RIDGE

FLOOD RISK SCREENING STUDY
ECO PARK, BUSINESS PARK JCT 13

ECOTRICITY

17 January 2020

FLOOD RISK SCREENING STUDY
ECO PARK, BUSINESS PARK JCT 13

ECOTRICITY

21 January 2020

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1.1	22/02/2020	Updated following client comments on Allocation Site reference	[redacted]	[redacted]	[redacted]

CONTENTS

1. INTRODUCTION

1.1. Appointment and Brief

1.1.1. This Flood Risk Screening Study (FRSS) has been prepared on behalf of Ecotricity for a proposed development of Land at M5 Junction 13 Stonehouse (hereby referred to as the 'Site'). The site is allocated for development within the Local Plan Review: Draft Plan for a mix of uses including employment and sports related uses.

1.1.2. The allocated site comprises 2 parcels of land, either side of the A419. The majority of the site falls in Flood Zone 1 with an area of the southern parcel of land falling within Flood Zone 3.

1.1.3. The parcels of land have extensive planning history including application reference S.16/0043/OUT submitted in 2016 for a mixed use development comprising of 'Green Technology Hub' (B-class employment uses) on the northern parcel of land, and a 'Sports Hub' including a football stadium and several other pitches, on the southern parcel of land. This application was accompanied by significant technical work including an Environmental Statement which considered Flood Risk and Drainage in detail.

1.1.4. This application was revised in December 2017 to remove the employment development and involved the relocation of the stadium and sports facilities to the northern parcel of land. No development was proposed in the southern parcel of land. No objection to this scheme was received in respect of flood risk and drainage and this application was recommended for approval by officers. However, committee resolved to refuse planning permission.

1.1.5. Following this refusal, a revised application was submitted for a stadium and sports facilities on the northern parcel of land (S.19/1418/OUT). Again, the application was recommended for approval and committee resolved to grant planning permission subject to conditions and the completion of a S106 agreement. Therefore, it is considered that the northern parcel of the allocated site is acceptable in planning terms for the proposed uses.

1.1.6. Given this context, the focus of this study has been to review the southern parcel of the allocated site. An application is currently being prepared for the remainder of the 'Eco-Park' which will look to deliver employment generating uses and canal restoration on the southern parcel of land, in line with the remainder of the allocation. However, the flood risk and drainage constraints for this site are well known and understood from previous assessment on the site.

1.1.7. The purpose of this document is to outline the development of the proposed FRSS.

1.1.8. It aims to review the flood risk at the Site, as follows:

- Provide an analysis of the proposed development in terms of the risks of flooding from
  - surface water;
  - rivers;
  - sea;
  - and reservoirs.

1.1.9. The FRSS herein is subject to further detailed analysis undertaken as for a level 2 Flood Risk Analysis.

1.2. Aims and Objectives

1.2.1. The FRSS has been prepared with reference to the following requirements:

1.2.2. The FRSS must:

- Review the most up-to-date local flood risk information, including the Preliminary Flood Risk Assessment (PFRA), Strategic Flood Risk Assessment (SFRA) and Catchment Management Plan for the area of interest.
- Review the Environment Agency's online flood risk mapping.
- Review Planning Policy applicable to the application site.

The FRSS Should

- Review the Planning History of the site
- Adhere to current best practice guidance
- Initial Liaison with the Local Sewerage Undertaker;
- Initial Consultation with the Lead Local Flood Authority, EA and CCT;

1.3. Limitations

1.3.1. The purpose of this report as outlined in Section 1.2, together with those related matters specifically referred to therein and it is not intended to be used for any other purposes. The report is for the sole benefit and may only be relied upon by the addressee, to whom we will owe a duty of care. The report and any part of it is confidential to the addressee and should not be disclosed to any third party for any purpose, without the prior written consent of Ridge and Partners LLP as to the form and context of such disclosure. The granting of such consent shall not entitle the third party to place reliance on the report, nor shall it confer any third-party rights pursuant to the Contracts (Rights of Third Parties) Act. The report may not be assigned to any third party.

1.4. Reference Information

1.4.1. The following information has been obtained and interrogated as part of this study:

- Environment Agency (2020) Long Term online flooding maps
- Gloucester County Council (2011) Preliminary Flood Risk Assessment
- Halcrow (2012) Level 2 Strategic Flood Risk Assessment for Stroud District Council
- JBA Consulting (2019) Level 2 Strategic Flood Risk Assessment for Stroud District Council
- Environment Agency (2009) Summary report for Catchment Flood Management Plan
- RSK (2017) Flood Risk Assessment: Eco Park Stroud
- Severn Trent Asset Records (2029)

1.4.2. In addition, the following documents have been consulted:

- Stroud District Council (2015) Stroud District Local Plan
- Stroud District Council (2019) Stroud District Local Plan Review Draft Plan for Consultation
- Communities and Local Government Document. (2012). The National Planning Policy Framework;
- PWA Planning (2017) Environmental Statement: Eco Park Stroud
- Environment Agency. (2016). Flood Risk Assessments: Climate Change Allowances;
- Environment Agency. (2013). Rainfall Runoff Management for Developments;
- CIRIA. (2015). C753 – The SuDS Manual;

2. EXECUTIVE SUMMARY

2.1.1. A Flood Risk Screening Study has been undertaken to look at the site located at Junction 13 of the M5. The site referred to in the report is the southern parcel of land which makes up part of the allocated site referred to in the Local Plan Review: Draft Plan.

2.1.2. The whole of the allocated site has been the subject of extensive planning history including an application covering both the northern and southern parcels of land (S.16/0043/OUT) that make up the allocation. This application was accompanied by significant technical work (including an Environmental Statement which covered flood risk and drainage in detail). Whilst the southern parcel of land was subsequently removed from the application, the baseline information has been reviewed. A revised application was submitted for a stadium and sports facilities on the northern parcel of land (S.19/1418/OUT). This was recommended for approval and committee resolved to grant planning permission subject to conditions and the completion of a S106 agreement.

2.1.3. Given the above planning history, it is considered that the northern parcel of the allocated site is acceptable in planning terms for the proposed uses. This study therefore focusses on the southern parcel of land.

2.2. Allocated Site

Assessment of Strategic Flood Risk Assessment

2.2.1. The most recent Level 2 Strategic Flood Risk Assessment shows that 11.9% of the allocated site area (42 ha) is in Flood zone 3b and 6.8% is within Flood Zone 3a. The Level 2 Strategic Flood risk assessment confirms that the allocated site is classed as Less Vulnerable in terms of Flood Risk vulnerability as defined by Paragraph 66, Table 2 of the NPPF.

2.3. Land South of A419

Assessment on EA long term flood risk data

2.3.1. Based on the current EA data, the application site is at high risk of flooding from Surface water, River and Sea sources and a low risk of flooding from reservoirs. The majority of the application site currently sits within Flood Zone 1. However, there is a proportion of the application site which is designated as Flood Zone 3 and should be considered at high risk of flooding from surface water and river flooding.

Assessment of Catchment Flood Management Plan

2.3.2. Following the required guidance in the Catchment Flood Management Plan, Surface water discharge from the application site will need to be by way of a SuDS scheme and will need to be restricted to a QBar rate of 90.5l/s for the 23 ha site. Any future design of the on site surface water management would need to be in accordance with the CIRIA Suds Manual.

Assessment of Planning application S.16/0043/OUT

2.3.3. The main part of the site south of the A419 was covered by the FRA completed for planning application (S.16/0043/OUT), which concluded that the site was at a low risk of flooding.

Assessment of FRA completed for Missing Mile Canal project

2.3.4. Modelling carried out as part of the FRA for the Missing Mile canal, shows that the area of the application site to the North East of the canal will become protected and the risk of flooding will reduce.

2.4. Conclusion

2.4.1. Based on the understanding that the EA has accepted the missing mile modelling and data there appear to be clear benefits to the proposed developable areas if a scheme is taken forward in conjunction with the canal development. This includes significant reductions to the area at risk of flooding in the application site which would free up further land for development in line with the allocation.

2.4.2. Further engagement will be required with the EA and LLFA in conjunction with the development of the scheme to gain a full understanding of this.

3. BASELINE

3.1. Location

3.1.1. Allocated Site PS20 is located to the east of Junction 13 of the M5, on either side of the A419. The allocated site is bound by Grove Lane to the north, adjacent properties to the east, the River Frome to the south and the M5 motorway to the west. The location of the Site is illustrated below in Figure 1.

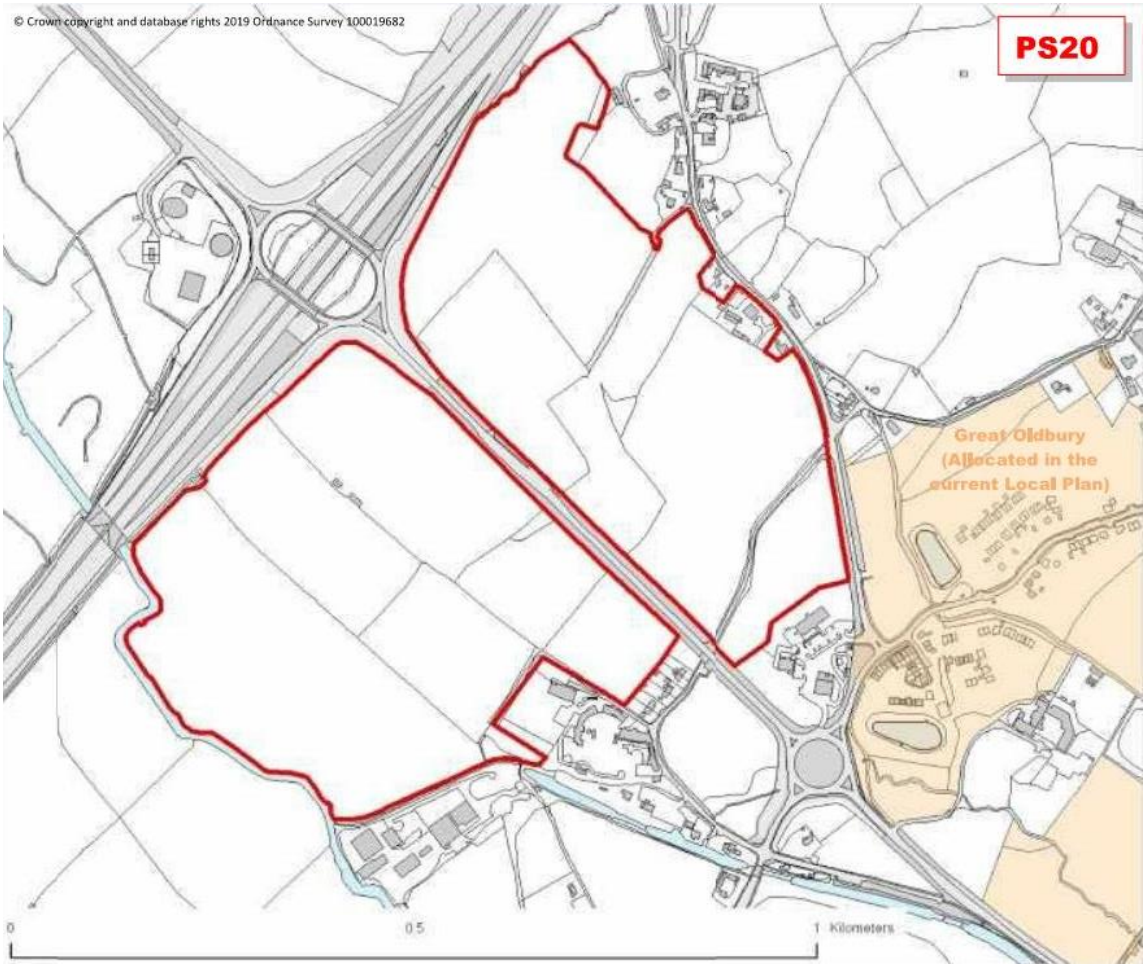

Figure 1: Site Location (Source: Stroud District Council, Draft Local Plan)

3.1.2. The Site is split into two parcels by the A419, the northern and the southern parcel. The following information relates to the land to the south of the A419 only.

3.1.3. The southern site is bounded by the M5 to the north west, the A419 to the north east, the River Frome to the South West and existing housing and development to the south east.

- British national Grid Reference: SO 77877 06447
- Easting: 377877 Northing: 206447
- Nearest postcode: GL10 3SH
- Total site area: approximately 23 hectares (ha)

3.1.4. The site currently made up of a series of fields separated by trees and hedges. For the site location plan see Figure 2.

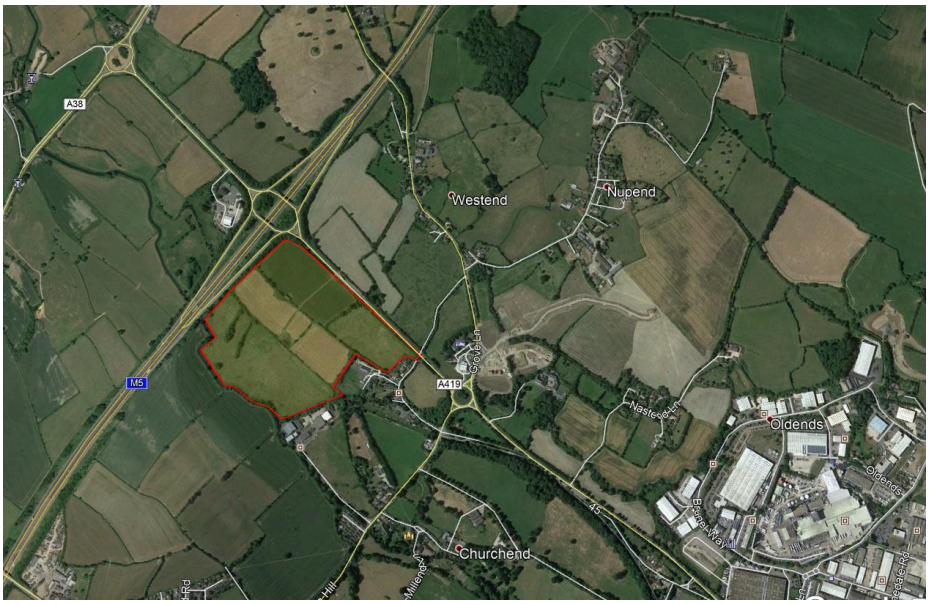

Figure 2 - Location Plan – Land South of A419

3.1.5. Access to the application site is currently via a farmer's gate on the A419.

3.1.6. The British Geological Survey (BGS) online mapping[1] shows that the site is underlain by River terrace deposits, 3 (frome,Glos) – Sand and gravel, and Alluvium – Clay, silt, sand and gravel. The underlying bedrock geology is classified as Blue Lias Formation and Charmouth Mudstone Formation – Mudstone.

3.1.7. The EA has developed Groundwater Source Protection Zones (SPZs) to assist in the assessment of risk to groundwater supplies taken from an abstraction point. Based on the indicative mapping[2] the site does not lie within any SPZ.

[1] Accessed via http://mapapps.bgs.ac.uk/geologyofbritain/home.html [Accessed 17/01/20]
[2] Accessed via https://magic.defra.gov.uk/MagicMap.aspx [Accessed 17/01/20]

3.2. Existing Drainage Regime

3.2.1. From a review of Severn Trent Waste Water Asset records, contained within Appendix A, there are none of their waste water assets in the application site area. We are awaiting a response from Severn Trent with regards to where the nearest point on their Waste Water network is.

3.2.2. Using ICP SUDS module in Microdrainage Source control the greenfield run off values have been calculated for the site. The full results can be reviewed in Appendix C.

STORM RETURN PERIOD	GREENFIELD RATE (L/S)
1:1	75.2
QBar	90.5
1:30	177.4
1:100	232.7

Table 1 - Green Field Run Off Rates

3.2.3. A detailed topographical survey should be undertaken to understand in more detail the current surface water flow paths and potential future methods of disposal.

4. QUANTIFYING FLOOD RISK

4.1.1. Detailed flood data has been requested from the Environment Agency, but we are yet to receive a response. As such the following review is of the maps available on the gov.uk[3] site.

4.2. Surface Water Flooding

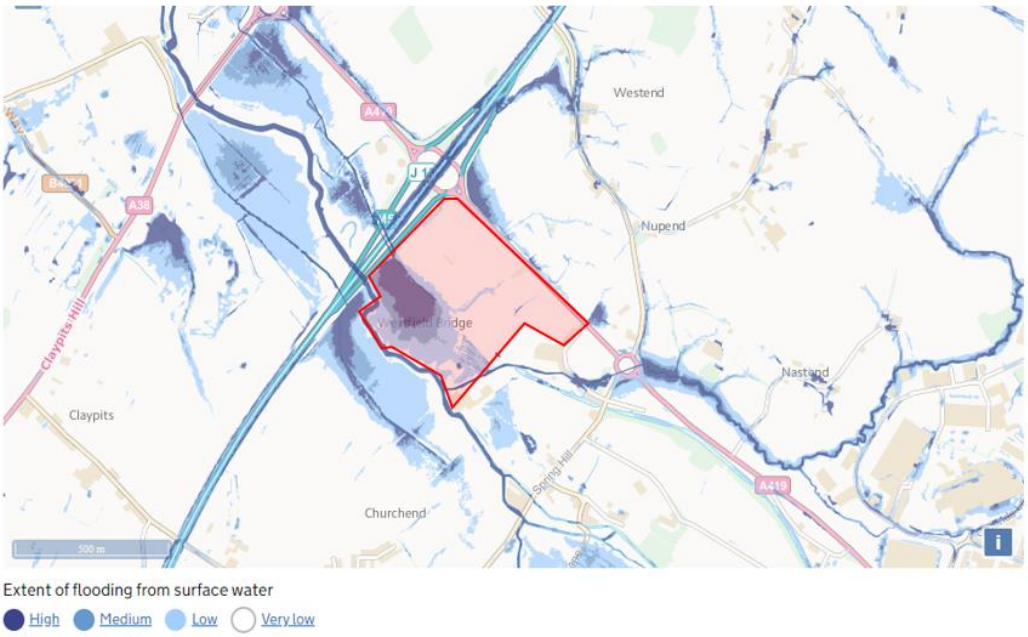

Figure 2 - Extract of EA Flood map showing Extent of Surface Water flooding

4.2.1. The site currently sits within areas that suffer from a high extent of flooding from surface water. It is therefore considered that part of the site is currently at a high risk of flooding from surface water.

[3] Flood risk maps accessed via https://flood-warning-information.service.gov.uk/long-term-flood-risk/map [Accessed 17/01/20]

4.3. River and Sea Flooding

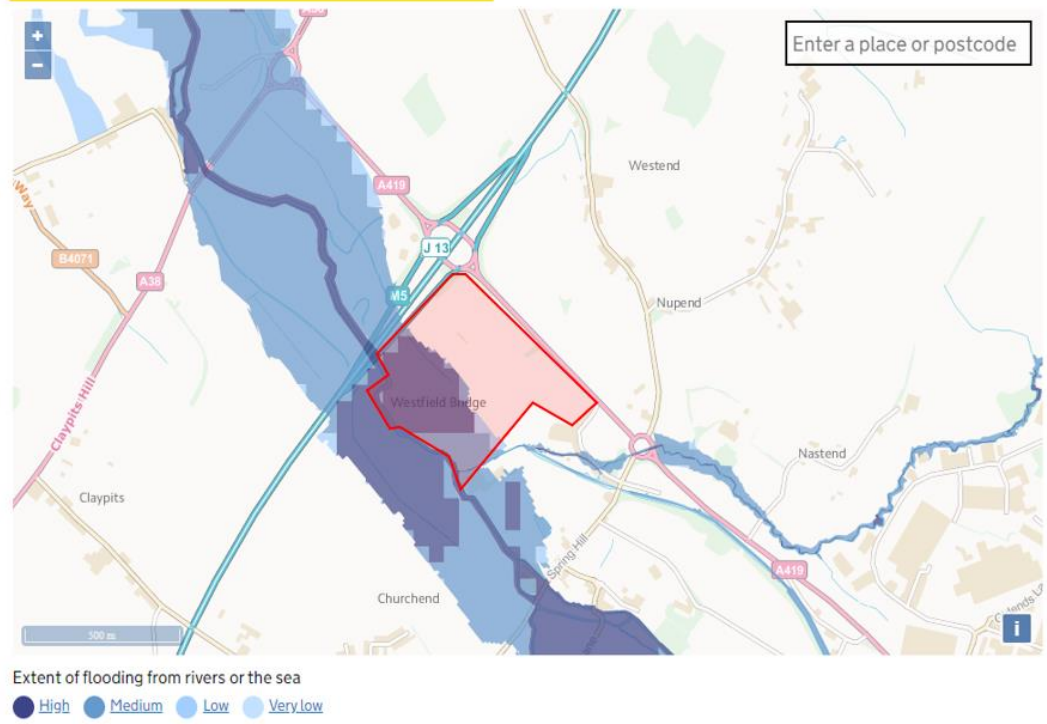

Figure 3 Extract of EA Flood map showing Extent of river or sea flooding

4.3.1. Figure 3 shows that some of the site currently sits within areas that suffer from a high extent of flooding from rivers. It is therefore considered that part of the site is at a high risk of flooding from rivers. The Figure 4 below also confirms that part of the site sits in a Flood Zone 3 area and does not currently benefit from flood defences. This means that the site area is at a 1% or greater probability of flooding from rivers.

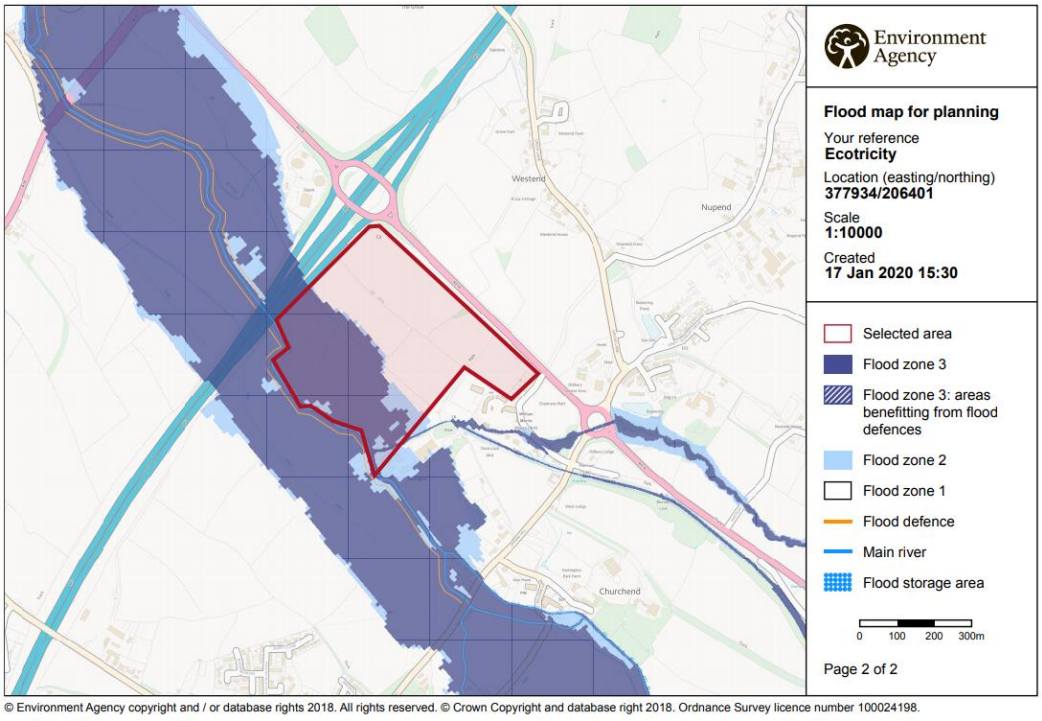

Figure 4 Extract of EA Flood map showing extent Flood Zones

4.4. Flooding from Reservoirs

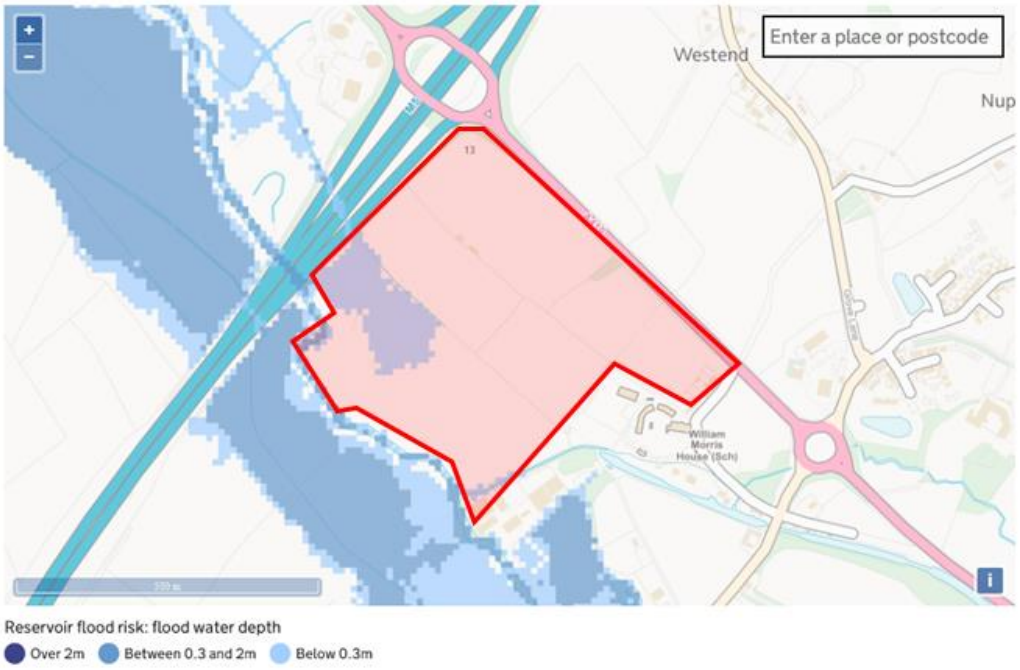

Figure 5 Extract of EA Flood map showing depth of flood water depth due to Reservoir flood risk

4.4.1. The site currently sits within areas that suffer from a low depth of flooding from reservoirs. It is therefore considered that the application site is currently at a low risk of flooding from reservoirs.

5. REVIEW OF EXISITING STUDIES & PLANNING POLICY

5.1. Preliminary Flood Risk Assessment

5.1.1. A Preliminary Flood Risk Assessment (PFRA) is required to be undertaken by county councils under the EC Floods Directive. They assess past floods, possible harmful consequences of future floods and identify areas of significant flood risk.

5.1.2. A PFRA does not aim to highlight local issues specially, as it is in the context of flood risk in Europe.

5.1.3. The Preliminary Flood Risk Assessment by Gloucestershire County Council [November 2011], notes that there may be areas that are locally important areas of flooding but are not classed as a 'Flood Risk Area'. The purpose of the PFRA is to assess areas of significant risk across Europe.

5.2. Strategic Flood Risk Assessment

5.2.1. A Strategic Flood Risk Assessment (SRFA) is required to be undertaken to support the development of Local Plans. A level 1 SRFA is required where flooding is not a major issue in relation to potential development sites and where development pressures are low.

5.2.2. A level 2 SRFA is required when there is insufficient land outside Flood Zone 2 & 3 to accommodate all the necessary development. The level 2 SRFA needs to undertake a detailed assessment of the flooding characteristics within a Flood Zone and other sources of flooding.

5.2.3. The level 2 SFRA aims to provide analysis for site options using latest available flood risk data and modelling so the Council can apply the Exception Test.

5.2.4. Two level 2 Strategic Flood risk assessments are available that cover the allocated site which have been prepared for Stroud District Council. The current adopted local plan is supported by the Level 2 Strategic Flood Risk Assessment completed by Halcrow in 2012.

5.2.5. The allocated site is not specially covered by the Level 2 SRFA completed by Halcrow in 2012 as it was not an allocated site in the adopted Local plan. The report does confirm that the River Frome is tide locked for 1.5 hours around Saul and that a flood alleviation scheme was built in the Upper Framilode Area. A future assessment should look at the detail within the appendixes of the level 2 SRFA report to understand the flood risk that is discussed to the south of the River Frome, adjacent to the application site.

5.2.6. The Draft Plan currently under consideration is supported by a new Level 2 Strategic Flood Risk Assessment completed by JBA Consulting in 2019. The allocated site is specifically covered and referred to as Preferred Option Site EAS007 (Allocated site PS20 in the Draft Local Plan). See Appendix B for an extract of the relevant detail of the report.

5.2.7. It covers the allocated site, both north and south of the A419 and refers to a total site area of 42.09 ha. The assessment goes on to state the percentages of the site that fall within the different classification of the different flood zones. From the available EA data, it can be seen that the percentages of the site mentioned for Flood Zone 3a of 6.8% (2.9Ha) and Flood Zone 3b of 11.9% (5Ha) will be for the most part within the application site.

5.2.8. Flood Zone 3a sites are not suitable for highly vulnerable development such as basement flats and Park Homes. Flood Zone 3a sites are suitable for more vulnerable development such as houses, hospitals, pubs and hotels as long as they pass the Exception test. Water compatible Less vulnerable development such as commercial uses are acceptable.

5.2.9. Flood Zone 3b is an area defined as land where water has to flow or be stored in times of flood. Highly vulnerable (basement flats and park homes), more vulnerable (houses, hospitals and pubs) and less vulnerable (commercial, churches) developments are not permitted in this area.

5.2.10. Further engagement with the Environment Agency is required to understand exactly where the flood zone 3a and 3b areas are within the site.

5.2.11. It does confirm that the application site is classed as Less Vulnerable in terms of Flood Risk vulnerability as defined by Paragraph 66, Table 2 of the NPPF. This assessment was on the basis of no canal or embankment being present on the site.

5.3. Catchment Flood Management Plan

5.3.1. The Environment Agency has completed a summary report of their Catchment Flood Managed plan[4] in 2009 which covers the application site. The application site is within Sub Area 5 – Frome and the relevant requirements for the proposed site are:

- Development must be managed to minimise flood risk and should be sustainable over the long term. Surface Water flooding is a growing problem.
- Development must follow the sequential approach of PPS 25.
- Encourage more sustainable natural floodplains.
- Encourage SuDS.
- Seek opportunities to sustain and increase the amount of floodplain grazing on lower reaches of the River Frome.

5.3.2. From the above requirements the application site must therefore follow the sequential approach and any surface water management on site should be by way of SuDS Features. The design and review of suitable SuDS features should be undertaken in consultation with the CIRIA SuDS Manual C753.

[4] Available at assets.publishing.service.gov.uk [Accessed 16/01/20]

5.4. Planning application S.16/0043/OUT

5.4.1. As part of the planning application for a football stadium and its associated works, an Environmental Statement (ES) was prepared. This application boundary covered the area north and south of the A419 as shown by the below Figure 6.

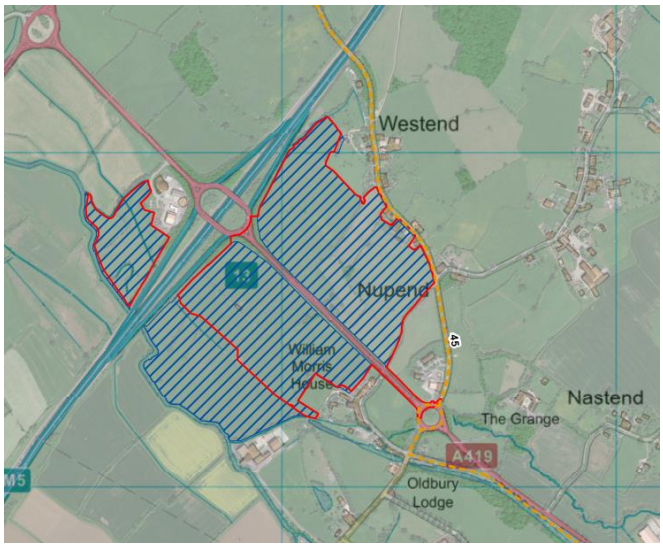

Figure 6 - Site location plan with application boundary shown in red and land ownership shown in blue

5.4.2. The ES included a Flood Risk Assessment for the site which reviewed the relevant EA Flood Zone maps and other sources of flooding. This concluded that the proposed site under the planning application S.16/0043/OUT was located entirely within Flood Zone 1 and that the flood risk from other sources is low. It also confirmed that it complies with the requirements of the Sequential test.

6. REVIEW OF FLOOD RISK ASSESMENT FOR MISSING MILE CANAL

6.1.1. As part of the planning application (S.19/0291/FUL) for the proposed Missing Mile section of canal the Environmental Statement included a detailed flood risk assessment and associated modelling was undertaken. This was accessed on the Stroud District Council planning database.

6.1.2. The environmental statement is a relevant document to be considered as it reviewed a 500m wide buffer around the proposal which covers the application site.

"Section 6.83 - The whole of the Phase 1B study reach was included in the hydraulic model and assessed as part of the Flood Risk Assessment due to the position of the Missing Mile in the right bank floodplain of the River Frome and the proposed post-development hydraulic connectivity during flooding between the River Frome and Stroudwater Navigation as it extends from Westfield Lock, Eastington, to Gloucester and Sharpness Canal, at Saul Junction."

"Section 6.87 - The M5 embankment is shown to dissect the floodplain, with a flow route through the River Frome bridge. Both the 1 in 100 year and 1 in 1000-year flood extents are such that it suggests that both the left bank pedestrian access culvert and the right bank pedestrian cattle creep will also likely act as flood flow routes as well as two Armco tube crossings nearby."

6.1.3. The Flood Risk Assessment (FRA) carried out by Katherine Colby Hydrologists undertook a modelling exercise that created a new baseline model for the area. The modelling was carried out in consultation with the Environment who ultimately agreed with the modelling. The review was carried out by the Modelling & Forecasting team at the Environment agency, and the correspondence relating to this is attached as Appendix E of the FRA.

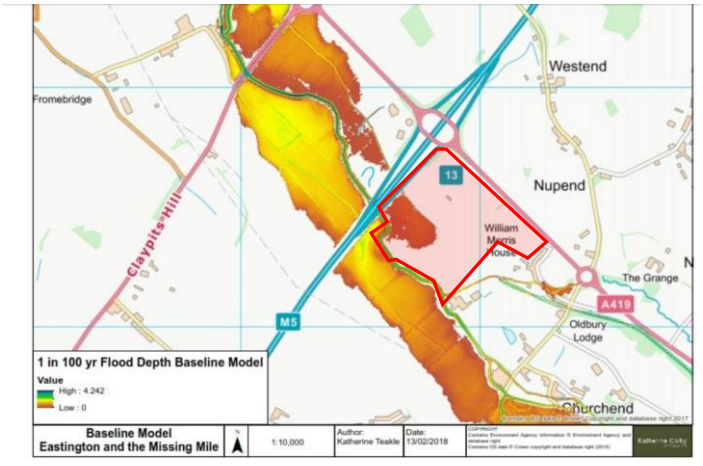

Figure 14: Baseline model 1 in 100 year flood depths through Eastington and the Missing Mile

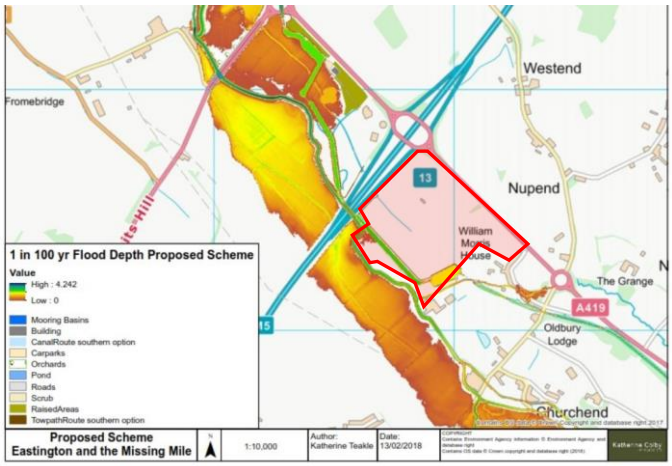

Figure 15: Proposed model 1 in 100 year flood depths through Eastington and the Missing Mile

Figure 7 - Extract of Figure 14 & 15 from the Missing Mile FRA showing predicted 1 in 100 year flood depth before and after the implementation of the proposed canal route

6.1.4. Figure 7 demonstrates that the flood plain area for the 1 in 100-year event will be removed from the application site should the Missing Mile canal section be built in the proposed location.

6.1.5. Section 3.1.37 of the FRA states that the Baseline model illustrates that flooding would occur on the right bank floodplain of the River Frome, on the upstream side of the M5 embankment; this flood extent is not replicated in the Proposed Scheme flood extent. This is due to the proposed M5 crossing lateral weir structure that diverts flood water from the River Frome into the Stroudwater Canal. The connection between the River and the Canal in this location removes the flooding onto the River Frome right bank floodplain upstream of the M5 that is illustrated in the Baseline model flood extent.

6.1.6. It can be taken from the FRA undertaken that the proposed development of the Canal would have significant benefit in reducing the area at risk of flooding currently within the application site. In consultation with the EA, the updated detailed flood maps will need to be reviewed to reclassify the flood zones.

7. CONCLUSIONS

7.1.1. A Flood Risk Screening Study has been undertaken to look at the application site located at Junction 13 of the M5. The application site referred to in the report is the southern parcel of land which makes up the allocated site referred to in the Local Plan Review: Draft Plan.

7.1.2. The whole of the allocated site has been the subject of extensive planning history including an application covering both the northern and southern parcels of land (S.16/0043/OUT) that make up the allocation. This application was accompanied by significant technical work (including an Environmental Statement which covered flood risk and drainage in detail). Whilst the southern parcel of land was subsequently removed from the application, the baseline information has been reviewed. A revised application was submitted for a stadium and sports facilities on the northern parcel of land (S.19/1418/OUT). This was recommended for approval and committee resolved to grant planning permission subject to conditions and the completion of a S106 agreement.

7.1.3. The most recent Level 2 Strategic Flood Risk Assessment shows that 11.9% of the allocated site area (42 ha) is in Flood zone 3b and 6.8% is within Flood Zone 3a. The Level 2 Strategic Flood risk assessment confirms that the allocated site is classed as Less Vulnerable in terms of Flood Risk vulnerability as defined by Paragraph 66, Table 2 of the NPPF.

7.1.4. Based on the current EA data, part of the southern site is at high risk of flooding from Surface water, River and Sea sources and a low risk of flooding from reservoirs. The majority of the application site currently sits within Flood Zone 1. However, there is a proportion of the site which is designated as Flood Zone 3 and should be considered at high risk of flooding from surface water and river flooding.

7.1.5. Following the required guidance in the Catchment Flood Management Plan, Surface water discharge from the application site will need to be by way of a SuDS scheme and will need to be restricted to a QBar rate of 90.5l/s for the 23 ha site. Any future design of the on site surface water management would need to be in accordance with the CIRIA Suds Manual.

7.1.6. Modelling carried out as part of the FRA for the Missing Mile canal, shows that the area of the application site to the North East of the canal will become protected and the risk of flooding will reduce.

7.1.7. Based on the understanding that the EA has accepted the missing mile modelling and data there appear to be clear benefits to the proposed developable areas if a scheme is taken forward in conjunction with the canal development. This includes significant reductions to the area at risk of flooding in the application site which would free up further land for development in line with the allocation.

7.1.8. Further engagement will be required with the EA and LLFA in conjunction with the development of the scheme to gain a full understanding of this.

APPENDIX A

SEVERN TRENT ASSET RECORDS

(c) Crown copyright and database rights 2020 Ordnance Survey 100031673

Scale: 1:1250 | Date: 17/01/20 | Wastewater Plan A2

Data updated: 14/11/19 | Map Centre: 377735,206447 | Our Ref: 363112 - 1 | Powered by digdat

Public Foul Gravity/Lateral Drain		Highway Drain		Manhole Foul	
Public Combined Gravity/Lateral Drain		Overflow Pipe		Manhole Surface	
Public Surface Water Gravity/Lateral Drain		Disposal Pipe		Abandoned Pipe	
Pressure Foul		Culverted Water Course		Section 104 sewers are shown in green	
Pressure Combined		Pumping Station		Private sewers are shown in magenta	
Pressure Surface Water		Fitting			

tomclark@ridge.co.uk

Ecotricity West

SEVERN TRENT

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Data updated: 14/11/19

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Map Centre: 378164,206422 | Our Ref: 363112 - 2 | Powered by digdat

Public Foul Gravity/Lateral Drain		Highway Drain		Manhole Foul	
Public Combined Gravity/Lateral Drain		Overflow Pipe		Manhole Surface	
Public Surface Water Gravity/Lateral Drain		Disposal Pipe		Abandoned Pipe	
Pressure Foul		Culverted Water Course		Section 104 sewers are shown in green	
Pressure Combined		Pumping Station		Private sewers are shown in magenta	
Pressure Surface Water		Fitting			

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Ecotricity East

SEVERN TRENT

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as “STW Apparatus” in these general conditions and precautions.

b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.

e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).

f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).

3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.

5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.

7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.

8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.

12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.

16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014

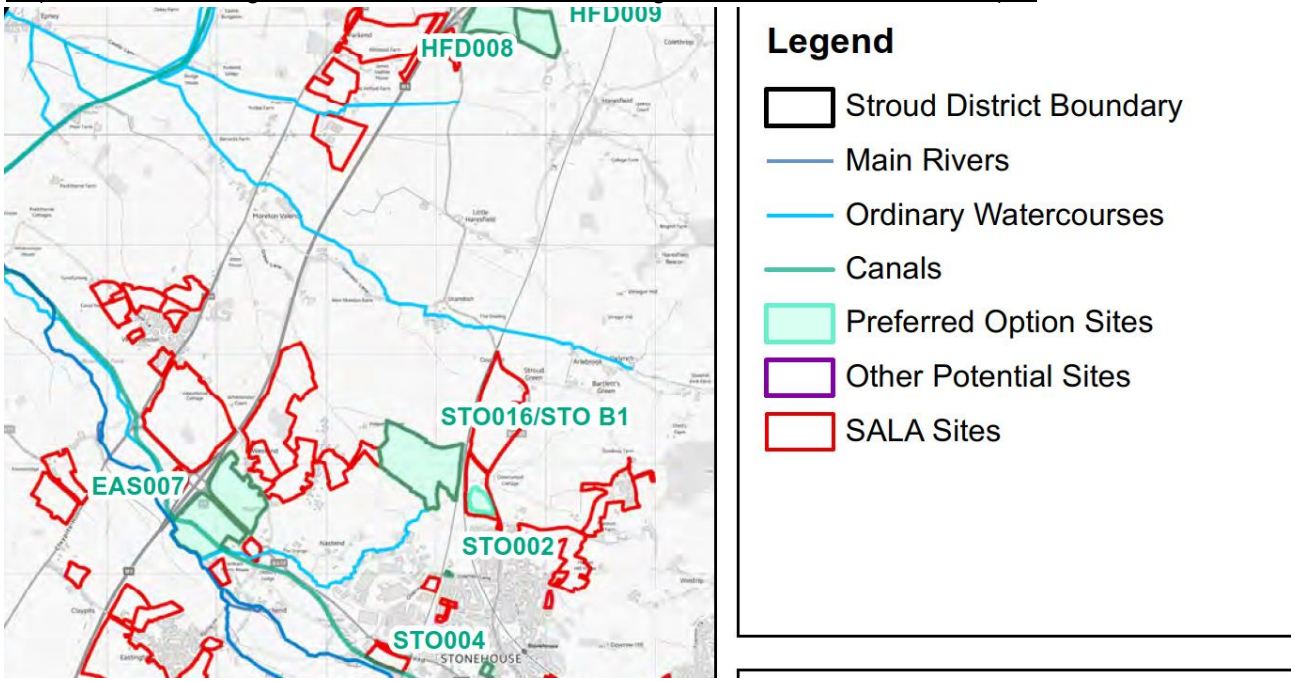
18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

APPENDIX B

EXTRACT FROM STROUD LEVEL 2 STRATEGIC FLOOD RISK ASSESMENT

Draft Report – November 2019 – JBA Consulting
https://www.stroud.gov.uk/info/Stroud_Level_2_Strategic_Flood_Risk_Assessment.pdf



			Proportion of site shown to be at risk (%)															
			Flood Zones						Updated Flood Map for Surface Water					ASTGWF				
Site code Area (ha)	Site Name	Area (ha)	FZ 3b only	FZ 3a only	Total % within FZ3	% in FZ2	% in FZ1	Total % within FZ 3a + 70% CC	Total % at surface water risk up to 30-yr	Total % at surface water risk up to 100-yr	Total % at surface water risk up to 1000 yrs	% within Historic Flood Map	% within Risk of Flooding from Reservoirs	ASTGWF - Category 1 <25%	ASTGWF - Category 2 >=25% <50%	ASTGWF - Category 3 >=50% <75%	ASTGWF - Category 4 >=75%	Presence of Watercourse (Detailed River Network)
EAS007	Land at Junction 13 of M5	42.09	11.9 %	6.8 %	18.7 %	21.4 %	78.6 %	0.0%	7.2%	12.5%	42.3%	19.3%	7.1%	55.0%	0.0%	0.0%	45.0%	Yes

Site code Area (ha)	Site Name	Flood Risk Vulnerability (as in Para 66, Table 2 of NPPF PPF)	Is the site in FZ1 and at low risk from other sources? (see Read me tab for criteria)	Presence of a canal?	Presence of an embankment? (within 50m
EAS007	Land at Junction 13 of M5	Less Vulnerable	No	No	No

APPENDIX C

GREEN FIELD RUN OFF CALCULATION - MICRODRAINAGE RESULTS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.400
Area (ha)	23.000	Urban	0.000
SAAR (mm)	793	Region Number	Region 4

Results l/s

QBAR Rural	90.5
QBAR Urban	90.5
Q100 years	232.7
Q1 year	75.2
Q30 years	177.4
Q100 years	232.7

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