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Land South of the Forty, Cricklade

Hannick Homes and Developments Ltd

Flood Risk Assessment

July 2025





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Executive Summary

This Flood Risk Assessment (FRA) is compliant with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. It has been produced on behalf of Hannick Homes and Developments Ltd in respect of a planning application for a proposed residential development at land south of the Forty, Cricklade.

This report demonstrates that the proposed development not at significant flood risk, subject to the recommended flood mitigation strategies being implemented.

The site is located within Flood Zone 1 on the Environment Agency Flood Map for Planning. This is the area at low risk of fluvial flooding.

The site is shown to be at high to low risk of pluvial flooding, this being due to previous ridge and furrow agricultural practices. Areas at risk of pluvial flooding are shown to be located within the depressions in the topography associated with this, as well as at the ditches in the north and east of the site. Profiling of ground levels shall remove this risk, and direct surface water runoff to the proposed attenuation basin in the southeast of the site.

The drainage strategy utilises proposed surface water sewers to direct runoff from the proposed development to an attenuation basin located in the southeast of the site. A pump station is proposed to control the flow of discharge to the northern ditch within the site, directed via a proposed storm rising main. This is subject to land drainage consent.

In compliance with the requirements of National Planning Policy Framework, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area as a result of suitable management of surface water runoff discharging from the site.



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1 Introduction

Background

- 1.1 The purpose of this FRA is to assess the risk of flooding to the proposed development and where possible provide sufficient mitigation to demonstrate that the future users of the development would remain safe throughout its lifetime, that the development would not increase flood risk on site and elsewhere and, where practicable, that the development would reduce flood risk overall.

Site Proposals

- 1.2 The proposed development forms an outline planning application for the construction of up to 49 dwellings with associated access, parking, and landscaping.
- 1.3 A copy of the proposed development drawings is included within **Appendix A**.

National & Local Planning Policy

- 1.4 The National Planning Policy Framework (NPPF)¹ sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Planning Practice Guidance (PPG) is also available online².
- 1.5 The PPG sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.
- 1.6 The NPPF states that a site-specific Flood Risk Assessment will be required for proposals:
- a) that are greater than 1 hectare in area within Flood Zone 1
 - b) for all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3
 - c) in an area within Flood Zone 1 which has critical drainage problems; and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding
 - d) in an area within Flood Zone 1 identified in a Strategic Flood Risk Assessment as being at increased flood risk in the future
 - e) in an area in Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use
- 1.7 This FRA aims to provide sufficient flood risk information to satisfy the requirements of the NPPF, PPG and regional/local government plans and policies.
- 1.8 This assessment considers the risks of all types of flooding to the site including tidal, fluvial, surface, groundwater, sewer and artificial sources and provides mitigation measures to ensure that the flood risk to the site is minimised and that flood risk off-site is not increased.

¹ <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

² <https://www.gov.uk/guidance/flood-risk-and-coastal-change>



Sources of Information

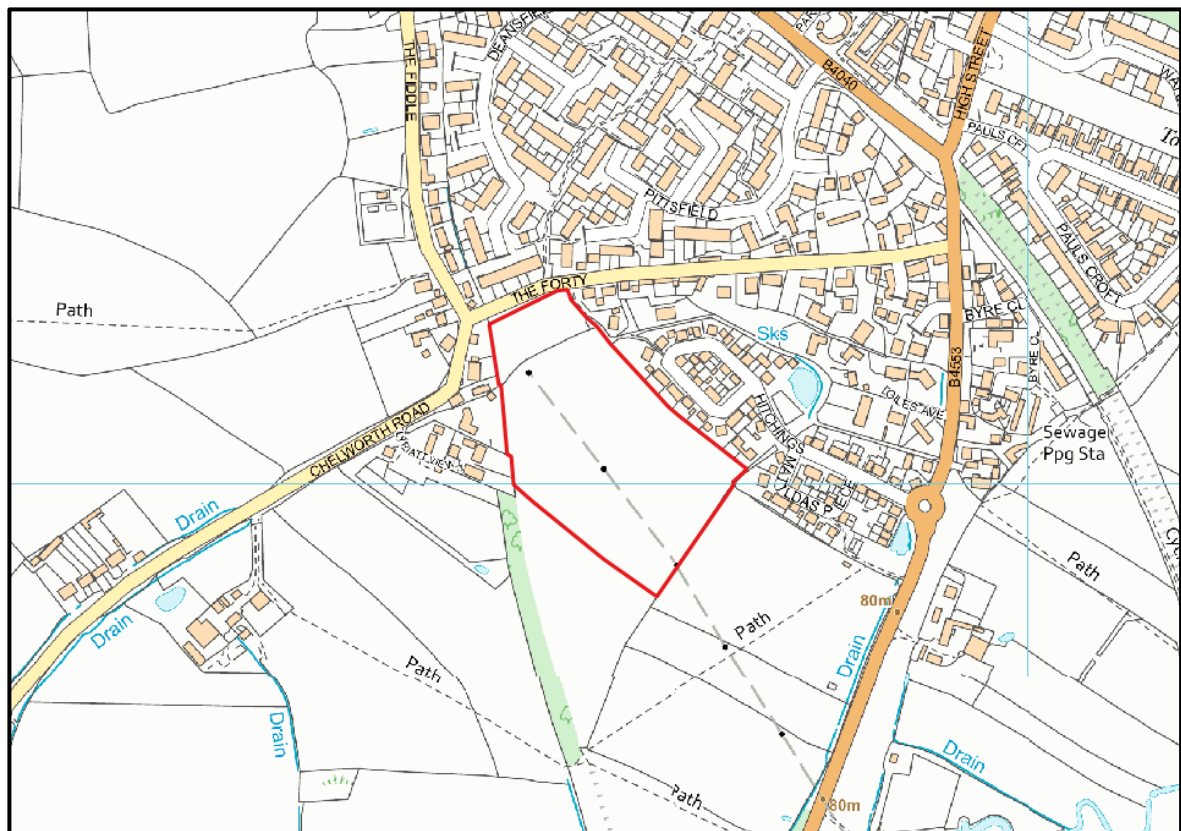
1.9 This FRA has been based on the following sources of information:

- a) NPPF
- b) NPPF-PPG
- c) Site Layout Plan
- d) Ordnance Survey mapping
- e) Site Topographical Survey
- f) DEFRA Magic mapping
- g) Environment Agency mapping
- h) Wiltshire Council Strategic Flood Risk Assessment (2019)
- i) Site visit undertaken by Rappor
- j) Web Based Soil Mapping
- k) British Geological Survey Drift & Geology Maps
- l) Infiltration Testing undertaken by Earth, Environmental, and Geotechnical Ltd
- m) Thames Water Sewer Records
- n) Local Press Flood Reports / Anecdotal Evidence

2 Existing Site & Hydrology Characteristics

Site Location & Composition

- 2.1 The site is located off The Forty, on the southwestern extent of Cricklade. The approximate co-ordinates for the centre of the site are E: 409621; N: 193033, with the nearest post code of SN6 6FD. The site location is approximately shown outlined in red in **Figure 2.1**.
- 2.2 The current site comprises of greenfield pasture land with hedgerows located on all boundaries. The Forty bounds the north of the site, and dwellings are located to the west and east. Greenfield land is present to the south and south east of the site.



(Source: Promap)

Figure 2.1 Site Location

Topography

- 2.3 A detailed topographic survey was carried out during July 2022, a copy of which is included within **Appendix B**. Ground levels on the site are shown to be relatively flat but fall slightly in an easterly direction from 81.40 metres Above Ordnance Datum (mAOD) to 80.70mAOD located in the east of the site.

Ground Conditions

- 2.4 Geological data held by the British Geological Survey (BGS)³ shows that the bedrock geology underlying the site is Oxford Clay Formation (mudstone). No superficial deposits are recorded at the site.
- 2.5 The nearest borehole log with freely available information is located approximately 200m west of the site and was recorded to a depth of 2.0m, obtained via online BGS maps⁴. The borehole log reference number is SU09SE23. The log identifies presence of silt and clay.
- 2.6 Soils mapping⁵ indicates the underlying soil as slowly permeable, seasonally wet, slightly acidic but base-rich loamy and clayey soils with impeded drainage.
- 2.7 Soakaway testing was undertaken June 2022 (see **Appendix C**). A total of 3 soakaway test pits were established and testing was undertaken in accordance with BRE 365 'Soakaway Design' methodology guidance.
- 2.8 The test pits were excavated to a depth of 1.45 – 1.90 metres below ground level (mbgl). The borehole logs confirm the soils and geology as depicted by the soils and geology mapping.
- 2.9 The test pits did not drain sufficiently to obtain infiltration rates, thus soakaway testing demonstrated low infiltration potential. Slight seepage of groundwater was encountered at 0.80mbgl in Test Pit 03.
- 2.10 Department for Environment, Food & Rural Affairs (DEFRA) Magic Service Mapping⁶ shows the site is located in a groundwater Source Protection Zone (SPZ). The site is located within the 'Total Catchment' (Zone 3) and is close to the 400-day travel time 'Outer Zone' (Zone 2).

Existing Drainage & Hydrology

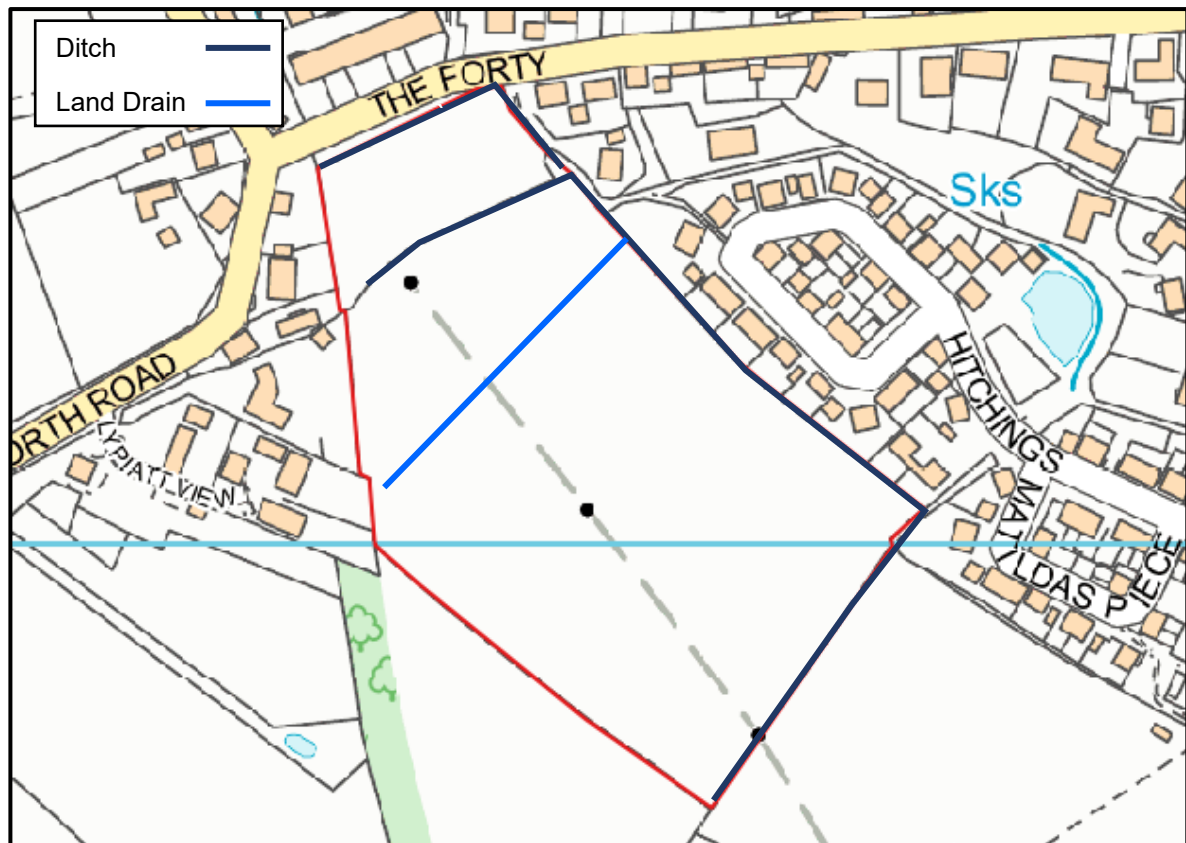
- 2.11 Ditches are present along the northern, eastern, and southern boundaries of the site. A ditch is also present through the north of the site, as illustrated by **Figure 2.2**. A site visit confirmed that a land drain is also located through the centre of the site, the route of which is indicated within **Figure 2.2**. This drains northeast into the eastern ditch.

³ <https://geologyviewer.bgs.ac.uk/>

⁴ https://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSBoreholes&_ga

⁵ <http://www.landis.org.uk/soilsmap/>

⁶ <https://magic.defra.gov.uk/MagicMap.aspx>



(Source: Promap)

Figure 2.2 Location of Ditches at the Site

- 2.12 A disused canal is located to the southwest of the site. A visit to the site confirmed that this is filled in and does not aid any flow or storage of water.
- 2.13 The site is believed to currently drain naturally via existing rates of runoff to the ditches located on the site boundaries and the northern ditch located within the site.
- 2.14 Thames Water asset plans show that there is a 225mm diameter public foul sewer located within The Forty to the north of the site. A 225mm public foul sewer is located north of the site, within Deansfield. This drains east before connecting into the public foul asset within The Forty (see **Appendix D**).
- 2.15 A public surface water sewer is also located in Deansfield, to the north of the site. This drains east onto Pittsfield, before draining north.
- 2.16 Thames Water sewer records are contained in **Appendix D**.
- 2.17 The DEFRA Magic Map (England and Wales) shows there are no designated sites (SSSIs) in or close to the site including downstream (from a flood risk and drainage perspective).



3 Development Vulnerability & Flood Zone Classification

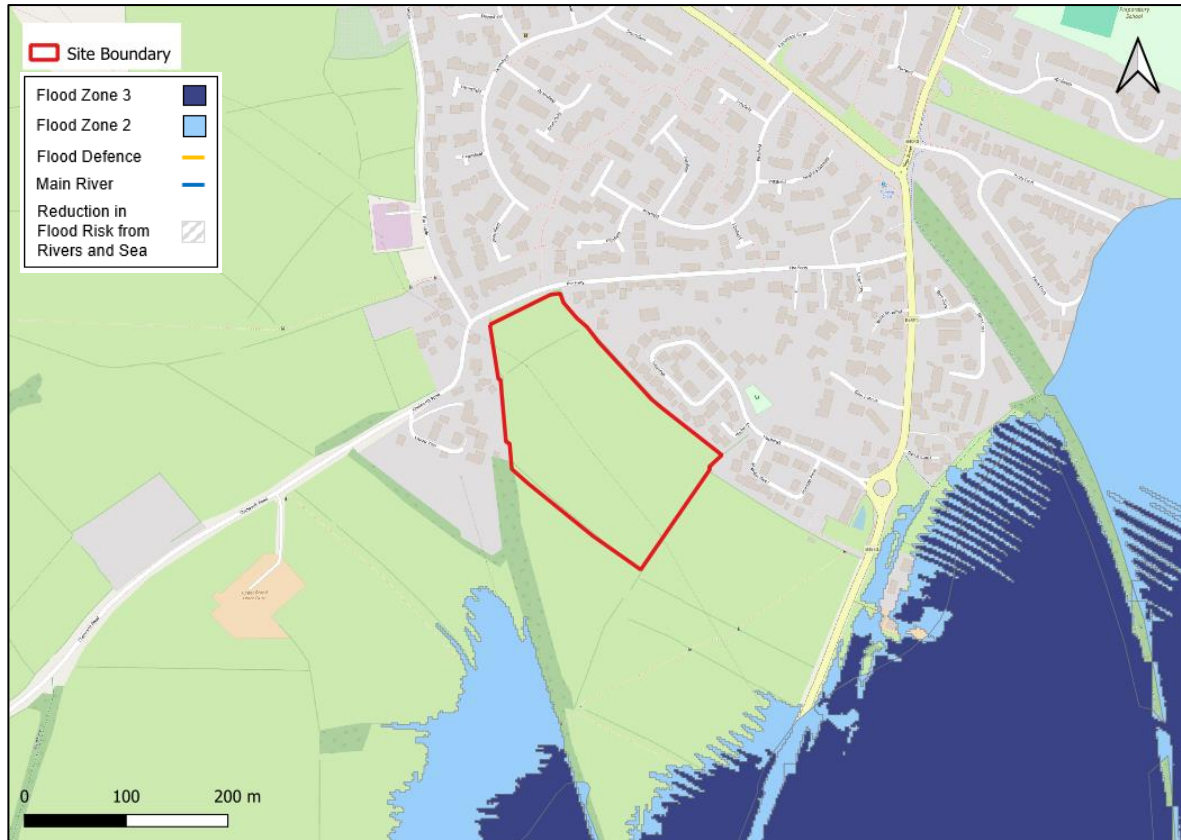
National Planning Policy Framework

- 3.1 Local Planning Authorities (LPA), have a statutory obligation to consult the Environment Agency (EA), on all applications in flood risk zones. The EA will consider the effects of flood risk in accordance with the NPPF.
- 3.2 NPPF requires that, as part of the planning process:
- a) A 'site specific' Flood Risk Assessment will be undertaken for any site that has a flood risk potential.
 - b) Flood risk potential is minimised by applying a 'sequential approach' to locating 'vulnerable' land uses.
 - c) Sustainable drainage systems are used for surface water disposal where practical.
 - d) Flood risk is managed through the use of flood resilient and resistant techniques.
 - e) Residual risk is identified and safely managed.
- 3.3 Table 1 of NPPF, categorises flood zones into:
- a) Zone 1- Low risk, less than 0.1% Annual Event Probability (AEP) (< 1 in 1000 years)
 - b) Zone 2- Medium risk, 0.1% AEP (1 in 1000 - 1 in 100 years)
 - c) Zone 3a- High risk, 1% AEP (> 1 in 100 years)
 - d) Zone 3b- High risk - Functional Floodplain, 3.33% AEP (>1 in 30 years)

Environment Agency Flood Map for Planning

- 3.4 The Environment Agency Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, since these can be breached, overtopped and may not be in existence for the lifetime of a development.
- 3.5 The site is located within Flood Zone 1 as shown on the Environment Agency Flood Map for Planning⁷ and **Figure 3.1**. This is the area shown to be at low risk of river flooding.

⁷ <https://flood-map-for-planning.service.gov.uk/>



(Source: Environment Agency)

Figure 3.1 Environment Agency Flood Map for Planning

4 Site Specific Flooding

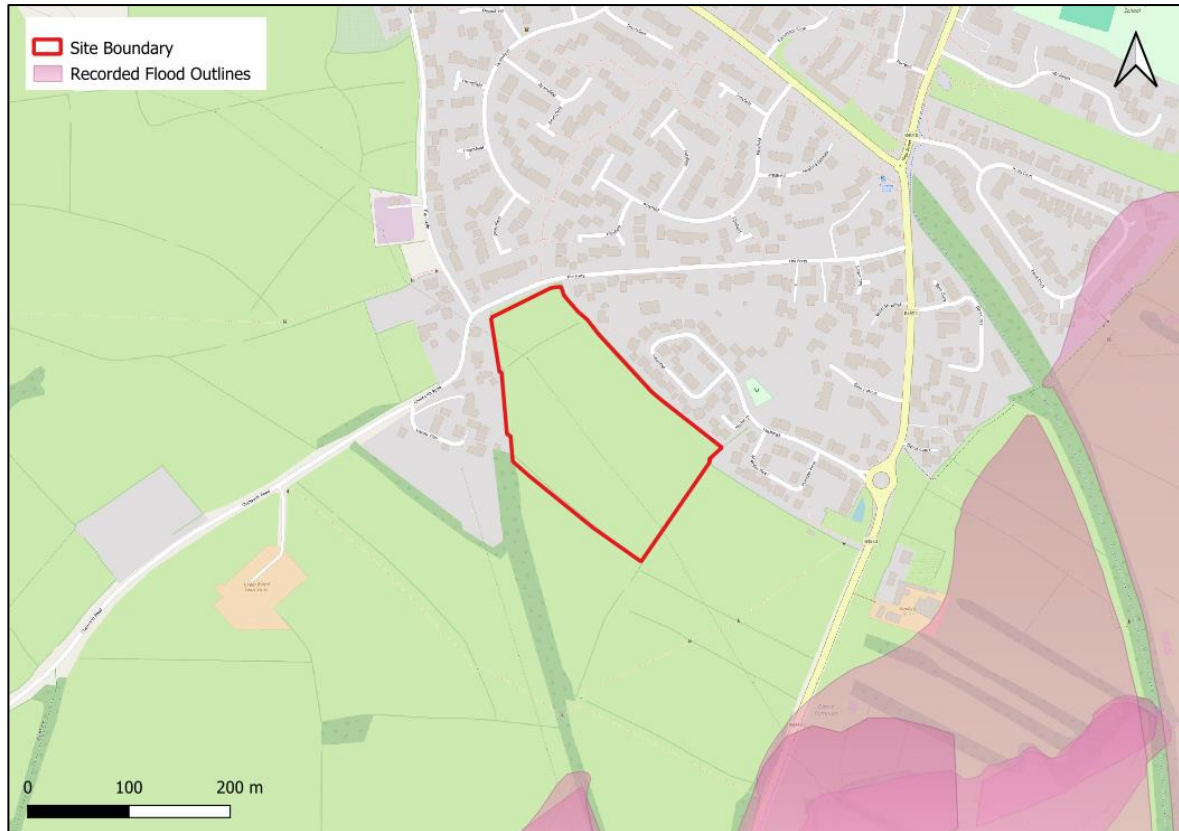
National Planning Policy Framework (NPPF)

- 4.1 In accordance with the National Planning Policy Framework, this Flood Risk Assessment considers all sources of flooding including:
- a) Tidal flooding – from sea;
 - b) Fluvial flooding – from rivers and streams;
 - c) Pluvial flooding – overland surface water flow and exceedance;
 - d) Groundwater flooding – from elevated groundwater levels or springs;
 - e) Flooding from sewers – exceedance flows from existing sewer systems; and
 - f) Artificial sources – reservoirs, canals etc.

Historic Flooding

- 4.2 The Wiltshire Council SFRA⁸ (2019) states that Cricklade is the main location that has experienced fluvial flooding associated with the River Thames, with notable events occurring in 1947, 1992, and the most recent being in 1993. However, these flood events did not affect the site or surrounding land. The SFRA also indicates that surface water flooding has been recorded in Cricklade, with the most recent incident of this being in 1992. Little further information on the severity of this is available.
- 4.3 Anecdotal references describing surface water flooding in gardens to the east of the site along Giles Avenue have been recorded, as well as descriptions of surface water flowing along The Forty. The presence of the ditch at the north of the site means that these surface water flows are intercepted before reaching the site. There is little additional information regarding these issues, however during a visit to the site, a separate source indicated that that there have been no incidents of flooding on The Forty.
- 4.4 The EA recorded flood outlines mapping shows that the nearest historic flood to the site was due to the River Key exceeding its channel capacity in 1947, where flood extents reached approximately 230m southeast of the site. Refer to **Figure 4.1**.

⁸https://www.wiltshire.gov.uk/media/5691/Strategic-Flood-Risk-Assessment-Level-1/pdf/Wiltshire_Council_Level_1_SFRA_v5.0.pdf?m=637459765054370000



(Source: Environment Agency)

Figure 4.1 Environment Agency Recorded Flood Outlines

- 4.5 Thames Water information as denoted by the SFRA indicates that the site has not been subject to any historic sewer flooding.

Tidal Flooding

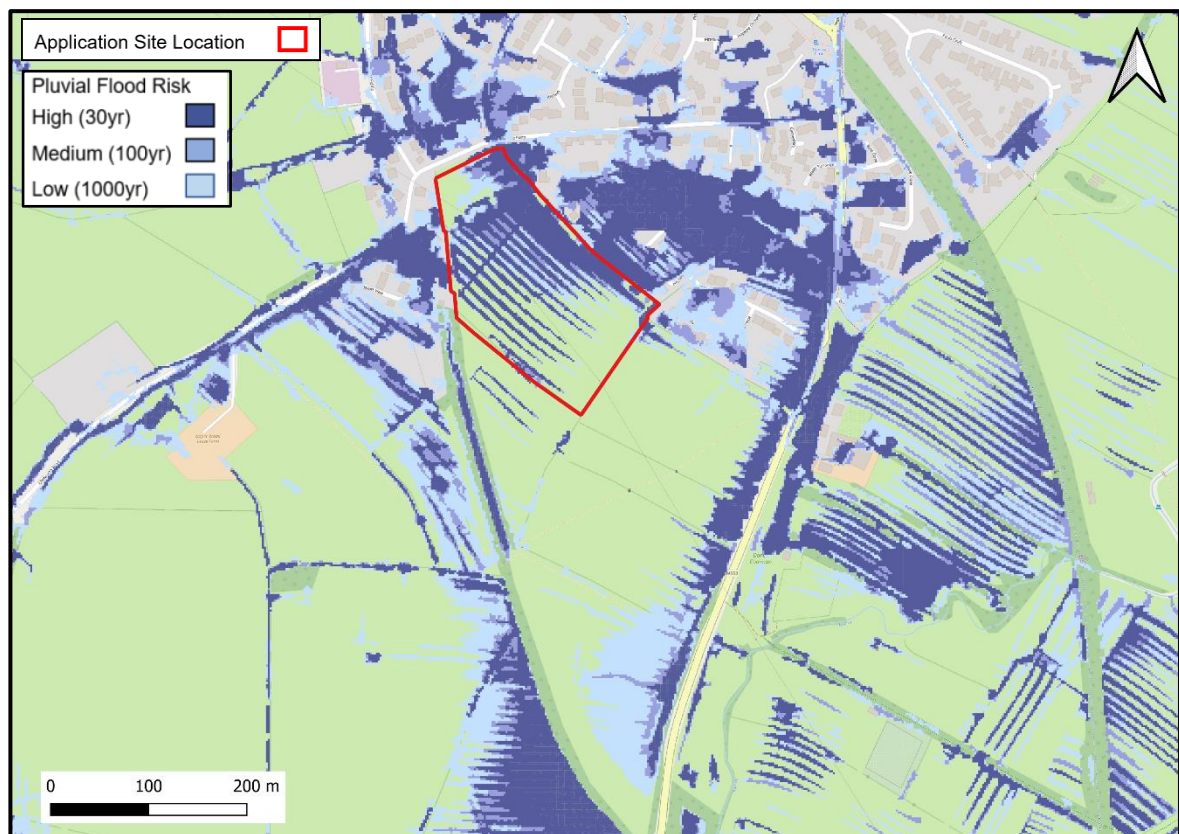
- 4.6 Inundation of low lying coastal areas by the sea may be caused by seasonal high tides, storm surges and storm driven wave action. Tidal flooding is most commonly a result of a combination of two or more of these mechanisms, which can result in the overtopping or breaching of sea defences. River systems may also be subject to tidal influences.
- 4.7 There are no watercourses/waterbodies in the vicinity of the site that pose a tidal risk to the site. The risk of tidal flooding is therefore negligible.

Fluvial Flooding

- 4.8 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.
- 4.9 The site is located within Flood Zone 1 as shown on **Figure 3.1**. This is the area shown to be at low risk of river flooding.

Pluvial Flooding

- 4.10 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.
- 4.11 Risk of flooding from surface water mapping has been prepared⁹, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.
- 4.12 The Surface Water (Pluvial) Flood map provided by the Environment Agency (**Figure 4.2**) indicates that the site is at high to low risk of pluvial flooding. Areas of higher pluvial flood risk are shown to be located within depressions of the topography associated with 'ridge and furrow' agricultural practices, which was confirmed following a site visit. These depressions shall be removed, and the ground re-profiled prior to construction of the proposed development.

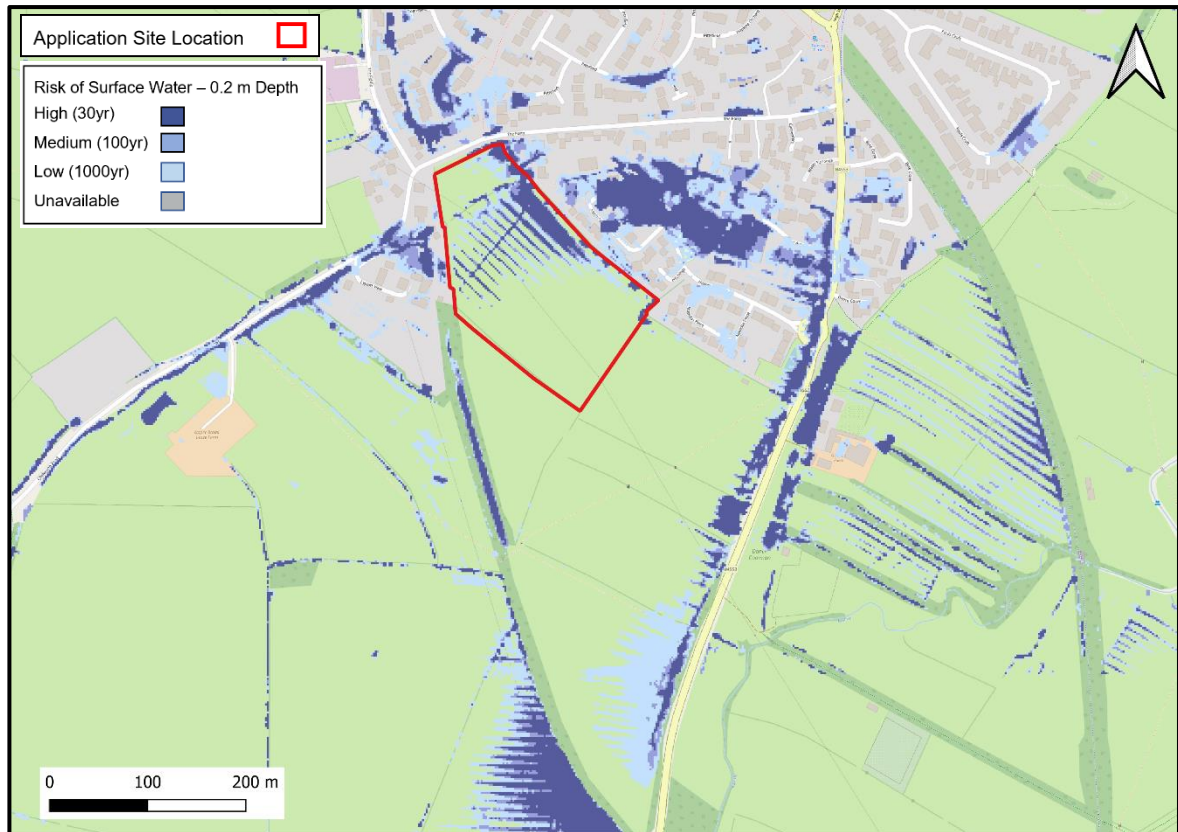


(Source: OpenStreetMap/Environment Agency)

Figure 4.2 Pluvial Flood Extents

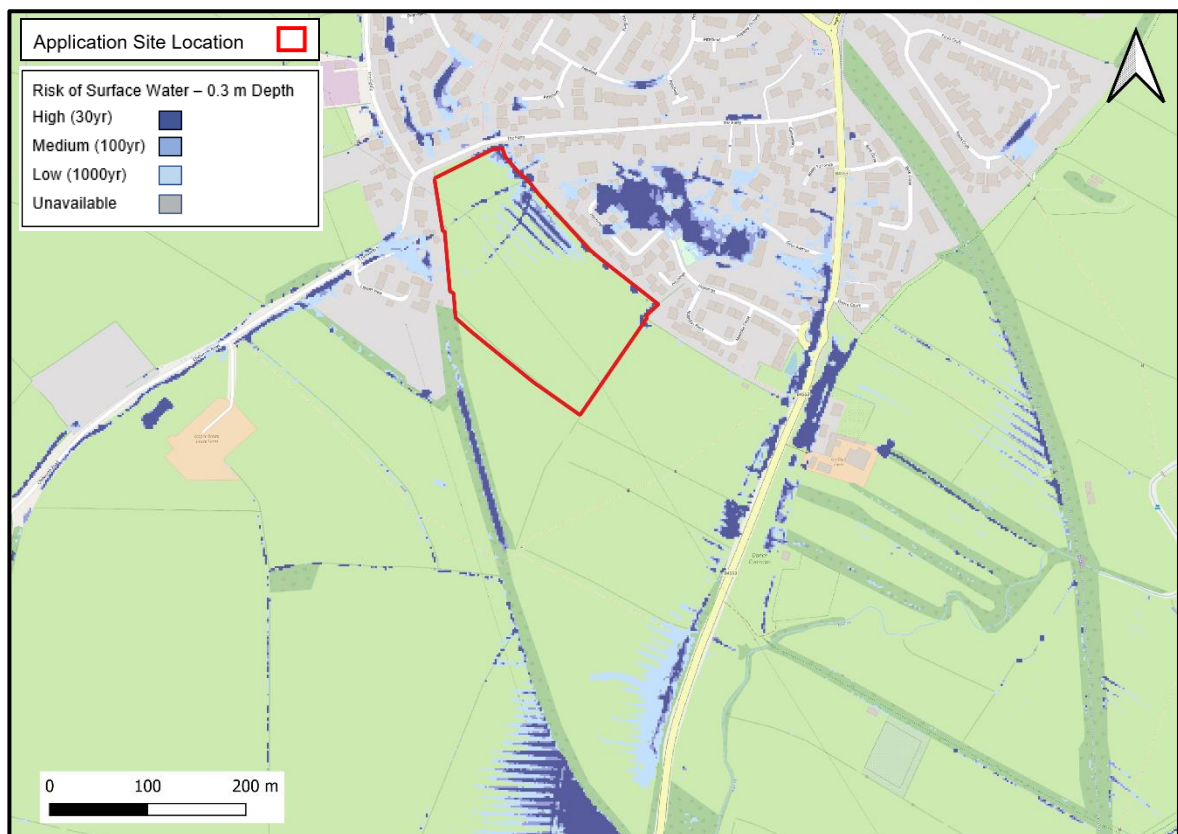
- 4.13 The northern and eastern ditches are also shown to be at high risk of pluvial flooding, due to the depressions in topography that are present here (**Figure 4.2**).
- 4.14 The majority of surface water risk on Site is modelled to have maximum depths of 0.2 m (**Figure 4.3**) with a section in the northeastern corner of Site reaching depths of up to 0.3 m (**Figure 4.4**).

⁹ <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>



(Source: OpenStreetMap/Environment Agency)

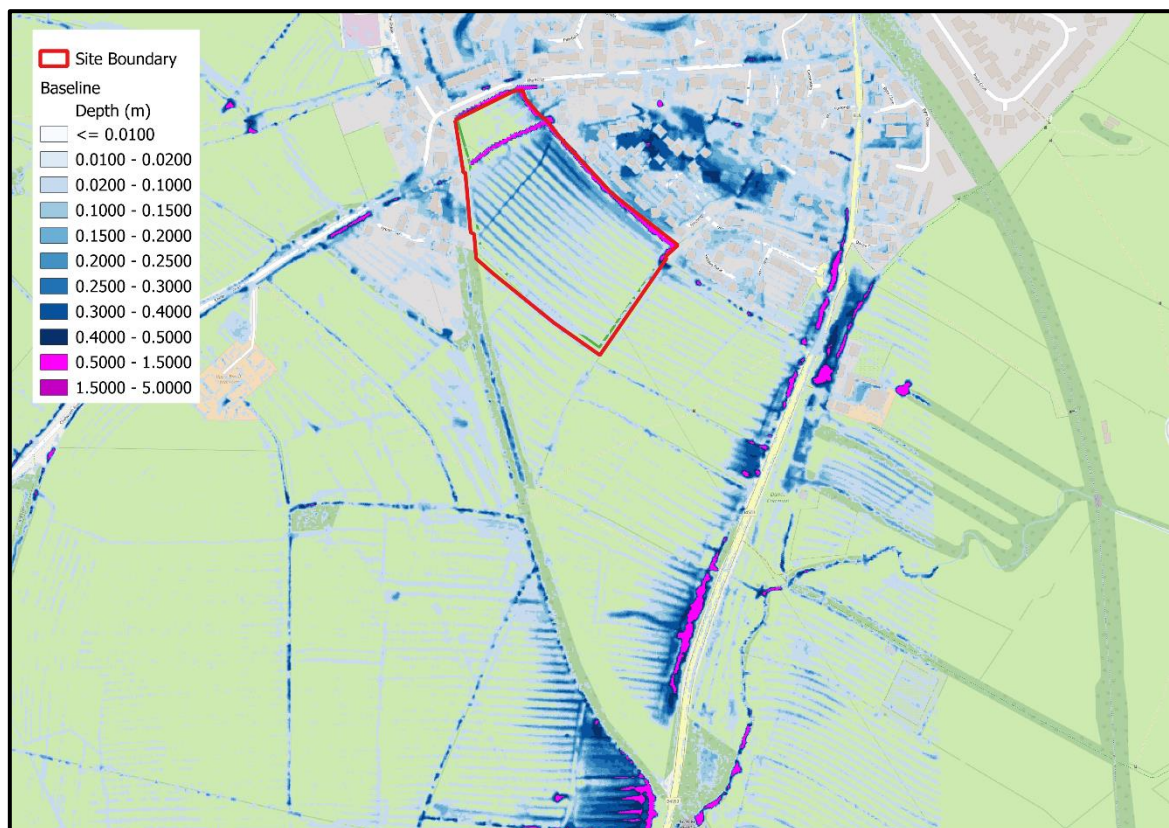
Figure 4.3 Pluvial Flood Depths – 0.2m



(Source: OpenStreetMap/Environment Agency)

Figure 4.4 Pluvial Flood Depths – 0.3m

- 4.15 These associated depths of flooding are considered shallow and deemed to be associated with the ridge and furrow characteristics of site and the drainage ditch network, ultimately forming part of a flow route. As such, Rappor Consultants Ltd have undertaken a hydraulic modelling exercise to confirm the existing risk to the Site and the risk posed by the proposed development. The results of this exercise are included in a report submitted for planning.
- 4.16 The baseline modelling exercise undertaken by Rappor provided outputs largely similar to that shown in the EA's mapping, however there is shown to be a slight increase in flood extents and depths. **Figure 4.6** shows the baseline model outputs for the 1 in 100-year plus 40% climate change event. The maximum flood depths modelled by Rappor are understood to reach depths of 0.45m for the majority of the site, with the existing ditches on site shown to hold water with depths of up to 0.9m. The patterns of surface water risk of site are also modelled to be relatively similar to the EA's mapping with the surface water ponding located 300 m south of site reaching depths of up to 0.85 m.



(Source: OpenStreetMap, Rappor)

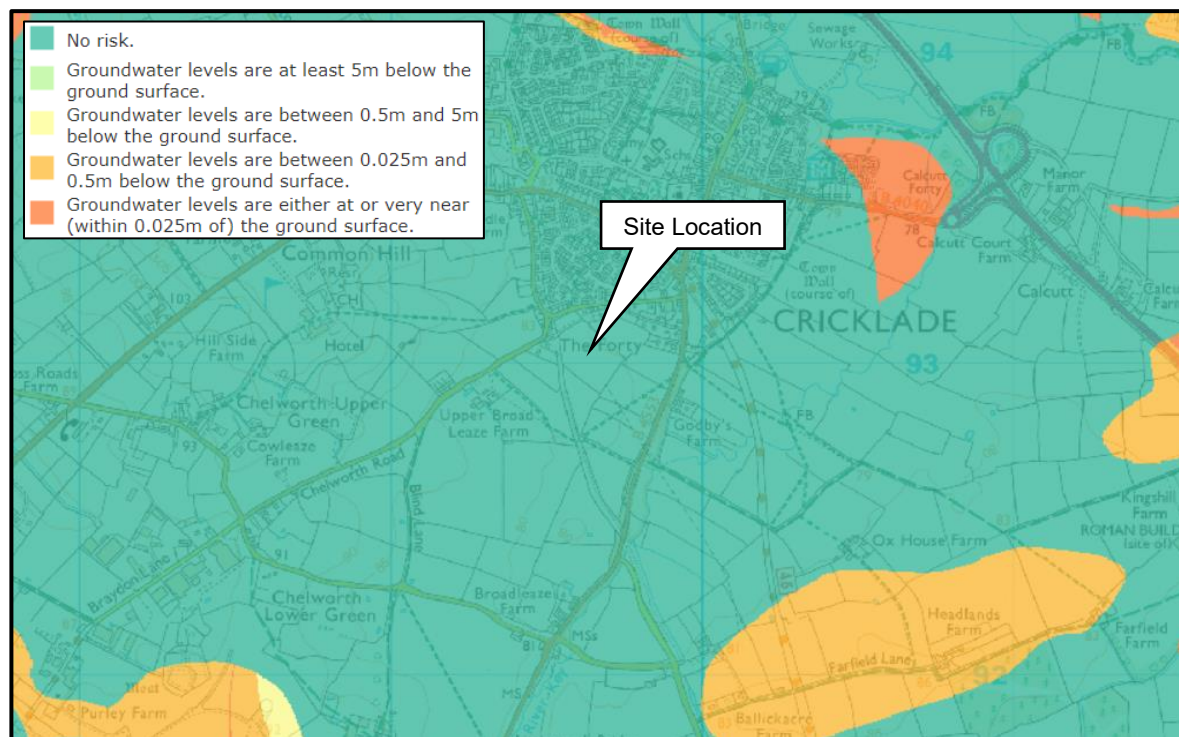
Figure 4.6 Baseline 1 in 100-Year Plus 40% Climate Change Allowance (Design Event) Model Outputs

- 4.17 The pluvial maps do not fully represent any underground drainage systems and therefore any flooding entering the site from existing roads is likely to be intercepted by road gullies and discharged into the local drainage network.
- 4.18 The SFRA recognises that surface water flooding is shown to correlate with small watercourses in Wiltshire. The document recognises the highest-ranking settlements at risk of surface water flooding and Cricklade is not referenced.

- 4.19 Further to the hydraulic modelling exercise undertaken by Rappor, the existing ditch network is identified to hold water up to depths of 0.9m and therefore flows will be contained, with associated depths of flooding within site considered shallow and deemed to be associated with the ridge and furrow characteristics.
- 4.20 Both EA mapping and modelling undertaken by Rappor suggests the Site is at low risk from pluvial flooding but has large areas of high risk deemed to be associated with the ridge and furrows as well as ditch network located on site.

Groundwater Flooding

- 4.21 Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology. This may be regional scale chalk or sandstone aquifers, or localised deposits of sands and gravels underlain by less permeable strata such as that in a river valley.
- 4.22 The Wiltshire Council SFRA states that Cricklade has been subject to historic groundwater flooding events due to the presence of sand and gravel superficial deposits. However, such deposits are not present at the site or its immediate vicinity, and the Wiltshire Council SFRA Data Explore Susceptibility to Groundwater Flooding map locates the site within an area at 'no risk' of groundwater flooding (**Figure 4.7**).



(Source: Wiltshire Council SFRA)

Figure 4.7 Risk of Groundwater Flooding

- 4.23 The risk of flooding from groundwater at this stage is considered to be low.

Sewer Flooding

- 4.24 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the



downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

- 4.25 Thames Water asset plans show that there is a 225mm diameter public foul sewer located within The Forty to the north of the site. A 225mm public foul sewer is located north of this in Deansfield, where it drains southeast to connecting to the northeast of the site (see **Appendix D**).
- 4.26 Thames Water information as denoted by the Wiltshire Council SFRA indicates that there are no records of sewer flooding within the site or its direct vicinity. However, through consultation with Wiltshire Council, it is understood that sewer flooding has been observed within The Forty, but Thames Water undertook a full sewer clean and survey in June 2024 to check for any sewer defects. The survey concluded there were no obstructions or concerns within the sewer. Refer to **Appendix D**.
- 4.27 At this stage, the risk of sewer flooding to the development site is considered to be low.

Flooding from Artificial Sources

Reservoirs

- 4.28 Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.
- 4.29 To help identify this risk, reservoir failure flood risk mapping has been prepared¹⁰, this shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst-case scenario and is only intended as a guide. This identifies the site isn't at risk from this source.
- 4.30 The development is considered to be at negligible risk of flooding from reservoirs.

¹⁰ <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>

5 NPPF Requirements

Sequential Test

- 5.1 The Sequential Test is a simple decision-making tool designed to ensure that areas at little or no risk of flooding are developed in preference to areas at higher risk. Local Planning Authorities (LPAs) should make the most appropriate use of land to minimise flood risk, substituting land uses so that the most vulnerable development is in the lowest risk areas.
- 5.2 Details on requirements for the application of a Sequential Test are included as part of the Planning Practice Guidance (PPG) that supports the NPPF.
- 5.3 A Sequential Test is required for the development proposal if both of the following apply:
 - a) The development is in Flood Zone 2 or 3
 - b) A Sequential Test hasn't already been carried out for a development of the type proposed
- 5.4 The Sequential Test also requires demonstration of the 'reasonable availability' of sites and those sites in areas with a lower probability of flooding 'would be appropriate to the type of development or land use proposed', which would clearly include the suitability of land with a lower flood risk in terms of planning balance as well as availability.
- 5.5 A Sequential Test is not required if one has already been undertaken for a development of the type proposed including for sites allocated for development in the LPAs Local Plan.
- 5.6 A Sequential Test is also not required if either of the following apply:
 - a) The proposal is a minor development
 - b) The development includes a change of use unless the development is a caravan, camping chalet, mobile home or park home site
 - c) The development site is in Flood Zone 1, unless there are flooding issues in the area of the proposal as identified within the relevant LPAs SFRA
- 5.7 The site is on land designated as Flood Zone 1 by the EA's Flood Zone Mapping, however, has been shown to be at risk of pluvial flooding.
- 5.8 Whilst the assessment has identified that parts of the site are at risk from pluvial flooding, and noting built development is located within these areas, it is understood that a Sequential Test is not deemed required as the modelling work by Rappor has demonstrated the development can come forward safely throughout its design life, and without proposing an increased risk elsewhere, mitigation akin to the requirements of the exceptions test have been proposed, with this approach outlined considered to be within accordance with paragraph 177 of the NPPF.

Exception Test

- 5.9 **Table 5.1** shows the matrix indicating the flood risk vulnerability types of development that are acceptable in different flood zones based upon the Flood Map for Planning and where an Exception Test is not required as shown in Table 2 of the PPG¹¹. The tick marks in the

¹¹ <https://www.gov.uk/guidance/flood-risk-and-coastal-change#para77>

table show where the principle of a development proposal is acceptable. The cross marks indicate where development would not be permitted.

- 5.10 The NPPF considers this development as ‘more vulnerable’ in terms of flood risk vulnerability as shown in Annex 3 of the PPG¹² due to the industry the proposals are set to serve. The proposed development is located within Flood Zone 1, which is sequentially preferable by directing development to the areas of lowest risk. The NPPF Flood Risk Vulnerability and Flood Zone Compatibility matrix (**Table 5.1**) confirms that a ‘more vulnerable’ development is deemed appropriate within Flood Zone 1.

Flood Zones/ Vulnerability	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	✓	Exception Test Required	✓	✓	✓
Flood Zone 3a~	Exception Test Required~	✗	Exception Test required	✓	✓
Flood Zone 3b*	Exception Test Required*	✗	✗	✗	✓*

(Flood Risk Table 2)

Table 5.1 Flood Risk Vulnerability and Flood Zone Compatibility

“~” In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

“*” In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere

- 5.11 The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in the situations where suitable sites at lower risk of flooding are not available.
- 5.12 The Exception Test requires two additional elements to be satisfied (as set out in paragraph 178 of the National Planning Policy Framework) before allowing development to be allocated or permitted in situations where suitable sites at lower risk of flooding are not available following application of the Sequential Test.
- 5.13 There are two parts to the Exception Test. It should be demonstrated that:
- development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and
 - the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

¹² <https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerability-classification>



- 5.14 All proposed dwellings are to be located within the Flood Zone 1 areas of the site. This is the area in which all forms of development are considered acceptable. The Drainage Strategy, provided by others, will detail how development drainage will be managed to ensure flood risk is not increased elsewhere. Part B of the Exception Test can be satisfied on this basis and subject to the mitigation measures outlined below to manage the surface water risk posed to site.

Flood Mitigation Measures

- 5.15 Ground levels should be profiled to remove hollows/depressions within the site topography and the area of potential risk of pluvial flooding.
- 5.16 Ground levels should be finished so that overland runoff is encouraged to flow away from the proposed new buildings and be directed to the nearest on-site drainage system runoff collection point.
- 5.17 A network of ditches with associated appropriate culverted sections will be implemented to ensure drainage of surface water.
- 5.18 The mitigation measures mean that the proposed parcels for development are free from pluvial flooding, these mitigation measures have been modelled and are shown within the results of the Modelling Report (22-0400-FMR-02) submitted as part of this application. The mitigation measures applied in modelling to make the development safe are also fully outlined within the Modelling Report.

Access & Egress

- 5.19 Safe pedestrian access/egress is available onto The Forty in order to access the wider road/street network to the north of the site and land outside the flood zones and areas of surface water flood risk.

6 Proposed Drainage Strategy

Introduction

- 6.1 Consideration of flood issues is not confined to the floodplain. This is recognised in the NPPF and associated guidance. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in a catchment, particularly flooding downstream; and replacing permeable vegetated areas with low permeability roofs, roads and other paved areas will increase the speed, volume and peak flow of surface water runoff.
- 6.2 A surface water management strategy for the development is proposed to manage and reduce the flood risk posed by surface water runoff from the site. The surface water drainage arrangements for any development site should be such that the volume and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net effect.
- 6.3 An assessment of the surface water runoff rates was undertaken to determine the surface water options and attenuation requirements for the site and is discussed below.

Existing Drainage

- 6.4 The current site is a greenfield plot of land, considered to drain at existing greenfield rates of runoff to the ditches in the north and east of the site.
- 6.5 The existing greenfield runoff rates have been calculated using the MicroDrainage and the Interim Code of Practice (ICP) SuDs method. The resulting calculations are included within **Appendix E**. The runoff rates were calculated as follows in **Table 6.1**:

Return Period (Yrs)	Runoff Rate (l/s)	30% Betterment on Greenfield Runoff Rates, in line Wiltshire Council betterment policy
1	4.4	3.08
30	10.4	7.28
100	13.6	9.52
QBAR	5.3	3.71

Table 6.1 QBAR

Surface Water Management

- 6.6 Sustainable drainage system measures (SuDS) should be used to control the surface water runoff from the proposed development site, thereby managing the flood risk to the site and surrounding areas from surface water runoff. These measures will also improve the quality of water discharged from the site.



- 6.7 Based on the latest National Standards for SuDS guidance, the SuDS hierarchy demands that surface water run off should be disposed of as high up the following list as practically possible:
- a) Collected for non-potable use, or then;
 - b) Into the ground (infiltration) and re-use, or then;
 - c) To a surface water body, or then;
 - d) To a surface water sewer, highway drain or another drainage system, or then;
 - e) To a combined sewer.

Water Reuse

- 6.8 The proposed development provides an opportunity to reuse surface water throughout the provision of rainwater harvesting products.
- 6.9 Rainwater butts should be provided at suitable locations where feasible, to reduce the volume of water entering the underground drainage system and the demand on the water supply network.
- 6.10 Harvested rainwater may be used for garden watering and other applications where a pressurised hose connection is not required. Stored rainwater also provides a source of clean water when hosepipe bans are in effect.

Infiltration Testing

- 6.11 Based on the geology shown to be underlying the site in the BGS online mapping, it is assumed that infiltration would not provide viable means of surface water discharge. Infiltration testing has been undertaken at this stage (see **Appendix C**).
- 6.12 The test pits did not drain sufficiently to obtain infiltration rates, thus soakaway testing demonstrated low infiltration potential. Slight seepage of groundwater was encountered at 0.80mbgl in Test Pit 03.

Proposed Drainage

- 6.13 The drainage strategy has been designed to account for infiltration being deemed unsuitable. The drainage hierarchy demands that discharging to a surface water body must be considered next. The ditch in the north of the site provides a suitable option to do so.
- 6.14 The introduction of hardstanding associated with the proposed development will introduce an impermeable area, which will increase the amount of runoff generated and could increase flood risk elsewhere unless managed to LLFA/IDB drainage requirements. The impermeable area increases to approximately 1.053ha when an additional 10% of impermeable area is included to account for urban creep.
- 6.15 As per principles outlined in the SuDS manual and the national standards for SuDS, effective management of surface water runoff entails utilising SuDS features close to source, which will be in the form of conveyance Swales and permeable paving as an example, with the primary storage features being an attenuation basin, all of which will satisfy and promote the four pillars of SuDS (water quantity, quality, amenity and biodiversity).



- 6.16 A pump station is proposed to control the flow of discharge to the northern ditch within the site, directed via a proposed storm rising main. This is subject to land drainage consent.
- 6.17 It is proposed to introduce a new gravity stormwater system with attenuation and a controlled discharge for up to a 1 in 100-year event plus 40% climate change allowance, which will reduce risk of flooding downstream.
- 6.18 The overall discharge rate from site will be restricted to the QBAR rate, with a 30% betterment in line with Wiltshire Council betterment policy, for all return period storms at 3.7l/s.
- 6.19 To demonstrate that the necessary storage volumes can be accommodated on the site an illustrative drainage layout has been prepared and has been included as **Appendix F**. Supporting drainage calculations are included in **Appendix E**.
- 6.20 The final layout and design of the surface water drainage network will be determined at the detailed design stage as the development masterplan evolves.

Exceedance Events

- 6.21 The attenuation basin will be designed with a capacity up to a 1 in 100-year (plus 40% climate change) event, with a +300mm freeboard allowance, based on the 3.7l/s restricted discharge rate. This provides a betterment (reduction) in runoff when compared to existing undeveloped conditions, where runoff is uncontrolled across all return periods.
- 6.22 A storm event in excess of this design standard would be extreme and would cause the attenuation basin to overtop (with no sudden deluge) and would then shed overland following the topography of the site, as per existing conditions.
- 6.23 Finished floor levels of new dwellings will be set above external levels, which will mitigate the residual risk of overtopping.

Water Quality

- 6.24 The SuDS Manual (CIRIA C753) states that the design of surface water drainage should consider minimising contaminants in surface water runoff discharged from the site. The level of treatment required depends on the proposed land use, according to the pollution hazard indices. For this site contaminant risks come from the residential roofing and parking.
- 6.25 To ensure that adequate treatment is provided the SuDS mitigation indices for the development must be equal to, or exceed, the pollution hazard indices. Surface water runoff from residential roofs is considered to present a **very low** hazard to water quality, whilst general residential parking presents a **low** hazard.
- 6.26 To ensure a suitable mitigation index is achieved the affected stormwater system has been assessed. **Table 6.2** indicates satisfactory water quality is achieved.
- 6.27 It is also recommended, as good practice, that gullies and chambers have suitable silt traps/catchpits to reduce sediments entering the system.

		Pollution Hazard Level	Total suspended solids	Metals	Hydro-carbons
Land Use	Residential Parking	Low	0.5	0.4	0.4
Total			0.5	0.4	0.4
SuDS Component	Attenuation Basin		0.5	0.5	0.6
Total			0.5	0.5	0.6
Total SuDS Mitigation Indices ≥ Pollution Hazard Indices			Yes	Yes	Yes

(As per C753 The SuDS Manual)

Table 6.2 Water Quality Indices

Foul Water Management

- 6.28 All foul sewerage should be designed in accordance with Building Regulations Part H. In areas where sewers are to be adopted by Thames Water, sewerage should be designed in accordance with Sewers for Adoption (7th Edition) and supplemented with additional standards provided by Thames Water. An application to enter into an agreement for sewer adoption must be made in writing to Thames Water prior to any works commencing on site. A connection point should be agreed with Thames Water.
- 6.29 Foul water from the proposed dwellings shall be collected through a traditional gravity drainage system and directed to a pump station located in the south of the site. This will direct flow via a proposed foul rising main to the existing public foul sewer located in The Forty, to the north of the site. A Section 106 application is required for this connection.
- 6.30 In 2023, Thames Water were consulted in the form of a Developer Enquiry and at the time, provided confirmation that there is sufficient capacity for the proposed development to discharge into the public foul sewer located in The Forty (see **Appendix D**). Following consultation with Wiltshire Council, a further Developer Enquiry was required to be submitted and a response to this was received in March 2025. The response confirmed an inability of the existing foul infrastructure to accommodate the foul flows from the development (see **Appendix D**).
- 6.31 Thames Water will be required to undertake a hydraulic modelling exercise to understand the necessary network upgrades to accommodate the flows. Once the site receives planning, Thams Water will be able to commence this process.

Maintenance Regime

- 6.32 Maintenance of SuDS features are essential to ensure that the surface water drainage system operates effectively and that flooding of the site and surrounding areas is prevented.
- 6.33 The responsibility of maintaining the private surface water and foul water drainage components would lie with the landowner of the site, who may delegate responsibility to an appointed external private management company.
- 6.34 A full maintenance regime should be carried out to ensure that the drainage system remains operational over its lifetime. **Table 6.3** summarises an initial maintenance plan for the



drainage components proposed within the development. The SuDS Manual (CIRIA C753) and manufacturer's guidelines should be referred to for further maintenance information.

Drainage Component	Required Action	Typical Frequency
Pipework, manholes, flow control chambers, catch pits and silt traps	Stabilise adjacent areas	As required
	Remove weeds	As required
	Clear any poor performing structures.	As required
	Inspect all structures for poor operation	Three monthly, 48 hours after large storms in first six months
	Monitor inspection chambers. Inspect silt accumulation rates and determine silt clearance frequencies	Annually
Attenuation Basin	Remove litter and debris	Monthly (or as required)
	Cut the grass – public area	Monthly (during growing season)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first three years)	Monthly (at start then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in the main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build up has occurred to inform management and disposal options	Half yearly
	Check any mechanical devices e.g., penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at a minimum of 0.1m above the pond base; include max 25% of pond surface)	Annually
	Remove sediment from any forebay	Every 1-5 years (or as required)
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 1-5 years (or as required)
	Repair erosion or other damage	As required
	Replant where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate inlets, outlets and overflows	As required

(As per C753 The SuDS Manual)

Table 6.3 Initial Operation and Maintenance Plan

7 Summary and Conclusions

Summary

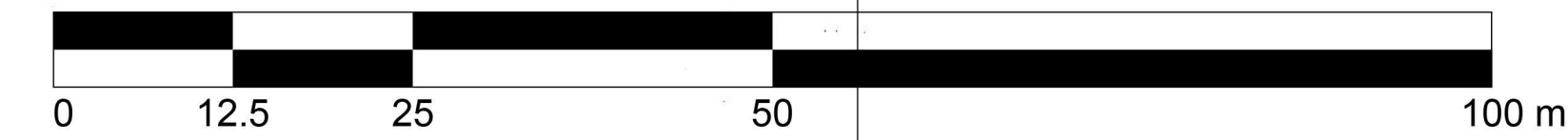
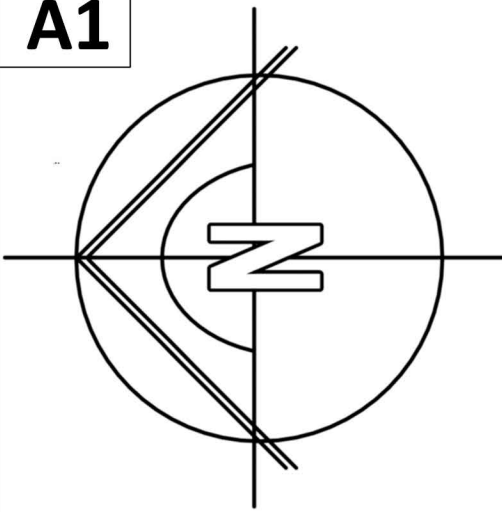
- 7.1 This assessment has considered the risks of all types of flooding to the site including tidal, fluvial, surface, groundwater, sewer and artificial sources and provides mitigation measures to ensure that the flood risk to the site is minimised and that flood risk off-site is not increased.

Conclusions

- 7.2 This assessment has indicated that the site in question is in Flood Zone 1 on the Environment Agency Flood Map for Planning and therefore at low risk of fluvial flooding.
- 7.3 The site is shown to be at high to low risk of pluvial flooding, this being a consequence of topography ridge and furrow farming. Re-profiled ground levels will remove this risk and surface water runoff shall be directed to the proposed attenuation basin in the southeast of the site.
- 7.4 The site is at low/negligible risk from all other assessed sources of flooding.
- 7.5 Application of the Sequential Test may be required, subject to confirmation from the planning consultant. Given the Flood Zone 1 location, the Exception Test also does not need to be applied.
- 7.6 Mitigation measures have been recommended and are outlined in full above.
- 7.7 Safe pedestrian access/egress is immediately available onto The Forty in order to access the wider road/street network to the north of the site.
- 7.8 Traditional gravity sewers shall direct surface water runoff to an attenuation basin which has been sized to accommodate the 100-year plus 40% climate change event. A pump station shall control the flow of discharge to the northern ditch within the site, via a storm rising main. The overall discharge rate from site will be restricted to the QBAR rate for all return period storms at 3.7l/s.
- 7.9 Foul water from the proposed development is to be directed via a pump station to the proposed connection point at the existing Thames Water public asset located in The Forty.
- 7.10 In compliance with the requirements of the National Planning Policy Framework, and subject to the mitigation measures proposed, the development will not cause or be subject to significant flood risk issues.



Appendix A – Proposed Development Drawings

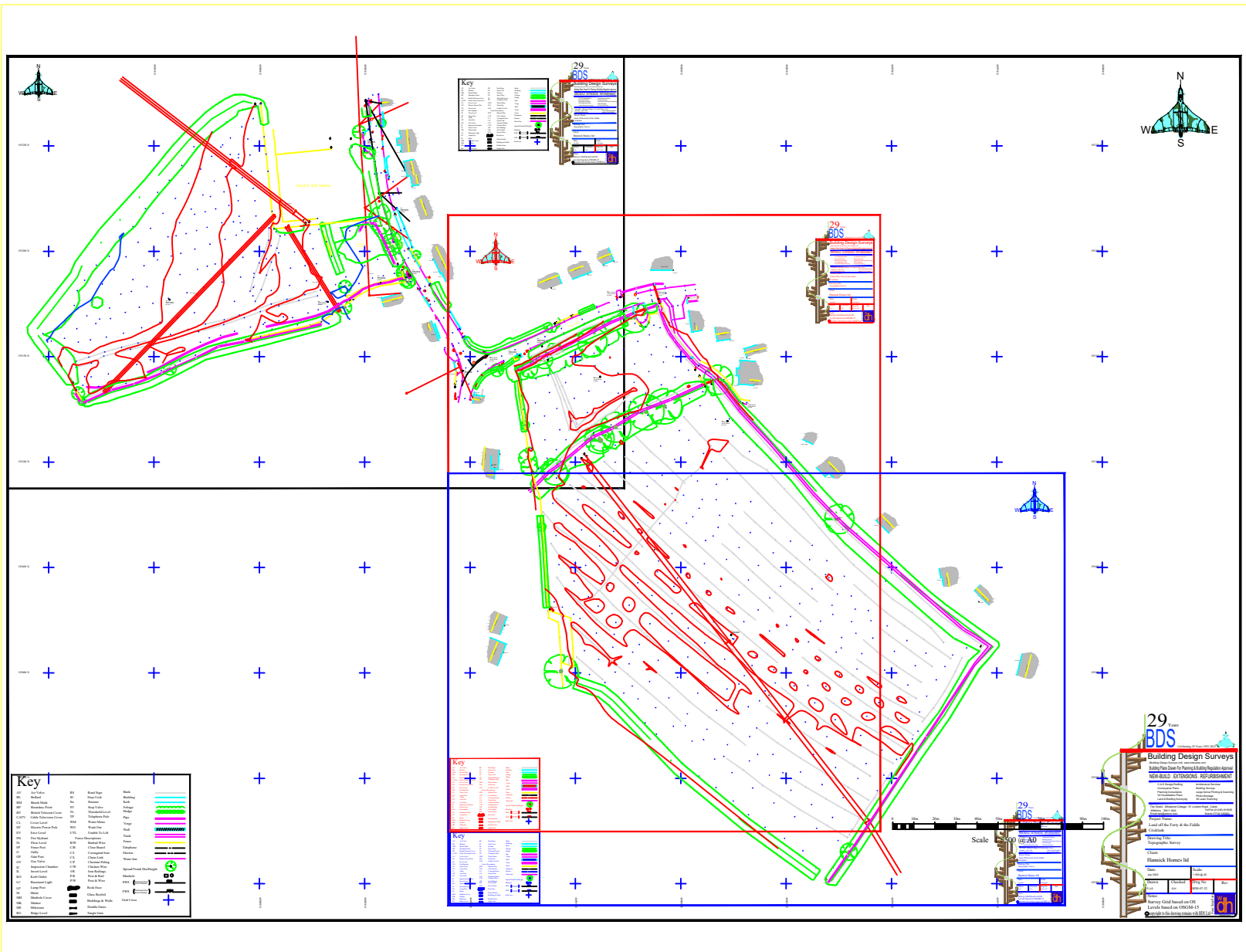


Scale 1:500 @ A1

CLIENT			
HANNICK HOMES			
PLANNING			
PROJECT TITLE			
CRICKLADE			
DRAWING TITLE			
ILLUSTRATIVE LAYOUT			
PROJECT NO.	DWG NO.	REVISION	STATUS
01793	40/001	.	
SCALE	DRAWN	CHECKED	DATE
1:500@A1	ST		01/12/2024



Appendix B – Topographical Survey





Appendix C – Infiltration Testing



OUR REF: B2972

29th June 2023

Hannick Homes & Developments Ltd

Dammas House
Dammas Lane
Old Town
Swindon
Wiltshire
SN1 3EF

By email (samcroft@hannick.com)

Dear Sam,

Land South of The Forty, Cricklade
Soakaway Testing

Further to completion of the soakaway testing at the above site, our letter report is as follows:

1. Introduction

Earth Environmental & Geotechnical (Southern) Ltd (EEGSL) has been commissioned by Hannick Homes & Developments Ltd ('the Client') to assess soil infiltration rates at a site in Cricklade, Wiltshire. These works were completed in accordance with the EEGSL proposal 2972, dated 23rd May 2023.

This letter report presents full factual records of the site work carried out, the ground conditions encountered in the trial pits and the soakaway test results. All information collected has been used to provide an assessment of soil infiltration rates and the suitability of the site for soakaway drainage.

The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information, improved practices or changes in legislation may require a reinterpretation of the report in whole or in part. EEGSL reserve the right to amend either conclusions or recommendations in light of any further information that may become available. The report is provided for the sole use by the client and is confidential to them.

Recommendations within this report are also based on exploratory records and in situ test results. No liability can be accepted for conditions not revealed by the exploratory hole, particularly at intervening locations. Whilst every effort is made to ensure accuracy of data supplied, all opinions expressed as to the spatial distribution of strata between sampling locations is for guidance only and no responsibility is accepted as to its accuracy.

2. Site Location & Description

The assessment site is located on Land South of the Forty, Cricklade, Wiltshire and is centered on National Grid Reference 409609, 193046 with a nearest postcode of SN6 6HW.

At the time of the investigation, the site was occupied by fields.

3. Published Geology

According to the British Geological Survey (BGS), the site is directly underlain by the Oxford Clay Formation of Jurassic Age. The Oxford Clay Formation is described as silicate-mudstone, grey, generally smooth to slightly silty, with sporadic beds of argillaceous limestone nodules.

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Earth Environmental & Geotechnical
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Registered Office:
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Registered in England.
No: 8436152

4. Fieldwork

The fieldwork was carried out by EEGSL on Thursday 22nd June 2023 and comprised:

- Three trial pits (designated TP01, TP02 and TP03) excavated to depths of between 1.45m and 1.90m below existing ground level using a tracked excavator. Details of the ground and groundwater conditions were noted and recorded on a Trial Pit Log (appended to this letter).
- Soakaway tests were carried out TP01 and TP02 in the trial pit in accordance with the methods described in BRE Digest 365⁽²⁰¹⁶⁾, the results of which are discussed in Section 5 below and attached to this letter.
- All works were supervised by EEGSL and the trial pits were backfilled after the completion of the soakaway testing.

The logging of soils and rocks has been carried out in accordance with BS5930⁽²⁰¹⁵⁾ except where superseded by the soil and rock description methodology in BS EN14688-1⁽²⁰⁰²⁾, BS EN 14688-2⁽²⁰⁰⁴⁾ and BS EN 14689-1⁽²⁰⁰³⁾.

The trial pit locations are shown in Figure 1 below.

Figure 1 – Soakaway Test Location Plan



5. Ground Conditions Encountered & Results of In Situ Testing

The trial pits encountered the following geological strata:

- Weathered Oxford Clay Formation was encountered below the topsoil and was proven to a maximum depth of 1.90m. The weathered deposits were encountered as:
 - Firm brown mottled grey and orange brown slightly gravelly CLAY with flint gravel.
 - Firm becoming stiff blue grey mottled orange brown slightly sandy silty CLAY.
 - Within TP03 slightly sandy silty clay with bands of yellow brown clayey SAND.

Man-made obstructions were not encountered during the excavation. No groundwater was encountered within TP01 and TP02. Within TP03, a small seepage was encountered at 0.80mbgl.

Soakaway testing was completed as per BRE Digest 365⁽²⁰¹⁶⁾. The tests did not sufficiently drain in order to obtain an infiltration rate.

Based on the results of the soakaway testing it is concluded soakaway drainage will not be suitable at this site.

----- END OF LETTER REPORT -----

Yours Sincerely,



Amelia Samuel

Senior Geotechnical Consultant

For and on behalf of Earth Environmental & Geotechnical (Southern) Ltd

Encl. Trial Pit Log, Soakaway Test Results

ENCLOSURE 1

TRIAL PIT LOGS

Trial Pit Log

Project Name: Land South of The Forty, Cricklade		Client: Hannick Homes		Date: 22/06/2023	
Location: Cricklade		Contractor: MCD Ground Solutions		Co-ords: E409567.00 N193148.00	
Project No. : B2972		Crew Name: SM		Equipment: 8 T tracked excavator	
Location Number TP01	Location Type TP	Level	Logged By CF	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.20			TOPSOIL: Grass over firm dark brown slightly sandy CLAY with frequent rootlets.	1		
								Firm brown mottled grey and orange slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of flint.			
					0.90			...becoming more orange brown and gravelly.		Firm grey and orange slightly gravelly sandy CLAY. Gravel is angular to subangular fine to medium of flint.	
					1.50			Firm becoming stiff blue grey mottled orange brown slightly sandy silty CLAY. Sand is fine to coarse.		...minor to occasional rootlets. Minor mineralisation of calcite (coarse sand size).	...becoming more blue grey mottled with orange and minor yellow brown.
					2.90			...becoming less orange. Calcite minerals no longer present.		End of Borehole at 2.900m	
								3			
								4			
								5			

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.60	0.50						

Remarks Trial pit terminated at 2.9mbgl at target depth. Groundwater not encountered. Trial Pit back filled with arisings.							 EARTH ENVIRONMENTAL & GEOTECHNICAL
--	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Land South of The Forty, Cricklade		Client: Hannick Homes		Date: 22/06/2023	
Location: Cricklade		Contractor: MCD Ground Solutions		Co-ords: E409693.00 N193038.00	
Project No. : B2972		Crew Name: SM		Equipment: 8 T tracked excavator	
Location Number TP02	Location Type TP	Level	Logged By CF	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			TOPSOIL: Grass over firm dark brown slightly sandy CLAY with frequent rootlets. Firm brown slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of flint. ...becoming more blue grey mottled with orange. Becoming sandy. Sand is fine to coarse.	1
					1.60			...veins of calcite mineralisation present. Firm becoming stiff blue grey banded orange brown slightly sandy silty CLAY. Sand is fine. ...minor to occasional rootlets. Becoming more grey brown. ...becoming more blue grey and slightly sandy.	2
					2.50			End of Borehole at 2.450m	3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.40	0.50						

Remarks Trial pit terminated at 2.45mbgl at target depth. Groundwater not encountered. Trial Pit back filled with arisings.							 EARTH ENVIRONMENTAL & GEOTECHNICAL
---	--	--	--	--	--	--	---

Trial Pit Log

Project Name: Land South of The Forty, Cricklade		Client: Hannick Homes		Date: 22/06/2023	
Location: Cricklade		Contractor: MCD Ground Solutions		Co-ords: E409579.00 N193031.00	
Project No. : B2972		Crew Name: SM		Equipment: 8 T tracked excavator	
Location Number TP03	Location Type TP	Level	Logged By CF	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			TOPSOIL: Grass over firm dark brown slightly sandy CLAY with frequent rootlets.	
					1.00			Firm brown mottled minor grey slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse of flint. Sand is fine to coarse	1
					2.70			Firm blue grey slightly sandy CLAY banded orange brown slightly gravelly clayey SAND. Gravel is angular to subangular fine to coarse of flint.	
								...becoming predominantly CLAY. Firm to stiff blue grey with minor yellow clay with occasional rootlets present.	
								...band of yellow slightly sandy silty CLAY. Rootlets becoming frequent.	2
								...becoming blue grey mottled brown slightly sandy (calcite mineralisation) silty CLAY.	
								End of Borehole at 2.700m	3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.70	0.60						

Remarks

Trial pit terminated at 2.70mbgl. Seepage of groundwater encountered at 0.80mbgl. Trial Pit back filled with arisings.

ENCLOSURE 2

SOAKAWAY TEST RESULTS



Earth Environmental & Geotechnical Ltd

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Email: southwest@earthenvironmental.co.uk

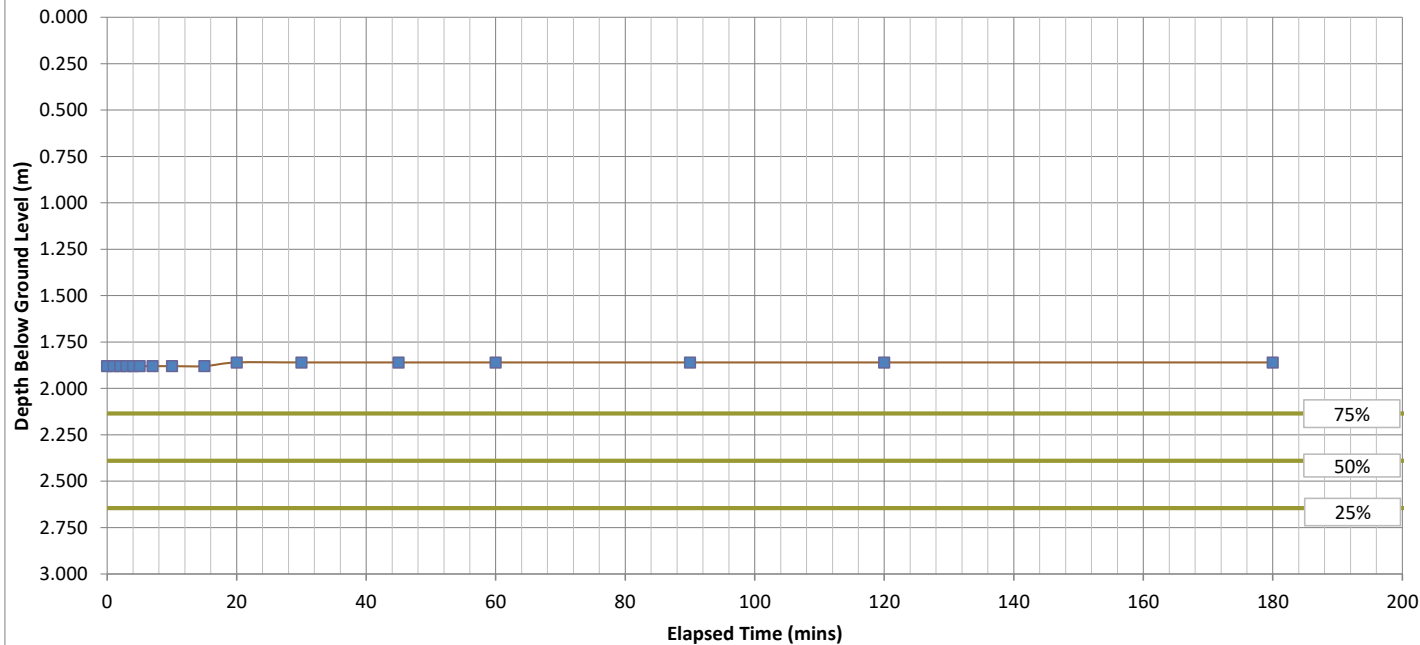
SOAKAWAY TEST

(To: BRE 365 2016)

Job No: B2972
Site: Land South of The Forty, Cricklade
Client: Hannick Homes

Location Reference:	SA1	
Date	22/06/2023	
Geology in test section	Clay	
Depth to Base of Hole	2.90	m
Effective Depth	1.02	m
Hole Width	0.50	m
Hole Length	1.70	m
Depth to water at start of test below ground level	1.88	m
Depth to water at end of test below ground level	1.86	m
Effective storage depth to 75% full	0.77	m
(Depth below GL)	2.14	m
Effective storage depth to 50% full	0.51	m
(Depth below GL)	2.39	m
Effective storage depth to 25% full	0.26	m
(Depth below GL)	2.65	m
Height to 50% depth	0.51	m3
Effective Storage Volume Vp75-25	0.87	m3
Time tp25 at which water is 75% of effective depth (minutes)		mins
Time tp25 at which water is 25% of effective depth (minutes)		mins
Time for water level to fall between Vp75 -25		mins
Time for water level to fall between Vp75 -25		secs
Internal surface area of hole up to 50% depth including base	7.23	m2
Soil Infiltration Rate, f	N/A	m/s

Time Elapsed (mins:sec)	Depth of Water below GL (m)	Measured Data
0.00	1.880	
1.00	1.880	
2.00	1.880	
3.00	1.880	
4.00	1.880	
5.00	1.880	
7.00	1.880	
10.00	1.880	
15.00	1.880	
20.00	1.860	
30.00	1.860	
45.00	1.860	
60.00	1.860	
90.00	1.860	
120.00	1.860	
180.00	1.860	





Earth Environmental & Geotechnical Ltd

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Email: southwest@earthenvironmental.co.uk

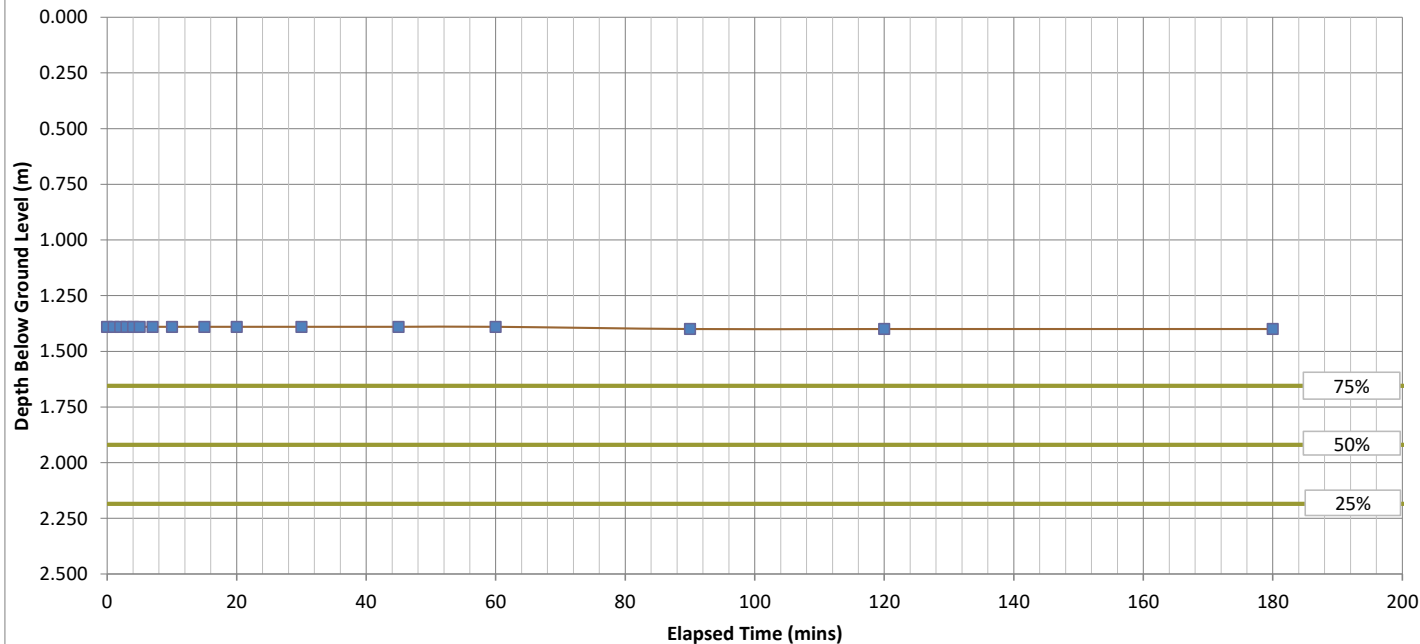
SOAKAWAY TEST

(To: BRE 365 2016)

Job No: B2972
Site: Land South of The Forty, Cricklade
Client: Hannick Homes

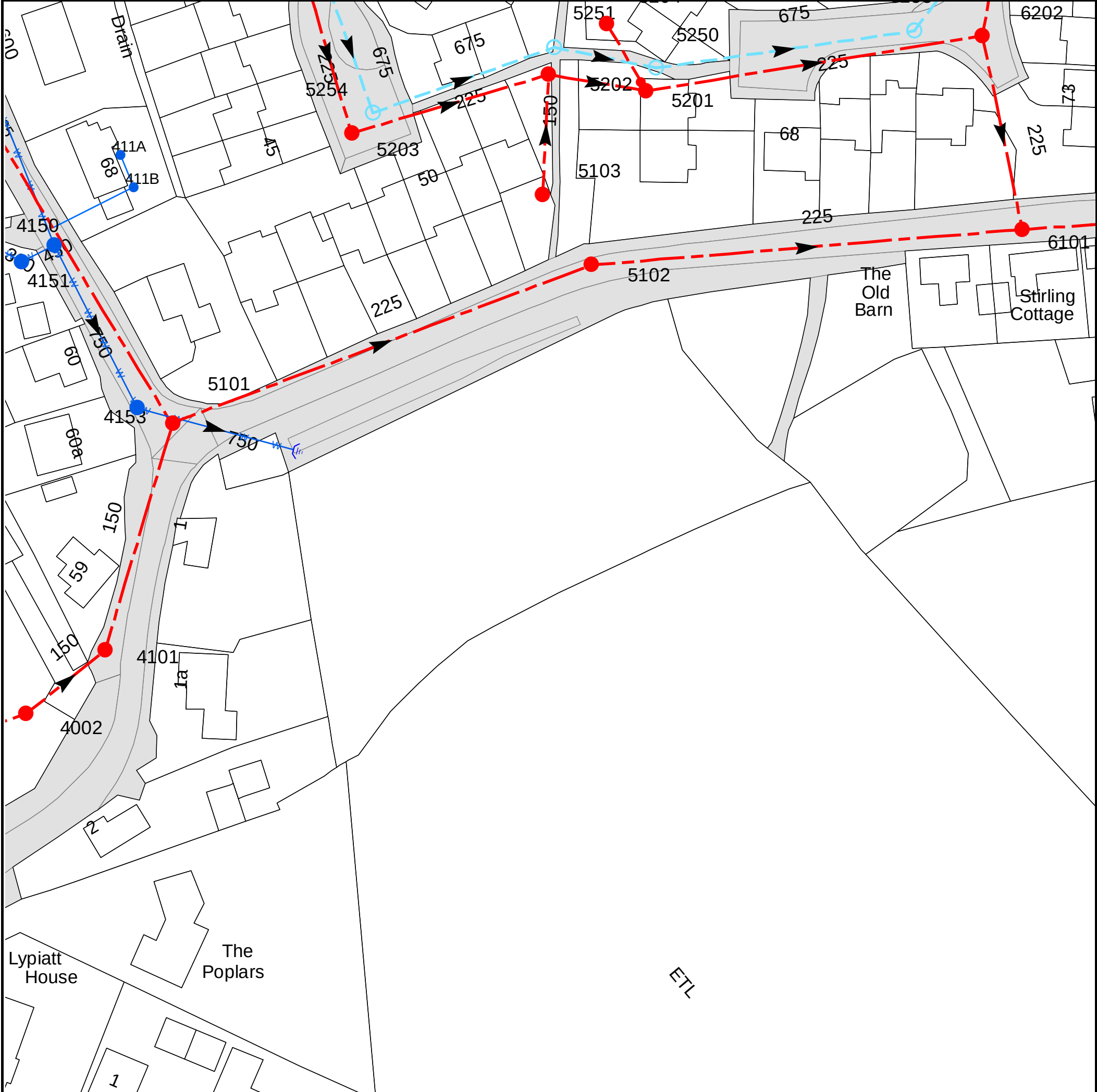
Location Reference:	SA02	
Date	22/06/2023	
Geology in test section	Clay	
Depth to Base of Hole	2.45	m
Effective Depth	1.06	m
Hole Width	0.50	m
Hole Length	1.40	m
Depth to water at start of test below ground level	1.39	m
Depth to water at end of test below ground level	1.40	m
Effective storage depth to 75% full	0.80	m
(Depth below GL)	1.66	m
Effective storage depth to 50% full	0.53	m
(Depth below GL)	1.92	m
Effective storage depth to 25% full	0.27	m
(Depth below GL)	2.19	m
Height to 50% depth	0.53	m3
Effective Storage Volume Vp75-25	0.74	m3
Time tp25 at which water is 75% of effective depth (minutes)		mins
Time tp25 at which water is 25% of effective depth (minutes)		mins
Time for water level to fall between Vp75 -25		mins
Time for water level to fall between Vp75 -25		secs
Internal surface area of hole up to 50% depth including base	5.36	m2
Soil Infiltration Rate, f	N/A	m/s

Time Elapsed (mins:sec)	Depth of Water below GL (m)	Measured Data
0.00	1.390	
1.00	1.390	
2.00	1.390	
3.00	1.390	
4.00	1.390	
5.00	1.390	
7.00	1.390	
10.00	1.390	
15.00	1.390	
20.00	1.390	
30.00	1.390	
45.00	1.390	
60.00	1.390	
90.00	1.400	
120.00	1.400	
180.00	1.400	





Appendix D – Thames Water Sewer Records and Information



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 409570,193127

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
6101	81.04	79.8
5103	81.8	80.7
411B	n/a	n/a
411A	n/a	n/a
5203	81.78	80.77
5254	81.78	80.37
5201	81.7	80.3
5202	81.76	80.43
5250	81.74	80.16
5251	81.73	80.27
6202	81.93	80.13
6253	81.85	80.13
5204	81.71	81.04
4002	n/a	n/a
4101	82.23	80.67
5101	82.88	80.36
4153	82.87	80.9
5102	81.52	80.17
4151	82.45	81.3
4150	82.47	81.07
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



Mr Kris Tovey

Rappr Consultants Ltd

CTP House,
Knapp Road,
Cheltenham,
GL50 5FQ



10 August 2023

Pre-planning enquiry: Confirmation of sufficient capacity

Site: LAND SOUTH OF THE FORTY CRICKLADE SN6 6NJ

Dear Mr Tovey,

Thank you for providing information on your proposed development.

Development of 3ha greenfield site to provide 70 dwellings.

Proposed foul water to discharge by pumped flows at 3.25 l/s to 225mm foul water sewer between MHs 5101 and 5102.

Proposed surface water to discharge to onsite SuDS and not discharged to public sewer.

We have completed the assessment of the foul water flows based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

We're pleased to confirm that there will be sufficient sewerage capacity in existing foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you've any further questions, please contact me on 07747647876.

Yours sincerely,

Kind Regards

p.p

James Kitching

Developer Services – Adoptions Engineer
Pre-planning & Sewer Adoptions Team



Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk



Charlotte Granger

Rappor
Pressworks
7-9 Ambrose Street
Cheltenham, Gloucestershire
GL50 3LH



27 March 2025

Pre-planning enquiry: Capacity concerns (Network and STW)

Dear Charlotte,

Thank you for providing information on your development at LAND SOUTH OF THE FORTY, CRICKLADE, SN6 6NJ

Proposed 49 General Housing

Proposed foul water via pumped at 4.75 l/s to 225mm FWS between FWMH SU09935101 and SU09935102

Proposed surface water discharge to onsite SuDS and then into ditch

No surface water to discharged to Thames Water sewer

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

We've assessed your **foul water** proposals and concluded that our sewerage network will not have enough capacity for you to connect. Unfortunately, we're unable to meet the needs of your **full** development at this time.

In order to ensure we make the appropriate upgrades – or 'off-site reinforcement' – to serve the remainder of your development, we'll need to carry out modelling work, design a solution and build the necessary improvements. This work is done at our cost.

Once we've begun modelling, we may need to contact you to discuss changing the connection point for capacity reasons. Please note that we'll pay the cost of covering any extra distance if the connection needs to be made at a point further away than the nearest practicable point of at least the same diameter.

How long could modelling and reinforcement take?

Typical timescales for a development of your size are:

Modelling: 9-12 months
Design: 6 months
Construction: Up to 18 months*
Total: Up to 36 months

*(dependent on Traffic Management, Local Authority and Third Party Landowners)

If the time you're likely to take from planning and construction through to first occupancy is longer than this, we'll be able to carry out the necessary upgrades in time for your development. If it's shorter, we may seek planning conditions, please contact me on the number below to discuss the timing of our activities.

What do you need to tell us before we start modelling?

We will only carry out modelling once we're confident that your development will proceed. In order to have this confidence, we'll need to know that you **own the land and have either outline or full planning permission**. Please email this information to us as soon as you have it.

If the modelling shows we need to carry out reinforcement work, then before we start construction we'll need you to supply us with notification that you've confirmed your F10 – Notification of construction project - submission to the Health and Safety Executive.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

- 1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- 2) rainwater infiltration to ground at or close to source
- 3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- 4) rainwater discharge direct to a watercourse (unless not appropriate)
- 5) controlled rainwater discharge to a surface water sewer or drain
- 6) controlled rainwater discharge to a combined sewer.

Where connection to the public sewerage network is required to manage surface water flows we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

Please see our [FAQ's leaflet](#) for additional information.

Capacity at STW?

The receiving network is served by Cricklade STW and there is a known performance issue which may cause the EA to object to the development. A more detailed assessment will be carried out when the LPA consult our Development Control team and we may require a planning condition to allow us time to upgrade the STW.

What do I need to do next?

If you've satisfied the points above, then you should compare your own timeline with the typical timescales we've suggested for our activities. If the time you're likely to take from planning and construction through to first occupancy is **more** than the total time we're likely to take, we'll be able to carry out the necessary upgrades in time for your development.

If you've any further questions, please contact me on 0774 764 6498.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Long Tran'.

Long Tran

Adoption Engineer

Developer Services – Adoptions Engineer, Sewer Adoptions Team

Members to NOTE this final email correspondence from Thames Water with reference to the residents' sewage flooding at the Forty and CTC query on capacity issues.

26 July 2024

Our Ref: 33530267

Residents' concerns

Dear Cara and residents

I'm writing to update you on your case, about residents' concerns in relation to sewer flooding in the area. I'm sorry to hear you remain unhappy with how we've handled your case.

As Customer Relations Manager, please be assured, I've carried out a full and final review of your case, in line with our [complaints procedure](#), and I'm replying on behalf of our Operations Director, Tess Fayers.

Our investigations

Our Field Operational Specialist (FOS) reviewed the residents' concerns and raised for a sewer clean and survey to be carried out. **The sewer clean and survey went ahead on 30 June**, under our reference **SA-1268133**, to check the sewer for any defects which could be causing any sewer flooding incidents.

A crew of our engineers carried out a full survey and found no obstructions or concerns within our sewer. The footage from the survey was referred to our FOS to further review and also found no issues or concerns.

I understand from a resident on your recent email dated 23 July, they believe there is a capacity issue at the nearby Sewer Pumping Station. Below I've provided more information to help residents understand about hydraulic flooding.

Hydraulic flooding

Hydraulic flooding is a term used to describe when our sewer network can't cope with the volume of water passing through it. Our sewers are designed to take wastewater away from businesses and homes and cope with normal weather conditions. There are occasions where we experience heavy rainfall for a long period of time causing water to enter our and exit from the lowest point, and this is referred to as hydraulic flooding.

While we're unable to design a sewer network that can cope with all conceivable weather conditions or eventualities, this doesn't mean the network is inadequate. It is fully capable to fulfil its purpose, but sadly, on occasions we experience a higher amount of rainfall than it can handle. Unfortunately, there's little that can be done to address this. If we were to make our sewers bigger this wouldn't necessarily solve the problem. In normal weather conditions an oversized sewer would also cause other issues. If a sewer pipe was oversized, during normal weather conditions the flow of water would be too slow, which in turn could increase blockages.

In terms of what we're doing to improve performance, we're spending £1.25 billion over the period from 2020 to 2025 on maintaining and improving our wastewater network and STWs. This includes increasing treatment and/or storage capacity at several sites, including Mogden, Chesham, Witney, Bourton on the Water, Fairford and many others. In London, the completion of the £4.6 billion 'supersewer' will provide a massive reduction in the need for discharges to the tidal River Thames. Our plan for the following five years, which is currently being prepared, will include further major improvements towards our goal of eliminating untreated discharges. You might be interested to find more detail within our River Health Report. Details can be found [here](https://www.thameswater.co.uk/media-library/home/about-us/performance/river-health/river-health-report.pdf)

Flooding responsibilities

There is no single body responsible for managing flood risk in the UK. Various organisations have different responsibilities.

Water and sewerage companies are responsible for managing the risks of flooding from burst water mains, foul and combined sewer systems.

Lead Local Flood Authorities (county councils and unitary authorities) are responsible for developing, maintaining, and applying a strategy for local flood risk management in their areas and for maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater, and ordinary watercourses.

Highway Authorities (Councils, National Highways, and TfL in London) are responsible for providing and managing highway drainage and roadside ditches; The Environment Agency is responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion. It also has operational responsibility for managing the risk of flooding from main rivers and the sea.

You can find out more about types of flooding, and responsibilities, on our website [here](#).

Roadside gullies

Heavy rain can sometimes cause surface-water flooding. Normally excess rainwater is diverted into roadside gullies, which feed into our sewers. If the gullies or sewers become blocked, water can back-up and flood a road.

If roadside gullies are blocked with leaves or other debris and water isn't draining away after the rain has stopped, we'd recommend contacting your local council. You can find your local council online [here](#).

Summary

I appreciate the residents in the area had queries, which I provided our response to on the email dated 5 June. I hope this has addressed all the queries and concerns for residents in the area. I've attached this for your records.

Within your email dated 17 April, you requested for a postal address due to the difficulties you had providing the attachments. I can confirm we did receive the attachments, however for future reference if you need our address, please use this one Thames Water Utilities Ltd, PO Box 286, Swindon, SN38 2RA

As our sewer was found clear of defects, we aren't looking to investigate further. However, it's important to us that we have every record of sewer flooding recorded on our database, so our advice is for residents to straight away contact our 24-Hour Customer Contact Centre on **0800 316 9800**, to allow us to investigate as and when issues occur. This also allows to build a record in the area for our field team to review and monitor.

Next steps

I hope my response has demonstrated that we've fully reviewed your case. As we've now outlined our final response, we've brought your case to a close.

However, if you remain dissatisfied with the outcome of your complaint, you have the option of asking CCW, the voice of the consumer, for an independent view on our position. You can contact CCW in one of the following ways:

- Letter – CCW, 23 Stephenson Street, Birmingham, B2 4BH
- Email – enquiries@ccwater.org.uk
- Telephone – **0300 034 2222** (between 8.30am and 5pm, Monday to Friday)

Yours sincerely

Josh Gallie

Customer Relations Manager



Appendix E – Drainage Calculations

Cotswold Transport Planning		Page 1
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ		
Date 01/07/2023 17:33 File	Designed by Kristovey Checked by	
Innovyze		
Source Control 2020.1.3		
ICP SUDS Mean Annual Flood Input Return Period (years)1Soil0.450 Area (ha) 1.150Urban0.000 SAAR (mm)729Region NumberRegion 4 Results1/s QBAR Rural5.3 QBAR Urban5.3 Q1 year4.4 Q1 year4.4 Q30 years10.4 Q100 years13.6		
©1982-2020 Innovyze		

Cotswold Transport Planning		Page 1
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ	LAND SOUTH OF THE FORTY CRICKLADE	
Date 30/07/2025 File 220400 Revised calcs.SRCX	Designed by CG Checked by SR	
Innovyze	Source Control 2020.1.3	

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	79.753	0.253	3.6	196.7	O K
30 min Summer	79.824	0.324	3.7	254.9	O K
60 min Summer	79.893	0.393	3.7	314.2	O K
120 min Summer	79.959	0.459	3.7	372.4	O K
180 min Summer	79.994	0.494	3.7	404.0	O K
240 min Summer	80.017	0.517	3.7	424.2	O K
360 min Summer	80.044	0.544	3.7	449.2	O K
480 min Summer	80.059	0.559	3.7	463.5	O K
600 min Summer	80.068	0.568	3.7	471.5	O K
720 min Summer	80.072	0.572	3.7	475.2	O K
960 min Summer	80.071	0.571	3.7	474.4	O K
1440 min Summer	80.059	0.559	3.7	463.2	O K
2160 min Summer	80.037	0.537	3.7	442.4	O K
2880 min Summer	80.011	0.511	3.7	419.3	O K
4320 min Summer	79.959	0.459	3.7	372.6	O K
5760 min Summer	79.910	0.410	3.7	328.9	O K
7200 min Summer	79.864	0.364	3.7	289.6	O K
8640 min Summer	79.823	0.323	3.7	254.6	O K
10080 min Summer	79.787	0.287	3.7	224.3	O K
15 min Winter	79.754	0.254	3.6	196.7	O K
30 min Winter	79.824	0.324	3.7	255.0	O K
60 min Winter	79.893	0.393	3.7	314.2	O K
120 min Winter	79.959	0.459	3.7	372.5	O K
180 min Winter	79.995	0.495	3.7	404.2	O K
240 min Winter	80.017	0.517	3.7	424.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	76.035	0.0	180.5	26
30 min Summer	49.499	0.0	232.9	41
60 min Summer	30.811	0.0	314.4	70
120 min Summer	18.615	0.0	379.7	130
180 min Summer	13.715	0.0	418.9	188
240 min Summer	10.995	0.0	446.7	248
360 min Summer	8.034	0.0	486.8	366
480 min Summer	6.428	0.0	515.3	484
600 min Summer	5.404	0.0	536.0	604
720 min Summer	4.687	0.0	550.2	722
960 min Summer	3.743	0.0	561.7	960
1440 min Summer	2.723	0.0	547.8	1172
2160 min Summer	1.979	0.0	742.0	1540
2880 min Summer	1.577	0.0	786.8	1944
4320 min Summer	1.143	0.0	848.9	2764
5760 min Summer	0.910	0.0	917.0	3528
7200 min Summer	0.762	0.0	959.1	4320
8640 min Summer	0.659	0.0	994.0	5024
10080 min Summer	0.583	0.0	1022.2	5752
15 min Winter	76.035	0.0	180.5	26
30 min Winter	49.499	0.0	232.9	41
60 min Winter	30.811	0.0	314.4	70
120 min Winter	18.615	0.0	379.7	128
180 min Winter	13.715	0.0	418.9	186
240 min Winter	10.995	0.0	446.7	244

Cotswold Transport Planning		Page 2
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ	LAND SOUTH OF THE FORTY CRICKLADE	
Date 30/07/2025 File 220400 Revised calcs.SRCX	Designed by CG Checked by SR	
Innovyze	Source Control 2020.1.3	

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
360 min Winter	80.044	0.544	3.7	449.7	O K
480 min Winter	80.060	0.560	3.7	464.2	O K
600 min Winter	80.069	0.569	3.7	472.3	O K
720 min Winter	80.073	0.573	3.7	476.3	O K
960 min Winter	80.073	0.573	3.7	476.4	O K
1440 min Winter	80.056	0.556	3.7	460.0	O K
2160 min Winter	80.026	0.526	3.7	432.5	O K
2880 min Winter	79.990	0.490	3.7	399.7	O K
4320 min Winter	79.914	0.414	3.7	332.2	O K
5760 min Winter	79.843	0.343	3.7	271.0	O K
7200 min Winter	79.782	0.282	3.7	219.8	O K
8640 min Winter	79.731	0.231	3.6	178.4	O K
10080 min Winter	79.691	0.191	3.5	146.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
360 min Winter	8.034	0.0	486.9	360
480 min Winter	6.428	0.0	515.5	474
600 min Winter	5.404	0.0	536.3	590
720 min Winter	4.687	0.0	550.8	702
960 min Winter	3.743	0.0	563.2	922
1440 min Winter	2.723	0.0	551.3	1212
2160 min Winter	1.979	0.0	742.1	1628
2880 min Winter	1.577	0.0	787.0	2080
4320 min Winter	1.143	0.0	850.3	2940
5760 min Winter	0.910	0.0	917.0	3704
7200 min Winter	0.762	0.0	959.2	4472
8640 min Winter	0.659	0.0	994.2	5184
10080 min Winter	0.583	0.0	1022.8	5856

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 1.053

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.351	4 8	0.351	8 12	0.351

Cotswold Transport Planning		Page 4
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ	LAND SOUTH OF THE FORTY CRICKLADE	
Date 30/07/2025 File 220400 Revised calcs.SRCX	Designed by CG Checked by SR	
Innovyze	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 81.000

Tank or Pond Structure

Invert Level (m) 79.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	734.0	1.200	1175.0	1.500	1299.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0088-3700-1200-3700
Design Head (m)	1.200
Design Flow (l/s)	3.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	88
Invert Level (m)	79.500
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.7	Kick-Flo®	0.743	3.0
Flush-Flo™	0.361	3.7	Mean Flow over Head Range	-	3.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.7	0.800	3.1	2.000	4.7	4.000	6.5	7.000	8.4
0.200	3.5	1.000	3.4	2.200	4.9	4.500	6.9	7.500	8.7
0.300	3.7	1.200	3.7	2.400	5.1	5.000	7.2	8.000	9.0
0.400	3.7	1.400	4.0	2.600	5.3	5.500	7.5	8.500	9.3
0.500	3.6	1.600	4.2	3.000	5.7	6.000	7.9	9.000	9.5
0.600	3.5	1.800	4.5	3.500	6.1	6.500	8.2	9.500	9.8

Cotswold Transport Planning		Page 1
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ	LAND SOUTH OF THE FORTY CRICKLADE	
Date 30/07/2025 File 220400 Revised calcs.SRCX	Designed by CG Checked by SR	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	79.945	0.445	3.7	359.7	O K
30 min Summer	80.068	0.568	3.7	471.2	O K
60 min Summer	80.189	0.689	3.7	586.2	O K
120 min Summer	80.304	0.804	3.7	700.9	O K
180 min Summer	80.365	0.865	3.7	764.1	O K
240 min Summer	80.404	0.904	3.7	805.1	O K
360 min Summer	80.456	0.956	3.7	859.9	O K
480 min Summer	80.489	0.989	3.7	896.3	O K
600 min Summer	80.512	1.012	3.7	921.3	O K
720 min Summer	80.528	1.028	3.7	938.9	O K
960 min Summer	80.547	1.047	3.7	959.7	O K
1440 min Summer	80.555	1.055	3.7	969.1	O K
2160 min Summer	80.534	1.034	3.7	945.4	O K
2880 min Summer	80.505	1.005	3.7	913.6	O K
4320 min Summer	80.450	0.950	3.7	853.7	O K
5760 min Summer	80.398	0.898	3.7	798.7	O K
7200 min Summer	80.348	0.848	3.7	746.3	O K
8640 min Summer	80.298	0.798	3.7	694.8	O K
10080 min Summer	80.244	0.744	3.7	641.1	O K
15 min Winter	79.945	0.445	3.7	359.6	O K
30 min Winter	80.068	0.568	3.7	471.3	O K
60 min Winter	80.189	0.689	3.7	586.3	O K
120 min Winter	80.304	0.804	3.7	701.0	O K
180 min Winter	80.365	0.865	3.7	764.4	O K
240 min Winter	80.405	0.905	3.7	805.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	138.153	0.0	298.9	27
30 min Summer	90.705	0.0	312.1	42
60 min Summer	56.713	0.0	562.7	72
120 min Summer	34.246	0.0	589.6	130
180 min Summer	25.149	0.0	578.6	190
240 min Summer	20.078	0.0	569.8	250
360 min Summer	14.585	0.0	557.6	370
480 min Summer	11.622	0.0	549.8	488
600 min Summer	9.738	0.0	544.4	608
720 min Summer	8.424	0.0	540.6	726
960 min Summer	6.697	0.0	536.6	966
1440 min Summer	4.839	0.0	535.3	1442
2160 min Summer	3.490	0.0	1106.9	2096
2880 min Summer	2.766	0.0	1070.4	2400
4320 min Summer	1.989	0.0	989.2	3160
5760 min Summer	1.573	0.0	1584.4	3976
7200 min Summer	1.311	0.0	1647.9	4824
8640 min Summer	1.129	0.0	1699.1	5624
10080 min Summer	0.994	0.0	1738.4	6464
15 min Winter	138.153	0.0	298.9	27
30 min Winter	90.705	0.0	312.1	41
60 min Winter	56.713	0.0	562.7	70
120 min Winter	34.246	0.0	589.8	128
180 min Winter	25.149	0.0	578.8	188
240 min Winter	20.078	0.0	569.9	246

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Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
360 min Winter	80.456	0.956	3.7	860.8	O K
480 min Winter	80.490	0.990	3.7	897.6	O K
600 min Winter	80.514	1.014	3.7	923.0	O K
720 min Winter	80.530	1.030	3.7	941.0	O K
960 min Winter	80.550	1.050	3.7	962.9	O K
1440 min Winter	80.560	1.060	3.7	974.6	O K
2160 min Winter	80.542	1.042	3.7	954.8	O K
2880 min Winter	80.507	1.007	3.7	916.3	O K
4320 min Winter	80.439	0.939	3.7	842.2	O K
5760 min Winter	80.368	0.868	3.7	767.3	O K
7200 min Winter	80.293	0.793	3.7	690.0	O K
8640 min Winter	80.203	0.703	3.7	600.8	O K
10080 min Winter	80.116	0.616	3.7	516.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
360 min Winter	14.585	0.0	557.7	364
480 min Winter	11.622	0.0	549.7	480
600 min Winter	9.738	0.0	544.1	598
720 min Winter	8.424	0.0	540.3	714
960 min Winter	6.697	0.0	536.1	946
1440 min Winter	4.839	0.0	534.6	1402
2160 min Winter	3.490	0.0	1106.7	2060
2880 min Winter	2.766	0.0	1071.9	2656
4320 min Winter	1.989	0.0	997.5	3296
5760 min Winter	1.573	0.0	1584.5	4264
7200 min Winter	1.311	0.0	1648.5	5184
8640 min Winter	1.129	0.0	1701.8	5976
10080 min Winter	0.994	0.0	1745.9	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.053

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
	(ha)		(ha)		(ha)
0	4 0.351	4	8 0.351	8	12 0.351

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Innovyze	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 81.000

Tank or Pond Structure

Invert Level (m) 79.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	734.0	1.200	1175.0	1.500	1299.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0088-3700-1200-3700
Design Head (m)	1.200
Design Flow (l/s)	3.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	88
Invert Level (m)	79.500
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.7	Kick-Flo®	0.743	3.0
Flush-Flo™	0.361	3.7	Mean Flow over Head Range	-	3.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.7	0.800	3.1	2.000	4.7	4.000	6.5	7.000	8.4
0.200	3.5	1.000	3.4	2.200	4.9	4.500	6.9	7.500	8.7
0.300	3.7	1.200	3.7	2.400	5.1	5.000	7.2	8.000	9.0
0.400	3.7	1.400	4.0	2.600	5.3	5.500	7.5	8.500	9.3
0.500	3.6	1.600	4.2	3.000	5.7	6.000	7.9	9.000	9.5
0.600	3.5	1.800	4.5	3.500	6.1	6.500	8.2	9.500	9.8



Appendix F – Drainage Strategy



Notes:

1. Do not scale from this drawing. All dimensions are in metres, unless stated otherwise.
2. This drawing is based on the Hannick Homes Sketch Layout 001
3. Ordnance Survey, (c) Crown Copyright 2020. All rights reserved. Licence number 100022432.
4. Drawing to be read in conjunction with all other drawings. Any discrepancies are to be reported to the engineer 5 working days in advance of undertaking any work.
5. This drawing is for information purposes only and is not to be used for Construction.
6. Further SuDS features are proposed with the detail to be provided as the scheme progresses. The presently shown information is indicative at this stage.

Key:

- EXISTING PUBLIC FOUL SEWER
- EXISTING PUBLIC STORM SEWER
- PROPOSED FOUL DRAINAGE
- PROPOSED STORM DRAINAGE
- PROPOSED FOUL RISING MAIN
- PROPOSED STORM RISING MAIN
- PROPOSED EASEMENT
- PROPOSED SWALE

P5	30/07/25	UPDATED TO INCLUDE LATEST LAYOUT	CG	SR
P4	27.11.23	REVISED LAYOUT	AS	BF
P3	13.11.23	REVISED FOLLOWING CLIENT COMMENT	AS	DP
P2	02.11.23	REVISED LAYOUT	AS	CE
P1	01.07.23	ISSUED FOR COMMENT	KT	KT
Rev	Date	Details	By	Chkd

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CLIENT:

HANNICK HOMES

PROJECT:

LAND SOUTH OF THE FORTY
CRICKLADE

TITLE:

DRAINAGE STRATEGY AND
CONSTRAINTS PLAN

SCALE @ A1:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:500	30.06.23	AS	CE	RS
STATUS:	PLANNING			
DRAWING NO:	220400-RAP-XX-XX-DR-C-3500			REVISION: P5

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