located at positions to test the suitability of the soils for soakaway trenches. Percolation testing was undertaken in the pits (Appendix 8).

BRE Digest 365 recommends calculation of infiltration rate from the time taken for the water volume to fall from 75% to 25% of the effective storage depth of the pit. It should be noted that only one complete cycle (TP02) was completed during the testing at the site. **It is considered that soakaway drainage is not suitable at the site due to the presence of a high groundwater table beneath the site.**

Trial Pit	Recorded Range(s) of Infiltration Rates (m/s)	Additional Remarks
TP01	Negligible fall in water level. Strata considered to be practically impermeable.	-
TP02	Only one cycle completed.	-
TP03	-	Shallow groundwater table encountered, unable to conduct test.

APPENDICES

Appendix 1 Drawings



Key

Site Location

[1]Base map produced from Google maps 2023.

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CLIENT

HALLAM LAND MANAGEMENT

PROJECT TITLE

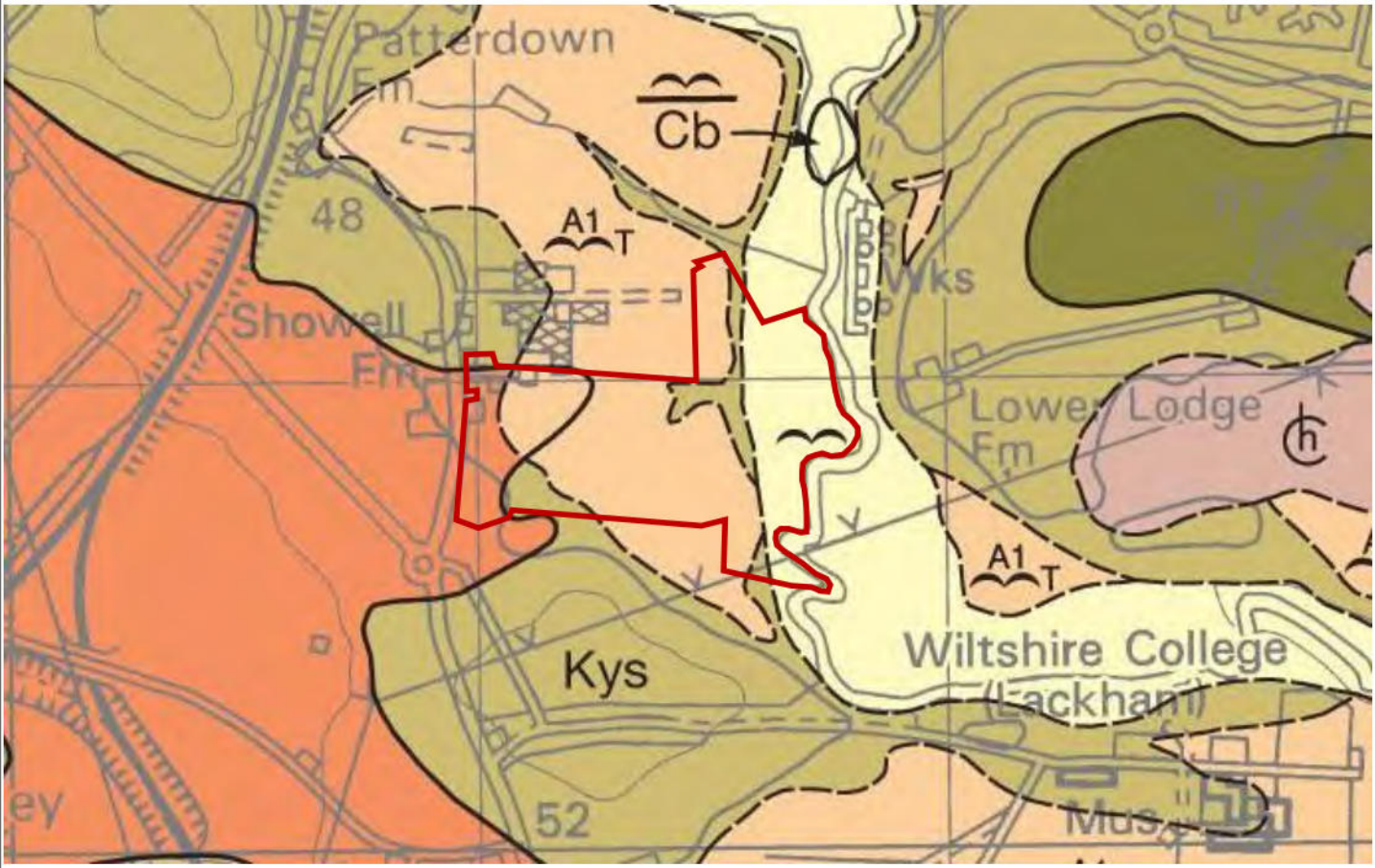
CHIPPENHAM

DRAWING TITLE

SITE LOCATION PLAN

Johnson Poole & Bloomer Consultants
GEO-ENVIRONMENTAL & MINERALS

DRAWN BY	APPROVED BY	DATE	SCALE	DRAWING No.
MHP	DOP	December 2023	NTS	XB620-01/R/F/01



LEGEND

Approximate Site Location

Cb — Symbol indicates the natural Superficial Deposit at surface or beneath any Artificially Modified Ground or landslide deposits, and the Bedrock at rockhead; other Superficial Deposits may intervene.

Geological boundary, Superficial Deposits

Geological boundary, Bedrock

Head: gravel, sand, silt and clay

Alluvium: clay, silt, sand and gravel

First River Terrace Deposits: clay, silt, sand and gravel

Bristol Avon Valley Formation, River Terrace Deposits, A1-3 as numbered: clay, silt, sand and gravel

OxC — Oxford Clay Formation

Kys — Kellaways Formation

Cb — Cornbrash Formation

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CLIENT

HALLAM LAND MANAGEMENT

PROJECT TITLE

CHIPPENHAM

DRAWING TITLE

BGS MAP EXTRACT BATH (SHEET 265 SOLID AND DRIFT)

Johnson Poole & Bloomer Consultants
GEO-ENVIRONMENTAL & MINERALS

DRAWN BY	APPROVED BY	DATE	SCALE	DRAWING No.
MP	DOP	December 2023	NTS	XB620-01/R/F/02



Legend

- Site Boundary
- Trial Pits
- Boreholes

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CLIENT: HALLAM LAND MANAGEMENT

PROJECT TITLE: CHIPPENHAM

DRAWING TITLE: BOREHOLES AND TRIAL PITS PLAN

Johnson Poole & Bloomer Consultants
GEO-ENVIRONMENTAL & MINERALS

DRAWN BY	APPROVED BY	DATE	SCALE	DRAWING No.
MP	SAG	NOV 2023	NTS	XB620-01/R/F/03

Appendix 2 Site Photographs



Plate 1: View looking south. General view of the site showing entrance to agricultural fields covered in grass separated by hedge rows. Photo taken to the north-west of the site.



Plate 2 View looking to the north-west. Photo showing access to the fields. Photo taken within the north-western area of the site.



Plate 3: View towards the north-east taken from the north-western area of the site. General view of the site showing fields.



Plate 4: View towards the south, taken from the north-western area of the site. General view of the site showing fields.



Plate 5: View towards the north-east, taken from the south-western area of the site. General view of the site showing fields.



Plate 6: View towards the south taken from the southern area of the site. General view of the site. General view of the site showing fields.



Plate 7: View towards the north-east, taken from the central area of the site. General view of the site showing fields.



Plate 8: View towards the west, taken from the north-eastern area of the site. General view of the site showing fields.

Appendix 3 Zetica UXO Risk Map

UNEXPLODED BOMB RISK MAP

zeticaUXO

SITE LOCATION

Location: SN15 2NU,
Map Centre: 390981,171057



This map principally indicates a hazard from Unexploded Bombs (UXB) due to WWII bombardment. Other sources of Unexploded Ordnance (UXO) may be present. It should be noted that this map does not represent UXO risk and should not be reported as such when reproduced.

LEGEND

- **High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- **Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- **Low:** Areas indicated as having 15 bombs per 1000acre or less.

Miltary | **Industry** | **UXO find** | **Other**
Transport | **Docks** | **Luftwaffe targets**
Utilities | **Bombing decoy** | **Airfields**

How to use your Unexploded Bomb (UXB) risk map?

This map indicates the potential for UXBs to be present because of World War Two (WWII) bombing. It can be incorporated into a technical report, such as a Phase 1 Desk Study, or similar document as an indication of the potential for UXO encounter on a Site. Other sources of UXO may also be indicated, although note that these are not comprehensive and more detailed research is required to confirm their presence.

What if my Site is in a moderate or high density area?

We typically recommend that a detailed UXO desk study and risk assessment is undertaken for sites in an area with a moderate or high bombing density.
Additionally, if your site is in close proximity to a strategic target, military establishment, airfield or bombing decoy, then additional detailed research is recommended.

If my site is in a low risk area, do I need to do anything?

If both the map and other research confirm that there is a low potential for UXO to be present on your site, then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

If you are unsure whether other sources of UXO may be present, you can request one of our pre-desk study assessments (PDSA) by emailing a site boundary and location to uxo@zetica.com.

You should never plan site work or undertake a risk assessment using these maps alone. More detail is required, to include an assessment of the likelihood of a source of UXO hazard from other military activity not reflected on these maps.

If I have any questions, who do I contact?

tel: +44 (0) 1993 886682 **email:** uxo@zetica.com **web:** www.zeticauxo.com

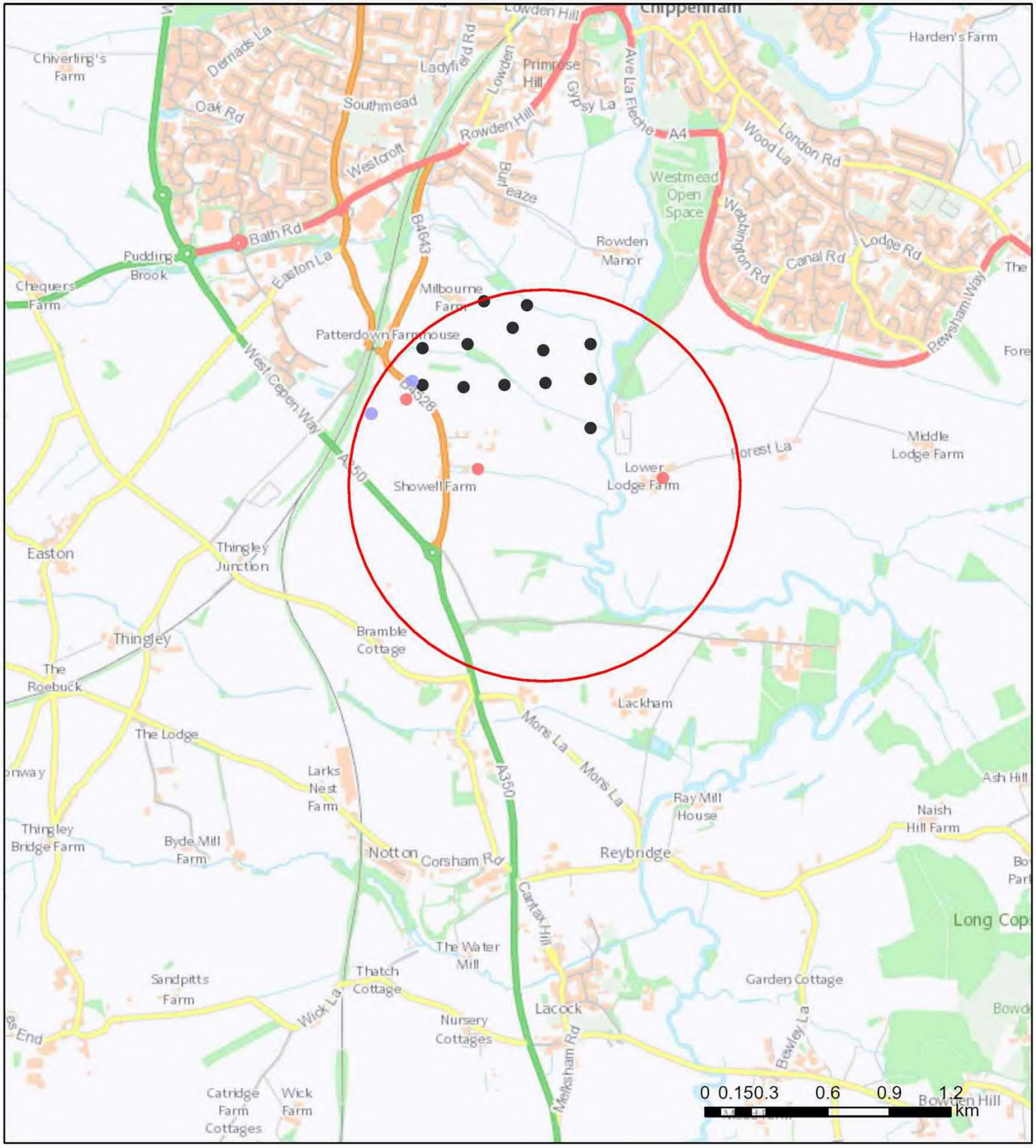
The information in this UXB risk map is derived from a range of sources and should be used with the accompanying notes on our website.

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Appendix 4 BGS Supplied Exploratory Hole Logs

XB620

British Geological Survey



Contains OS data © Crown Copyright and database right 2020

GeoIndex Onshore Data Sources: NERC, Natural England, English Heritage and Ordnance Survey

Map Key

Borehole records

- Unknown Length
- Confidential
- 0 - 10m
- 10 - 30m
- 30m+

Selection Results

Borehole records

Record	Reference	Name	Water Well Reference	PRECISION	Length (m)	Date	Easting	Northing	Scan Quality	AGS derived
Confidential/restricted access borehole - try GeoRecords.	ST97SW41	MELBOURNE FARM 3	N/A	undefined	Confidential	1989	391150	171850	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW45	MELBOURNE FARM 7	N/A	undefined	Confidential	1989	391290	171720	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW42	MELBOURNE FARM 4	N/A	undefined	Confidential	1989	391360	171830	not Entered	null
Scan	ST97SW242	FIELD SITE CHIPPENHAM	ST97/28DD	undefined	0.85	null	390600	171300	not Entered	null
Scan	ST97SW247	FIELD SITE CHIPPENHAM	ST97/28G	undefined	0.98	null	390600	171300	not Entered	null
Scan	ST97SW252	FIELD SITE CHIPPENHAM	ST97/28II	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW221	FIELD SITE CHIPPENHAM	ST97/28Y	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW251	FIELD SITE CHIPPENHAM	ST97/28I	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW244	FIELD SITE CHIPPENHAM	ST97/28EE	undefined	0.73	null	390600	171300	not Entered	null
Scan	ST97SW228	FIELD SITE CHIPPENHAM	ST97/28LL	undefined	1.14	null	390600	171300	not Entered	null
Scan	ST97SW256	FIELD SITE CHIPPENHAM	ST97/28AA	undefined	1.25	null	390600	171300	not Entered	null
Scan	ST97SW240	FIELD SITE CHIPPENHAM	ST97/28CC	undefined	0.55	null	390600	171300	not Entered	null
Scan	ST97SW245	FIELD SITE CHIPPENHAM	ST97/28F	undefined	0.5	null	390600	171300	not Entered	null
Scan	ST97SW236	FIELD SITE CHIPPENHAM	ST97/28Q	undefined	3.05	null	390600	171300	not Entered	null
Scan	ST97SW255	FIELD SITE CHIPPENHAM	ST97/28A	undefined	0.49	null	390600	171300	not Entered	null
Scan	ST97SW223	FIELD SITE CHIPPENHAM	ST97/28J	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW246	FIELD SITE CHIPPENHAM	ST97/28FF	undefined	0.91	null	390600	171300	not Entered	null
Scan	ST97SW226	FIELD SITE CHIPPENHAM	ST97/28KK	undefined	1.34	null	390600	171300	not Entered	null
Scan	ST97SW249	FIELD SITE CHIPPENHAM	ST97/28H	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW248	FIELD SITE CHIPPENHAM	ST97/28GG	undefined	0.98	null	390600	171300	not Entered	null
Scan	ST97SW14	PATTERDOWN	ST97/17	undefined	89.61	1953	390770	171370	not Entered	null

		FARM								
Scan	ST97SW21	CHIPPENHAM (PATTERDOWN) 2	N/A	undefined	3.05	1974	390800	171460	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW48	MELBOURNE FARM 10	N/A	undefined	Confidential	1989	390850	171440	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW43	MELBOURNE FARM 5	N/A	undefined	Confidential	1989	390850	171620	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW49	MELBOURNE FARM 11	N/A	undefined	Confidential	1989	391050	171430	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW44	MELBOURNE FARM 6	N/A	undefined	Confidential	1989	391070	171640	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW50	MELBOURNE FARM 12	N/A	undefined	Confidential	1989	391250	171440	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW46	MELBOURNE FARM 8	N/A	undefined	Confidential	1989	391440	171610	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW51	MELBOURNE FARM 13	N/A	undefined	Confidential	1989	391450	171450	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW47	MELBOURNE FARM 9	N/A	undefined	Confidential	1989	391670	171640	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW52	MELBOURNE FARM 14	N/A	undefined	Confidential	1989	391670	171470	not Entered	null
Confidential/restricted access borehole - try GeoRecords.	ST97SW53	MELBOURNE FARM 15	N/A	undefined	Confidential	1989	391670	171230	not Entered	null
Scan	ST97SW232	FIELD SITE CHIPPENHAM	ST97/28NN	undefined	0.85	null	390600	171300	not Entered	null
Scan	ST97SW233	FIELD SITE CHIPPENHAM	ST97/28O	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW229	FIELD SITE CHIPPENHAM	ST97/28M	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW219	FIELD SITE CHIPPENHAM	ST97/28W	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW235	FIELD SITE CHIPPENHAM	ST97/28P	undefined	3.96	null	390600	171300	not Entered	null
Scan	ST97SW234	FIELD SITE CHIPPENHAM	ST97/28OO	undefined	0.61	null	390600	171300	not Entered	null

Scan	ST97SW218	FIELD SITE CHIPPENHAM	ST97/28V	undefined	1.83	null	390600	171300	not Entered	null
Scan	ST97SW230	FIELD SITE CHIPPENHAM	ST97/28MM	undefined	0.98	null	390600	171300	not Entered	null
Scan	ST97SW241	FIELD SITE CHIPPENHAM	ST97/28D	undefined	0.43	null	390600	171300	not Entered	null
Scan	ST97SW257	FIELD SITE CHIPPENHAM	ST97/28B	undefined	0.49	null	390600	171300	not Entered	null
Scan	ST97SW225	FIELD SITE CHIPPENHAM	ST97/28K	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW222	FIELD SITE CHIPPENHAM	ST97/28Z	undefined	1.34	null	390600	171300	not Entered	null
Scan	ST97SW215	FIELD SITE CHIPPENHAM	ST97/28S	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW217	FIELD SITE CHIPPENHAM	ST97/28U	undefined	1.83	null	390600	171300	not Entered	null
Scan	ST97SW220	FIELD SITE CHIPPENHAM	ST97/28X	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW237	FIELD SITE CHIPPENHAM	ST97/28R	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW216	FIELD SITE CHIPPENHAM	ST97/28T	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW243	FIELD SITE CHIPPENHAM	ST97/28E	undefined	0.61	null	390600	171300	not Entered	null
Scan	ST97SW224	FIELD SITE CHIPPENHAM	ST97/28JJ	undefined	1.46	null	390600	171300	not Entered	null
Scan	ST97SW231	FIELD SITE CHIPPENHAM	ST97/28N	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW250	FIELD SITE CHIPPENHAM	ST97/28HH	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW239	FIELD SITE CHIPPENHAM	ST97/28C	undefined	0.43	null	390600	171300	not Entered	null
Scan	ST97SW238	FIELD SITE CHIPPENHAM	ST97/28BB	undefined	1.16	null	390600	171300	not Entered	null
Scan	ST97SW227	FIELD SITE CHIPPENHAM	ST97/28L	undefined	1.52	null	390600	171300	not Entered	null
Scan	ST97SW286	LOWER LODGE FARM FOREST LANE PEWSHAM	ST97/34	undefined	75	2017	392024	170986	not Entered	null
Scan	ST97SW15	GLENS NURSERIES PATTERDOWN	ST97/16	undefined	30.48	1946	391120	171030	not Entered	null

British Geological Survey

BGS ID: 397884 : BGS Reference: ST97SW242
British National Grid (27700) : 390600,171300

NGRC

BOREHOLE RECORDS

ADJUSTMENT FORM

QUARTER SHEET ST 97 SW.

BH REGISTRATION NUMBER 215 - 257.

RECORDS ENTERED AND HELD BY WALLINGFORD

BH REGISTRATION NUMBER(S)

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397884 : BGS Reference: ST97SW242
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW242

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397884 : BGS Reference: ST97SW242
British National Grid (27700) : 390600,171300

265/199

ST 97-28



KEY PLAN

Scale : 1:2500 (approx)

1" 265
6" Wilts 26NW.

Received from C.R. Phillips Borough Engineer Chippenham U.D.C. 26/2/52. for correspondence see 1" 265 Chippenham

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397889 : BGS Reference: ST97SW247
British National Grid (27700) : 390600,171300

LINE A.

265

	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H
Ft 0 - 1	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Brown Loam	Sandy Loam
1 - 2	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'4"	Clay Gravel, Rock at 1'4"	Gravel, Clay Rock at 1'8"	Gravel, Clay Rock at 1'8"	Loam with Sandy clay	Sandy Loam.
2 - 3					Gravel, Rock at 2'0"		Brown sandy clay with gravel	Sandy Loam with sandy clay
3 - 4							Gravel, Rock at 3'2"	Sandy Loam with sandy clay
4 - 5								Yellow Brown clay with little sand

ST 906 713
ST 97 / 28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397894 : BGS Reference: ST97SW252
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW252

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397863 : BGS Reference: ST97SW221
British National Grid (27700) : 390600,171300

LINE C.

265/199

	21 V	22 W	23 X	24 Y	25 Z	26 AB	27 BB
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam
1 - 2	Light Brown clay, some blue clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Brown sandy clay
2 - 3	Light brown clay with a little sand more blue clay	Light brown clay	Red brown loam with some clay	Lighter brown clay with some sand.	Lighter brown clay with some sand	Red brown loam with red sand More clay.	Sandy clay with small gravel, f. shells.
3 - 4	Light brown clay, some blue clay, with a little sand.	Lighter brown clay with a little sand	Lighter brown clay with a some sand.	Lighter brown clay with more red sand in the clay	Lighter brown clay with more red sand in the clay	Lighter brown sandy clay	Red brown sand & gravel, f.shells Rock 3'8".
4 - 5	Sandy clay to rock at 6ft.	Lighter brown clay with more red sand at 5ft.	Lighter brown clay with some sand	Sandy clay, Rock at 5'0"	Sandy clay Rock at 4'4"	Lighter brown sandy clay, more sand. Rock at 4'1".	

ST97/28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

Name and Number of Shaft or Bore 265 / 202

For Messrs. Chippenham R.D.C.

Town or Village Easterton Farm

County Wiltshire. Six-inch quarter sheet Wilts 26NW

6-inch Map Registered No. ST 97 SW/14

Exact site

Attach a tracing from a map, or a sketch-map, if possible. 9077 7137

Purpose for which made water supply - pilot hole for testing water possibilities.

Level at which shaft / bore commenced relative to O.D. 176.50. State if shaft / bore is ~~up~~ down, ~~horizontal or inclined; in latter cases give angle of inclination and direction~~ vertical cores 8" diameter.

Made by John Thom

Information from Date of Sinking 1953

Specimens Bi 9435-9607

Additional Notes in Space Overleaf

(For Survey use only) Geological Classification	Nature of Strata	Thickness			Depth		
Kellaways beds 14'	Yellow clay (driller's log)		12	-		12	-
	" clay with traces of rock (driller's log)		2	-		14	-
	Soft limestone (driller's log)		7	-		21	-
Cornbrash 22'	Coring commenced						
	No core, but reported limestone		7	-		28	-
	Buff shell-fragment limestone with small marly pellets and ferruginous spots. Top few inches blue-hearted. Base of core worn and top rather broken.		2	-		30	-
	Broken limestone (driller's log)		6	6		36	6
	Core missing (reported by driller as very soft)		7	-		43	6
Forest Marble 86' 4"	Slightly silty grey clay with silt laminae and tiny blue-grey limestone lacunal and concretions in top 6ft. Then 3'6" do. but interbedded with grey rather laminated mudstone						
	7'6" grey rather laminated mudstone						
	2'6" grey mudstone						
	(Only 19'6" of core recovered - remainder all clay according to driller)		23	6		67	-
	Very hard dark grey/grey rather fine-grained shell-fragment limestone with pellets of brown mudstone. Strongly impregnated with pyrite.			4		67	4
	Grey laminated mudstone (as above).						
	There was a very gentle flexure in the bedding at depth of 73'.		7	4		74	8

Continued Overleaf

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

	Several layers of strongly ~~inundated~~					?
	dark grey/grey oolitic pellety shell-	ST97SW/14				
	fragmental limestone - much pyritised.					
	Top and bottom of individual layers worn					
	indicating that mudstone had been					
Forest	worn away in between them	-	4		75	-
Marble	Grey Mudstone (as above), including					
continued	½" band of dark grey/grey oolitic					
(total	pellety shallow fragmental limestone					
83'4")	at 76' 9" and form ½" lenticles of					
	similar rock in bottom 8"	2	8		77	8
	Well-rounded lumps of tough dark grey					
	shell-fragment oolitic limestone					
	(typical Forest Marble type and					
	described hereafter as such)	-	4		78	-
	Core missing. (Reported by driller					
	to be mainly clay with some hard					
	limestone bands)	20	-		98	-
	Forest Marble type limestone (see					
	above).					
	Top and bottom of core worn and only					
	1ft. recovered	2	-		100	-
	Grey laminated slightly silty mudstone					
	with scattered tiny dark grey limestone					
	laminae and concretions, particularly					
	in basal 4". ½"band of dark grey					
	oolitic limestone and ½" band at					
	104'3" and 104'4" respectively.	4	6		104	6
	Creamy fawn shell-fragmental oolitic lime-					
	stone, oolithe rather coarse. Top 1½"					
	clayey.					
	Passing down at about 107ft. into a					
	fine-grained light-grey oolitic					
	limestone.	7	6		112	-

ADDITIONAL NOTES

Visited 8th & 9th April by G.W.Green and R.V.Melville. Depth 131', and core broken up down to that depth. Fossils and rock specimens collected. Concluded by F.G.Dimes and R.V.M. pn 5th-6th June,1953.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST 97 SW/14

	Grey and greyish fawn marl with rather perished calcareous shell fragments and ooliths core worn at base	1	4		113	4
	Core missing (reported by driller as blue clay)	3	8		117	-
	Greyish-fawn oolite-freestone. Scattered well worn and comminuted shell fragments	4	9		121	9
	do. grey. core worn at base	1	1		122	10
Bradford Clay 7' 10"	Grey fossiliferous marl Hard rather nodular calcite masses, mostly apparently corals, about 6" lumps recovered, remainder of core washed away	1	8		124	6
		4	4		128	10
	Grey fossiliferous marl	1	10		130	8
	Fawn shelly oolitic limestone with some indefinite marly patches	.-	4"		131	-
	Cream-buff coarse oolite	2	1		133	1
	do. greyer, shelly in patches; brownish earthy spots from 134' down	1	8		134	9
	Cream-buff coarse oolite, shelly in patches; vertical fissure (stylolitic) from 136'9" - 137'9"; coarser in lowest foot	3	1		137	10
	Finer-grained softer grey brashy oolite; calcite vugh at 138'6"	1	-		138	10
	Pure cream-grey oolite, shelly in patches; an indefinite darker grey, more earthy band from c.145'3"-146'6"; stylolitic vertical fissure with oxidized faces from 146' - 154'6"	16	8		155	6
Great Oolite (Bath Stone) 79' 1"	Finer-grained darker grey and brown brashy oolite, greenish patches on skin of core in basal 6"	3	9		160	3
	Pale-brown earthy fine-grained oolite darker and more earthy between 161'6" and c.162'6"; harder and more crystalline c.161'.	3	3		163	6
	Grey fine-grained earthy oolite with brownish earthy wisps; brashy and with thin vertical calcite veins in bottom 10"	3	-		166	6
	Fawn coarse shelly oolite	-	9		167	3
	Brownish earthy oolite	6	9		174	-
	Grey earthy fine-grained oolite with horizontal earthy wisps and a vertical stylolitic fissure	3	8		177	8
	Coarser brownish oolite with earthy wisps and shell-fragments which are more frequent below 179'; wood fragments around 182'; earthy wisps crowded					

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

	in bottom 3" ST97SW/14	5	7		183	3
	Grey earthy oolite		6		183	9
	Earthy parting		3		184	-
	Brownish earthy oolite		4		184	4
	Earthy parting		2		184	6
	Grey crystalline oolite sitting without break on crystalline limestone with scattered ooliths		5		184	11
			3		185	2
	Greyish-brown fine-grained earthy oolite	15	4		200	6
Gt Oolite	Finer-grained brownish oolite; earthy wisps, and greenish patches on skin of core, from 203'6" down; crystalline with small scattered ooliths from 205'; basal 3" shelly - passing down by intercalation of earthy wisps into	9	3		209	9
Upper Fuller's Earth 79'	clay with some ooliths and with bebbs of blue crystalline limestone, becoming blue crystalline limestone with earthy wisps	1	9		211	6
	Earthy silty clay	1	6		213	-
	Blue silty crystalline limestone	-	9		213	9
	Earthy silty clay interbedded with blue crystalline limestone, increasingly shelly and fuller of black ooliths in bottom 6 - 9"	-	6		214	3
	Earthy silty clay	2	1		216	4
	Pale-grey earthy marl with irregular layers and wisps of blue crystalline limestone	1	2		217	8
	Grey, slightly shaly clay with shell-fragments		10		218	6
	Pale greenish blue-grey marly limestone with some shell-fragments - passing down into	3	9		222	3
	Grey marl with blebs of blue l/stone	1	1		223	4
	Grey Marl		8		224	-
	Grey marly limestone	1	0		225	-
	Greenish blue-grey marl		3		225	3
	Compact grey marly l/stone	4	7		229	10
	Grey marl	1	2		231	-
	Compact grey marly l/stone with wispy partings which may be full of black ooliths, passing down into pale silty lst. and back to pale marly lst. and marl; variably shelly or with fragments of shell		6		231	6
	Grey marl 6" passing down into rough grey silty shelly limestone with irregular darker clayey partings	37	-		268	6
	GAPA	5	6		274	-

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

Geological Classification	Description ST97SW/14	Thickness		Depth	
	GAP A				
	Rough grey shelly lst. as above	1	-	A + 1	-
	GAP B				
	Dark grey marl, base very irregular	-	9	B +0	9
	Rough grey silty lst., marly in parts	4	-	B +4	9
	Grey clay	-	6	B +5	3
Fullers Earth Rock 5'3" +	Pale grey marly fossiliferous lst. interbedded with dark grey clay full of black ooliths	5	3	B+10	6
		Driller's final depth 294'-			

NOTE: The twenty feet below Gap A were represented by 11'6" of core. This part of the core had been interfered with by children and some pieces removed.

(Sgd) R.V.M.

Clipperham UDC "did not proceed with the development of the borehole at Pasterdown, it having been found that the pumping affected the water levels in the boreholes at Twyfields some half a mile or so away."

[WQ/265, 202/ Jean Allcock. 25.10.55]

Lively 1¼ mls. away HSR

RWLs at various depths while sinking bore.

0-40'	RWL	not recorded.
40-129'6"	RWL	17' bs
129'6" - 173'	RWL	30' bs.
173' - 183'	RWL	25' bs.
183' - 201'	RWL	21' bs.
201' - 294'	RWL	23' bs

[WQ/265,202/5.10.56. John Hem Lee.]

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST97 SW/14

9077 7137

ST97

A description of the Strata pierced should be given as follows:-

	Thickness of each Stratum		Total depths from the surface	
	Feet	Inches	Feet	Inches.
Drift & Kellaways Beds.	14	0	14	0
Cornbrash	22	6	36	6
Forest Marble	86	4	122	10
Bradford Clay	8	2	130	8
Great Oolite (Bath stone)	78	9	209	9
Upper Fullers Earth	79	0	288	9
Fullers Earth Rock	5	3	294	0

A Section to scale showing the size of the well or boring, strata pierced, rest level of water, and other particulars, should also be forwarded to the Ministry.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST 97 SW/14 Reference

D. R. A. Pomeroy

Dr Cam for retention

Patterdown Borehole Specimen Bi 9559

A thin section cut from the above specimen (E 29103) shows that the black mineral coating the ooliths in the limestone is dominantly pyrite. Scattered pyrite cubes (0.003 mm) can be seen, but the bulk of the pyrite is extremely finely crystalline. Some of the black material appears black by reflected light and may possibly be carbonaceous matter.

? Twinhoe. ?

[redacted]

(R. Dearnley)
Petrographical Department

25th November, 1959.

Geological Survey and Museum

ST 9077 7137

REGIMITE
(32)
JC&SLtd
Gp782/39
Code 10-76

RD/EC

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

Name and Number of Shaft or Bore: 265/202

6-inch Map Registered No. ST97SW 7

For Messrs. Chippenham U.D.C.

Town or Village Patterdown Farm

County Wiltshire. Six-inch quarter sheet Wilts 25NW

Exact site ST 9075 7134

Attach a tracing from a map, or a sketch-map, if possible.

Purpose for which made Water supply - 1 of hole for testing water possibilities.

Level at which shaft bore commenced relative to O.D. State if shaft bore is ~~or~~ down, ~~horizontal or~~ ~~inclined~~ in latter cases give angle of inclination and direction vertical cores 8" diameter.

Made by John Thom

Information from Date of Sinking 1953

Specimens BI 9435-9697

Additional Notes in Space Overleaf

For Survey use only: Geological Classification	Nature of Strata	Thickness		Depth	
Kellaways Beds 14'	Yellow clay (driller's log	12	-	12	-
	" clay with traces of rock (driller's log)	2	-	14	-
	Soft limestone (driller's log)	7	-	21	-
Cornbrash 22½'	Coring commenced				
	No core, but reported limestone	7	-	28	-
	Buff shell-fragment limestone with small marly pellets and ferruginous spots. Top few inches blue-hearted. Case of core worn and ~~~~ rather broken.	5	6	33	6
	Broken limestone (driller's log)				
	Core missing (reported by driller as very soft)	7	-	43	6
Forest Marble 85' 4"	Slightly silty grey clay with silt laminae and tiny blue-grey limestone nacreal and concretions in top 6ft. Then 3'6" do. but interbedded with grey rather laminated mudstone				
	7'6" grey rather laminated mudstone				
	2'6" grey mudstone				
	(Only 19'6" of core recovered - remainder all clay according to driller)	23	6	67	-
	Very hard dark grey/grey rather fine-grained shell-fragmental limestone with pellets of brown mudstone. Strongly impregnated with pyrite.		4	67	4
	Grey laminated mudstone (as above).				
	There was a very gentle flexure in the section at depth of 75'.	7	4	74	8

Continued Overleaf

Geological Survey and Museum, South Kensington, London, S.W.7.	Date received	Correspondence File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map	on 6" Map
					⊙	⊙

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST97SW 14

265/202

ST97/5 17

For Survey use only: GEOLOGICAL CLASSIFICATION	NATURE OF STRATA (Continued)	THICKNESS	DEPTH
	Several layers of strong indurated dark grey/grey oolitic pelleted shell-fragmental limestone - rock pyritised. Top and bottom of individual layers worn indicating that mudstone and beds worn away in between them	- 4	75 -
Forest Marble continue (total 86'4")	Grey mudstone (as above). including 4" band of dark grey/grey oolitic pelleted shallow fragmental limestone at 76' 9" and four ¼" lenticles of similar rock in bottom 8"	2 8	77 8
	Well-rounded lumps of tough dark grey shell-fragment oolitic limestone (typical Forest Marble type and described hereafter as such)	- 4	78 -
	Core missing. (Reported by driller to be mainly clay with some hard limestone bands)	20 -	98 -
	Forest Marble type limestone (see above). Top and bottom of core worn and only 1ft. 1" covered	2 -	100 -
	Grey laminated slightly silty mudstone with scattered tiny dark grey limestone laminae and concretions particularly in basal 4". ¼" band of dark grey oolitic limestone and ½" band at 104'3" and 104'4" respectively.	4 6	104 6
	Cream shell-fragmental oolitic limestone. Oliths rather coarse. Top 1" clayey.	7 6	112 -
	Passing down at about 107ft. into a fine-grained light-grey oolitic limestone.		

ADDITIONAL NOTES

Visited 8th & 9th April by H. Green and K.V.Melville. Depth 151', and core broken up down to that depth. Fossils and rock specimens collected. Concluded by F.G.Dines and K.V.M. on 5th-6th June, 1953.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST97SW 7

265/202

(11932) Wt.30370/9170 10,000 9/39 A.& E.W.Ltd. Gp.685

Name and Number of Shaft or Bore given by Geological Survey:

County 5 6/ Quarter Sheet

Geological Classification	Description	Thickness		Depth	
	Grey and greyish fawn marl with rather perished calcareous shell fragments and ooliths, core worn at base	1	4	113	4
	Core missing (reported by driller as blue clay)	3	8	117	-
	Greyish-fawn oolite-freestone. Scattered well worn and comminuted shell fragments	4	9	121	9
	do. grey, core worn at base	1	1	122	10
Oxford Clay 7' 10".	Grey fossiliferous marl Hard rather angular calcite masses, mostly apparently corals, about 6" lumps recovered, remainder of core washed away	1	8	124	6
	Grey fossiliferous marl	4	4	128	10
	Fawn shelly oolitic limestone with some indefinite marly patches	1	10	130	8
	Cream-buff coarse oolite	-	4	131	-
	do. greyer, shelly in patches; brownish earthy spots from 134'down	2	1	133	1
	Cream-buff coarse oolite, shelly in patches; vertical fissure (stylolitic from 137'9" - 137'9"; coarser in lowest foot	1	8	134	9
	Finer-grained softer grey brashy oolite; calcite vein at 138'6"	3	1	137	10
	Pure cream-grey oolite, shelly in patches; in indefinite darker grey more earthy band from c.145'3"-146'6"; stylolitic vertical fissure, with oxidised faces from 146' - 154'6"	1	-	138	10
Great Oolite (Bath Stone) 79' 1"	Finer-grained darker grey and brown brashy oolite, greenish patches on skin of core in basal 6"	16	8	155	6
	Pale-brown earthy fine-grained oolite [illegible] and more earthy between 161'6" and c.162'9"; harder and more crystalline c.161'.	3	9	160	3
	Grey fine-grained earthy oolite with brownish earthy wisps; brashy and with thin vertical calcite veins in bottom 10"	3	3	163	6
	Fawn course shelly oolite	3	-	166	6
	Brownish earthy oolite	-	9	167	3
	Grey earthy fine-grained oolite with horizontal earthy wisps and a vertical stylolitic fissure	6	9	174	-
		3	8	177	8

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST97SW 14

265/202

(11932) WL30/370/0170 10,000 9/30 A.& E.W.,Ltd. Gp.xxx

Name and Number of Shaft or Bore given by Geological Survey:

County | 1/4 Quarter-Sheet | 1/97

Geological Classification	Description	Thickness			Depth		
	in bottom 3"		5	7		183	3
	Grey earthy oolite			6		183	9
	Earthy parting			3		184	-
	Brownish earthy oolite			4		184	4
	Earthy parting			2		184	6
	Grey crystalline oolite with						
	without break to crystalline lime-stone with scattered oolites			5		184	11
	Greyish-brown fine-grained earthy oolite			3		185	2
Fl. Oolite	Finer-grained brownish oolite; earthy wisps, and greenish patches on skin of core. From 203'6" down; crystalline with small scattered ooliths from 205'; basal 3" shelly - passing down by intercalation of earthy wisps into		15	4		200	6
Upper Fuller's Earth 79'	clay with some ooliths and with bulbs of blue crystalline limestone, becoming blue crystalline limestone with earthy wisps		9	3		209	9
	Earthy silty clay		1	9		211	6
	Blue silty crystalline limestone		1	6		213	-
	Earthy silty clay interbedded with blue crystalline limestone, increas-ingly shelly and fuller of black		-	9		213	9
	ooliths in bottom 6 - 9"			6		214	3
	Earthy silty clay		2	1		215	4
	Pale-grey earthy marl with irregular layers and wisps of blue crystalline		1	2		217	8
	limestone			10		218	6
	Grey, slightly shaly clay with shell-fragments		3	9		222	3
	Pale greenish blue-grey marly lime-stone with some shell-fragments -						
	passing down into		1	1		223	4
	Grey marl with bleb of blue l/stone			8		224	-
	Grey Marl		1	0		225	
	Grey marly limestone			3		225	3
	Greenish blue-grey marl		4	7		229	10
	Compact grey marly l/stone		1	2		231	-
	Grey marl			6		231	6
	Compact grey marly limestone with wisps						
	partings which may be full of black						
	oolites, passing down into the silty						
	lst. and back to pale marly lst.						
	marl; variably shelly or with frag-ments of shell		37	-		258	6
	Grey marl 6" passing down into rough						

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(*40540) Wt.10120/4161 6,000 4/50 A.& E.W.Ltd Gp.668

Name and Number of Shaft or Bore given by Geological Survey:

County: Gloucestershire

Geological Classification	Description	Thickness			Depth		
	Gap A						
	Rough grey shelly lst. as above		1	-		A + 1	-
	Gap B						
	Dark grey marl, base very irregular		-	9		B + 0	9
	Rough grey silty lst. marly in parts		4	-		B + 4	9
	Grey clay		-	6		B + 5	3
Fullers Earth Rock 5'3" +	Pale grey marly fossiliferous lst. interbedded with dark grey clay full of black oolithe		5	3		B + 10	6
	Driller's final depth 294'-						
	NOTE: The twenty feet below Gap A were represented by 11'6" of core. This part of the core had been interfered with by children and some pieces removed (H.J.B.V.)						

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JOHN THOM LTD., CANAL WORKS, PATRICROFT, MANCHESTER.

265/202

PUMPING TEST

BOROUGH OF CHIPPENHAM - BOREHOLE AT PATTERDOWN

TIME	WATER LEVEL	G.P.H.	REMARKS
10.0.a.m.	46'	-	Valve Shut
10.15	47'	1,136	Slightly discoloured
10.30	48'	1,979	Clearing
10.45	56'	4,298	"
11.0	55'	4,298	
11.15	74'	6,458	Slightly discoloured
11.30	73'	6,011	Clear
11.45	91'	9,587	Slightly discoloured
12.0	87'	8,593	Clearing
12.15.p.m.	85'	9,131	"
12.30	95'	10,110	"
12.45	82'	8,177	"
1.0	83'	8,177	"
1.30	83'	8,598	"
2.0	80'	8,177	"
2.30	82'	8,177	"
3.0	78'	8,177	"
3.30	78'	8,177	"
4.0	74'	8,177	"
4.30	74'	8,177	"
5.0	75'	8,177	"
5.30	75'	8,177	"
6.0	75'	8,177	"
6.30	75'	8,177	"
7.0	75'	8,177	"
7.30	75'	8,177	"
8.0	75'	8,177	"
8.30	74'	8,177	"
9.0	74'	8,177	"
9.30	74'	8,177	"
10.0	74'	8,177	"
10.30	74'	8,177	"
11.0	73'	8,177	"
11.30	73'	8,177	"
12.0	73'	8,177	"
12.30	72'	8,177	"
1.0.a.m.	72'	8,177	"
1.30	72'	8,177	"
2.0	72'	8,177	"
2.30	72'	8,177	"
3.0	72'	8,177	"
3.30	72'	8,177	"
4.0	72'	8,177	"
4.30	72'	8,177	"
5.0	72'	8,177	"
5.30	72'	8,177	"
6.0	72'	8,177	"
6.30	72'	8,177	"
7.0	72'	8,177	"
7.30	72'	8,177	"
8.0	72'	8,177	"
8.30	72'	8,177	"
9.0	72'	8,177	"
9.30	73'	8,177	"
			Pump Stopped.

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	TIME	WATER LEVEL	C.P.M.	REMARKS
6.53.	4.30.p.m.	87'		
	5.0	126'	13,570	Dirty
	5.30	118'	12,330	"
	6.0	114'	12,330	"
	6.30	109'	12,950	"
	7.0	105'	12,950	"
	7.30	102'	12,950	Clear
	8.0	99'	10,110	"
	8.30	95'	10,110	"
	9.0	92'	10,110	"
	9.30	90'	10,110	"
	10.0	85'	10,110	"
	10.30	90'	11,100	"
	11.0	87'	10,110	"
	11.30	85'	10,110	"
	12.0	85'	10,110	"
6.53.	12.30.a.m.	84'	10,110	"
	1.0	83'	10,110	"
	1.30	84'	10,110	"
	2.0	85'	10,110	"
	2.30	84'	10,110	"
	3.0	83'	10,110	"
	3.30	83'	10,110	"
	4.0	82'	10,110	"
	4.30	83'	10,110	"
	5.0	83'	10,110	"
	5.30	83'	10,110	"
	6.0	84'	10,110	"
	6.30	84'	10,110	"
	7.0	84'	10,110	"
	7.30	84'	10,110	"
	8.0	84'	10,110	"
	8.30	86'	11,190	"
	9.0	88'	10,650	"
	9.30	87'	10,110	"
	10.0	86'	10,110	"
	10.30	84'	10,110	"
	11.0	84'	10,110	"
	11.30	83'	10,110	"
	12.0	83'	10,110	"
	12.30.p.m.	83'	10,110	"
	1.0	83'	10,110	"
	1.30	83'	10,110	"
	2.0	83'	10,110	"
	2.30	83'	10,110	"
	3.0	83'	10,110	"
	3.0	83'	10,110	"
	4.0	82'	9,587	"
	4.30	83'	10,110	"
	5.0	83'	10,110	"
	5.30	83'	10,110	"
	6.0	82'	10,110	"
	6.30	82'	10,110	"
	7.0	81'	10,110	"
	7.30	81'	10,110	"
	8.0	81'	10,110	"
	8.30	81'	10,110	"
	9.0	81'	10,110	"
	9.30	81'	10,110	"
	10.0	81'	10,110	"
	10.30	81'	10,110	"
	11.0	81'	10,110	"
	11.3	80'	10,110	"
	12.0	80'	10,110	"

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	TIME	WATER LEVEL	G.P.H.	REMARKS
33.	12.30.a.m.	80'	10,110	Clear
	1.0	80'	10,110	"
	1.30	80'	10,110	"
	2.0	80'	10,110	"
	2.30	81'	10,110	"
	3.0	82'	10,110	"
	3.30	82'	10,110	"
	4.0	82'	10,110	"
	4.30	81'	10,110	"
	5.0	81'	10,110	"
	5.30	81'	10,110	"
	6.0	81'	10,110	"
	6.30	81'	10,110	"
	7.0	81'	10,110	"
	7.30	81'	10,110	"
	8.0	82'	10,110	"
	8.30	82'	10,110	"
	9.0	82½'	10,110	"
	9.30	83'	10,110	"
	10.0	87'	10,650	"
	10.30	88'	10,650	"
	11.0	88'	10,650	"
	11.30	87'	10,110	"
	12.0	87'	10,110	"
	12.30.p.m.	87'	10,110	"
	1.0	87'	10,110	"
	1.30	86'	10,110	"
	2.0	85'	10,110	"
				Extra 45' of rising main added.
Official start.	4.45	104'	14,850	Jun. 25th. Clear
	5.15	122'	14,850	
	5.30	117'	13,570	
	6.0	113'	13,570	
	6.30	113'	13,570	
	7.0	107'	13,570	
	7.30	102'	13,570	
	8.0	98'	13,570	
	8.30	95'	13,570	
	9.0	95'	13,570	
	9.30	94'	13,570	
	10.0	93'	13,570	
	10.30	92'	13,570	
	11.0	92'	13,570	
	11.30	92'	13,570	
	12.0	91'	13,570	
26.6.33	12.30.a.m.	92'	13,570	
	1.0	89'	13,570	
	1.30	89'	13,570	
	2.0	89'	13,570	
	2.30	88'	13,570	
	3.0	87'	13,570	
	3.30	87'	13,570	
	4.0	87'	13,570	
	4.30	87'	13,570	
	5.0	87'	13,570	
	6.0	86'	13,570	
	6.30	86'	13,570	
	7.0	86'	13,570	
	8.0	87'	13,570	
	8.30	87'	13,570	
	9.0	87'	13,570	
	10.0	87'	13,570	

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DATE	TIME	WATER LEVEL	G.P.H.	REMARKS
26.6.53.	2.0.p.m.	87'	13,570	Clear
	3.0	87'	13,570	
	4.0	87'	13,570	
	4.30	89'	13,570	
	5.0	89'	13,570	
	6.0	90'	13,570	
	7.0	90'	13,570	
	8.0	90'	13,570	
	9.0	90'	13,570	
	10.0	90'	13,570	
	11.0	90'	13,570	
	12.0	90'	13,570	
27.6.53	1.0.a.m.	90'	13,570	
	2.0	90'	13,570	
	3.0	89'	13,570	
	4.0	89'	13,570	
	5.0	89'	13,570	
	6.0	89'	13,570	
	7.0	89'	13,570	
	8.0	87'	13,570	
	9.0	87'	13,570	
				Stopped Pump to tighten fan belt on Generator.
	9.50	70'	16,220	
	10.0	80'	16,220	
	10.15.	98'	15,530	
	10.30	100'	14,850	
	10.45	100'	14,850	
	11.0	100'	14,850	
	12.0	92'	13,570	
	1.0.p.m.	86'	13,570	
	2.0	80'	13,570	
	3.0	83'	13,570	
	4.0	80'	13,570	
	5.0	80'	13,570	
	6.0	80'	13,570	
	7.0	80'	13,570	
	8.0	80'	13,570	
	9.0	82'	13,570	
	10.0	81'	13,570	
	10.30			Pump stopped. Renewed Fan Belt for Water Pump on Diesel Engine
	12.15	65'	17,650	Clear
28.6.53.	1.0.a.m.	80'	13,570	
	2.0	89'	13,570	
	3.0	86'	13,570	
	4.0	85'	13,570	
	5.0	85'	13,570	
	6.0	85'	13,570	
	7.0	85'	13,570	
	8.0	85'	13,570	
	9.0	87'	14,220	
	10.0	87'	14,220	
	11.0	88'	14,220	
	12.0	89'	14,220	
	1.0.p.m.	90'	14,220	
	2.0	90'	14,220	
	3.0	90'	14,220	
	4.0	89'	14,220	
	5.0	89'	14,220	
	6.0	88'	14,220	

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...ns	TIME	WATER LEVEL	G.P.H.	REMARKS
2.6.53.	8.0.p.m.	87'	14,220	Clear
	9.0	87'	14,220	
	10.0	87'	14,220	
	11.0	87'	14,220	
	12.0	87'	14,220	
3.6.53.	1.0.a.m.	87'	14,220	
	2.0	86'	14,220	
	3.0	86'	14,220	
	4.0	86'	14,220	
	5.0	86'	14,220	
	6.0	86'	14,220	
	7.0	86'	14,220	
	8.0	87'	14,220	
	9.0	88'	14,220	
	10.0	88'	14,220	
	11.0	88'	14,220	
	12.0	89'	14,220	
	1.0.p.m.	90'	14,220	
	2.0	90'	14,220	
	3.0	90'	14,220	
	4.0	90'	14,220	
	5.0	90'	14,220	
	6.0	90'	14,220	
	7.0	91'	14,220	
	8.0	91'	14,220	
	9.0	90'	14,220	
	10.0	89'	14,220	
	11.0	89'	14,220	
	12.0	88'	14,220	
4.6.53.	1.0.a.m.	89'	14,220	
	2.0	89'	14,220	
	3.0	89'	14,220	
	4.0	89'	14,220	
	5.0	89'	14,220	
	6.0	89'	14,220	
	7.0	89'	14,220	
	8.0	89'	14,220	
	9.0	90'	14,220	
	10.0	90'	14,220	
	11.0	90'	14,220	
	12.0	90'	14,220	
	1.0.p.m.	91'	14,220	
	2.0	91'	14,220	
	3.0	93'	14,220	
	4.0	92'	14,220	
	5.0	92'	14,220	
	6.0	92'	14,220	
	7.0	92'	14,220	
	8.0	92'	14,220	
	9.0	92'	14,220	
	10.0	91'	14,220	
	11.0	90'	14,220	
	12.0	90'	14,220	
5.6.53.	1.0.a.m.	90'	14,220	
	2.0	90'	14,220	
	3.0	90'	14,220	
	4.0	90'	14,220	
	5.0	90'	14,220	
	6.0	90'	14,220	
	7.0	90'	14,220	
	8.0	90'	14,220	

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DATE	TIME	WATER LEVEL	G.P.H.	REMARKS
1953.	1.0.p.m.	93'	14,220	Clear
	2.0	94'	14,220	
	3.0	94'	14,220	
	4.0	94'	14,220	
	5.0	94'	14,220	
	6.0	94'	14,220	
	7.0	94'	14,220	
	8.0	94'	14,220	
	9.0	94'	14,220	
	10.0	93'	14,220	
	11.0	93'	14,220	
	12.0	93'	14,220	
1953.	1.0.a.m.	93'	14,220	
	2.0	93'	14,220	
	3.0	92'	14,220	
	4.0	92'	14,220	
	5.0	92'	14,220	
	6.0	92'	14,220	
	7.0	91'	14,220	
	8.0	92'	14,220	
	9.0	92'	14,220	
	10.0	93'	14,220	
	11.0	93'	14,220	
	12.0.	93'	14,220	Pump Stopped.

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BOROUGH OF CHIPPENHAM. Appendix No.

Borough Surveyor and Water Engineer's Report
October 1953.

Report on the completion of the Trial Borehole at Patterdown.

It will be remembered that it was recently agreed with the Calne and Chippenham R. D. C. to endeavour to obtain an additional source of water to supply their Eastern Area scheme with a maximum of 600,000 gallons per day.

Briefly the Agreement was that the Borough Council would undertake to sink the borehole at Patterdown, and, if it was successful, to develop this source and produce the 600,000 gallons per day required as part of the Borough Undertaking. The R. D. C. would pay for the water at terms and conditions to form part of another agreement. It was also agreed that if the Patterdown Borehole proved abortive, the R.D.C. would meet the cost of the works abandoned.

A contract for a 9" diameter trial borehole, and, if successful, a 36" diameter borehole was let to Messrs. John Thom Ltd. The Contract sum was £13,898.

Boring of the trial borehole to a depth of 294 feet has been completed and the rocks passed through have been examined by the Geological Survey and they report that the rocks are identified as follows:-

	Thickness.	Depth.
Drift and Kellaways Beds.	14' 0"	14' 0"
Cornbrash	22' 6"	36' 6"
Forest Marble	86' 4"	122' 10"
Bradford Clay	8' 2"	130' 8"
Great Oolite (Bath Stone)	78' 9"	209' 9"
Upper Fuller's Earth	79' 0"	288' 9"
Fuller's Earth Rock	5' 3"	294' 0"

The first attempt to test the yield of this borehole by pumping failed because the pump became choked and possibly damaged by silt in the borehole which was found to have accumulated to a height of some 82 feet above the bottom of the borehole. When the pump was removed this silt was exhausted by an air lift pump.

The pumping test was commenced on the 25th June, 1953 and finished on the 2nd July, 1953. The water level in the borehole was depressed from the rest level of 46 feet below ground level to 94 feet below ground level by raising 14,220 gallons per hour during the period of the test.

An extract of the readings of the pumping test as supplied by the Contractor and checked by the Council's staff are as follows:-

Date.	Time.	Water Level.	G. P. H.
25. 6. 53	4 p.m.	104'	14,850
	8 p.m.	98'	13,570
	12 p.m.	91'	13,570
26. 6. 53.	4 a.m.	87'	13,570
	8 a.m.	87'	13,570
	12 a.m.	87'	13,570
	4 p.m.	87'	13,570
	8 p.m.	90'	13,570
	12 p.m.	90'	13,570

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Appendix No. 1. (Contd.)

Date.	Time.	Water Level	G.P.H.	
27.6.53.	4 a.m.	89'	13,570	
	8 a.m.	87'	13,570	
	12 a.m.	92'	13,570	
	4 p.m.	80'	13,570	
	8 p.m.	80'	13,570	
	12 p.m.	65'	17,650	
28.6.53.	4 a.m.	85'	13,570	
	8 a.m.	85'	13,570	
	12 a.m.	89'	14,220	
	4 p.m.	89'	14,220	
	8 p.m.	87'	14,220	
	12 p.m.	87'	14,220	
29.6.53.	4 a.m.	86'	14,220	
	8 a.m.	87'	14,220	
	12 a.m.	89'	14,220	
	4 p.m.	90'	14,220	
	8 p.m.	91'	14,220	
	12 p.m.	88'	14,220	
30.6.53.	4 a.m.	89'	14,220	
	8 a.m.	89'	14,220	
	12 a.m.	90'	14,220	
	4 p.m.	92'	14,220	
	8 p.m.	92'	14,220	
	12 p.m.	90'	14,220	
1.7.53.	4 a.m.	90'	14,220	
	8 a.m.	90'	14,220	
	12 a.m.	93'	14,220	
	4 p.m.	94'	14,220	
	8 p.m.	94'	14,220	
	12 p.m.	93'	14,220	
2.7.53.	4 a.m.	92'	14,220	
	8 a.m.	92'	14,220	
	12 a.m.	93'	14,220	Pump stopped.

The pump was stopped at 12 noon on the 2nd July 1953 and the water level recovered as follows:-

Water Level Below Ground.	Time.
94 ft.	Pump stopped.
87 ft.	30 secs.
85 ft.	1 min.
82 ft.	2 min.
81 ft.	3 min.
80½ft.	4 min.
80 ft.	5 min.

Samples of the water from this borehole taken during the test on the 29th June have been examined by The Counties Public Health Laboratories and a copy of their report is attached.

During this period of seven days pumping there occurred several indications that close mechanical sympathy existed between water in this borehole and the water in the Council's sources at Ivyfields. I therefore invited Dr. Buchan of the Geological Survey and Mr. Witham the Engineer to the Calne & Chippenham R.D.C. to meet me with the Contractors for the Borehole. This meeting took place on the 8th July and on the information available from the boring and the test pumping including the probable effect to be expected at the Council's existing sources by the development of the Patterdown Borehole, it was agreed that the Borough and the Rural District Councils should be advised not to proceed with the further development of the Patterdown Borehole before obtaining further detailed evidence of the water available in the underground sources of this area. To obtain this information it was agreed that a series of pumping tests should be undertaken in the sources of the Chippenham Borough and that the effect of these tests observed on other boreholes in the district.

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Appendix No. 3 (contd).

During the period from the 15th to 24th July I arranged to carry out detailed tests on the existing sources at Westmead and Ivyfields, and at the same time obtain information from other Boreholes in the district.

The tests comprised pumping separately each of the Council's Boreholes, and finally by pumping all the Boreholes together. To avoid interference by other users of underground water, the tests were carried out mainly at nighttime. All the information obtained has been submitted to Dr. Buchan for consideration of his staff who have experience of similar sources throughout the country.

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Appendix No. II (Contd.)

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THE COUNTIES PUBLIC HEALTH LABORATORIES.

66, Victoria Street,
London. S. W. 1.

21st July, 1953.

Reference H/RH/40.

REPORT ON THE ANALYSIS OF A SAMPLE OF WATER

Received on the 29th June, 1953.

From: BOROUGH OF CHIPPENHAM.

Labelled: Trial Borehole, Patterdown, delivery of test pump.

This sample has slight opalescence and deposit, the turbidity being appreciable but not pronounced, a condition which no doubt relates to the recent date of construction of the borehole.

The water is neutral in reaction, very hard in character though not excessively so, contains no excess of salinity or mineral constituents in solution and it is free from metals apart from a negligible trace of iron. It is of the highest standard of organic quality.

From the aspect of the chemical analysis these results are indicative of a pure and wholesome water suitable for public supply purposes.

(Signed) Gordon Miles.

1 (A)

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST97SW

265/202

Appendix No. 1.

Copy.

THE COUNTIES PUBLIC HEALTH LABORATORIES.
66, Victoria Street,
London. S. W. 1.

Analysis of a sample of water received 29.6.53 Ref. H/RN/40.
from BORCUGH OF CHIPPENHAM
labelled Trial Borehole, Patterdown, delivery of test pump. date 29.6.53 11.30 am.

Taken by C.R.Phillips. Witness A. Pettitt. Signed C. R. Phillips.

CHEMICAL RESULTS EXPRESSED IN PARTS PER MILLION.

Appearance Slight opalescence with a white deposit of chalk and siliceous particles.

Turbidity.....6

Colour	Nil	Odour	Nil	Taste	Normal
pH	7.3		Free Carbon Dioxide		18
Electric Conductivity	610		Alkalinity as $CaCO_3$		255

Ca	Mg	Na	CO_3	SO_4	Cl	NO_3	SiO_2
120	6.3	11	153	58	24	0.0	10

102			153	
18				43
	3.8			15
	2.5			
		11		

		Chloride	
			7
			17

Hypothetical Combinations

Calcium carbonate	255
Calcium sulphate	61
Magnesium sulphate	19
Magnesium chloride	10
Sodium chloride	28
Silica	10
Difference	17

Total solid constituents dried at 180° C. 400

Hardness - Total	325	Carbonate	255	Non-carbonate	70
Nitrate Nitrogen	0.0		Nitrite Nitrogen		Absent
Ammoniacal Nitrogen	0.010		Oxygen absorbed		0.25
Albuminoid Nitrogen	0.000		Residual chlorine:		Absent
Metals Iron:	0.05		Selenium (Se): Absent (less than 0.5)		
Fluoride (F)	0.7				

(Signed) Gordon Miles.

21st July, 1953.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

265/202

ST97/17

Vertical scale being 20 ft to 1 in.
Horizontal Scale 10 ft to 1 in.

From Boro' of Chippenham Borough Council Offices
Ref. 1143. Date. 4.4.55

Contact BGS: ngdc@bgs.ac.uk

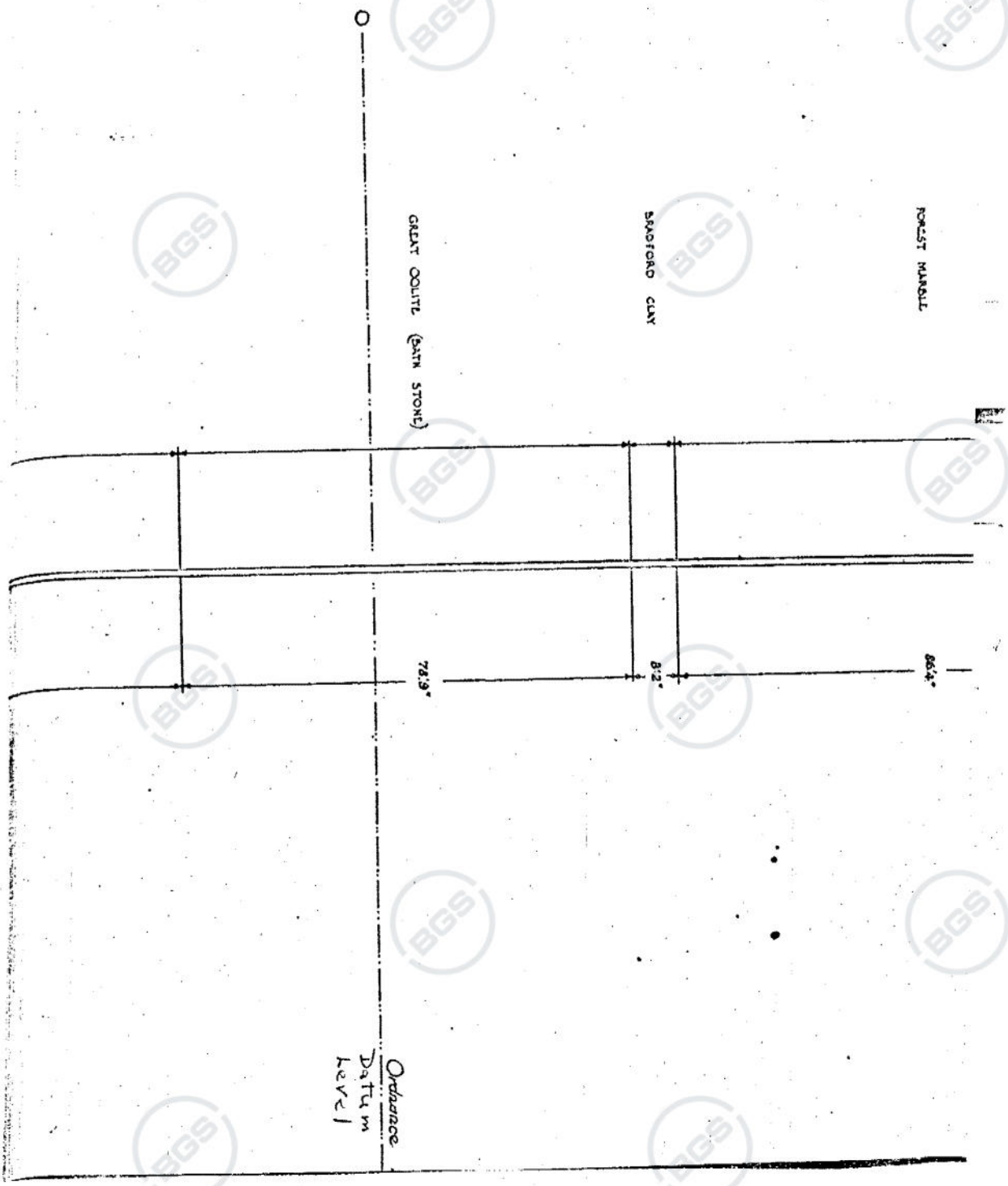
British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST97SW

265/202

ST97/



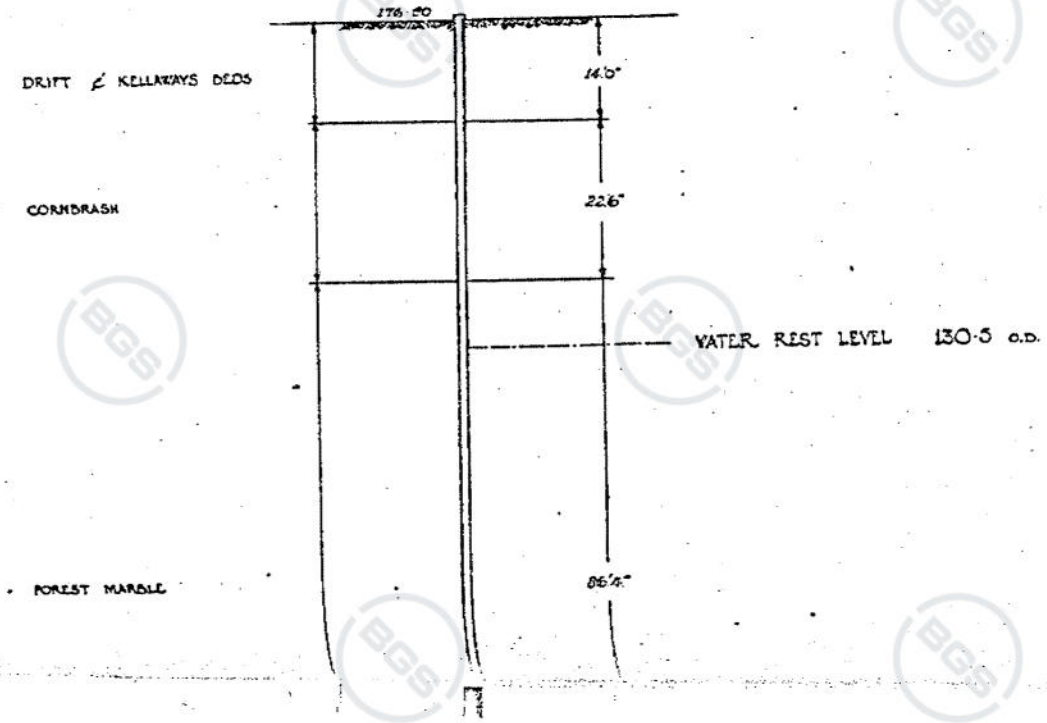
Contact BGS: ngdc@bgs.ac.uk

STEN

265/202

PATTERDOWN TRIAL BOREHOLE

9" DIAMETER.



265/202

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370
Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
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British National Grid (27700) : 390770,171370

ST97

265/202

202

ST97

A description of the Strata pierced should be given as follows:-

	Thickness of each Stratum		Total depths from the surface	
	Feet	Inches	Feet	Inches.
Drift & Kellaways Beds.	14	0	14	0
Cornbrash	22	6	36	6
Forest Marble	86	4	122	10
Bradford Clay	8	2	130	8
Great Oolite (Bath stone)	78	9	209	9
Upper Fullers Earth	79	0	288	9
Fullers Earth Rock	5	3	294	0

A Section to scale showing the size of the well or boring, strata pierced, rest level of water, and other particulars, should also be forwarded to the Ministry.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST97 13

To be furnished in Triplicate

265 / ST97 202

WELLS AND BOREHOLES.

Information to be supplied (intriplicate to the Ministry of Housing and Local Government

Name of District	Chippenham Borough Council
If the District is a Rural District, name of Contributory Place concerned.	
Level of surface of ground above Ordnance Datum.	176.50 (O.D)
Depth and diameter of shaft or boring, or of each	Trial hole only 294' of 9" dia.
Depth or depths at which water was found	46'0"
Estimated Quantity of Water required in Gallons per day	600,000 g.p.d. with fully developed 30" diam. borehole.
Yield of Water in gallons per diem, as ascertained by continuous pumping during 7 days or otherwise.	341,300 g.p.d.
Level of water above Ordnance Datum at commencement of pumping	130.50 (O.D)
Level of water above Ordnance Datum at cessation of pumping	82.50 (O.D)
Time taken for water to return to original rest level after pumping ceased	Returned to 96.50 O.D. within 5 minutes.
A tabulated Statement should be sent showing the quantity of water pumped in each 24 hours during the duration of the test together with the level of the water above Ordnance Datum at the end of each day. If there should be any stoppage, the reason and duration should be stated.	This is attached.
Limit of deviation from vertical as specified in inches per 100 feet.	4" None specified
Deviation as ascertained by measurement	None taken.
Distances of the well or borehole from any other known wells or boreholes in the neighbourhood.	1. Nestles 1.6 miles 2. Ivyfields Station 1.2 " 3 Harris's Langley Burrell 2.8
Quality. (Copies of chemical and bacteriological analyses should be annexed. Information as to the mineral constituents of the water is desirable)	This is attached.
A 6" to the miles Ordnance map showing (in red) the precise situation of the well or borehole	
Date of Completion of well or borehole.	Test completed 2.7.53.
Well or borehole sunk by	Messrs. John Thom Ltd. Patricroft, Nr. Manchester.

Signed .....[redacted]..

Date .....15th April 1955.....

Normally the pumping test should be continuous over a period of 14 days.
This form should be signed by the Engineer for the proposed works.

K.20a. P.T.O.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

ST97/17

MJB 10/1093

MJB 1/49

Table 5.1

Transmissivity calculated from specific capacity determinations

Locality and well number	Aquifer	Discharge l/s (g.p.h.)	Drawdown m.(ft.)	Time in days. *Assumed 1 day where not given	Spec. Capacity l/s per m. (g.p.h./ft.)	Transmissivity m^2/d (g.p.d./ft.)
ST944 873 Milbourne Farm 202	ST98/5 Forest Marble	1 (800)	4.2 (14)	*1	0.25(57.1)	35.3 (2,370)
ST923 841 Corston 99	ST98/9B Forest Marble	1.8 (1400)	20.3(66)	14	0.87(210)	146 (9,810)
ST9416 8230 Grove Farm 188	ST98/14 Forest Marble	1.1 (850)	28.9(95)	0.3	.04 (8.9)	5.3 (354)
ST9580 8250 West Street Fm. 232	ST98/36 Forest Marble	1.6 (1,232)	16.8(55)	0.3	.09 (22.4)	13 (875)
ST9430 8010 Harding Farm 87	ST98/54 Great Oolite	1.6 (1,240)	17.1(56)	0.3	.09 (22.4)	13 (875)
ST9410 7850 Sutton Benger 81	ST97/8A/B Great Oolite	4.9 (3,890)	33.2(109)	0.3	0.15(35.4)	20.8 (1,395)
ST9221 7365 United Dairies 30	ST97/11 Great Oolite	4.4 (3,500)	28.3(93)	0.3	0.15(37.6)	22.1 (1,482)
ST 8778 6552 Hayes Atworth 12a	ST86/39 Great Oolite	0.6 (500)	27.7(91)	5	.02 (5.4)	3.9 (260)
ST9038 7103 Thingley Junction 21	ST97/15 Great Oolite	2.52 (2,000)	0.6 (2)	0.3	4.1 (1,000)	587 (39,400)
Ivyfield, 3 25	ST97/19C Great Oolite	215 (170,700)	19.8 (65)	3.9	10.8(2,626)	162 (10,900)
Ivyfield, 2 25	ST97/19B Great Oolite	25.2 (20,000)	1.1 (3.5)	.04	23.6(5,714)	2,540(170,700)
Westmead, 4 26	ST97/19D Great Oolite	25.2 (20,000)	36.3(120)	.04	4.1 (990)	480 (32,300)
Ivyfield, 5 25	ST97/19E Great Oolite	25.2 (20,000)	1.8 (6)	.04	13.8(3,333)	1,634(109,700)
ST 8690 8679 Park Farm 115	ST88/8 Great Oolite	1.3 (1,064)	3 (10)	0.3	0.4 (106)	62 (4,192)
ST949 876 Milbourne 114	ST98/25 Great Oolite	53.6 (42,600)	12.2(40)	1	4.4 (1,065)	378 (25,500)
ST 973 892 Charlton 115	ST98/1 Great Oolite	76 (60,400)	10.4(34.2)	0.1	7.3 (1,766)	844 (56,900)
Chavenage 130	ST89/14 Great Oolite	1.5 (1,200)	5.2 (17)	*1	0.29(70.6)	46.6 (3,150)
ST 937 841 Rodbourne 98	ST98/2A Great Oolite	32.6 (25,900)	3.8 (12)	.08	8.6 (2,072)	1,225(82,200)
ST90767136 Patterdown 22	ST97/17 Great Oolite	17.9 (14,220)	14.6(48)	7	1.2 (296)	205 (13,500)
Lacock 15	ST96/5? Great Oolite	50.4 (40,000)	1.6 (5.4)	1	30.6(7,407)	4,008(260,900)
Holt No. 1 3 ST 87006255	ST86/1 Great Oolite	12.5 (9,950)	2.9 (9.5)	.33	4.3 (1,047)	536 (36,000)
ST8599 6211 Holt No. 2 2	ST86/9C Great Oolite	25.2 (20,000)	3.9 (12.8)	1	6.5 (1,562)	847 (56,500)
Holt No. 2 2	Great Oolite	108.4(86,000)	32.9(108)	1	3.3 (796)	431 (28,900)
ST 8681 8040 Grittleton 85	ST88/2 Great Oolite	1.3 (1,050)	3 (10)	*1	.43 (105)	65.2 (4,378)

Continue

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397656 : BGS Reference: ST97SW14
British National Grid (27700) : 390770,171370

MJB/D/1094
MJB1/49

Table 5.1 (Continued)

Locality and well number	Aquifer	Discharge l/s (g.p.h.)	Drawdown m.(ft.)	Time in days. *Assumed 1 day where not given	Spec. Capacity l/s per m. (g.p.h./ft.)	Transmissivity m^2/d (g.p.d./ft.)
Goodshill (a) 13 ST 887 672	ST86/59 Great Oolite	2.0 (1,650)	4.3 (14)	14	.48 (117)	77.5 (5,200)
Goodshill (b) 13	Great Oolite	5 (3,954)	5.2 (17)	14	.96 (232)	153 (10,304)
Atworth Engineering 11 ST 8691 6587	ST86/37 Great Oolite	1.9 (1,500)	2.1 (7)	*1	.88 (214)	133 (8,925)
Crows Hall Farm 104 ST 776 840	ST78/8 Great Oolite	0.6 (500)	2.1 (7)	.5	.3 (71.4)	37.6 (2,525)
Long Furlong Farm 125 ST 8764 9223	ST89/33 Great Oolite	0.6 (510)	8.8 (29)	*1	.07 (17.5)	11.6 (780)
Wilts Bacon 139 ST 920 738	ST97/12 Great Oolite & Inf. Oolite	2.2 (1,750)	79 (260)	*1	.03 (6.7)	3.6 (245)
Long Newnton 153 ST917 913	ST99/36A/B Inf. Oolite	30.1 (23,900)	19.5(64)	3.2	1.5 (373)	229 (15,413)
Oldford (not on map)	ST75/8A Inf. Oolite	33.1 (26,300)	1.7 (5.5)	1	19.6(4,747)	2,249(151,00
Westonbirt 154	Inf. Oolite	5 (4,000)	14 (46)	.04	5.0 (1,219)	694 (46,584
Ilsom Estate 165 ST9075 9456	ST99/50B Inf. Oolite	1.9 (1,500)	12.4(41)	1	0.14(36)	24.2 (1,622
Manor Farm 158 ST927 927	ST99/5B Inf. Oolite	0.76 (600)	1.8 (6)	1	0.4 (100)	62.5 (419
Upton Grove 162 ST8822 9550	ST89/20 Inf. Oolite	.4 (320)	8.5 (28)	.5	.05 (11.4)	7.15 (480
Tetbury (a) 161 ST8609 946	ST89/25A Inf. Oolite	11.3 (9,000)	4.6 (15)	*1	2.5 (600)	372 (25,
Tetbury (b) 161	ST89/25B Inf. Oolite	12.6 (10,000)	7 (23)	*1	1.8 (433)	270 (18,13
West End Town Farm 143 ST787 742	ST77/14 Inf. Oolite	.75 (600)	5.8 (19)	3	0.13(31.5)	22.1 (1,4

Values not corrected for well loss because of low discharges

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397657 : BGS Reference: ST97SW15
British National Grid (27700) : 391120,171030

RECORD OF WELL (SHAFT OR BORE)

(attach copy of analysis if available)

N. 4386
ST97SW/15
9112 7103
65/199

EXACT SITE OF WELL

At GLEN'S NURSERIES
PATTERDOWN ST 9112 7103
Town or Village CHIPPENHAM
County WILTS Six-inch quarter sheet 26 NW/E
For Messrs. W. GLEN & SONS. State whether owner, tenant, builder, contractor, consultant, etc. :—
Address (if different from above)
Level of ground surface above sea-level (O.D.) 16 ft. If well-top is not at ground level, state how far ... {above; below; ft.
SHAFT ft.; diameter ft.; Details of headings
BORE 100 ft.; diameter of bore: at top 6 ins.; at bottom ins.
Details of permanent lining tubes

TEST CONDITIONS

Water struck at depths of ft. below well-top.
Rest-level of water ft. above/below well-top. Suction at ft. Yield on hours'/days' test
pumping at 1,800 galls. per hour with depression to ft. below well-top.
Recovery to rest-level in mins./hours Capacity of pump g.p.h. Date of measurements

NORMAL CONDITIONS

Description of permanent pumping equipment :
Make and/or type Motive power
Capacity gallons per hour. Suction at ft.
Amount pumped galls. per day. Estimated consumption galls. per week.
Well made by Date of well July 1946
Information from NE/265

ADDITIONAL NOTES

Sited on Wilts 26 NW/E.
19.11.51. ATV.

Returns sent in connection with Section 6 of Water Act dated 18/6/54. refer to "Borehole" "Surface Well" and "Borehole Well". REG

LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.		Date Received	1" O.S. Map No.	Site marked on 1" Map	(use symbol) on 6" Map
		14.11.51		○	○

(*35243) Wt.44731/0424 12,000 3/48 A.& E.W.Ltd. Gp.685

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397657 : BGS Reference: ST97SW15
British National Grid (27700) : 391120,171030

ST97SW 15.

(For Survey use only) Geological Classification	NATURE OF STRATA If measurements start below ground surface, state how far ...	Thickness Feet	Thickness Inches	Depth Feet	Depth Inches
	Soil	1	6	1	6
	Rough Gravel —	3	6	5	0
	Gravel	5	0	10	0
	Grained stone	2	0	12	0
	Sand and Grave (W)	5	0	17	0
	Blue clay	21	0	38	0
	Blue clay and stone bands	6	0	44	0
	Blue clay	10	0	54	0
	Blue stone	2	0	56	0
	Blue clay	4	0	60	0
	Blue and brown stone (W)	40	0	100	0

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397657 : BGS Reference: ST97SW15
British National Grid (27700) : 391120,171030

RECORD OF WELL (SHAFT OR BORE)

(attach copy of analysis if available)

For Survey use only
N. 4386

265/198

EXACT SITE OF WELL

At GLEN'S' NURSERIES

PATTERDOWN ST 9112 7103

Town or Village CHIPPENHAM

County WILTS Six-inch quarter sheet 26 NW/E

For Messrs. N. GLEN & SONS. State whether owner, tenant, builder, contractor, consultant, etc. :—

Address (if different from above) ST97/16.

Level of ground surface above sea-level (O.D.) 160-155 ft. If well-top is not at ground level, state how far ... {above; below; ft.

SHAFT ft.; diameter ft.; Details of headings

BORE 100 ft.; diameter of bore: at top 6 ins.; at bottom ins.

Details of permanent lining tubes

Water struck at depths of ft. below well-top.

TEST CONDITIONS

Rest-level of water ft. {above; below} well-top. Suction at ft. Yield on {hours'; days'} test pumping at 1,800 galls. per hour with depression to ft. below well-top.

Recovery to rest-level in {mins.; hours} Capacity of pump g.p.h. Date of measurements

NORMAL CONDITIONS

Description of permanent pumping equipment:

Make and/or type Motive power

Capacity gallons per hour. Suction at ft.

Amount pumped galls. per day. Estimated consumption galls. per week.

Well made by Date of well July 1946

Information from WE/265

ADDITIONAL NOTES

Sited on Wilts 26 NW/E.
19.11.51. ATV.

Returns sent in connection with Section 6 of Water Act dated 18/6/54 refer to "Borehole", "Surface Well" and "Borehole Well". REP.

LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.		Date Received	1" O.S. Map No.	Site marked (use symbol) on 1" Map	on 6" Map
		14.11.51			

*35243) W1.44731/0424 12,000 3/48 A.&E.W.Ltd. Gp.695

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397657 : BGS Reference: ST97SW15
British National Grid (27700) : 391120,171030

(For Survey use only) Geological Classification	Nature of Strata If measurements start below ground surface, state how far ...	Thickness Feet ...	 Inches ...	Depth Feet	 Inches
	Soil	1	6	1	6
	Rough Gravel	3	6	5	0
	Gravel	5	0	10	0
	Gravel stone	2	0	12	0
	Sand and Grave (W)	5	0	17	0
	Blue clay	21	0	38	0
	Blue clay and stone bands	6	0	44	0
	Blue clay	10	0	54	0
	Blue stone	2	0	56	0
	Blue clay	4	0	60	0
	Blue and brown stone (W)	40	0	100	0

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397663 : BGS Reference: ST97SW21
British National Grid (27700) : 390800,171460

ST 97 SW/21
9080 7146

6815

BOREHOLE RECORD

Chippenham
A 2

18.2.74
D. Robb
CPT
0.70m.
1.52

S & A
150mm.

63.5 kg

Water encountered at 1.52m. a.m. 18.2
Water level p.m. Nil 18.2

	D				Top Soil
1	D				Soft to firm brown grey clay with medium to fine subrounded limestone gravel
				SWL	
2	D	CPT	12.12.15.20		Sub angular coarse medium and fine fossilised limestone with some clay
		CPT	16.20.26.30		
3	D	CPT	No pen		

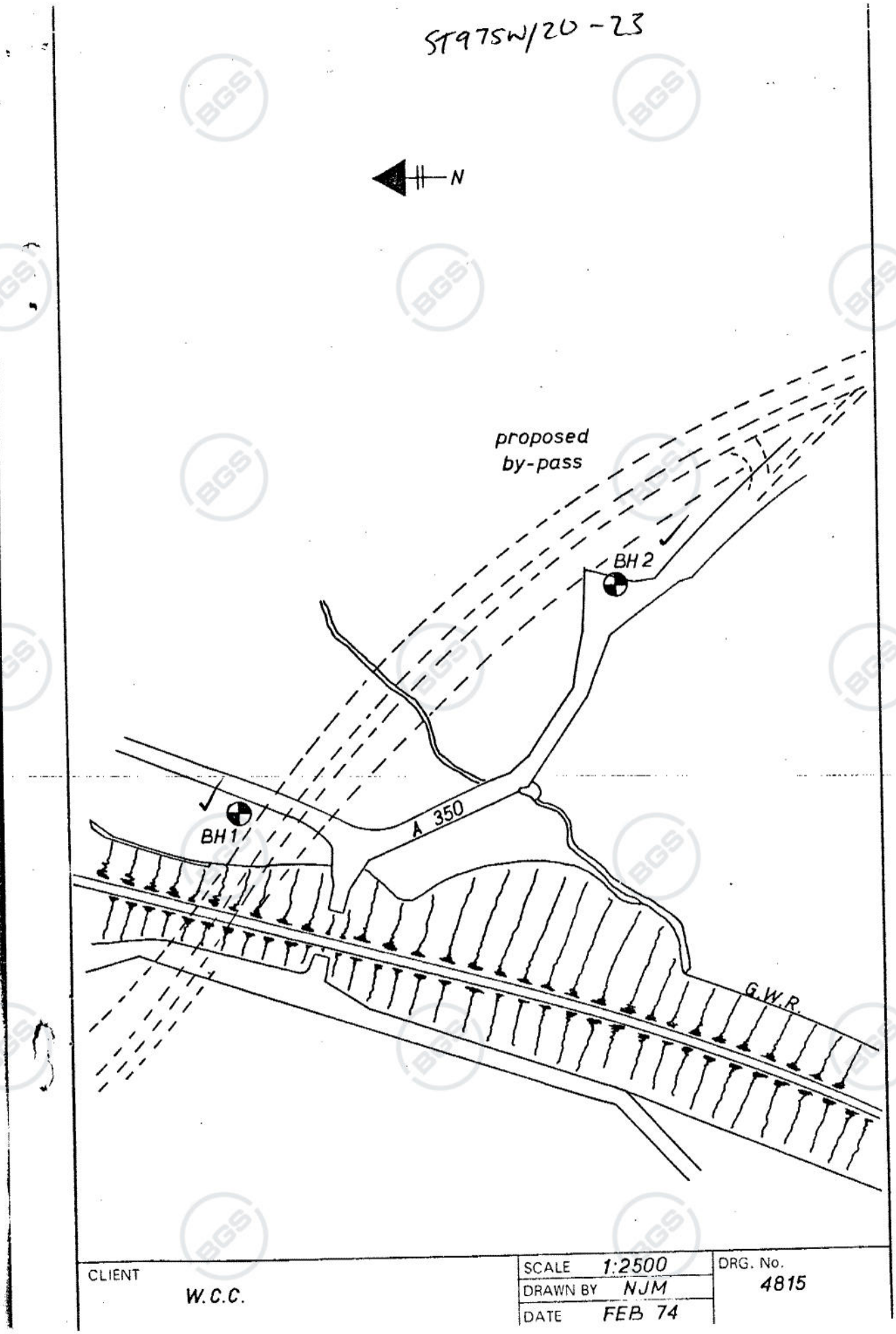
Borehole terminated at 3.05m. Limestone rock

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397663 : BGS Reference: ST97SW21
British National Grid (27700) : 390800,171460

ST97SW/20 - 23



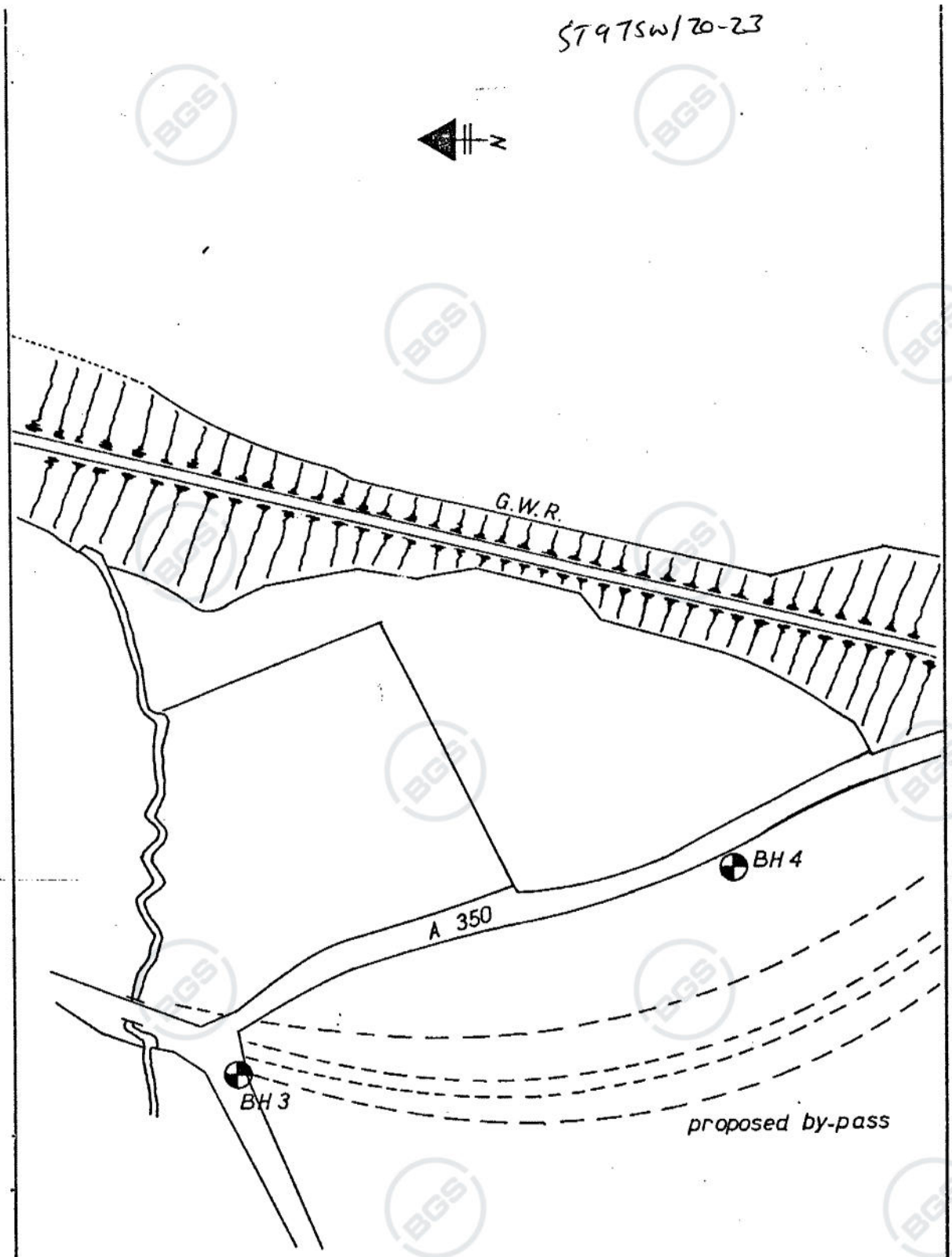
CLIENT W.C.C.	SCALE 1:2500	DRG. No. 4815
	DRAWN BY NJM	
	DATE FEB 74	

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397663 : BGS Reference: ST97SW21
British National Grid (27700) : 390800,171460

ST 97 SW/20-23



CLIENT W.C.C.	SCALE 1:2500	DRG. No. 4815
	DRAWN BY NJM	
	DATE FEB 74	

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397893 : BGS Reference: ST97SW251
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9 I	10 J	11 K	12 L	13 M	14 N	15 O	16 P	17 Q	18 R	19 S	20 T	21 U
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 251

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397886 : BGS Reference: ST97SW244
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 JJ	36 KK	37 LL	38 MM	39 NN	40 OO
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW244

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397870 : BGS Reference: ST97SW228
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST 97 SE 228

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397882 : BGS Reference: ST97SW240
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW240

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397887 : BGS Reference: ST97SW245
British National Grid (27700) : 390600,171300

LINE A.

265

	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H
Ft 0 - 1	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Brown Loam	Sandy Loam
1 - 2	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'4"	Clay Gravel, Rock at 1'4"	Gravel, Clay Rock at 1'8"	Gravel, Clay Rock at 1'8"	Loam with Sandy clay	Sandy Loam.
2 - 3					Gravel, Rock at 2'0"		Brown sandy clay with gravel	Sandy Loam with sandy clay
3 - 4							Gravel, Rock at 3'2"	Sandy Loam with sandy clay
4 - 5								Yellow Brown clay with little sand

ST 906 713

ST 97 12 28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397878 : BGS Reference: ST97SW236
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9 I	10 J	11 K	12 L	13 M	14 N	15 O	16 P	17 Q	18 R	19 S	20 T	21 U
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 236

Contact BGS: ngdc@bgs.ac.uk

BGS British Geological Survey

BGS ID: 397897 : BGS Reference: ST97SW255
British National Grid (27700) : 390600,171300

LINE A.

265/1997

	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H
Ft 0 - 1	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Brown Loam	Sandy Loam
1 - 2	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'4"	Clay Gravel, Rock at 1'4"	Gravel, Clay Rock at 1'8"	Gravel, Clay Rock at 1'8"	Loam with Sandy clay	Sandy Loam.
2 - 3					Gravel, Rock at 2'0"		Brown sandy clay with gravel	Sandy Loam with sandy clay
3 - 4							Gravel, Rock at 3'2"	Sandy Loam with sandy clay
4 - 5								Yellow Brown clay with little sand

ST 906 713
ST 97 128

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397865 : BGS Reference: ST97SW223
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9	10	11	12	13	14	15	16	17	18	19	20	21
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 223

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397888 : BGS Reference: ST97SW246
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW246

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397868 : BGS Reference: ST97SW226
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW226

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397891 : BGS Reference: ST97SW249
British National Grid (27700) : 390600,171300

LINE A.

265

	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H
Ft 0 - 1	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Brown Loam	Sandy Loam
1 - 2	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'4"	Clay Gravel, Rock at 1'4"	Gravel, Clay Rock at 1'8"	Gravel, Clay Rock at 1'8"	Loam with Sandy clay	Sandy Loam.
2 - 3					Gravel, Rock at 2'0"		Brown sandy clay with gravel	Sandy Loam with sandy clay
3 - 4							Gravel, Rock at 3'2"	Sandy Loam with sandy clay
4 - 5								Yellow Brown clay with little sand

ST 906 713

ST 97 128

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397890 : BGS Reference: ST97SW248
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW248

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397874 : BGS Reference: ST97SW232
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW232

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397875 : BGS Reference: ST97SW233
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9 I	10 J	11 K	12 L	13 M	14 N	15 O	16 P	17 Q	18 R	19 S	20 T	21 U
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 233

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397871 : BGS Reference: ST97SW229
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9	10	11	12	13	14	15	16	17	18	19	20	21
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST97/28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397861 : BGS Reference: ST97SW219
British National Grid (27700) : 390600,171300

LINE C.

265/199

	21 V	22 W	23 X	24 Y	25 Z	26 AB	27 BB
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam
1 - 2	Light Brown clay, some blue clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Brown sandy clay
2 - 3	Light brown clay with a little sand more blue clay	Light brown clay	Red brown loam with some clay	Lighter brown clay with some sand.	Lighter brown clay with some sand	Red brown loam with red sand More clay.	Sandy clay with small gravel, f. shells.
3 - 4	Light brown clay, some blue clay, with a little sand.	Lighter brown clay with a little sand	Lighter brown clay with a some sand.	Lighter brown clay with more red sand in the clay	Lighter brown clay with more red sand in the clay	Lighter brown sandy clay	Red brown sand & gravel, f.shells Rock 3'8".
4 - 5	Sandy clay to rock at 6ft.	Lighter brown clay with more red sand at 5ft.	Lighter brown clay with some sand	Sandy clay, Rock at 5'0"	Sandy clay Rock at 4'4"	Lighter brown sandy clay, more sand. Rock at 4'1".	

ST97/28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397877 : BGS Reference: ST97SW235
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9	10	11	12	13	14	15	16	17	18	19	20	21
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 235

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397876 : BGS Reference: ST97SW234
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW234

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397860 : BGS Reference: ST97SW218
British National Grid (27700) : 390600,171300

LINE C.

265/199

	21 V	22 W	23 X	24 Y	25 Z	26 AB	27 BB
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam
1 - 2	Light Brown clay, some blue clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Brown sandy clay
2 - 3	Light brown clay with a little sand more blue clay	Light brown clay	Red brown loam with some clay	Lighter brown clay with some sand.	Lighter brown clay with some sand	Red brown loam with red sand More clay.	Sandy clay with small gravel, f. shells.
3 - 4	Light brown clay, some blue clay, with a little sand.	Lighter brown clay with a little sand	Lighter brown clay with a some sand.	Lighter brown clay with more red sand in the clay	Lighter brown clay with more red sand in the clay	Lighter brown sandy clay	Red brown sand & gravel, f.shells Rock 3'8".
4 - 5	Sandy clay to rock at 6ft.	Lighter brown clay with more red sand at 5ft.	Lighter brown clay with some sand	Sandy clay, Rock at 5'0"	Sandy clay Rock at 4'4"	Lighter brown sandy clay, more sand. Rock at 4'1".	

ST97/28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397872 : BGS Reference: ST97SW230
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW230

Contact BGS: ngdc@bgs.ac.uk

BGS British Geological Survey

BGS ID: 397883 : BGS Reference: ST97SW241
British National Grid (27700) : 390600,171300

LINE A.

265/1997

Ft	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H
0 - 1	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Brown Loam	Sandy Loam
1 - 2	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'4"	Clay Gravel, Rock at 1'4"	Gravel, Clay Rock at 1'8"	Gravel, Clay Rock at 1'8"	Loam with Sandy clay	Sandy Loam.
2 - 3					Gravel, Rock at 2'0"		Brown sandy clay with gravel	Sandy Loam with sandy clay
3 - 4							Gravel, Rock at 3'2"	Sandy Loam with sandy clay
4 - 5								Yellow Brown clay with little sand

ST 906 713

ST 97 / 28

Contact BGS: ngdc@bgs.ac.uk

BGS British Geological Survey

BGS ID: 397899 : BGS Reference: ST97SW257
British National Grid (27700) : 390600,171300

LINE A.

265/1997

	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H
Ft 0 - 1	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Brown Loam	Sandy Loam
1 - 2	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'4"	Clay Gravel, Rock at 1'4"	Gravel, Clay Rock at 1'8"	Gravel, Clay Rock at 1'8"	Loam with Sandy clay	Sandy Loam.
2 - 3					Gravel, Rock at 2'0"		Brown sandy clay with gravel	Sandy Loam with sandy clay
3 - 4							Gravel, Rock at 3'2"	Sandy Loam with sandy clay
4 - 5								Yellow Brown clay with little sand

ST 906 713

ST 97 128

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397867 : BGS Reference: ST97SW225
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9	10	11	12	13	14	15	16	17	18	19	20	21
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 225

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397864 : BGS Reference: ST97SW222
British National Grid (27700) : 390600,171300

LINE C.

265/199

	21 V	22 W	23 X	24 Y	25 Z	26 AB	27 BB
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam
1 - 2	Light Brown clay, some blue clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Brown sandy clay
2 - 3	Light brown clay with a little sand more blue clay	Light brown clay	Red brown loam with some clay	Lighter brown clay with some sand.	Lighter brown clay with some sand	Red brown loam with red sand More clay.	Sandy clay with small gravel, f. shells.
3 - 4	Light brown clay, some blue clay, with a little sand.	Lighter brown clay with a little sand	Lighter brown clay with a some sand.	Lighter brown clay with more red sand in the clay	Lighter brown clay with more red sand in the clay	Lighter brown sandy clay	Red brown sand & gravel, f.shells Rock 3'8".
4 - 5	Sandy clay to rock at 6ft.	Lighter brown clay with more red sand at 5ft.	Lighter brown clay with some sand	Sandy clay, Rock at 5'0"	Sandy clay Rock at 4'4"	Lighter brown sandy clay, more sand. Rock at 4'1".	

ST97/28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397857 : BGS Reference: ST97SW215
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9 I	10 J	11 K	12 L	13 M	14 N	15 O	16 P	17 Q	18 R	19 S	20 T	21 U
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 215

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397859 : BGS Reference: ST97SW217
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9	10	11	12	13	14	15	16	17	18	19	20	21
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST97/28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397862 : BGS Reference: ST97SW220
British National Grid (27700) : 390600,171300

LINE C.

265/199

	21 V	22 W	23 X	24 Y	25 Z	26 AB	27 BB
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam
1 - 2	Light Brown clay, some blue clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Brown sandy clay
2 - 3	Light brown clay with a little sand more blue clay	Light brown clay	Red brown loam with some clay	Lighter brown clay with some sand.	Lighter brown clay with some sand	Red brown loam with red sand More clay.	Sandy clay with small gravel, f. shells.
3 - 4	Light brown clay, some blue clay, with a little sand.	Lighter brown clay with a little sand	Lighter brown clay with a some sand.	Lighter brown clay with more red sand in the clay	Lighter brown clay with more red sand in the clay	Lighter brown sandy clay	Red brown sand & gravel, f.shells Rock 3'8".
4 - 5	Sandy clay to rock at 6ft.	Lighter brown clay with more red sand at 5ft.	Lighter brown clay with some sand	Sandy clay, Rock at 5'0"	Sandy clay Rock at 4'4"	Lighter brown sandy clay, more sand. Rock at 4'1".	

ST97/28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397879 : BGS Reference: ST97SW237
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9 I	10 J	11 K	12 L	13 M	14 N	15 O	16 P	17 Q	18 R	19 S	20 T	21 U
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 237

Contact BGS: ngdc@bgs.ac.uk

BGS British Geological Survey
BGS ID: 397885 : BGS Reference: ST97SW243
British National Grid (27700) : 390600,171300

LINE A.

265

	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H
Ft 0 - 1	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Brown Loam	Sandy Loam
1 - 2	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'4"	Clay Gravel, Rock at 1'4"	Gravel, Clay Rock at 1'8"	Gravel, Clay Rock at 1'8"	Loam with Sandy clay	Sandy Loam.
2 - 3					Gravel, Rock at 2'0"		Brown sandy clay with gravel	Sandy Loam with sandy clay
3 - 4							Gravel, Rock at 3'2"	Sandy Loam with sandy clay
4 - 5								Yellow Brown clay with little sand

ST 906 713
ST 97 128

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397866 : BGS Reference: ST97SW224
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW224

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397873 : BGS Reference: ST97SW231
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9 I	10 J	11 K	12 L	13 M	14 N	15 O	16 P	17 Q	18 R	19 S	20 T	21 U
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 231

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397892 : BGS Reference: ST97SW250
British National Grid (27700) : 390600,171300

LINE D.

265/100

/	28 CC	29 DD	30 EE	31 FF	32 GG	33 HH	34 JJ	35 KK	36 LL	37 MM	38 NN	39 OO	40
Ft. 0 - 1.	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Red Brown Loam	RedBrown Loam	RedBrown Loam	Loam & Rock.
1 - 2.	Gravel. Rock at 1'8".	Brown sandy clay with small pieces of rock	Brown sandy clay with small pieces of rock.	Brown sandy clay with small pieces of rock	Brown sandy clay with small gravel	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	RedBrown Loam with some sandy clay	Red Brown Loam	RedBrown Loam with some sandy clay	RedBrown Loam with sandy clay	RedBrown Loam with sandy clay	Rock 2ft.
2 - 3		Brown sandy clay with more gravel to rock at 2'8".	Brown sandy clay with more gravel to rock at 2'4"	Brown sandy clay with more gravel to rock at 3'0"	Brown sandy clay with more gravel	Red Brown loam with sandy brown clay	Red Brown loam with sandy brown clay	Sandy brown clay	Red Brown loam with some clay	Red Brown loam with some sandy clay	Loam & clay with gravel	Rock at 2'8"	
3 - 4					Brown sandy clay with rock at 3'2"	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Red Brown loam with some small gravel	Sandy brown clay	RedBrown Loam with some sandy clay to rock at 3'10"	Loamy gravel. Rock at 3'2"		
4 - 5						RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 5ft.	RedBrown Loam with some small gravel Rock at 4'8"	Sandy brown clay to rock at4'4"				

ST97SW250

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 397881 : BGS Reference: ST97SW239
British National Grid (27700) : 390600,171300

LINE A.

265

	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H
Ft 0 - 1	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Brown Loam	Sandy Loam
1 - 2	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'6"	Clay Gravel Rock at 1'4"	Clay Gravel, Rock at 1'4"	Gravel, Clay Rock at 1'8"	Gravel, Clay Rock at 1'8"	Loam with Sandy clay	Sandy Loam.
2 - 3					Gravel, Rock at 2'0"		Brown sandy clay with gravel	Sandy Loam with sandy clay
3 - 4							Gravel, Rock at 3'2"	Sandy Loam with sandy clay
4 - 5								Yellow Brown clay with little sand

ST 906 713
ST 97 128

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397880 : BGS Reference: ST97SW238
British National Grid (27700) : 390600,171300

LINE C.

265/199

	21 V	22 W	23 X	24 Y	25 Z	26 AB	27 BB
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Brown Loam
1 - 2	Light Brown clay, some blue clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Red Brown Loam with some clay	Brown sandy clay
2 - 3	Light brown clay with a little sand more blue clay	Light brown clay	Red brown loam with some clay	Lighter brown clay with some sand.	Lighter brown clay with some sand	Red brown loam with red sand More clay.	Sandy clay with small gravel, f. shells.
3 - 4	Light brown clay, some blue clay, with a little sand.	Lighter brown clay with a little sand	Lighter brown clay with a some sand.	Lighter brown clay with more red sand in the clay	Lighter brown clay with more red sand in the clay	Lighter brown sandy clay	Red brown sand & gravel, f.shells Rock 3'8".
4 - 5	Sandy clay to rock at 6ft.	Lighter brown clay with more red sand at 5ft.	Lighter brown clay with some sand	Sandy clay, Rock at 5'0"	Sandy clay Rock at 4'4"	Lighter brown sandy clay, more sand. Rock at 4'1".	

ST97/28

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 397869 : BGS Reference: ST97SW227
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9	10	11	12	13	14	15	16	17	18	19	20	21
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

ST 97 SW 227

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 20193101 : BGS Reference: ST97SW286
British National Grid (27700) : 392024,170986

JACKSON DRILLING LTD.

Email: info@jacksondrilling.co.uk • Telephone: 01458 851276 • Fax: 01458 850544

DRILLER'S LOG

Strata Record

Depth	Description
	Clay Silty Mudstone
	Mudstone - Interbedded with Limestone

Drill Run Record

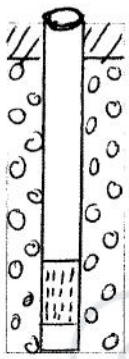
Depth from	Depth to	OH/Core	Time o'clock	Run (mins)	Core Length	Core Recov	Flush return	Casing Depth	Water Level
GL	-18.00	PCD					100%	4.50	
18.00	-75.00	PCD					100%		

Groundwater Records

WATER ENCOUNTERED	1	2	3
Depth Struck	50.00	65.00	
Casing Depth			
Inflow			
Depth 5 mins			
Depth 10 mins			
Depth 15 mins			
Depth 20 mins			
Cut off at			

WATER LEVELS	Depth	Casing	Time
Morning			
Evening			
Other			

PIEZOMETER / STANDPIPE



Penetration Testing and Sampling

Depth from	Depth to	Type	1	2	3	4	5	6	N Blows U	Sample Length	Casing Depth	Water Level

Borehole Complete / Incomplete

FIELD RECORDS

Piezometer/Standpipe	From	To
Plain Pipe	GL	6.50
Slotted Pipe	6.50	74.00
Base Plug Pipe	74.00	75.00
Bentonite Seal	GL	4.50
Grout/Backfill		
Borehole Dia.		

FLUSH	From	To
Flush type: AIR	GL	75.00
Loss of Flush		

Excavation Dimensions:

Backfill:

Remarks: Visitors, Instructions, Weather, etc.

Carried installation with gravel pack filter System.
Borehole producing atleast 4.000 Litres per hr.

S/C	Core	Off/Hole	Case	W

Move	Drill	Stand	Brouk	Work

Crew: L. MANN / P. MARLOW

Driller's Signature: [redacted]

SITE: Lower Lodge Farm SN15 3QZ

JOB No: 11094

RIG TYPE:

DAY: Thur

DATE: 9/8/17

Move From: /

BH No: 1

Jackson Drilling Limited | Rotary Drilling Daily Record

QMF 17A

Contact BGS: ngdc@bgs.ac.uk

TEST CERTIFICATE

1st Floor Building 550 Winch Road Kent Science Park Sittingbourne Kent ME9 8EF England
Telephone: 0844 7250742

Mr John Hunt
CHG South West Ltd
1 Homewood Way
Ground Floor Unit 3
Homewood Way
Bridport, Dorset
DT6 3FH

Certificate Number: TSBN823504-1 Final
Date Reported: 22/08/2017
Date Analysis Started: 15/08/2017
Order Number:

Lab Ref.	Sample Details	Method Number	Test	Result	Units	Flag
SBN2996491	Rcvd Dt:: 14/08/2017 Description: 10.08.17, Lower Lodge Farm Forest Lane Pewsham Chippenham SN15 3QZ Job No:11094	SUB-CON	Chloride	637.76	mg / l Cl	S
		SUB-CON	Sulphate	100.5	mg / l SO4	S
		SUB-CON	Sodium Total	65.8	mg / l	S
		SUB-CON	Magnesium Total	24.2	mg / l	S
		SUB-CON	Calcium Total	169.2	mg / l	S
		SUB-CON	Chromium Total	0.9	µg / l	S
		SUB-CON	Manganese Total	9.2	µg / l	S
		SUB-CON	Iron Total	455.2	µg / l	S
		SUB-CON	Nickel Total	8	µg / l	S
		SUB-CON	Arsenic Total	1.1	µg / l	S
		SUB-CON	Cadmium Total	<0.06	µg / l	S
		SUB-CON	Mercury Total	<0.02	µg / l	S
		SUB-CON	Lead Total	1.6	µg / l	S
		SUB-CON	Ammonium	0.39	mg / l NH4	S
		SUB-CON	Nitrite	0.023	mg / l NO2	S
		SUB-CON	Nitrate	<2.0	mg / l NO3	S
		SUB-CON	pH Value	7.5	Units	S
		SUB-CON	Hardness	523	mg / l CaCO3	S
		SUB-CON	Solids Dissolved	1477	mg / l	S

Note: all chemistry analysis was subcontracted to another laboratory on our approved list of subcontractors.

[redacted]

Adrian Goldsmith

General Manager

For and on Behalf of ALS Food and Pharmaceutical

Disclaimers:

The testing results in this certificate relate only to the samples described above.
Unless otherwise stated, all results are expressed on an as received basis.
'S' indicates a test which is sub-contracted to an approved laboratory holding ISO 17025 accreditation.

ALS Food & Pharmaceutical is a trading name of Eclipse Scientific Group Limited - Registered in England: Company number 05158323
Registered Office: Sands Mill, Huddersfield Road, Mirfield, West Yorkshire, WF14 9DQ

British Geological Survey

BGS ID: 397858 : BGS Reference: ST97SW216
British National Grid (27700) : 390600,171300

LINE B.

265/199

	9	10	11	12	13	14	15	16	17	18	19	20	21
Ft. 0 - 1	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Loam & Sandy Clay	Loam & Sandy Clay	Brown Loam	Brown Loam	Brown Loam	Brown Loam	Clay, sand & Loam	Loam & Yellow Clay	Brown Loam
1 - 2	Brown Loam	Brown Yellow Clay with more sand	Brown Yellow Clay with more sand	Brown Yellow Clay with some sand	Yellow Clay, little sand	Light Brown clay with little sand	Loam & Sandy Clay	Light Brown Clay, little sand.	Brown sandy clay	Brown sandy clay	Bluish clay	Clay, some Blue Clay	Light brown clay, some blue clay.
2 - 3	Brown Loam	Light Brown clay with blue clay intru-sions.	Light Brown Clay with blue clay intru-sions	Brown and Bluish Clay	Brown and Bluish Clay	Brown and Bluish Clay	Light Brown Clay	Light Brown Clay	Brown sandy clay	Brown sandy clay	Bluish clay	Clay with some gravel	Light brown clay with a little sand.
3 - 4	Brown sandy clay	Brown & Blue Clay, little sand.	Brown & Blue Clay, little sand.	Brown & Blue Clay	Bluish clay, fine gravel debris	Bluish clay, fine gravel debris	Bluish clay, with gravel debris	Brown, bluish clay	Brown sandy clay, with some blue clay	Brown sandy clay	Bluish clay	Bluish clay	Light brown clay, some blue clay with a little sand
4 - 5	Brown Sandy Clay	Light Brown Clay	Brown & Blue Clay, little sand	Brown & Blue Clay	Bluish Clay	Bluish Clay	Bluish Clay	Brown Bluish Clay with some pieces rock to10ft. 10'-13' BlueClay	Bluish Clay to 5ft Sandy brown clay with/some blueClay to10ft.	Sandy Brown Clay with some blue Clay	Bluish Clay Solid blue clay	Bluish Clay some sand	Sandy clay to rock at 6ft.

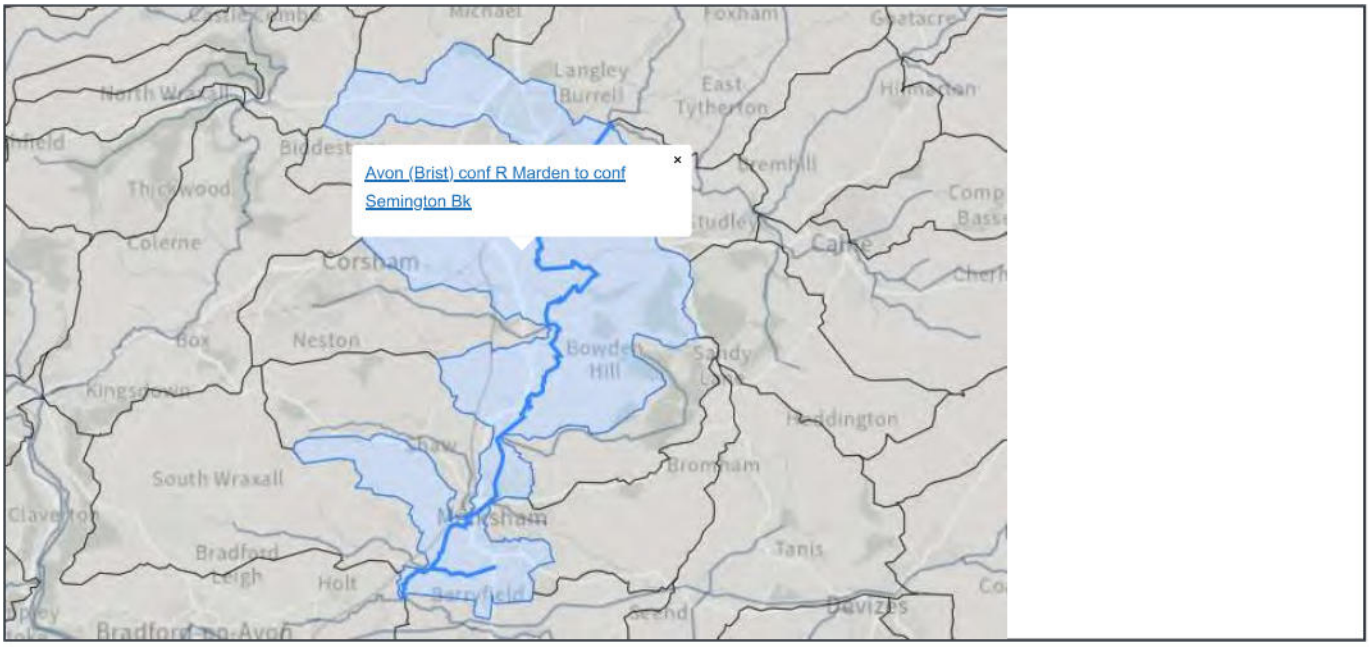
ST 97 SW 216

Contact BGS: ngdc@bgs.ac.uk

Appendix 5 Environment Agency Catchment Data

Avon (Brist) conf R Marden to conf Semington Bk Water Body

Moderate ecological status



Get Avon (Brist) conf R Marden to conf Semington Bk data

Download water body (Shapefile)
Download water body (GeoJSON)
Download classifications (CSV)
Download site classifications (CSV)
Download investigations (CSV)
Download challenges (CSV)
Download objectives (CSV)
Download protected areas (CSV)

Related links

Plan maps on ArcGIS online
Flood risk management plans

Attributes

Viewing latest data (Updated on 03 August 2023). Switch to river basin management plan data

GB109053027440	River	not designated artificial or heavily modified
NGR ST8824662153	**Surveillance Water Body** No	**Length** 25.13 km
Catchment area 61.78 km2	**Catchment area** 6178.011 ha	

Classifications

Time period: Cycle 3

Classification Item	2019	2022
Ecological	**Moderate**	**Moderate**
Biological quality elements	**Moderate**	**Moderate**
Fish	**High**	**High**
Invertebrates	**Good**	**Good**
Macrophytes and Phytobenthos Combined	**Moderate**	**Moderate**
Macrophytes Sub Element	**Moderate**	**Moderate**
Physico-chemical quality elements	**Moderate**	**Moderate**
Acid Neutralising Capacity	**High**	**High**
Ammonia (Phys-Chem)	**High**	**High**
Dissolved oxygen	**High**	**High**
Phosphate	**Moderate**	**Moderate**
Temperature	**High**	**High**
pH	**High**	**High**
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	**Supports good**	**Supports good**
Morphology	**Supports good**	**Supports good**
Specific pollutants	**High**	**High**
Chlorothalonil	**High**	**High**
Copper	**High**	**High**
Diazinon	**High**	**High**
Dimethoate	**High**	**High**
Iron	**High**	**High**
Manganese	**High**	**High**
Pendimethalin	**High**	**High**
Triclosan	**High**	**High**
Zinc	**High**	**High**
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**

Classification Item	2019	2022
Dioxins and dioxin-like compounds	**Good**	
Heptachlor and cis-Heptachlor epoxide	**Good**	
Hexabromocyclododecane (HBCDD)	**Good**	
Hexachlorobenzene	**Good**	
Hexachlorobutadiene	**Good**	
Hexachlorocyclohexane	**Good**	
Mercury and Its Compounds	Fail	
Pentachlorobenzene	**Good**	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Quinoxyfen	**Good**	
Priority substances	**Good**	**Does not require assessment**
Aclonifen	**Good**	
Alachlor	**Good**	
Bifenox	**Good**	
Cybutryne	**Good**	
Cypermethrin (Priority)	**Good**	
Dichlorvos (Priority)	**Good**	
Fluoranthene	**Good**	
Lead and Its Compounds	**Good**	
Nickel and Its Compounds	**Good**	
Terbutryn	**Good**	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Why do all water bodies have a chemical status of fail?

Investigations into classification status

No data to show

Reasons for not achieving good (RNAG) and reasons for deterioration (RFD)

All reasons (RFDs and RNAGs) attributed to the classification elements in this water body.

Reason Type	SWMI	Activity	Category	Classification Element	More information
RNAG	Diffuse source	Other (not in list, must add details in comments)	Agriculture and rural land management	Phosphate	Details
RNAG	Point source	Sewage discharge (continuous)	Water Industry	Macrophytes and Phytobenthos Combined	Details
RNAG	Point source	Sewage discharge (continuous)	Water Industry	Phosphate	Details
RNAG	Unknown (pending	Unknown (pending	Sector under	Perfluorooctane	Details

Reason Type	SWMI	Activity	Category	Classification Element	More information
RNAG	measures delivered to address reason, awaiting recovery	Not applicable	No sector responsible	Mercury and Its Compounds	Details
RNAG	measures delivered to address reason, awaiting recovery	Not applicable	No sector responsible	Polybrominated diphenyl ethers (PBDE)	Details

Reasons for not achieving good status by business sector

The issues preventing waters reaching good status and the sectors identified as contributing to them. The numbers in the table are individual counts of the reasons for not achieving good status with a confidence status of 'confirmed' and 'probable', where the latest classification is less than good status. There may be more than one reason in a single water body. Note, table does not include reasons for deterioration.

Significant water management issue	Physical modifications	Pollution from waste water	Pollution from towns, cities and transport	Changes to the natural flow and level of water	Invasive non-native species	Pollution from rural areas	Pollution from abandoned mines
Agriculture and rural land management	0	0	0	0	0	1	0
Industry	0	0	0	0	0	0	0
Mining and quarrying	0	0	0	0	0	0	0
Navigation	0	0	0	0	0	0	0
Urban and transport	0	0	0	0	0	0	0
Water Industry	0	2	0	0	0	0	0
Local & central government	0	0	0	0	0	0	0
Domestic general public	0	0	0	0	0	0	0
Recreation	0	0	0	0	0	0	0
Waste treatment and disposal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
No sector responsible	0	0	0	0	0	0	0
Sector under investigation	0	0	0	0	0	0	0
Total	0	2	0	0	0	1	0

Objectives

Classification Item	Status	Year	Reasons
Ecological		2027 - Low	Disproportionately expensive;

Classification Item	Status	Year	Reasons
Biological quality elements	**Good**	2027 - Low confidence	Disproportionately expensive: Disproportionate burdens
Fish	**Good**	2015	
Invertebrates	**Good**	2015	
Macrophytes and Phytobenthos Combined	**Good**	2027 - Low confidence	Disproportionately expensive: Disproportionate burdens
Physico-chemical quality elements	**Good**	2027 - Low confidence	Disproportionately expensive: Disproportionate burdens
Acid Neutralising Capacity	**Good**	2015	
Ammonia (Phys-Chem)	**Good**	2015	
Dissolved oxygen	**Good**	2015	
Phosphate	**Good**	2027 - Low confidence	Disproportionately expensive: Disproportionate burdens
Temperature	**Good**	2015	
pH	**Good**	2015	
Hydromorphological Supporting Elements	**Supports good**	2015	
Hydrological Regime	**Supports good**	2015	
Supporting elements (Surface Water)	**Not assessed**	2015	
Specific pollutants	**High**	2015	
Chlorothalonil	**High**	2015	
Copper	**High**	2015	
Diazinon	**High**	2015	
Dimethoate	**High**	2015	
Iron	**High**	2015	
Manganese	**High**	2015	
Pendimethalin	**High**	2015	
Triclosan	**High**	2015	
Zinc	**High**	2015	
Chemical	**Good**	2063	Natural conditions: Chemical status recovery time; Technically infeasible: No known technical solution is available
Priority hazardous substances	**Good**	2063	Natural conditions: Chemical status recovery time; Technically infeasible: No known technical solution is available
Benzo(a)pyrene	**Good**	2015	
Cadmium and Its Compounds	**Good**	2015	
Dioxins and dioxin-like compounds	**Good**	2015	
Heptachlor and cis-Heptachlor epoxide	**Good**	2015	
Hexabromocyclododecane (HBCDD)	**Good**	2015	

Classification Item	Status	Year	Reasons
Hexachlorocyclohexane	**Good**	2015	
Mercury and Its Compounds	**Good**	2040	Natural conditions: Chemical status recovery time
Pentachlorobenzene	**Good**	2015	
Perfluorooctane sulphonate (PFOS)	**Good**	2039	Technically infeasible: No known technical solution is available
Polybrominated diphenyl ethers (PBDE)	**Good**	2063	Natural conditions: Chemical status recovery time
Quinoxyfen	**Good**	2015	
Priority substances	**Good**	2015	
Aclonifen	**Good**	2015	
Alachlor	**Good**	2015	
Bifenox	**Good**	2015	
Cybutryne	**Good**	2015	
Cypermethrin (Priority)	**Good**	2015	
Dichlorvos (Priority)	**Good**	2015	
Fluoranthene	**Good**	2015	
Lead and Its Compounds	**Good**	2015	
Nickel and Its Compounds	**Good**	2015	
Terbutryn	**Good**	2015	
Other Pollutants	**Does not require assessment**	2015	

Protected areas

PA Name	Id	Directive	More information
River Avon (Bristol)	UKENRI77	Urban Waste Water Treatment Directive	
Upper Bristol Avon	UKENRI115	Urban Waste Water Treatment Directive	
S Bk - source to conf R Avon (Brist) NVZ	S559	Nitrates Directive	

Monitoring sites which have been used to classify this water body

Shows which sites were used for classification for which years within each cycle.

Monitoring Site	Cycle 1	Cycle 2	Cycle 3
BRISTOL AVON AT SCOTLAND ROAD Z1012003	2011, 2014, 2012, 2009, 2010, 2013		
BRISTOL AVON CATCHMENT/BRISTOL AVON MAIN RIVER/LACOCK (TE)/ 10534	2011, 2014, 2010, 2013, 2012, 2009	2014, 2013, 2016, 2019, 2015	2019, 2022
BRISTOL AVON AT MONKTON HOUSE Z1011701	2014, 2011, 2012, 2010, 2013, 2009	2013, 2014, 2016, 2019, 2015	2022, 2019

Monitoring Site	Cycle 1	Cycle 2	Cycle 3
BRISTOL AVON AT MELKSHAM BYPASS Z1012013	2010, 2013, 2009, 2012, 2011		
BRISTOL AVON CATCHMENT/BRISTOL AVON MAIN RIVER/CHIPPENHAM (TE)/ 10583	2011, 2014, 2010, 2013, 2012, 2009	2014, 2013, 2016, 2019, 2015	2019, 2022
BERRYFIELD STREAM Z1440101	2009	2015, 2016, 2019	2019
BRISTOL AVON AT BLOCKHOUSE Z1011901		2016, 2015	
147541 147541	2014	2015, 2014, 2019, 2016	2019
BRISTOL AVON U/S LACKHAM STW Z1012101	2012, 2014, 2010, 2013, 2011, 2009	2015, 2016, 2019	2019
7788 7788	2014, 2009, 2010, 2011	2014, 2016, 2019, 2015	2019
BRISTOL AVON CONIGRE MEAD Z1012008	2013, 2014, 2012		
160921 160921	2014	2015, 2014, 2019, 2016	2019
7780 7780	2009, 2011, 2010		
BRISTOL AVON AT LACOCK Z1012001	2009, 2010, 2011, 2013, 2014, 2012		
7783 7783	2009, 2011, 2014, 2010	2016, 2019, 2015, 2014	2019
151817 151817	2014	2016, 2015, 2014, 2019	2019
7779 7779	2009, 2011, 2014, 2010	2016, 2019, 2015, 2014	2019

Upstream water bodies

- Clackers Bk - source to conf R Avon (Brist)
- South Bk - source to conf R Avon (Brist)
- Pudding Bk - source to conf R Avon (Brist)
- Bydemill Bk - source to conf RIver Avon (Brist)
- Chalfield Brook - source to conf Avon
- Forest Brook
- Marden - conf Cowage Bk to conf R Avon (Brist)
- Avon (Brist) conf Tetbury Avon to conf R Marden

Downstream water bodies

- Bristol Avon (Semington Bk to By Bk)

Appendix 6 Window Sampling Logs – Geospek Ltd – November 2023

Johnson Poole & Bloomer

Site	Number
Chippenham	BH01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand Excavated 0.3m x 0.3m		43.94	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391517.484 E 171222.358 N	08/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
			Water strike(1) at 0.30m.	43.59	(0.35) 0.35	TOPSOIL: Brown silty slightly clayey silty fine to medium SAND with abundant fine rootlets.		▽1	
				43.34	(0.25) 0.60	Brown clayey sandy sub-angular to sub-rounded fine to coarse GRAVEL of flint and quartz. (River Terrace Deposits)			
				42.89	(0.45) 1.05	Brown very sandy sub-angular to sub-rounded fine to coarse GRAVEL of quartz and flint. (River Terrace Deposits)			
						Complete at 1.05m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 0.3m bgl.
Unable to access borehole location with window sampling rig, inspection pit dug to 1.05m bgl.
Inpsection pit installed with 50mm ID HDP standpipe to 1.05m bgl. Slotted pipe from 0.35m to 1.05m with gravel surround.
Plain SP from 0.35m to surface with bentonite seal. Concrete from 0.1m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No.
XB620.BH01

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Johnson Poole & Bloomer

Site	Number
Chippenham	BH02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand Excavated 0.3m x 0.3m		44.11	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391503.411 E 171075.289 N	08/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.35)	TOPSOIL: Brown silty slightly clayey silty fine to medium SAND with abundant fine rootlets.			
				43.76	0.35				
					(0.25)	Brown clayey sandy sub-angular to sub-rounded fine to coarse GRAVEL of flint and quartz. (River Terrace Deposits)			
			Water strike(1) at 0.60m.	43.51	0.60			▽1	
					(0.45)	Brown very sandy sub-angular to sub-rounded fine to coarse GRAVEL of quartz and flint. (River Terrace Deposits)			
				43.06	1.05	Complete at 1.05m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 0.6m bgl.
Unable to access borehole location with window sampling rig, inspection pit dug to 1.05m bgl.
Inspection pit installed with 50mm ID HDP standpipe to 1.05m bgl. Slotted pipe from 0.35m to 1.05m with gravel surround.
Plain SP from 0.35m to surface with bentonite seal. Concrete from 0.1m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No.
XB620.BH02

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Johnson Poole & Bloomer

Site	Number
Chippenham	BH03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand Excavated 0.3m x 0.3m		43.80	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391522.017 E 170869.964 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.40)	TOPSOIL: Brown clayey silty fine to coarse SAND.			
			Water strike(1) at 0.40m.	43.40	0.40			▽1	
					(0.60)	Light brown and grey slightly clayey sandy sub-angular to sub-rounded GRAVEL of flint and quartz. (River Terrace Deposits)			
				42.80	1.00				
						Complete at 1.00m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 0.4m bgl.
Unable to access borehole location with window sampling rig, inspection pit dug to 1.0m bgl.
Inspection pit installed with 50mm ID HDP standpipe to 1.0m bgl. Slotted pipe from 0.4m to 1.0m with gravel surround.
Plain SP from 0.4m to surface with bentonite seal. Concrete from 0.1m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No.
XB620.BH03

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Johnson Poole & Bloomer

Site	Number
Chippenham	BH04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand Excavated 0.3m x 0.3m		44.13	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391521.501 E 170734.503 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.40)	TOPSOIL: Brown clayey silty fine to coarse SAND.			
				43.73	0.40				
					(0.20)	Soft to firm brown silty sandy CLAY. (River Terrace Deposits)			
			Water strike(1) at 0.65m.	43.53	0.60			▽1	
					(0.35)	Light grey and light brown slightly silty sandy sub-angular to sub-rounded fine to coarse GRAVEL of flint and quartz. (River Terrace Deposits)			
				43.18	0.95				
						Complete at 0.95m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 0.65m bgl.
Unable to access borehole location with window sampling rig, inspection pit dug to 0.95m bgl.
Inspection pit installed with 50mm ID HDP standpipe to 0.95m bgl. Slotted pipe from 0.3m to 0.95m with gravel surround
Plain SP from 0.3m to surface with bentonite seal. Concrete from 0.1m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No.
XB620.BH04

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Johnson Poole & Bloomer

Site	Number
Chippenham	BH05

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand Excavated 0.3m x 0.3m		44.69	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391425.718 E 170810.22 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.35)	TOPSOIL: Brown silty clayey fine to coarse SAND with occasional rootlets.			
				44.34	0.35	Soft to firm brown silty sandy CLAY. (River Terrace Deposits)			
			Water strike(1) at 0.90m.		(0.75)	Becomes very sandy below 0.9m bgl.		▽1	
				43.59	1.10	Complete at 1.10m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 0.9m bgl.
Unable to access borehole location with window sampling rig, inspection pit dug to 1.1m bgl.
Inspection pit installed with 50mm ID HDP standpipe to 1.1m bgl. Slotted pipe from 0.3m to 1.1m with gravel surround.
Plain SP from 0.3m to surface with bentonite seal. Concrete from 0.1m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No.
XB620.BH05

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Johnson Poole & Bloomer

Site	Number
Chippenham	BH06

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand Excavated 0.3m x 0.3m		45.73	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391322.296 E 170712.063 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.35)	TOPSOIL: Brown slightly clayey silty fine to coarse SAND.			
				45.38	0.35	Soft brown silty sandy CLAY with pockets of very clayey silty fine to coarse SAND.			
					(0.80)	Becomes very sandy below 0.9m bgl.		▽1	
			Water strike(1) at 1.00m.	44.58	1.15	Complete at 1.15m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 1.0m bgl.
Unable to access borehole location with window sampling rig, inspection pit dug to 1.15m bgl.
Inspection pit installed with 50mm ID HDP standpipe to 1.15m bgl. Slotted pipe from 0.4m to 1.15m with gravel surround.
Plain SP from 0.4m to surface with bentonite seal. Concrete from 0.1m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No. XB620.BH06

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Johnson Poole & Bloomer

Site	Number
Chippenham	BH07

Machine : Drive-in Windowless Sampler Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)	Client	Job Number
		44.68	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391294.983 E 170920.141 N	08/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				44.33	(0.35) 0.35	TOPSOIL: Grass over brown slightly clayey very silty fine to coarse SAND with occasional quartz gravels.			
				44.18	(0.15) 0.50	Soft brown very sandy CLAY. (River Terrace Deposits)			
				43.68	(0.50) 1.00	Medium dense brown slightly clayey very sandy sub-angular to sub-rounded fine to coarse GRAVEL of flint and quartz. (River Terrace Deposits)		▽1	
1.00-1.45	SPT(C) N=22		Water strike(1) at 1.00m. 1,1/4,5,7,6	42.98	(0.70) 1.70	Brown gravelly fine to coarse SAND. (River Terrace Deposits) Becomes very gravelly below 1.4m bgl.			
2.00-2.45	SPT(C) N=7		3,2/1,2,2,2	42.38	(0.60) 2.30	Loose brown sandy to sub-angular sub-rounded GRAVEL of flint and quartz. (River Terrace Deposits)			
2.50	HSV 53.33kPa		50, 55, 55/Av. 53.33	41.68	(0.70) 3.00	Stiff becoming very stiff dark grey slightly silty slightly sandy CLAY. (Kellaway Clay Formation)			
3.00-3.26	SPT(C) 50/110		17,8/23,27			Complete at 3.00m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 1.0m bgl.
Borehole collapsed to 2.0m bgl.
Borehole installed with 50mm ID HDP standpipe to 2.0m bgl. Slotted pipe from 1.0m to 2.0m with gravel surround.
Plain SP from 1.0m to surface with bentonite seal. Concrete from 0.3m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	MP

Figure No. XB620.BH07

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Johnson Poole & Bloomer

Site	Number
Chippenham	BH08

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand Excavated 0.3m x 0.3m		46.28	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391198.432 E 170920.141 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.30)	TOPSOIL: Brown clayey silty fine to coarse SAND.			
				45.98	0.30	Soft to firm brown silty sandy CLAY. (River Terrace Deposits)			
					(0.35)				
				45.63	0.65	Brown very clayey sandy SILT with pockets of soft to firm silty very sandy CLAY. (River Terrace Deposits)		▽1	
			Water strike(1) at 0.90m.		(0.50)				
				45.13	1.15	Complete at 1.15m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 0.9m bgl.
Unable to access borehole location with window sampling rig, inspection pit dug to 1.15m bgl.
Inspection pit installed with 50mm ID HDP standpipe to 1.15m bgl. Slotted pipe from 0.4m to 1.15m with gravel surround.
Plain SP from 0.4m to surface with bentonite seal. Concrete from 0.1m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No. XB620.BH08

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Johnson Poole & Bloomer

Site	Number
Chippenham	BH09

Machine / Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine : Drive-in Windowless Sampler Method : Drive-in Windowless Sampler		46.65	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391069.235 E 170917.639 N	08/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				46.30	(0.35) 0.35	TOPSOIL: Grass over brown slightly clayey very silty fine to coarse SAND with occasional quartz gravels.			
1.00-1.45	SPT(C) N=28		Water strike(1) at 1.00m. 8,8/7,8,7,6		(2.15)	Medium dense becoming very dense light brown and grey clayey slightly sandy angular to sub-rounded fine to coarse GRAVEL of limestone (Cornbrash Formation)		▽1	
2.00-2.45	SPT(C) N=35		5,7/5,5,10,15						
2.50-2.76	SPT(C) 25*/85 50/175		21,4/40,10	44.15	2.50	Complete at 2.50m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 1.0m bgl.
Borehole collapsed to 1.8m bgl.
Borehole installed with 50mm ID HDP standpipe to 1.8m bgl. Slotted pipe from 0.8m to 1.8m with gravel surround.
Plain SP from 1.0m to surface with bentonite seal. Concrete from 0.3m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No.
XB620.BH09

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Johnson Poole & Bloomer

Site	Number
Chippenham	BH10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand Excavation 0.3m x 0.3m	0.3mm to 1.10m	50.08	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391028.954 E 170737.349 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.40)	TOPSOIL: Brown slightly clayey silty fine to medium SAND with abundant rootlets.			
				49.68	0.40				
					(0.70)	Firm dark brown and light brown silty sandy CLAY with occasional gravels of flint. (River Terrace Deposits)			
				48.98	1.10				
						Complete at 1.10m			

Remarks
Borehole location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was not encountered.
Unable to access borehole location with window sampling rig, inspection pit dug to 1.1m bgl.
Inspection pit installed with 50mm ID HDP standpipe to 1.1m bgl. Slotted pipe from 0.3m to 1.1m with gravel surround.
Plain SP from 0.3m to surface with bentonite seal. Concrete from 0.1m bgl to surface with a lockable flush security cover.

Scale (approx)	Logged By
1:50	DP

Figure No.
XB620.BH10

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Appendix 7 Trial Pit Logs – Johnson Poole & Bloomer – November 2023

Johnson Poole & Bloomer

Site	Trial Pit Number
Chippenham	TP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavation	0.7m x 2.6m x 1.7m	45.79	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391142.768 E 170950.176 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL: Grass over slightly clayey very silty fine to coarse SAND with occasional quartz gravel and rootlets.		
				45.39	0.40	Light brown and grey sandy sub-angular to sub-rounded fine to coarse GRAVEL of limestone. (Cornbrash Formation) Strata wet below 0.7m bgl.		
					(1.30)			
				44.09	1.70	Complete at 1.70m		



Remarks

Trial pit location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was not encountered during excavation, however strata was wet below 0.7m bgl.
Trial pit side walls were generally stable during excavation.
Trial pit backfilled with arisings upon completion and tamped down with machine bucket.

Scale (approx)	Logged By	Figure No.
1:50	DP	XB620.TP01

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Johnson Poole & Bloomer

Site	Trial Pit Number
Chippenham	TP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavation	1.05m x 2.2m x 1.7m	45.79	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391031.773 E 170852.561 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL: Brown slightly clayey silty fine to medium SAND with abundant rootlets.		
				45.39	0.40	Grey and brown slightly clayey slightly silty gravelly sub-angular to sub-rounded COBBLEs of limestone. (Cornbrash Formation)		
					(1.30)			
				44.09	1.70	Complete at 1.70m		



Remarks

Trial pit location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 1.5m bgl.
Trial pit side walls were generally stable during excavation.
Trial pit backfilled with arisings upon completion and tamped down with machine bucket.

Scale (approx)	Logged By	Figure No.
1:50	DP/MP	XB620.TP02

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Johnson Poole & Bloomer

Site	Trial Pit Number
Chippenham	TP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavation	0.6m x 2.3 x 2.0m	47.89	Hallam Land Management Limited	XB620
	Location	**Dates**	**Engineer**	**Sheet**
	391133.369 E 170723.592 N	09/11/2023	DOP	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL: Soft brown silty sandy CLAY with occasional fine rootlets.		
				47.49	0.40	Soft brown silty sandy CLAY		
					(0.50)			
				46.99	0.90	Light brown and grey clayey sandy sub-angular to sub-rounded fine to coarse GRAVEL of flint, limestone and quartz. (River Terrace Deposits)		
					(1.00)			
				45.99	1.90	Grey and brown slightly clayey slightly silty gravelly sub-angular to sub-rounded COBBLEs of limestone. (Cornbrash Formation)		
				45.89	2.00	Complete at 2.00m		



Remarks

Trial pit location was scanned for services by Midland Survey Ltd prior to excavation.
Groundwater was encountered at 1.05m bgl.
Trial pit side walls began to collapse (granular material).
Trial pit backfilled with arisings upon completion and tamped down with machine bucket.

Scale (approx)	Logged By	Figure No.
1:50	DP	XB620.TP03

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Appendix 8 Soakaway Test Results

SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365:2016

Client: Hallam Land Management
Site: Chippenham
JPB Project Ref: XB620-01

Test Location: T P01
Test Date: 09/11/2023
Calculation Date: 21/11/2023

TO BE READ IN CONJUNCTION WITH JPB REPORT REF: XB620-01

Size of Soakaway:

Length (m)	2.60
Width (m)	0.70
Depth of pit (m)	1.70
Test Depth (m)	0.48
Water level above base (m)	1.22
Effective volume (m^3)	2.22

input required
calculated

Test Depths of Soakaway:

Depth of water at start (m)	0.48
Water level above base at start (m)	1.22
Depth of water at end (m)	0.56
Water level above base at end (m)	1.14
Effective range of test (m)	0.08

75% effective depth for full cycle depth	0.915
50% effective depth for full cycle depth	0.610
25% effective depth for full cycle depth	0.305
Effective range required for full cycle test	0.610

FULL CYCLE TEST NOT ACHIEVED. RESULTS ARE INDICATIVE

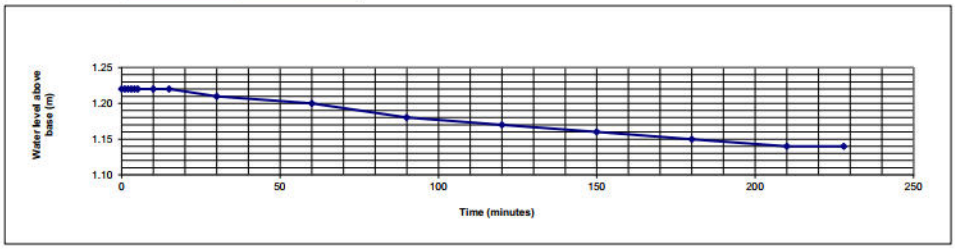
Calculation of Soil Infiltration Rate

Time (minutes)	Depth of water below surface (m)	Water level above base (m)
0	0.48	1.22
1	0.48	1.22
2	0.48	1.22
3	0.48	1.22
4	0.48	1.22
5	0.48	1.22
10	0.48	1.22
15	0.48	1.22
30	0.49	1.21
60	0.50	1.20
90	0.52	1.18
120	0.53	1.17
150	0.54	1.16
180	0.55	1.15
210	0.56	1.14
228	0.56	1.14

%	Depth (m)	Water level above base (m)	Time * (minutes)
75%	0.50	1.200	60
50%	0.52	1.180	90
25%	0.54	1.160	150

* estimated from graph

Volume outflow 75%-25% (m^3)	0.07	(V_{p75-25})
Area of pit (50% effective depth) m^2	5.71	(α_{p50})
Time outflow 25%-75% (minutes)	90	(t_{p75-25})



$$f = \frac{V_{p75-25}}{\alpha_{p50} \times t_{p75-25}}$$

Soil Infiltration (f) = Negligible fall in water level. Strata considered to be practically impermeable.

Completed by:	*DOP*

Checked by:	*SAG*

SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365:2016

Client: Hallam Land Management
Site: Chippenham
JPB Project Ref: XB620-01

Test Location: T P02
Test Date: 09/11/2023
Calculation Date: 21/11/2023

TO BE READ IN CONJUNCTION WITH JPB REPORT REF: XB620-01

Size of Soakaway:

Length (m)	2.20
Width (m)	1.05
Depth of pit (m)	1.70
Test Depth (m)	0.50
Water level above base (m)	1.20
Effective volume (m^3)	2.77

input required
calculated

Test Depths of Soakaway:

Depth of water at start (m)	0.50
Water level above base at start (m)	1.20
Depth of water at end (m)	1.11
Water level above base at end (m)	0.59
Effective range of test (m)	0.61

75% effective depth for full cycle depth	0.900
50% effective depth for full cycle depth	0.600
25% effective depth for full cycle depth	0.300
Effective range required for full cycle test	0.600

FULL CYCLE TEST NOT ACHIEVED. RESULTS ARE INDICATIVE

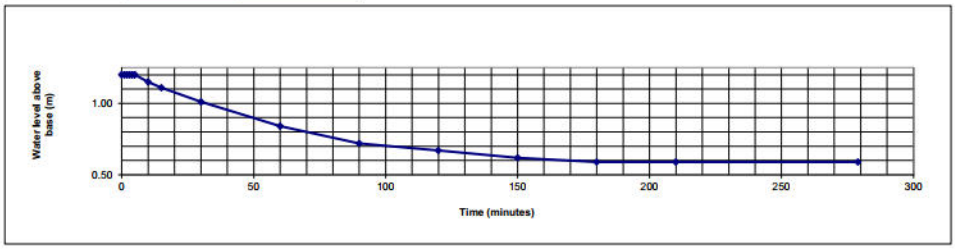
Calculation of Soil Infiltration Rate

Time (minutes)	Depth of water below surface (m)	Water level above base (m)
0	0.50	1.20
1	0.50	1.20
2	0.50	1.20
3	0.50	1.20
4	0.50	1.20
5	0.50	1.20
10	0.55	1.15
15	0.59	1.11
30	0.69	1.01
60	0.86	0.84
90	0.98	0.72
120	1.03	0.67
150	1.08	0.62
180	1.11	0.59
210	1.11	0.59
279	1.11	0.59

%	Depth (m)	Water level above base (m)	Time * (minutes)
75%	0.65	1.048	30
50%	0.81	0.895	50
25%	0.96	0.743	80

* estimated from graph

Volume outflow 75%-25% (m^3)	0.70	(V_{p75-25})
Area of pit (50% effective depth) m^2	6.21	(α_{p50})
Time outflow 25%-75% (minutes)	50	(t_{p75-25})



$$f = \frac{V_{p75-25}}{\alpha_{p50} \times t_{p75-25}}$$

Soil Infiltration (f) = Negligible fall in water level. Strata considered to be practically impermeable.

Completed by:	*DOP*

Checked by:	*SAG*

Appendix 9 **Results of On Site Groundwater Monitoring – Johnson Poole and Bloomer Ltd – December 2023 to May 2024**

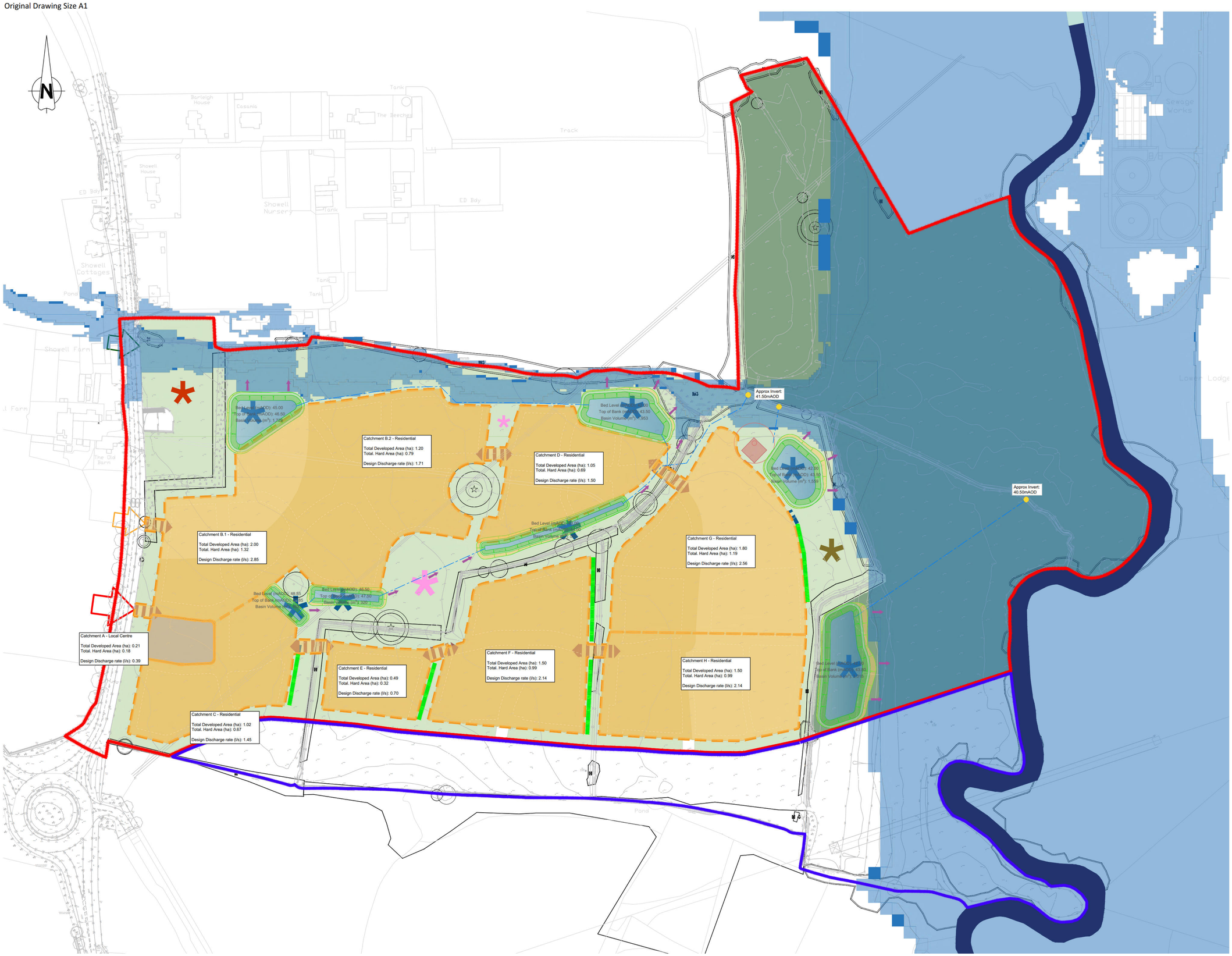
Borehole	Approx level (mAOD)	Water Depths Recorded (m) Water level [mAOD]					
		08/12/23	08/01/24	06/02/24	07/03/24	05/04/24	07/05/24
BH01	43.943	0.28 [43.663]	0.38 [43.563]	0.48 [43.463]	0.45 [43.493]	0.22 [43.723]	0.61 [43.333]
BH02	44.114	0.62 [43.494]	0.66 [43.454]	0.91 [43.204]	0.74 [43.374]	0.38 [43.734]	0.63 [43.484]
BH03	43.801	0.25 [43.551]	0.31 [43.491]	0.59 [43.211]	0.36 [43.441]	0.13 [43.671]	N/A*
BH04	44.136	0.39 [43.746]	0.37 [43.766]	0.79 [43.346]	0.40 [43.736]	0.29 [43.846]	N/A*
BH05	44.688	0.60 [44.088]	0.54 [44.148]	1.02 [43.688]	0.71 [43.978]	0.40 [44.288]	N/A*
BH06	45.731	0.78 [44.951]	0.74 [44.991]	DRY	0.91 [44.821]	0.42 [45.311]	DRY
BH07	44.679	0.45 [44.229]	0.43 [44.249]	0.70 [43.979]	0.48 [44.199]	0.20 [44.479]	0.65 [44.029]
BH08	46.278	0.83 [45.448]	0.80 [45.478]	DRY	0.85 [45.428]	0.39 [45.888]	DRY
BH09	46.653	0.97 [45.683]	0.71 [45.943]	1.32 [45.333]	0.86 [45.793]	0.54 [46.113]	1.29 [45.363]
BH10	50.076	0.63 [49.446]	0.68 [49.396]	DRY	DRY	0.73 [49.346]	DRY

*Unable to locate borehole – likely destroyed/buried by recent ploughing activity.


Johnson
Poole &
Bloomer
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Appendix D – Surface Water Drainage Strategy Plan

Original Drawing Size A1



NOTES:

1. Do not scale from this drawing.
2. All dimensions are in metres unless otherwise stated.
3. Brookbanks Consulting Ltd has prepared this drawing for the sole use of the client. The drawing may not be relied upon by any other party without the express agreement of the client and Brookbanks Consulting Ltd. Where any data supplied by the client or from other sources has been used, it has been assumed that the information is correct. No responsibility can be accepted by Brookbanks Consulting Ltd for inaccuracies in the data supplied by any other party. The drawing has been produced based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.
4. No part of this drawing may be copied or duplicated without the express permission of Brookbanks Consulting Ltd.
5. Preliminary drawing for outline planning and is intended to inform for outline planning only. Strictly not for construction purposes.
6. Flood extents have been taken from the DEFRA Environment Agency Shape Files, updated November 2025.
7. Topo survey based on survey dwg no. 46287_T_REV0 from Interlocks Survey 09.02.23.
8. Root Protection Areas have been taken from EDP drawing edp2272_sk006 Arb for Dims, recieved 23.11.23.
9. All SuDS have been placed outside of both flood extents (received from the EA) and Root Protection Areas (based off the drawing provided in point 7).
10. Flood Extents may be revised based on any future flood modelling.
11. Connection points have been determined based on the Topo Survey. Confirmation of these levels to be obtained at detailed design stage.
12. A full finished floor levels assessment across all parcels has yet to be undertaken so additional ground raising may be required. Final heights will be calculated at detailed design stage.
13. Exceedance overland flow routes for mitigation to be provided at later design stages.
14. Existing assets not shown on survey or sewer records discovered on site to be noted and reported back to engineer. Condition of ditch course and any existing assets to be assessed prior to construction and reported back to engineer.

KEY:

- Red Line Boundary
- River Avon
- Development Parcel Boundary
- SuDS Basin and Earthworks
- Illustrative Conveyance Swales
- DEFRA Fluvial Flood Zone 2 and 3 Flood Extent
- Indicative Outfall Location
- Indicative Foul Pumping Station and 10m Cordon Sanitaire
- Indicative Exceedence Flow Route
- Indicative Surface Water Sewer

In accordance with the national policy the first 5mm of rainfall will be managed through the incorporation of on parcel SuDS such as permeable paving and rain gardens. The indicative swales and basins will also contribute to achieving the 5mm of interception.

Due to required basin sizes and root protection areas, some of the proposed SuDS are illustrated overlapping the development parcels. In most of these designs, the overlapping areas have been restricted to the maintenance strip and earthworks which can be incorporated into the parcel design.

B	Updated Drainage Design Information	KP	AW	AW 13.04.26
A	Updated Parameters Plan and Drainage Design	KP	CP	AW 08.04.26
-	First Issue	KP	CP	AW 25.03.26

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Hallam Land

Land East of Showell Farm, Chippenham

Illustrative Surface Water Drainage Strategy

Status		Status Date
Preliminary		APR 2026
Drawn	**Checked**	**Date**
KP	AW	25.03.26
Scale	**Number**	**Rev**
1:1500	13143-DR-01	B

0 30 60 90 120 150
METRES

UNTIL TECHNICAL APPROVAL HAS BEEN OBTAINED FROM THE RELEVANT LOCAL AUTHORITIES, IT SHOULD BE UNDERSTOOD THAT ALL DRAWINGS ARE ISSUED AS PRELIMINARY AND NOT FOR CONSTRUCTION. SHOULD THE CONTRACTOR COMMENCE SITE WORK PRIOR TO APPROVAL BEING GIVEN, IT IS ENTIRELY AT THEIR OWN RISK.

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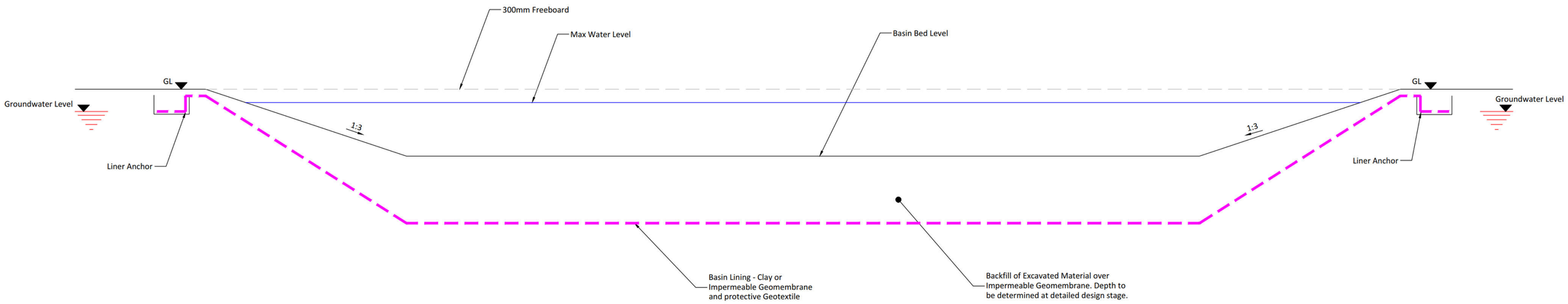
P:\13143 Chippenham\CAD\BCL\Working Drawings\13143-DR-01 B - Surface Water Drainage Strategy.dwg

Appendix E – Typical Sections

Original Drawing Size A1

NOTES:

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TYPICAL LINED BASIN SECTION
NTS

-	First Issue	JP CP	AW 23.04.26

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Hallam Land

Land East of Showell Farm, Chippenham

Typical Lined Basin Section

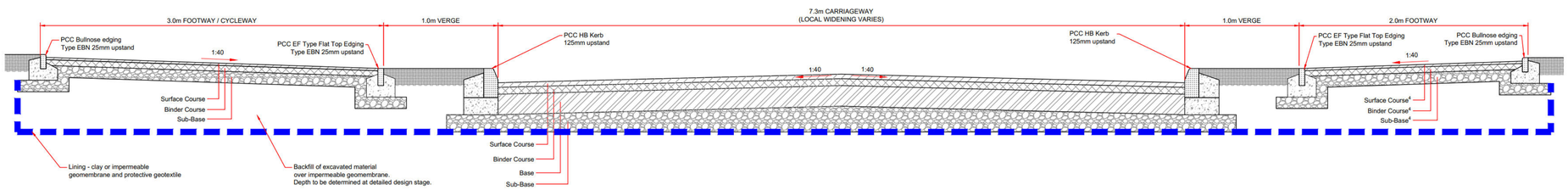
Status		Status Date
Draft		April 2026
Drawn	**Checked**	**Date**
JP	AW	23.04.2026
Scale	**Number**	**Rev**
NTS	13143-SK-02	-

0 10 20 30 40 50
METRES

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P:\13143 Chippenham\CAD\BCL\Working Drawings\13143-SK-02 - Typical Lined Basin Section.dwg

Original Drawing Size A1



TYPICAL SECTION THROUGH ADOPTABLE ROAD
FULL WIDTH
1:20 SCALE

NOTES:

1. Do not scale from this drawing.
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-	First Issue	TN CP	AW 19.05.26

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Hallam Land

Land East of Showell Farm, Chippenham

Typical Lined Carriageway Construction

Status		Status Date
Draft		May 2026
Drawn	**Checked**	**Date**
TN	CP	19.05.2026
Scale	**Number**	**Rev**
NTS	13143-SK-03	-

0 10 20 30 40 50
METRES

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Appendix F- Surface Water Drainage Calculations

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	13/03/2026
Calculated by	Brookbanks
Reference	
Model version	2.2.3

Location

Site name	Chippenham
Site location	



Site easting (British National Grid)	391463
Site northing (British National Grid)	170848

Site details

Total site area (ha)	29.97 ha

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Greenfield runoff

Method

Method	FEH statistical (2025)

FEH statistical (2025)

	My value		Map value	
SAAR9120 (mm)	787	mm		
BFIHOST19scaled	0.588			
QMed-QBar conversion	1.075		1.075	
QMed (l/s)	77.1	l/s		
QBar (FEH statistical 2025) (l/s)	82.9	l/s		

Growth curve factors

	My value	Map value
Hydrological region	8	8
1 year growth factor	0.78	
2 year growth factor	0.93	
10 year growth factor	1.49	
30 year growth factor	1.95	
100 year growth factor	2.43	
200 year growth factor	2.78	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	64.7	l/s
Flow rate 2 year (l/s)	77.1	l/s
Flow rate 10 years (l/s)	123.5	l/s
Flow rate 30 years (l/s)	161.7	l/s
Flow rate 100 years (l/s)	201.4	l/s
Flow rate 200 years (l/s)	230.5	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

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Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
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)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Residential A and C	0.850	5.00	44.000		45.849	58.306	1.000	43.000
1			42.500	1500	64.919	58.302	1.000	41.500

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	Residential A and C	1	250.000	0.600	43.000	41.500	1.500	166.7	600	7.21	135.1

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	1.883	532.5	414.9	0.400	0.400	0.850	0.0	400	2.071

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	250.000	166.7	600	Circular	44.000	43.000	0.400	42.500	41.500	0.400

Link	US Node	Node Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Residential A and C	Junction	1	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Residential A and C	45.849	58.306	44.000	1.000		0	1.000	43.000	600
1	64.919	58.302	42.500	1.000	1500	1 	1.000	41.500	600

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Residential A and C Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	43.000	Product Number	CTL-SHE-0068-1800-0700-1800
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node Residential A and C Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	43.000
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	933.0	0.0	1.000	2367.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Residential A and C	1050	43.156	0.156	10.7	166.0520	0.0000	OK
15 minute summer	1	1	41.500	0.000	0.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
1440 minute summer	Residential A and C	Hydro-Brake®	1	1.8	118.4

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Residential A and C	1410	43.415	0.415	18.3	517.2883	0.0000	OK
15 minute summer	1	1	41.500	0.000	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Residential A and C	Hydro-Brake®	1	1.8	136.5

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	Residential A and C	2160	43.747	0.747	25.2	1109.3610	0.0000	FLOOD RISK
15 minute summer	1	1	41.500	0.000	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
2160 minute winter	Residential A and C	Hydro-Brake®	1	1.9	219.8

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Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
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)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Residential B1	1.320	5.00	46.500		45.849	58.306	1.500	45.000
1			42.500	1500	64.919	58.302	1.000	41.500

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	Residential B1	1	415.000	0.600	45.000	41.500	3.500	118.6	600	8.09	128.2

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	2.235	631.9	611.6	0.900	0.400	1.320	0.0	479	2.526

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	415.000	118.6	600	Circular	46.500	45.000	0.900	42.500	41.500	0.400

Link	US Node	Node Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Residential B1	Junction	1	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Residential B1	45.849	58.306	46.500	1.500		0	1.000	45.000	600
1	64.919	58.302	42.500	1.000	1500	1 	1.000	41.500	600

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Residential B1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	45.000	Product Number	CTL-SHE-0078-2900-1200-2900
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.9	Min Node Diameter (mm)	1200

Node Residential B1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	45.000
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	1167.0	0.0	1.500	1895.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Residential B1	1050	45.210	0.210	16.7	259.5665	0.0000	OK
15 minute summer	1	1	41.500	0.000	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
1440 minute summer	Residential B1	Hydro-Brake®	1	2.7	180.4

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Residential B1	1410	45.602	0.602	28.4	800.6819	0.0000	SURCHARGED
15 minute summer	1	1	41.500	0.000	2.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Residential B1	Hydro-Brake®	1	2.8	215.8

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	Residential B1	2160	46.175	1.175	39.1	1727.5930	0.0000	SURCHARGED
15 minute summer	1	1	41.500	0.000	2.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
2160 minute winter	Residential B1	Hydro-Brake®	1	2.9	339.6

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Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
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)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Residential B2 and D	1.490	5.00	43.500		45.849	58.306	1.500	42.000
1			42.500	1800	64.919	58.302	1.000	41.500

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	Residential B2 and D	1	70.000	0.600	42.000	41.500	0.500	140.0	750	5.49	150.0

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)
1.000	2.363	1043.9	807.7	0.750	0.250	1.490	0.0	498	2.594

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	70.000	140.0	750	Circular	43.500	42.000	0.750	42.500	41.500	0.250

Link	US Node	Node Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Residential B2 and D	Junction	1	1800	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Residential B2 and D	45.849	58.306	43.500	1.500		0	1.000	42.000	750
1	64.919	58.302	42.500	1.000	1800	1	1.000	41.500	750

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Residential B2 and D Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	42.000	Product Number	CTL-SHE-0082-3200-1200-3200
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.2	Min Node Diameter (mm)	1200

Node Residential B2 and D Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	42.000
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	1321.0	0.0	1.500	2116.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Residential B2 and D	1050	42.211	0.211	18.8	294.4096	0.0000	OK
15 minute summer	1	1	41.500	0.000	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
1440 minute summer	Residential B2 and D	Hydro-Brake®	1	3.0	201.3

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Residential B2 and D	1410	42.602	0.602	32.1	903.6364	0.0000	OK
15 minute summer	1	1	41.500	0.000	3.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Residential B2 and D	Hydro-Brake®	1	3.2	245.1

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	Residential B2 and D	2160	43.181	1.181	44.1	1952.7470	0.0000	SURCHARGED
15 minute summer	1	1	41.500	0.000	3.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
2160 minute winter	Residential B2 and D	Hydro-Brake®	1	3.2	377.9

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Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
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)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Residential E, F, H	2.300	5.00	43.800		45.849	58.306	1.500	42.300
1			41.500	1800	64.919	58.302	1.000	40.500

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	Residential E, F, H	1	170.000	0.600	42.300	40.500	1.800	94.4	750	5.98	145.8

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	2.880	1272.2	1211.7	0.750	0.250	2.300	0.0	590	3.250

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	170.000	94.4	750	Circular	43.800	42.300	0.750	41.500	40.500	0.250

Link	US Node	Node Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Residential E, F, H	Junction	1	1800	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Residential E, F, H	45.849	58.306	43.800	1.500		0	1.000	42.300	750
1	64.919	58.302	41.500	1.000	1800	1 	1.000	40.500	750

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Residential E, F, H Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	42.300	Product Number	CTL-SHE-0103-5000-1200-5000
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node Residential E, F, H Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	42.300
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	2117.0	0.0	1.500	3163.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	Residential E, F, H	1500	42.508	0.208	20.9	461.5034	0.0000	OK
15 minute summer	1	1	40.500	0.000	1.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
2160 minute summer	Residential E, F, H	Hydro-Brake®	1	4.8	427.9

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Residential E, F, H	1410	42.893	0.593	49.5	1396.1860	0.0000	OK
15 minute summer	1	1	40.500	0.000	4.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Residential E, F, H	Hydro-Brake®	1	5.0	378.1

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	Residential E, F, H	2160	43.479	1.179	68.1	3015.9380	0.0000	SURCHARGED
15 minute summer	1	1	40.500	0.000	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
2160 minute winter	Residential E, F, H	Hydro-Brake®	1	5.0	582.5

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Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
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)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Residential G	1.190	5.00	43.500		45.849	58.306	1.500	42.000
1			42.500	1500	64.919	58.302	1.000	41.500

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	Residential G	1	20.000	0.600	42.000	41.500	0.500	40.0	525	5.09	150.0

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)
1.000	3.549	768.2	645.1	0.975	0.475	1.190	0.0	370	3.952

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	20.000	40.0	525	Circular	43.500	42.000	0.975	42.500	41.500	0.475

Link	US Node	Node Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Residential G	Junction	1	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Residential G	45.849	58.306	43.500	1.500		0	1.000	42.000	525
1	64.919	58.302	42.500	1.000	1500	1 	1.000	41.500	525

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Residential G Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	42.000	Product Number	CTL-SHE-0074-2600-1200-2600
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.6	Min Node Diameter (mm)	1200

Node Residential G Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	42.000
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	1069.0	0.0	1.500	1749.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	Residential G	1500	42.207	0.207	10.8	234.5004	0.0000	OK
15 minute summer	1	1	41.500	0.000	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
2160 minute summer	Residential G	Hydro-Brake®	1	2.4	221.5

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Residential G	1410	42.595	0.595	25.6	726.3116	0.0000	SURCHARGED
15 minute summer	1	1	41.500	0.000	2.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Residential G	Hydro-Brake®	1	2.4	186.9

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	Residential G	2160	43.157	1.157	35.2	1559.3560	0.0000	SURCHARGED
15 minute summer	1	1	41.500	0.000	2.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
2160 minute winter	Residential G	Hydro-Brake®	1	2.6	300.4

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Appendix G – Wessex Water Sewer Records

Wessex Water Web Map



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WATER MAINS

- Distribution Main
- Washout Main
- Raw Water Main
- Abandoned Main
- Private Main

SITES

- Source
- Reservoir
- Pump
- Treatment Works

FITTINGS

- Valve - Open
- Valve - Closed
- Fire Hydrant
- Pressure Reducing Valve
- Meter

SEWERS

	PUBLIC	PRIVATE	SECTION 104
Foul			
Surface			
Combined			
Abandoned			

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow) styles of line are shown on the key in sample/typical colours.

OTHER WESSEX PIPES

- Rising Mains
- Effluent Disposal
- Overflow
- Syphon

NON-WESSEX / UNKNOWN

- Private Rising Mains
- Culverted Watercourse
- Highway Drain
- Use Unknown
- Status Unknown

STRUCTURES

- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Outfall
- Inlet
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Washout
- Air Valve
- Hatch Box

OTHER STRUCTURES

- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

Information in this plan 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. Building over or near Wessex Water's apparatus is not normally permitted.

Wessex Water
YTL GROUP

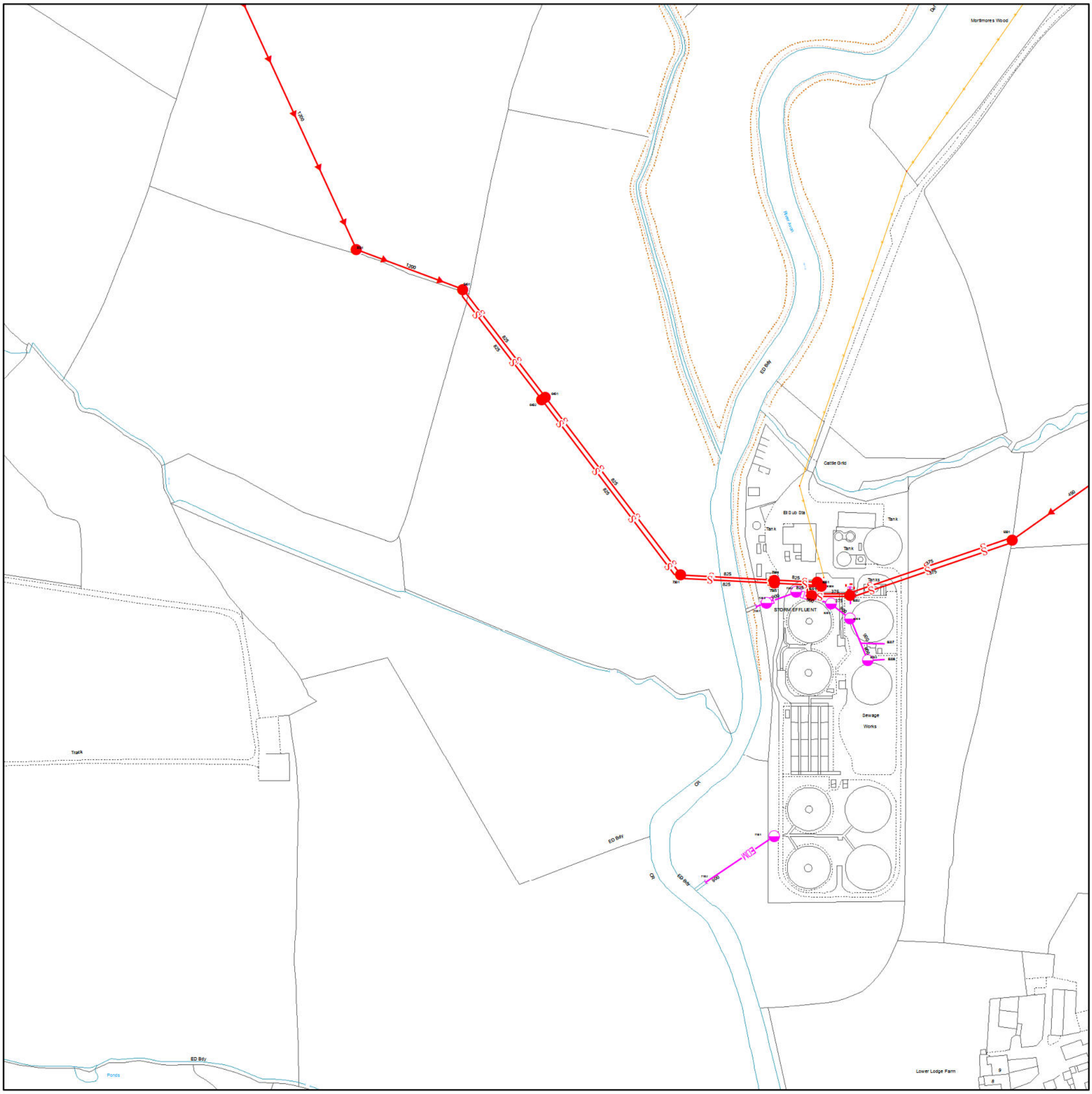
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Centre: 391,307, 170,823

N W E S

Wessex Water Web Map



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WATER MAINS
- Distribution Main
- Washout Main
- Raw Water Main
- Abandoned Main
- Private Main

SITES
- Source
- Reservoir
- Pump
- Treatment Works

FITTINGS
- Valve - Open
- Valve - Closed
- Fire Hydrant
- Pressure Reducing Valve
- Meter

SEWERS — PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

OTHER WESSEX PIPES
- Rising Mains
- Effluent Disposal (EDM)
- Overflow
- Syphon (S)

NON-WESSEX / UNKNOWN
- Private Rising Mains
- Culverted Watercourse (CW)
- Highway Drain (H)
- Use Unknown (?)
- Status Unknown (SU)

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow) styles of line are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Outfall
- Inlet
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow (CSO)
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column (VC)
- Rodding Eye (RE)
- Catchpit (CP)
- Flushing Chamber (FC)
- Soakaway (SW)
- Non Return Valve
- Washout
- Air Valve
- Hatch Box (HB)

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

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Wessex Water
YTL GROUP

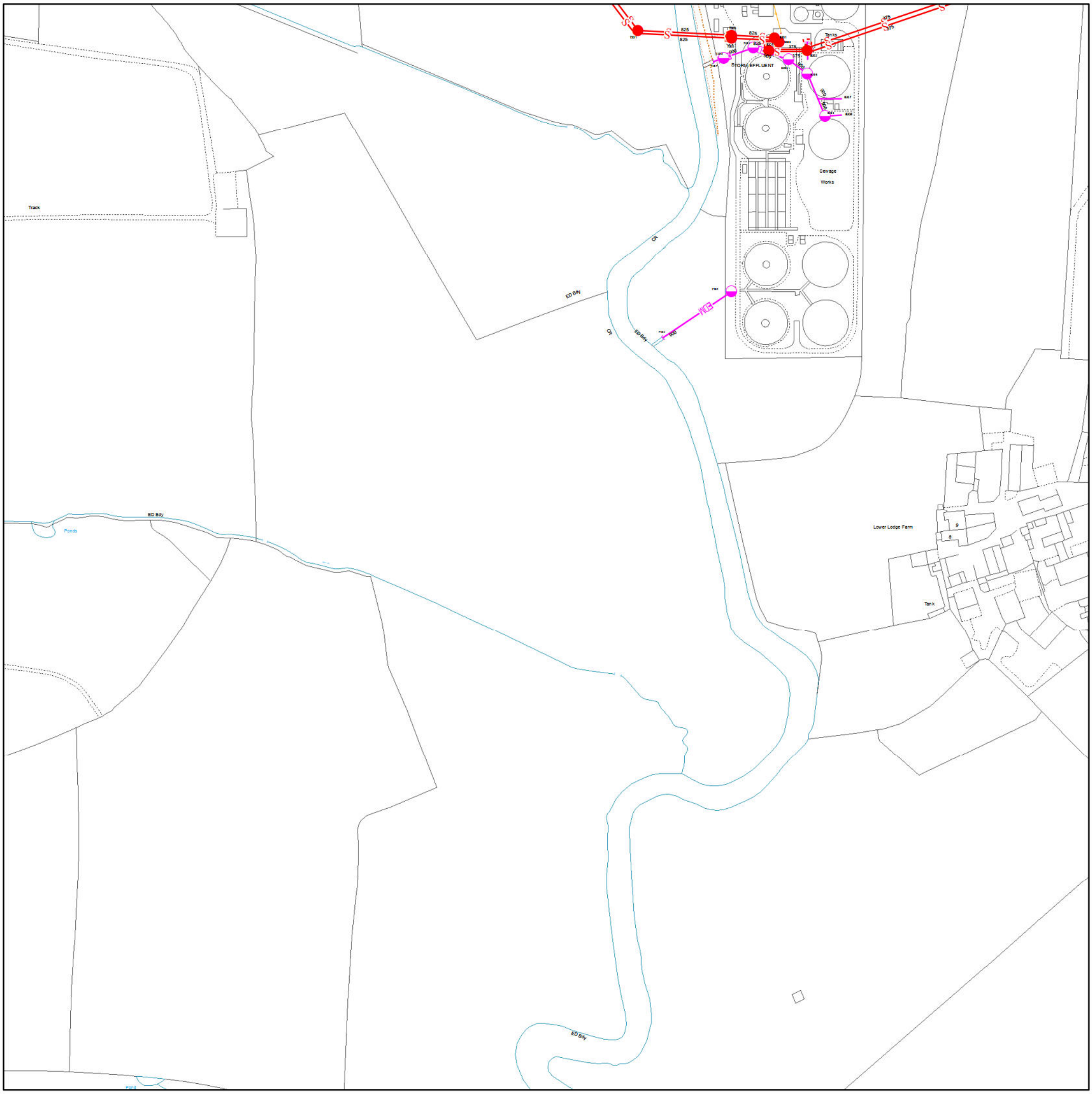
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Centre: 391,633, 171,326

N W E S

Wessex Water Web Map



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WATER MAINS
- Distribution Main
- Washout Main
- Raw Water Main
- Abandoned Main
- Private Main

SITES
- Source
- Reservoir
- Pump
- Treatment Works

FITTINGS
- Valve - Open
- Valve - Closed
- Fire Hydrant
- Pressure Reducing Valve
- Meter

SEWERS — PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

OTHER WESSEX PIPES
- Rising Mains
- Effluent Disposal
- Overflow
- Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- Culverted Watercourse
- Highway Drain
- Use Unknown
- Status Unknown

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow) styles of line are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Outfall
- Inlet
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Washout
- Air Valve
- Hatch Box

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

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Wessex Water
YTL GROUP

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Scale: 1:2,500

Centre: 391,661, 170,972

Wessex Water Web Map



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WATER MAINS
- Distribution Main
- Washout Main
- Raw Water Main
- Abandoned Main
- Private Main

SITES
- Source
- Reservoir
- Pump
- Treatment Works

FITTINGS
- Valve - Open
- Valve - Closed
- Fire Hydrant
- Pressure Reducing Valve
- Meter

SEWERS — PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

OTHER WESSEX PIPES
- Rising Mains
- Effluent Disposal
- Overflow
- Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- Culverted Watercourse
- Highway Drain
- Use Unknown
- Status Unknown

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow) styles of line are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Outfall
- Inlet
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Washout
- Air Valve
- Hatch Box

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

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Wessex Water
YTL GROUP

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Scale: 1:2,500

Centre: 391,052, 170,877

Wessex Water Web Map



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WATER MAINS

- Distribution Main
- Washout Main
- Raw Water Main
- Abandoned Main
- Private Main

SITES

- Source
- Reservoir
- Pump
- Treatment Works

FITTINGS

- Valve - Open
- Valve - Closed
- Fire Hydrant
- Pressure Reducing Valve
- Meter

SEWERS

	PUBLIC	PRIVATE	SECTION 104
Foul			
Surface			
Combined			
Abandoned			

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow) styles of line are shown on the key in sample/typical colours.

OTHER WESSEX PIPES

- Rising Mains
- Effluent Disposal
- Overflow
- Syphon

NON-WESSEX / UNKNOWN

- Private Rising Mains
- Culverted Watercourse
- Highway Drain
- Use Unknown
- Status Unknown

STRUCTURES

- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Outfall
- Inlet
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Washout
- Air Valve
- Hatch Box

OTHER STRUCTURES

- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

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Wessex Water
YTL GROUP

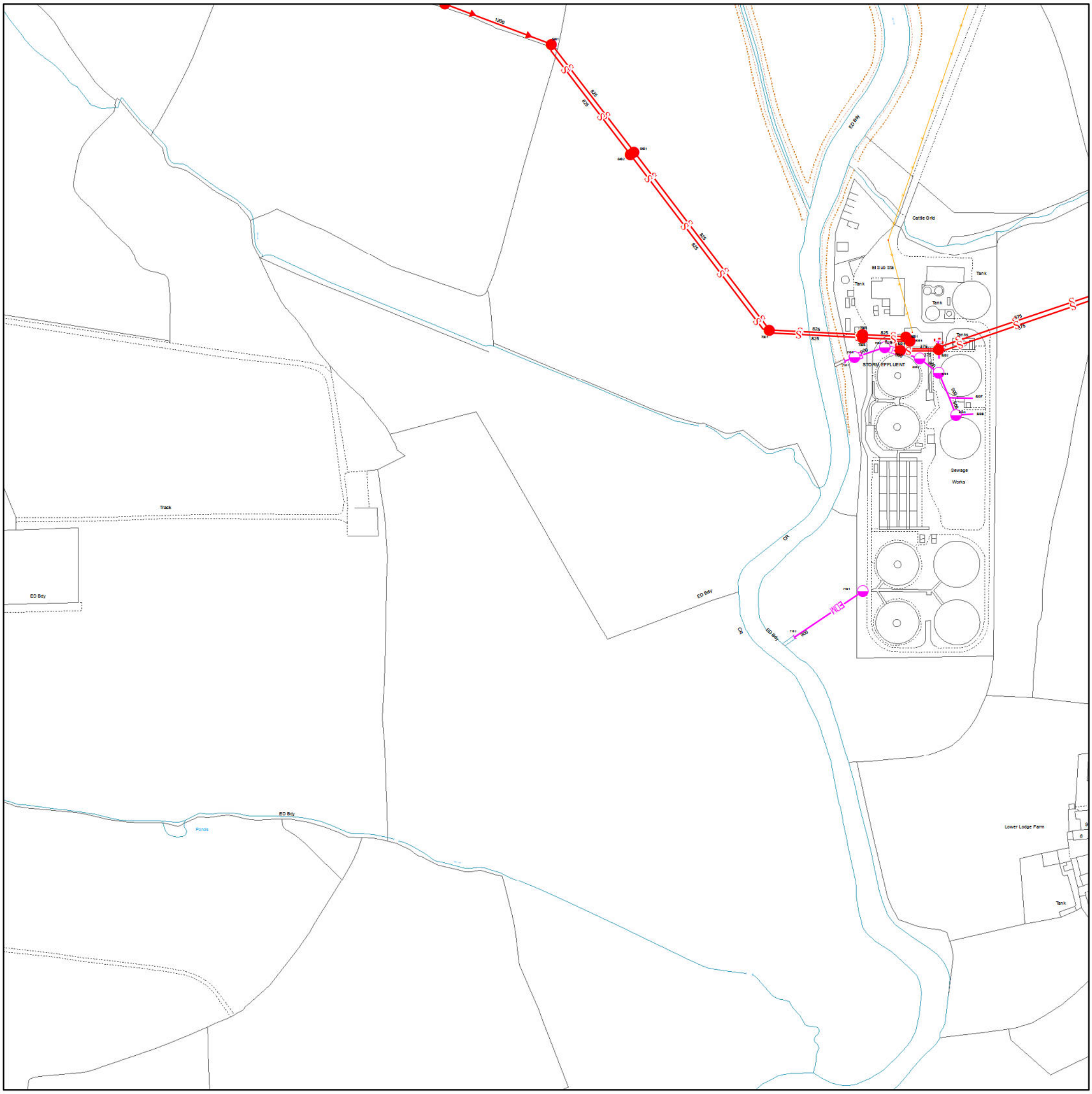
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Centre: 391,664, 170,756

N W E S

Wessex Water Web Map



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WATER MAINS

- Distribution Main
- Washout Main
- Raw Water Main
- Abandoned Main
- Private Main

SITES

- Source
- Reservoir
- Pump
- Treatment Works

FITTINGS

- Valve - Open
- Valve - Closed
- Fire Hydrant
- Pressure Reducing Valve
- Meter

SEWERS

	PUBLIC	PRIVATE	SECTION 104
Foul	→	·····	▷
Surface	--→	·····	--▷
Combined	→	·····	▷
Abandoned	×	×	×

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow) styles of line are shown on the key in sample/typical colours.

OTHER WESSEX PIPES

- Rising Mains
- EDM — Effluent Disposal
- Overflow
- S — Syphon

NON-WESSEX / UNKNOWN

- Private Rising Mains
- CW — Culverted Watercourse
- H — Highway Drain
- ? — Use Unknown
- SU — Status Unknown

STRUCTURES

- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Outfall
- Inlet
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Washout
- Air Valve
- HB Hatch Box

OTHER STRUCTURES

- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

Information in this plan 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. Building over or near Wessex Water's apparatus is not normally permitted.

Wessex Water
YTL GROUP

Date: 17/11/2021, 15:28:46

Scale: 1:2,500

Centre: 391,576, 171,167

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