Katherine Colby

Flood Risk Assessment

Green Devil's Kitchen
Q-park Bath Road
Woodchester
Stroud
Gloucestershire
GL5 5HT

Date	21/05/2021
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1.0 Introduction

1.1 Introduction

1.1.1 Katherine Colby Hydrologists Limited has been commissioned by Ecotricity (Next Generation) Limited to undertake a Flood Risk Assessment of Q-park, Bath Road, Woodchester, Stroud, Gloucestershire GL5 5HT. A Flood Risk Assessment is required to extend the existing Green Devil's Kitchen located at the site. Specifically, the proposal is to construct a single storey steel frame extension, built onto a new large hard core / concrete pad. It is proposed that this construction would be an extension to the existing modular steel frame building from Fisher Modular Construction, which currently accommodates Green Devil's Kitchen. This existing building is elevated on 460mm concrete pads and is located on an existing concrete area in the north west of the site.

1.2 Location

1.2.1 The site is located in Woodchester, near Stroud, Gloucestershire which is south of Gloucester, north east of Bristol, and west of Cirencester.

1.2.2 Specifically, the site is located on the west side of A46 Bath Road, opposite the Junction with Culver Hill (Figure 1). The Nailsworth Brook flows in an overall south to north direction west of the site, beyond the Nailsworth to Stroud cycle path.

1.2.3 A National Grid Reference for the site is SO 84273 01950 and a post code is GL5 5HT.

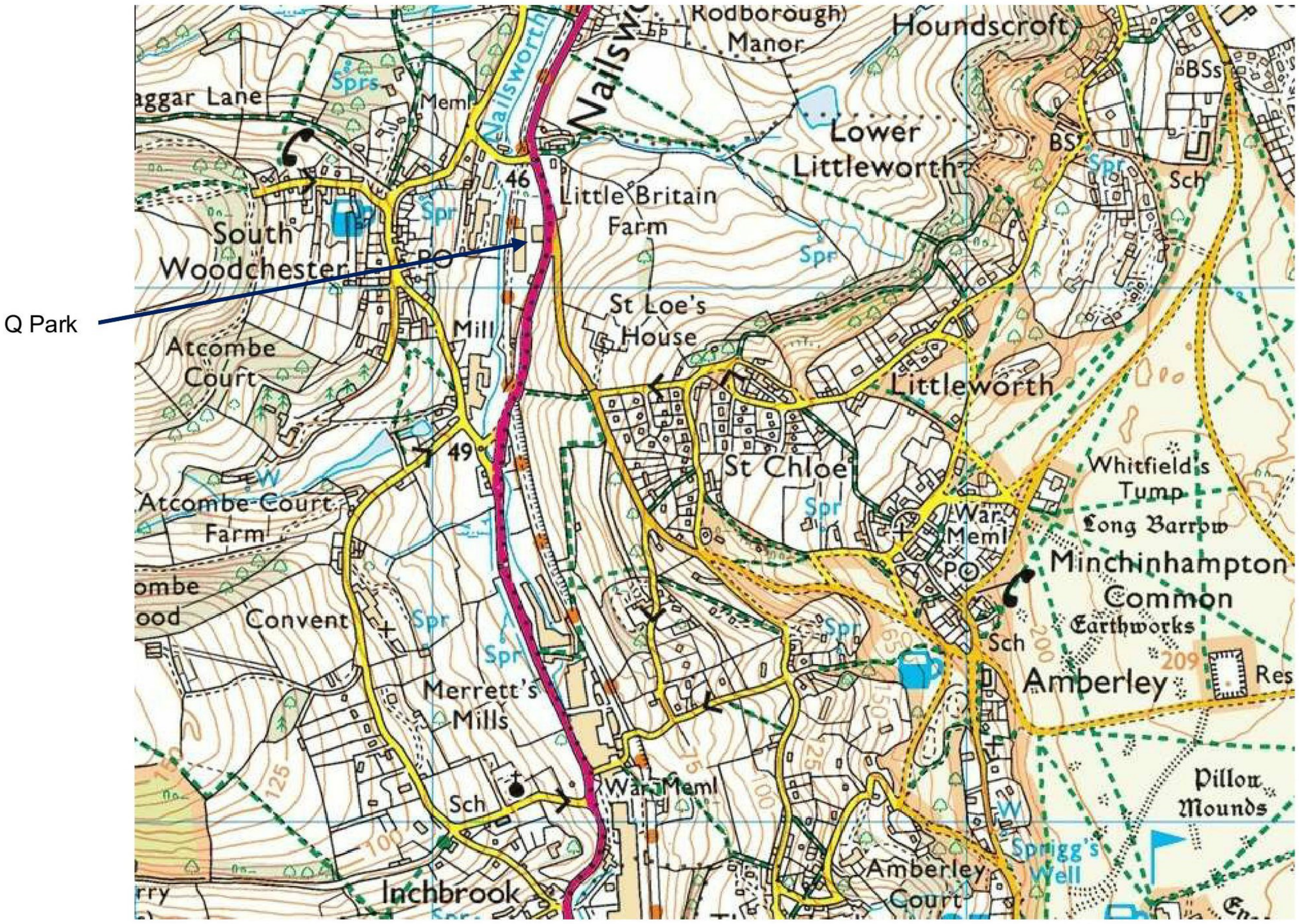

Figure 1: An Ordnance Survey map illustrating the position of the site in Woodchester.
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1.3 Aims and Objectives

1.3.1 This report aims to provide an assessment of flood risk in line with National Planning Policy Framework for the purpose of accompanying a Planning Application to extend the existing Green Devil's Kitchen located at the site. Specifically, the proposal is to construct a single storey steel frame extension, built onto a new large hard core / concrete pad.

1.3.2 The objectives of this report are to review available information about geology, topography and hydrology local to the site and subsequently assess the risk of flooding from a range of sources based on this information and consultation with relevant authorities. Recommendations will be made, where necessary, to manage and/or mitigate any flood risks identified.

2.0 Development Description and Background

2.0.1 The following section provides a description of the existing and proposed site layout. Background information about topography, geology and hydrology of the site and surrounding area are also detailed to provide a baseline to the Flood Risk Assessment.

2.1 Development Site Description

2.1.1 The site is currently used by an established wind turbine manufacturing business (Britwind) owned and operated by Ecotricity Group. The existing premises comprise a range of buildings, vehicle parking and storage facilities for the manufacture and export of meteorological masts and small wind turbines. There is both pedestrian and vehicular access to Q Park from the A46 Bath Road via two entrances located on the eastern boundary of the site.

2.1.2 The site is currently occupied by an existing industrial unit, an office building and areas of concrete hard standing, tarmac, gravel and planting along much of the site boundaries. The existing modular steel frame building that currently accommodates Green Devil's Kitchen is located on an existing concrete area in the north west of the site.

2.1.3 The A46 Bath Road runs along the eastern and southern boundaries of the site, the Nailsworth to Stroud cycle path runs along the western boundary of the site. A dwelling house is located north of the northern boundary, fronting onto Station Road. The Nailsworth Brook flows in an approximate south to north direction, west of the Nailsworth to Stroud cycle path.

2.1.4 The proposal is to extend the existing Green Devil's Kitchen located on the existing concrete area in the north west of the site. Specifically, the proposal is to construct a single storey steel frame extension, built onto a new large hard core / concrete pad.

2.1.5 It is considered that the current use of the site as Light Industrial, manufacturing, would be classified as "*Less vulnerable*", based on the flood risk vulnerability classification outlined in Table 2 of the Planning Practice Guidance to the National Planning Policy Framework (Communities and Local Government, 2014). It is considered that with the proposed use of food processing that its classification would remain unchanged post development.

2.1.6 The area of the proposed extension building is 325m^2 (Drawing ref: 6470_T0021_06, April 2021; Figure 10).

2.1.7 There is an existing surface water management system at the site, which is to remain post-development.

2.2 Development Site Background

2.2.1 **Topography**

2.2.2 A topographic survey of the site has been undertaken by Monument Geomatics Limited (November 2017) and is provided in Appendix A of this report.

2.2.3 The site is considered in thirds in line with the presentation of the topographic survey (Appendix A). In the northern third the topographic survey illustrates approximately 50% gravel and 50% concrete or tarmac. There is an entrance into this part of the site, through the eastern boundary, entering into the northern end of the tarmac area; the entrance is at an elevation of 46.29mAOD. The gravel area is located in the northern half of this area and is overall sloping down in an easterly direction towards the eastern boundary of the site. Elevations in this gravel area range from 47.24mAOD to 46.55mAOD. The concrete area is located in the southern half of this area, on the western quarter of this area and is at an elevation of 47.04mAOD, rising to 47.08mAOD at its southern end. An ACO-DRAIN runs parallel and east of the concrete area from its northern extent to approximately three quarters along its length; two gullies are positioned in line and south of the ACO-DRAIN, east of concrete area. East of the ACO DRAIN and gullies is a weighbridge and the tarmac area. Land levels decrease towards the centre of the tarmac area where there are gullies. In this part of the site there is a high elevation of 47.2mAOD on the eastern boundary of this area and a low elevation of 46.55mAOD at the northern gully in this area.

2.2.4 The central third of the site is covered by two buildings with a vehicle access road between them. The tarmac road between the two buildings slopes down in a northerly direction from 47.14mAOD to 46.87mAOD. It is noted that there are gullies along this road. The car park south of the eastern building slopes down in a westerly direction towards gullies, with an overall slope in a northerly direction too. The elevations in the southern part of the car park range from 47.91mAOD to 47.41mAOD and in the northern part of the car park range from 47.66mAOD to 47.21mAOD. South of the aforementioned car park is the main entrance into the site through the eastern boundary. The entrance slopes down from the main road into the site; the level at the entrance is 48.8mAOD.

2.2.5 In the southern third of the site is a mixture of tarmac and concrete areas. Tarmac leads down from the main entrance to the site into this area. Concrete then covers much of the northern half of this part of the site with levels overall decreasing to the centre of this concrete area where an ACO-DRAIN is positioned running in a north-south orientation. A second ACO-DRAIN is positioned on the same orientation towards the western boundary, with levels on the concrete, locally to the east of this second drain, draining towards this infrastructure. The levels in this northern part of this area range from about 47.85mAOD to 47.11mAOD. The southern part of this area is largely covered by Tarmac and slopes down in a westerly direction towards gullies positioned along the western boundary. The levels in this part of the site range from about 48.0mAOD to 47.5mAOD, with a couple of localised lower points noted (low of 47.39mAOD).

2.2.6 LiDAR coverage of the site and surrounds at 1m detail was available from Open Government Data (Figure 2). The red line is indicative of the extent of the site. LiDAR illustrates that the site is located within the bottom of a valley, with steep slopes to the east and west rising to Minchinhampton common and Selsley common respectively.

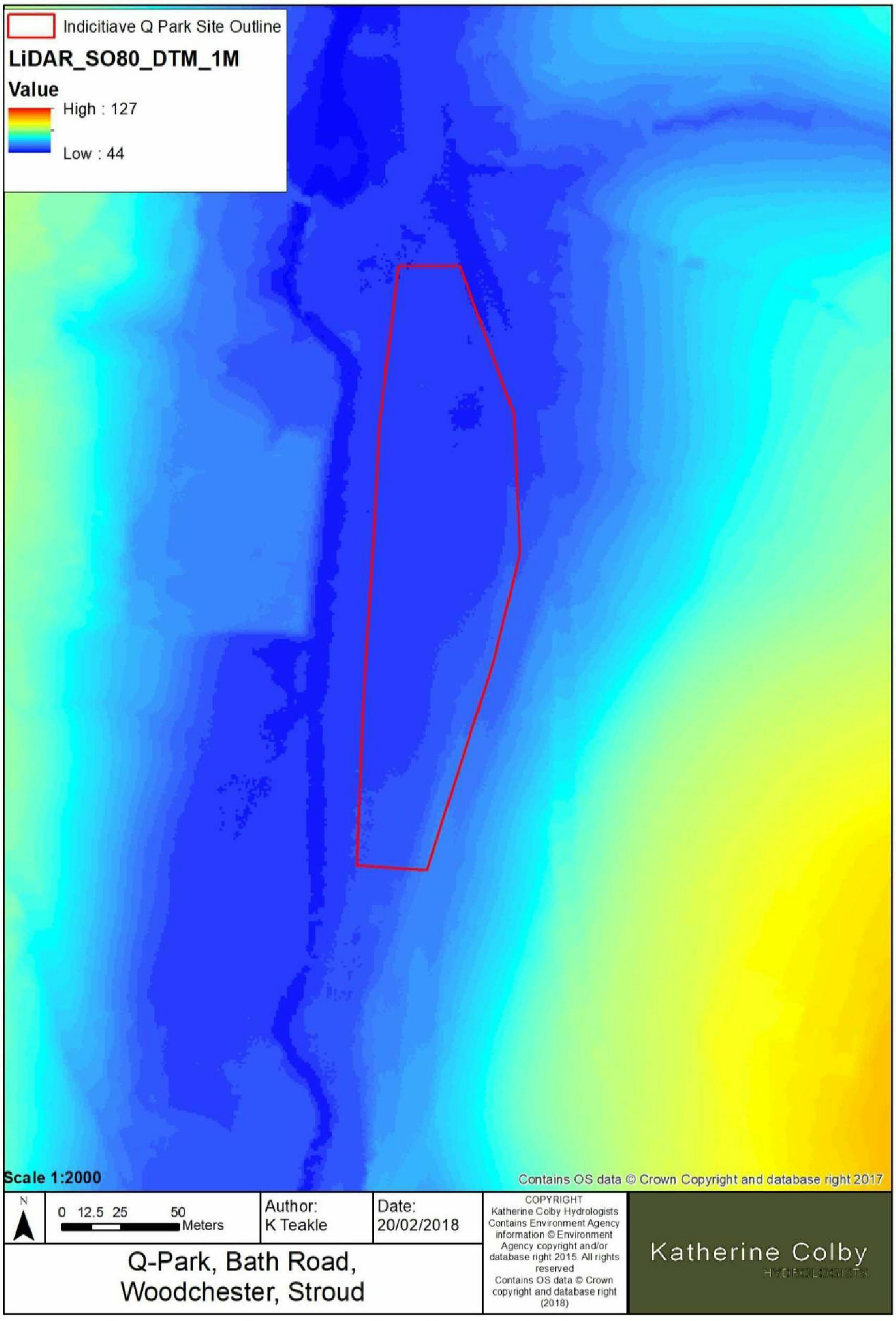

Figure 2: LiDAR covering the area of the site *Contains Environment Agency information © Environment Agency and database right*

2.2.7 **Geology**

2.2.8 Available mapping for the area of interest was reviewed, namely the British Geological Survey (1975) Gloucester, England and Wales Sheet 234, Solid and Drift Geology 1:50,000. This map indicates that the site is underlain by "*Alluvium*" (British Geological Survey, 1975). "*Made ground*" is indicated north of the site, Alluvium is indicated south of the site and Lower Jurasic "*Clay*" is indicated to the east and west of the site. It is noted that beyond the Clay, to the east and west of the site, the geology is "*Cotteswold Sands*" and beyond that the geology changes through the Inferior Oolite and Great Oolite Series of the Middle Jurassic.

2.2.9 **Hydrology**

2.2.10 The Nailsworth Brook flows west of the site, beyond the Nailsworth to Stroud cycle path, in a southerly direction (Figure 3). This watercourse is a tributary of the River Frome, the confluence being at Dudbridge, near Sainsbury's supermarket.

2.2.11 The site is located in the bottom of a valley with steep slopes rising to the west, beyond the Nailsworth Brook, and to the east, beyond the A46 Bath Road. A road junction between the Bath Road and Culver Hill occurs east of the site (Figure 3). A review of the Ordnance Survey 1: 25,000 map indicates that Culver Hill could drain a catchment area of approximately 0.7km^2, picking up surface water runoff from St. Chloe, parts of Littleworth and parts of Amberley and extending up to Minchinhampton Common. It is considered that surface water could runoff from Culver Hill towards the Bath Road.

2.2.12 A minor watercourse drains the catchment adjacent, and to the north of, the Culver Hill Catchment. This watercourse discharges into the right bank of the Nailsworth Brook, likely downstream of Station Road (unconfirmed).

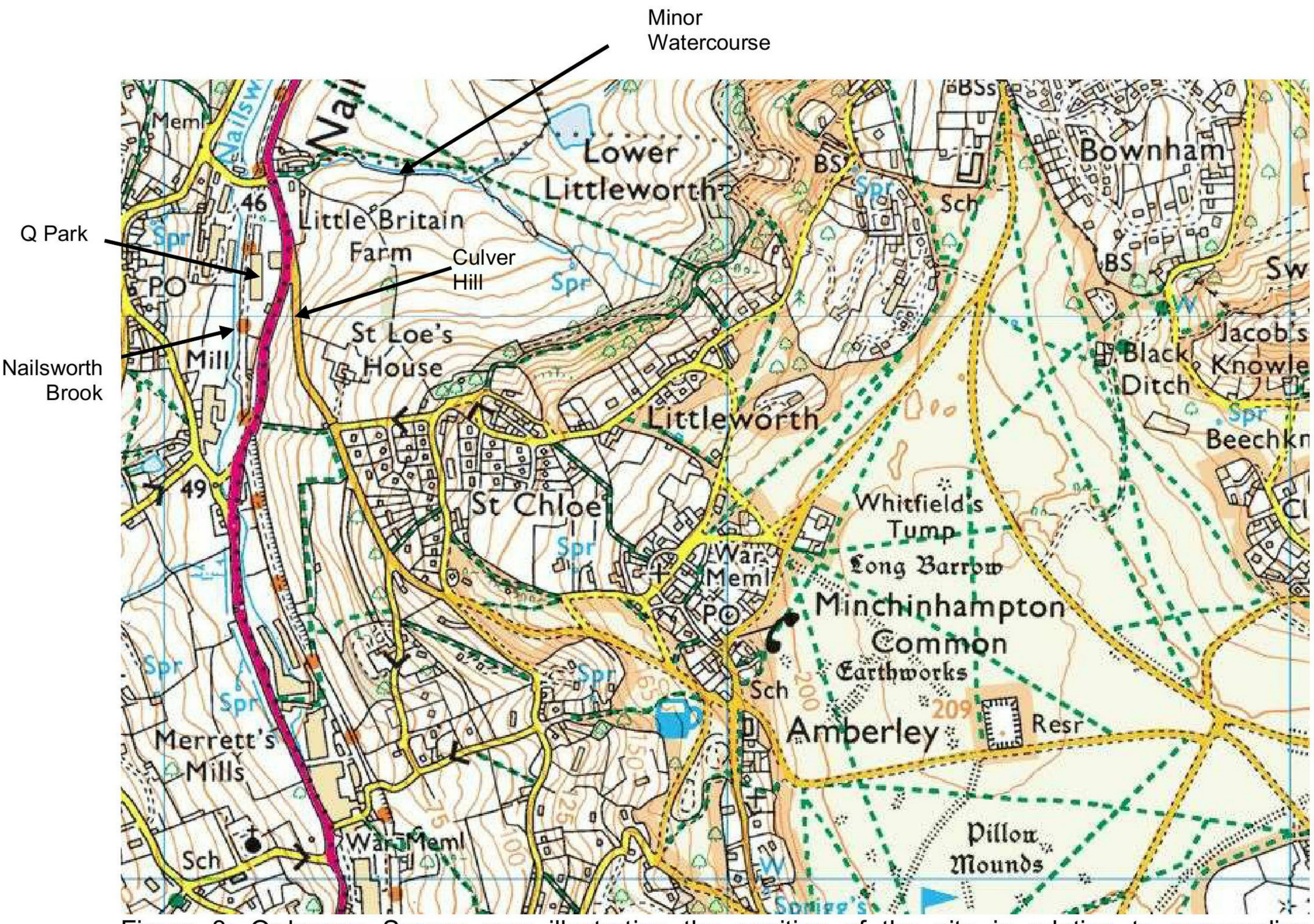

Figure 3: Ordnance Survey map illustrating the position of the site in relation to surrounding watercourses. *© Crown copyright and database rights [2017] OS 0100042840*

3.0 Flood Hazard Definition and Probability

3.0.1 In the following section the flood hazard to the proposed development site is defined and the probability of flooding from each potential source is concluded. The potential sources of flooding that have been considered as part of this Flood Risk Assessment are: Fluvial, surface water, groundwater and sewer sources. The flood hazard from each of these sources is defined and the probability of the site flooding from each source concluded following consultation with the relevant authority and review of available information.

3.1 Fluvial Sources

3.1.1 **Introduction**

3.1.2 The proposed development site is located east of a tributary to the River Frome, the Nailsworth Brook. This watercourse flows in an overall south to north direction, west of the site. At the site it is proposed to extend the existing Green Devil's Kitchen located at the site as illustrated in Appendix A.

3.1.3 **Environment Agency Data**

3.1.4 The Environment Agency Flood Map for Planning indicates that the location of the proposed development at Q Park is within Flood Zone 3 (Figure 4).

3.1.5 The Environment Agency supplied flood water level information from the 1d element of their Nailsworth Stream model. The results provided included water levels for a range of climate change scenarios and comprised 1 in 100 year design events with a range of percentage increase in flows. As discussed in the previous Development Description section the site would be classified as "*Less vulnerable*". Therefore, in line with Environment Agency, September 2020, Climate Change allowances for planning for the SHWG area "*For water compatible or less vulnerable development e.g. commercial, the FRA should use the 'central' climate change allowance (20%), as a minimum, to inform built in resilience; but aim to incorporate managed adaptive approaches/measures for the 'higher central' allowance (25%) where feasible*."

Node	1 in 100 year	1 in 1000 year	1 in 100 year + 20% climate change	1 in 100 year + 25% climate change
1.041	47.26	47.57	47.33	47.36
1.041_l1	47.17	47.48	47.26	47.28
1.040	47.08	47.56	47.19	47.22

3.1.6 Table 1: Environment Agency Modelled flood water levels for the Nailsworth Brook

3.1.7 Node 1.041_l1 is located on the Nailsworth Brook adjacent to the proposed location of the Kitchen extension (Figure 5).

3.1.8 The proposed location for the Kitchen extension is on the concrete area located in the north west part of the site. It is at an elevation of 47.04mAOD, rising to 47.08mAOD at its southern end. It is proposed to take a conservative approach and use an elevation of 47.04mAOD for the purpose of this assessment.

3.1.9 The depth of flooding that would occur during a 1 in 100 year with 25% allowance for climate change would be 0.24m depth (47.28 mAOD – 47.04 mAOD).

3.1.10 The 1 in 100 year with 20% allowance for climate change at Node 1.041_l1 is **47.26mAOD** and the 1 in 100 year with 25% allowance for climate change at Node 1.041_l1 is **47.28mAOD**.

3.1.11 It is recommended that the finished floor level of the proposed Kitchen extension be set at **47.58mAOD** (47.28mAOD+300mm freeboard allowance).

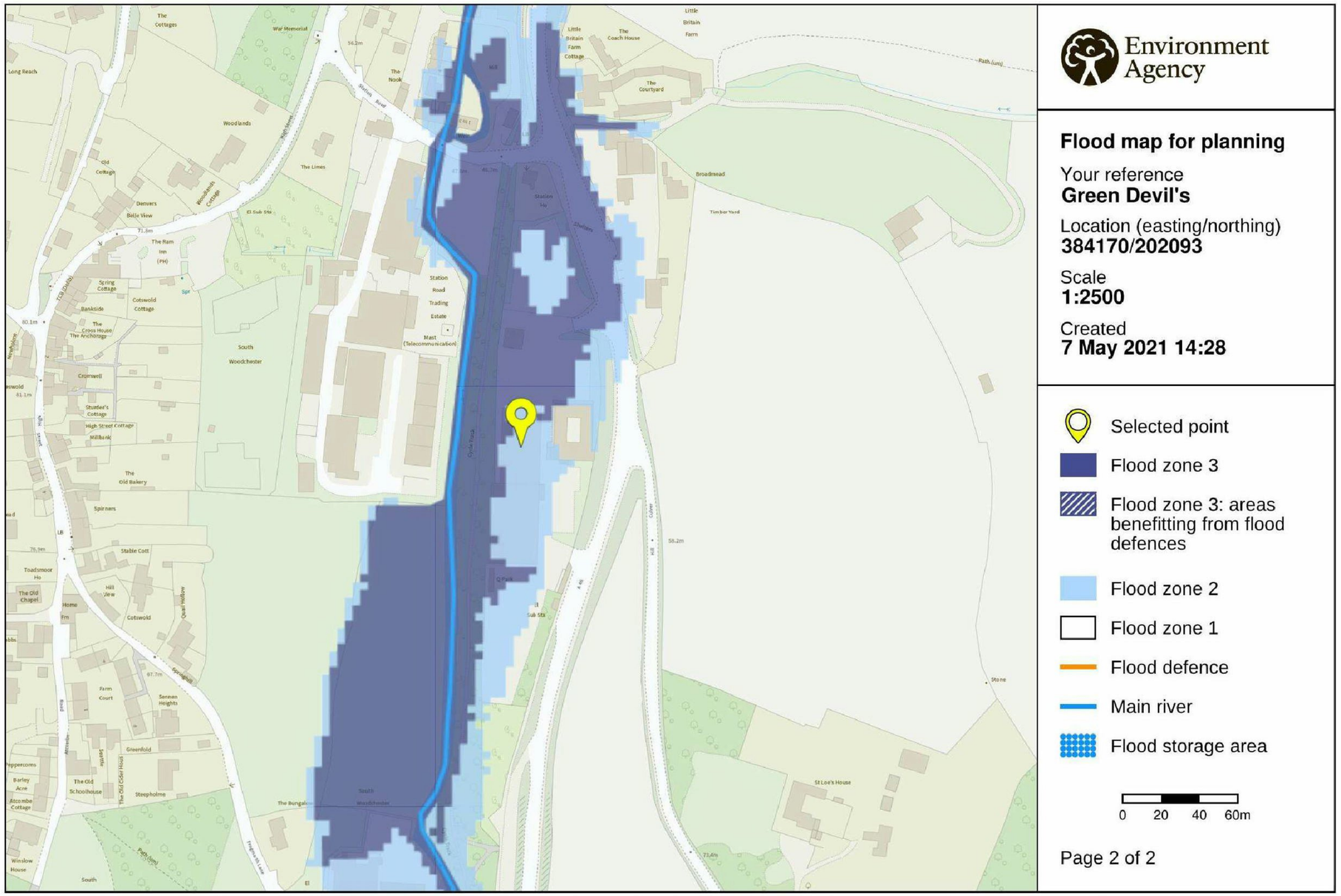

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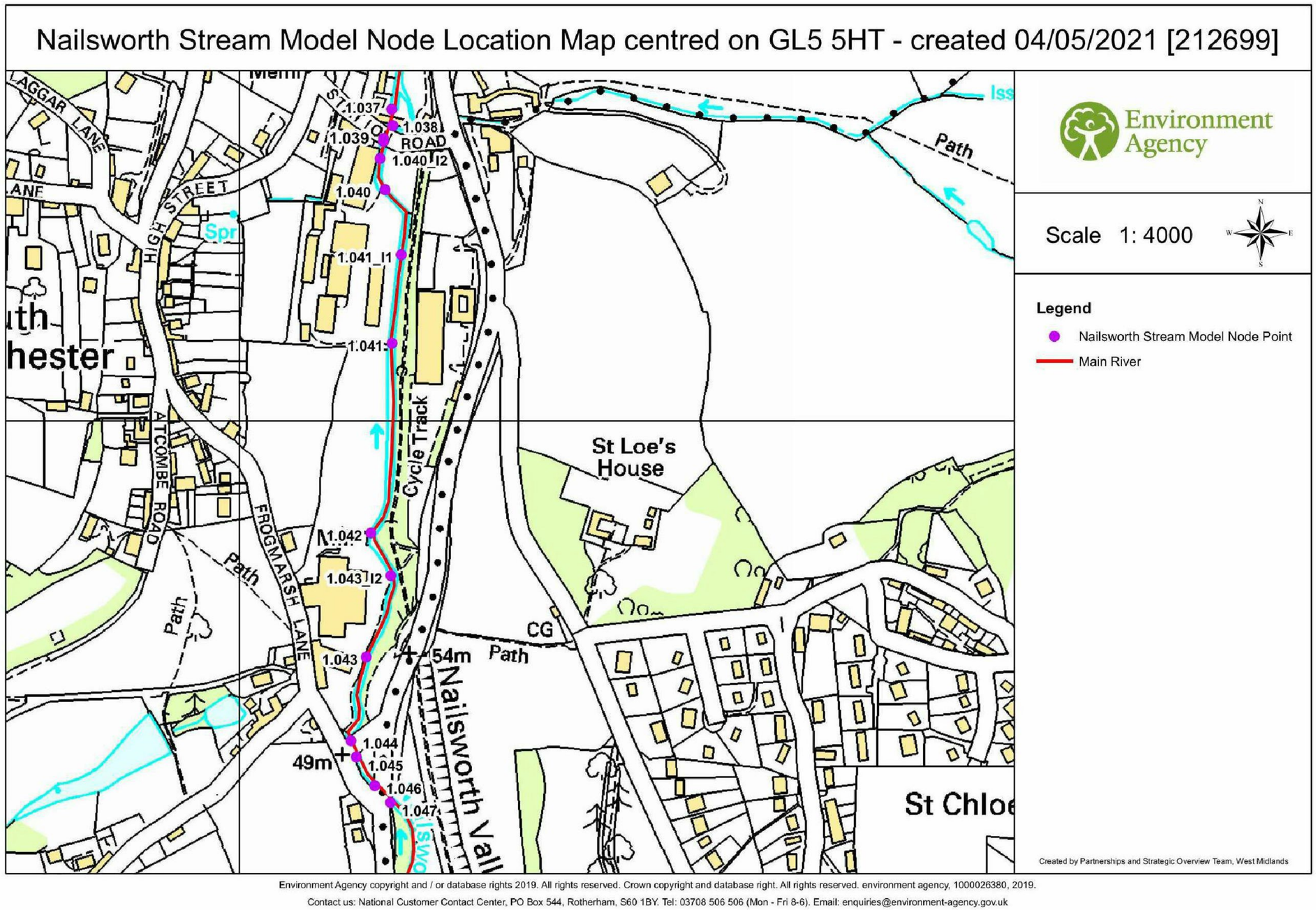
Figure 4: Environment Agency Flood Map for Planning (Rivers and Sea). *Contains Environment Agency information © Environment Agency and database right*



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Contact us: National Customer Contact Center, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon - Fri 8-6). Email: enquiries@environment-agency.gov.uk

Figure 5: Environment Agency Flood Map for Planning (Rivers and Sea). *Contains Environment Agency information © Environment Agency and database right*

3.1.12 **Access and Egress**

3.1.13 Access and egress to the site is via two entrances on the eastern boundary of the site onto the A46 Bath Road. The southern entrance is shown in Figure 4 to be located in Flood Zone 1 and the Bath Road at this location also within Flood Zone 1. The proposed location of the Kitchen extension is closer to the northern entrance, which is located in Flood Zone 3 and the Bath Road is also within Flood Zone 3 in this location (Figure 4).

3.1.14 **Flood Management and Mitigation Measures**

3.1.15 It is recommended that the finished floor level of the proposed Kitchen extension be set at, or above 47.58mAOD (47.28mAOD+300mm freeboard allowance).

3.1.16 It is recommended that the Environment Agency is contacted to include the site on the register of properties to receive flood warnings and / or flood alert.

3.1.17 It is recommended that in the event of receipt of a flood warning and / or flood alert for the site that a Flood Evacuation and Management Plan be followed.

3.2 Groundwater Sources

3.2.1 Available mapping for the area of interest was reviewed, namely the British Geological Survey (1975) Gloucester, England and Wales Sheet 234, Solid and Drift Geology 1:50,000. This map indicates that the site is underlain by "*Alluvium*" (British Geological Survey, 1975).

3.2.2 It is considered that given the location of the site at the bottom of a valley and in the vicinity of the Nailsworth Brook that groundwater levels could be relatively close to the surface.

3.2.3 The Halcrow Group Limited, September 2008 Level 1 SFRA indicates that at the time of their report there were "*no recorded incidents of groundwater flooding*" by the Environment Agency in the Stroud District. However, Stroud District Council was aware of groundwater issues (Halcrow Group Limited, 2008).

3.2.4 It is considered that there is a potential for groundwater issues to affect the site.

3.2.5 **Flood Management and Mitigation Measures**

3.2.6 The proposed Kitchen extension is to be elevated above surrounding ground levels.

3.3 Sewer Sources

3.3.1 Severn Trent Water was previously consulted regarding occurrences of flooding at the site from this source. Their response, provided in Appendix B, indicated that they do not have a record of historic flooding from sewers at this site.

3.3.2 **Flood Management and Mitigation Measures**

3.2.1 It is considered that the position of the site at the bottom of a valley, adjacent to a watercourse, does increase the probability of flooding from sewer sources. The proposed Kitchen extension is to be elevated above surrounding ground levels.

3.4 Surface Water Sources

3.4.1 The topography of the site is discussed in detailed in the Topography section of this report. There are localised slopes across the site that are managed using a network of gullies and ACO DRAINS.

3.4.2 The SFRA advises that "*Locations around Stroud are known to be affected by surface water flooding due to the combination of steep catchments, combined urban drainage networks, older style properties and an abundance of woodland debris which blocks the urban drainage network*" (Halcrow Group Limited, 2008). These factors are considered to be applicable and should be taken into consideration when considering flood risk from this source to the site.

3.4.3 The Severn Tidal Tributaries Catchment Flood Management Plan (Environment Agency, December 2009) highlights that there is a risk of surface water runoff in Stroud due to "…*rapid run-off and insufficient local drainage capacity*". It is considered that there is the potential for the site to be affected by surface water runoff due to the topographic position of the site within the wider catchment.

3.4.4 As discussed in the Hydrology section of this report the site is located within the bottom of a valley, with steep slopes occurring beyond the site, to the east and west. A road junction between the Bath Road and Culver Hill occurs east of the site (Figure 3). A review of the Ordnance Survey 1: 25,000 map indicates that Culver Hill could drain a catchment area of about 0.7km^2, picking up surface water runoff from St. Chloe, parts of Littleworth and parts of Amberley and extending up to Minchinhampton Common. It is considered that surface water could runoff from Culver Hill towards the Bath Road and thus pose a potential risk of surface water flooding to the site. As discussed elsewhere in this report there is a network of gullies and ACO DRAINS across this site and the Client, having already occupied this site, is understood to be satisfied that these operate effectively in managing flood risk from this source.

3.4.5 The Bath Road runs along the eastern boundary of the site; it is noted that the topographic survey of the site notes that there is Highways curbing and gullies along the Bath Road, north of the main (southern) entrance to the site (Appendix A). It is considered that surface water that might enter the site from the Bath Road through the entrance ways would be picked up within the existing surface water drainage arrangements for the site.

3.4.6 The Environment Agency Risk of Flooding from Surface Water map has been accessed and illustrates the likelihood of flooding from surface water (Figures 6 to 9). Three events are illustrated on this mapping: High, Medium and Low Risk. High Risk events represent those events with a probability of occurrence in any given year of greater than 3.3%; Medium Risk events have a probability of occurrence in any given year of 1% to 3.3%; and Low Risk events have a probability of occurrence in any given year of 0.1% to 1%. "Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding" (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map, 05/01/21).

3.4.7 The Environment Agency Risk of Flooding from Surface Water map indicates that flooding of the proposed development site could occur from this source. It indicates that the proposed Kitchen extension is located within an area that is at Very Low and Low Risk of flooding from surface water sources (Figure 6).

3.4.8 The location of the proposed Kitchen extension is within an area identified as at risk of flooding from surface water sources with depths of flooding during a Low Risk event of less than 300mm, and 300mm to 900mm (Figure 7).

3.4.9 The Environment Agency Risk of Flooding from Surface Water map indicates that flooding of the northern entrance to the proposed development site could occur from this source. It indicates that the northern entrance is located within an area that is at Low, Medium and High Risk of flooding from surface water sources (Figure 6).

3.4.10 The location of the northern entrance is within an area identified as at risk of flooding from surface water sources with depths of flooding during a Low Risk event of 300mm to 900mm, and Over 900mm (Figure 7).

3.4.11 The location of the northern entrance is within an area identified as at risk of flooding from surface water sources with depths of flooding during a Medium Risk event of less than 300mm, and 300mm to 900mm (Figure 8).

3.4.12 The location of the northern entrance is within an area identified as at risk of flooding from surface water sources with depths of flooding during a High Risk event of less than 300mm, and 300mm to 900mm (Figure 9).

3.4.13 Velocities of flood water from this source, at the northern entrance to the site: for a Low Risk event, are shown to be more than 0.25m/s; for a Medium Risk event velocities are shown as both more than 0.25m/s and less than 0.25m/s; for a High Risk event velocities are shown as both more than 0.25m/s and less than 0.25m/s – it is noted that the extent of flooding in this event is reduced from the Medium Risk event.

3.4.14 **Existing Surface Water Drainage Arrangements**

3.4.15 The arrangement for surface water drainage at the site is a network of gullies and ACO DRAINs; this arrangement is to remain post-development.

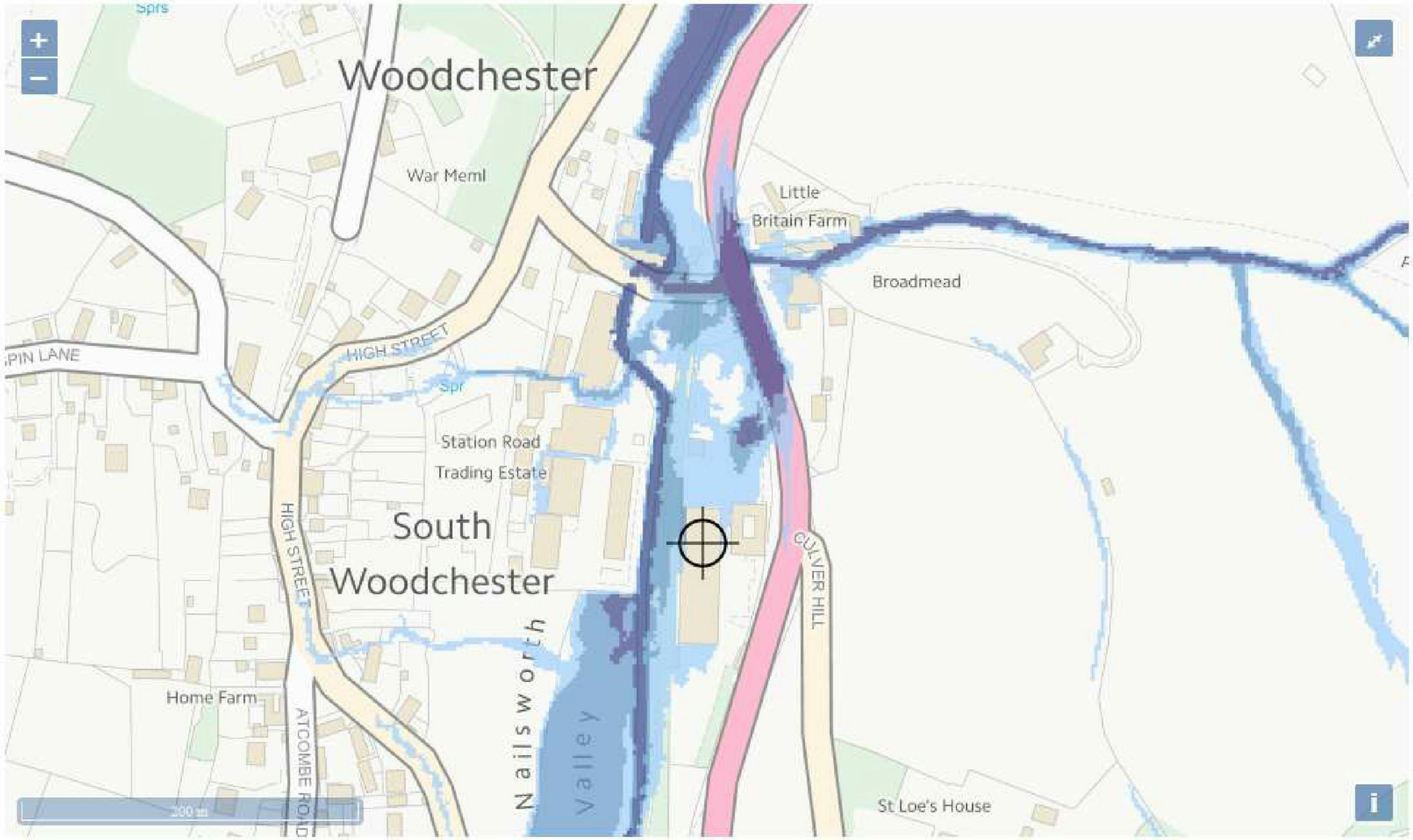


Figure 6: Environment Agency map illustrating the Flood Risk from Surface Water: Extent of Surface Water Flooding (accessed January 2021). *Contains Environment Agency information © Environment Agency copyright and database rights 2021*

Figure 7: Environment Agency map illustrating the Flood Risk from Surface Water: Low Risk Scenario Water Depth (accessed January 2021). *Contains Environment Agency information © Environment Agency copyright and database rights 2021*

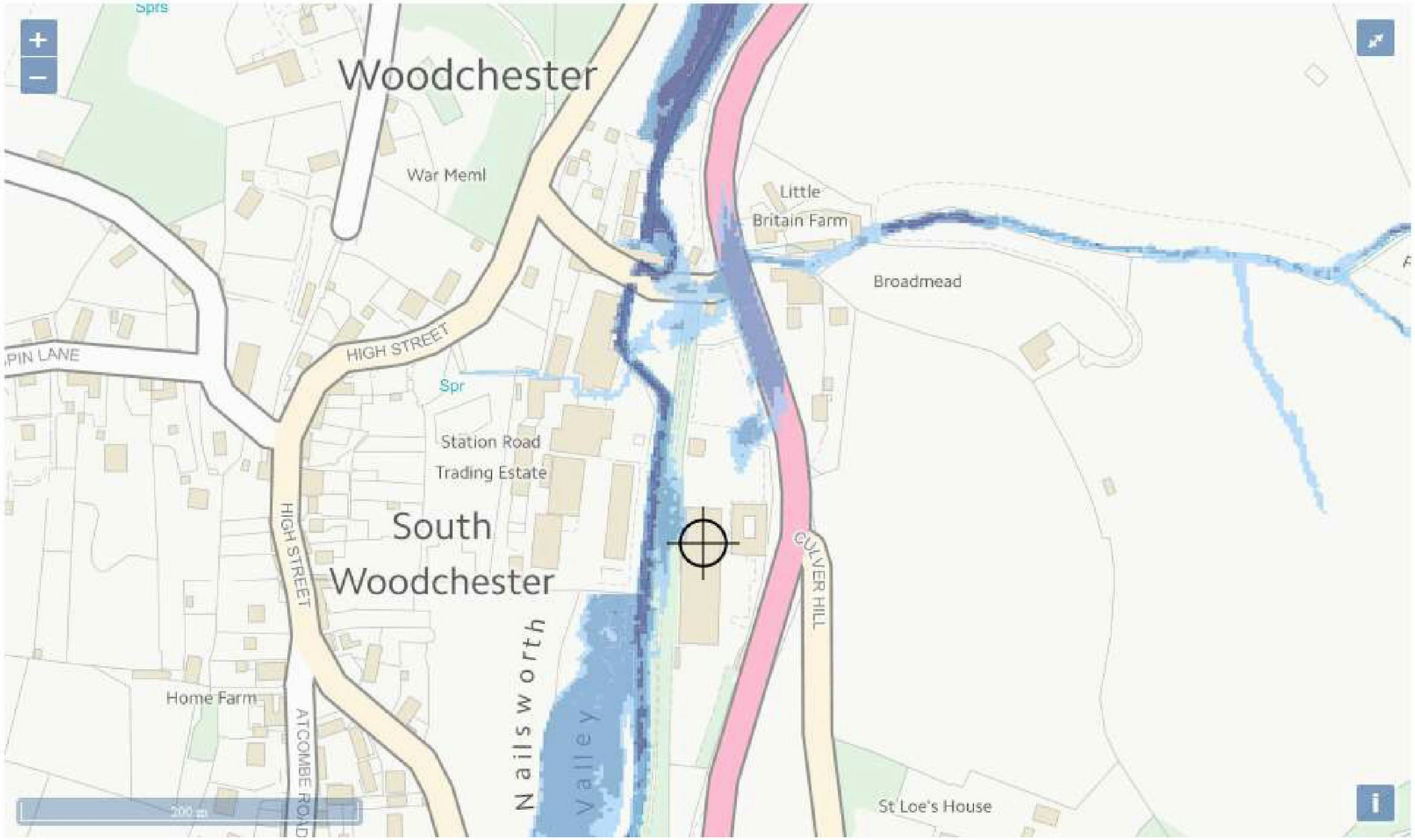


Figure 8: Environment Agency map illustrating the Flood Risk from Surface Water: Medium Risk Scenario Water Depth (accessed January 2021). *Contains Environment Agency information © Environment Agency copyright and database rights 2021*

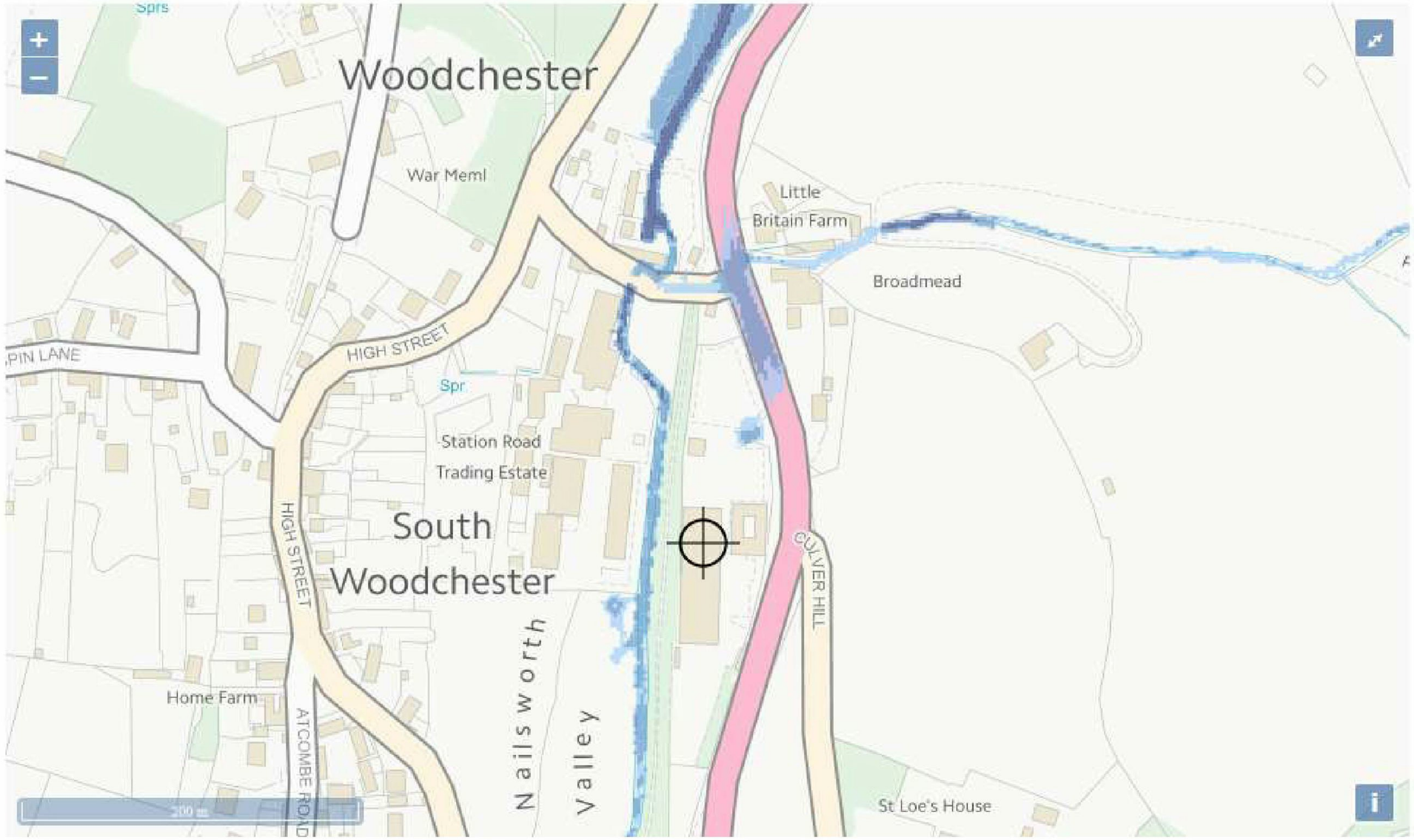


Figure 9: Environment Agency map illustrating the Flood Risk from Surface Water: High Risk Scenario Water Depth (accessed January 2021). *Contains Environment Agency information © Environment Agency copyright and database rights 2021*

4.0 Flood Risk Management Measures

4.0.1 The Environment Agency Flood Map for Planning locates the proposed development at Q Park as within Flood Zone 3. It is recommended that flood vulnerable elements of the proposed development be raised above the flood water level for a 1 in 100 year with allowance for climate change.

4.0.2 It is recommended that the finished floor level of the proposed Kitchen extension be set at, or above 47.58mAOD (47.28mAOD+300mm freeboard allowance).

4.0.3 It is recommended that the Environment Agency is contacted to include the site on the register of properties to receive flood warnings and / or flood alert.

4.0.4 It is recommended that in the event of receipt of a flood warning and / or flood alert for the site that a Flood Evacuation and Management Plan be followed.

4.0.5 It is recommended that to manage the risk of groundwater flooding to the proposed Kitchen extension that it is elevated above surrounding ground levels.

4.0.6 The arrangement for surface water drainage at the site is a network of gullies and ACO DRAINs; this arrangement is to remain post-development.

4.0.7 It is considered that management and mitigation measures to address the potential for surface water flooding would suffice for mitigating and managing potential flooding from a sewer source. In addition, it is noted that the proposed Kitchen extension is to be elevated above surrounding ground levels.

5.0 Offsite Impacts

5.1 Surface Water Runoff

5.1.1 Post-development there would be no increase in hard surface areas.

5.2 Compensatory Storage

5.2.1 The proposed Kitchen extension is to cover an area of 325m^2. The 1 in 100 year with 25% allowance for climate change is at Node 1.041_l1 is 47.28mAOD. The proposed location for the Kitchen extension is on the concrete area located in the north west part of the site. It is at an elevation of 47.04mAOD, rising to 47.08mAOD at its southern end. It is proposed to take a conservative approach and use an elevation of 47.04mAOD for the purpose of this assessment.

5.2.2 Based on the aforementioned information

47.28mAOD - 47.04mAOD = 0.24m depth * 325m^2 = 78m^3.

5.2.3 This can be accommodated by lowering ground levels by 0.2m within the area delimited in Figure 10 and marked as 500m^2.

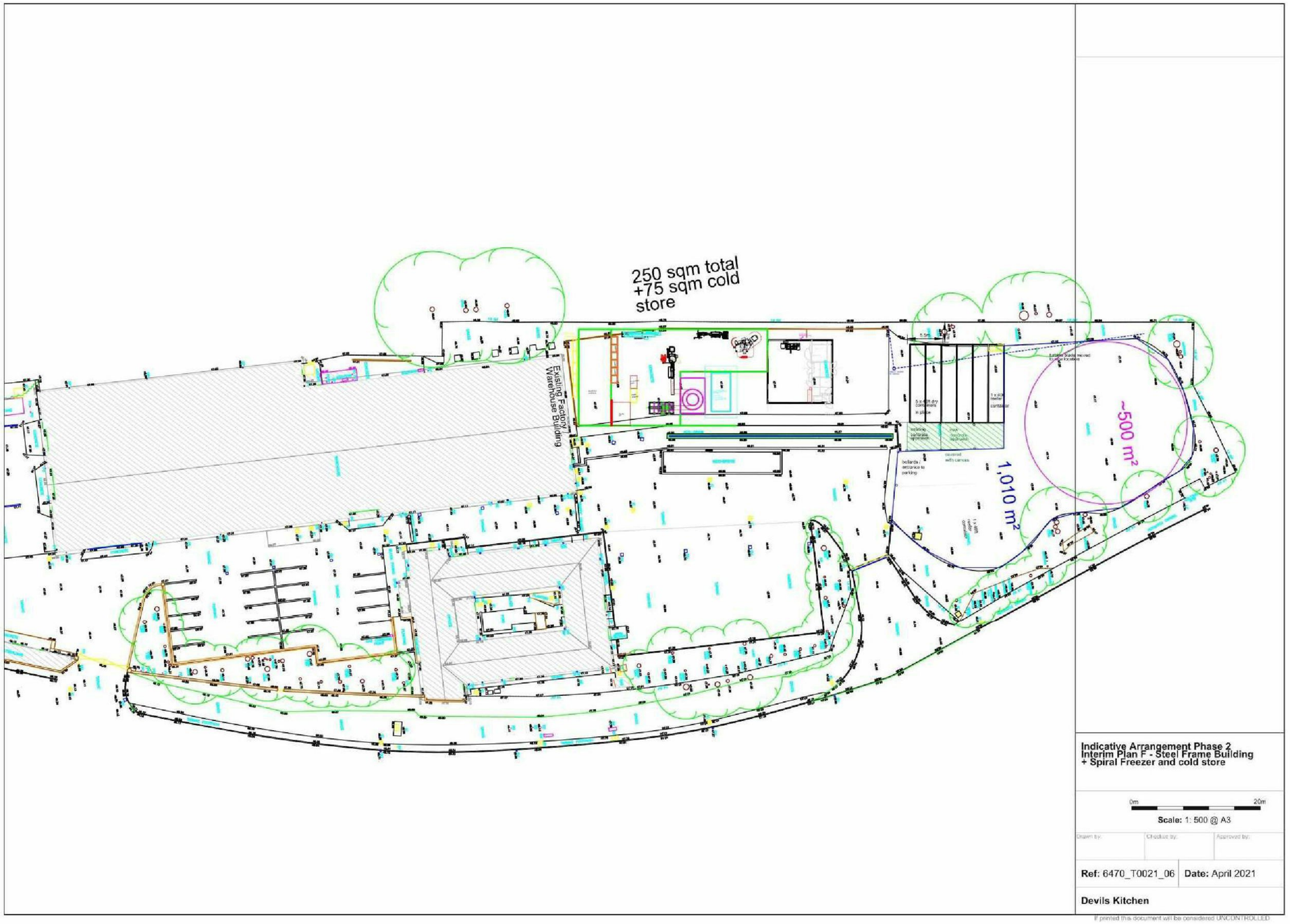


Figure 10: Area available to lower levels to compensate floodplain storage within proposed Kitchen extension annotated "~500 m^2"

6.0 Conclusion

6.0.1 A Flood Risk Assessment has been undertaken of Q-park, Bath Road, GL5 5HT to accompany a Planning Application to extend the existing Green Devil's Kitchen located at the site. Specifically, the proposal is to construct a single storey steel frame extension, built onto a new large hard core / concrete pad. It is proposed that this construction would be an extension to the existing modular steel frame building from Fisher Modular Construction, which currently accommodates Green Devil's Kitchen.

6.0.2 The site is located in Woodchester, near Stroud. The Nailsworth Brook is west of the site, beyond the Nailsworth to Stroud cycle path, and flows in an overall south to north direction.

6.0.3 The Environment Agency was consulted regarding flooding from fluvial sources at the site. The Environment Agency Flood Map for Planning locates the proposed development at Q Park as within Flood Zone 3. The Environment Agency supplied flood water level information from the 1d element of their Nailsworth Stream model. The results provided included water levels for a range of climate change scenarios and comprised 1 in 100 year design events with a range of percentage increase in flows.

6.0.4 Environment Agency Node 1.041_I1 is located on the Nailsworth Brook adjacent to the proposed location of the Kitchen extension. The proposed location for the Kitchen extension is on the concrete area located in the north west part of the site; it is at an elevation of 47.04mAOD, rising to 47.08mAOD at its southern end. The 1 in 100 year with 20% allowance for climate change at Node 1.041_I1 is 47.26mAOD and the 1 in 100 year with 25% allowance for climate change at Node 1.041_I1 is 47.28mAOD. A conservative approach was adopted and 47.04mAOD used for the purpose of assessing flood risk from this source. The depth of flooding that would occur during a 1 in 100 year with 25% allowance for climate change would be 0.24m depth (47.28 mAOD – 47.04 mAOD).

6.0.5 Recommendations have been made to manage the risk of flooding from fluvial sources. It is recommended that the finished floor level of the proposed Kitchen extension be set at 47.58mAOD (47.28mAOD+300mm freeboard allowance). It is recommended that the Environment Agency is contacted to include the site on the register of properties to receive flood warnings and flood alerts. It is recommended that in the event of receipt of a flood warning and / or a flood alert for the site that a Flood Evacuation and Management Plan be followed.

6.0.6 The site is bounded to the east by Bath Road. Access and egress to the site is via two entrances on the eastern boundary of the site onto the A46 Bath Road. The southern entrance is shown in Figure 5 to be located in Flood Zone 1 and the Bath Road at this location also within Flood Zone 1. The proposed location of the portacabin is closer to the northern entrance, which is located in Flood Zone 3 and the Bath Road is also within Flood Zone 3 in this location.

6.0.7 With regards the risk of flooding from groundwater sources it is recommended that the proposed portacabin is elevated above surrounding ground levels.

6.0.8 To manage the risk of flooding due to surface water runoff the existing arrangement for surface water drainage at the site (a network of gullies and ACO DRAINs) is to remain post-development.

6.0.9 With regards the risk of flooding from sewer sources it is considered that management and mitigation measures to address the potential for surface water flooding would suffice for mitigating and managing potential flooding from a sewer source. In addition, it is noted that the proposed Kitchen extension is to be elevated above surrounding ground levels.

6.0.10 There would be no increase in hard surfaced areas at the site post-development and the current arrangement of surface water drainage at the site (a network of gullies and ACO DRAINs) is to remain post-development.

6.0.11 With regards to compensatory storage, calculations have been undertaken to determine the volume required to compensate for the proposed development of a kitchen extension at the site, based on the 1 in 100 year with 25% allowance for climate change flood water level supplied by the Environment Agency. A location has been proposed within the site where levels could be lowered to compensate for the proposed development.

7.0 References

British Geological Survey, 1975. Gloucester. England and Wales Sheet 234. Solid and Drift Geology. 1:50,000 (Keyworth, Nottingham, British Geological Survey)

Communities and Local Government, March 2014, Planning Practice Guidance to the National Planning Policy Framework

Environment Agency, September 2020 update, Climate Change allowances for planning – SHWG area

Environment Agency, December 2009, Severn Tidal Tributaries Catchment Flood Management Plan

Halcrow Group Limited, September 2008, Stroud District Council Strategic Flood Risk Assessment for Local Development Framework Level 1

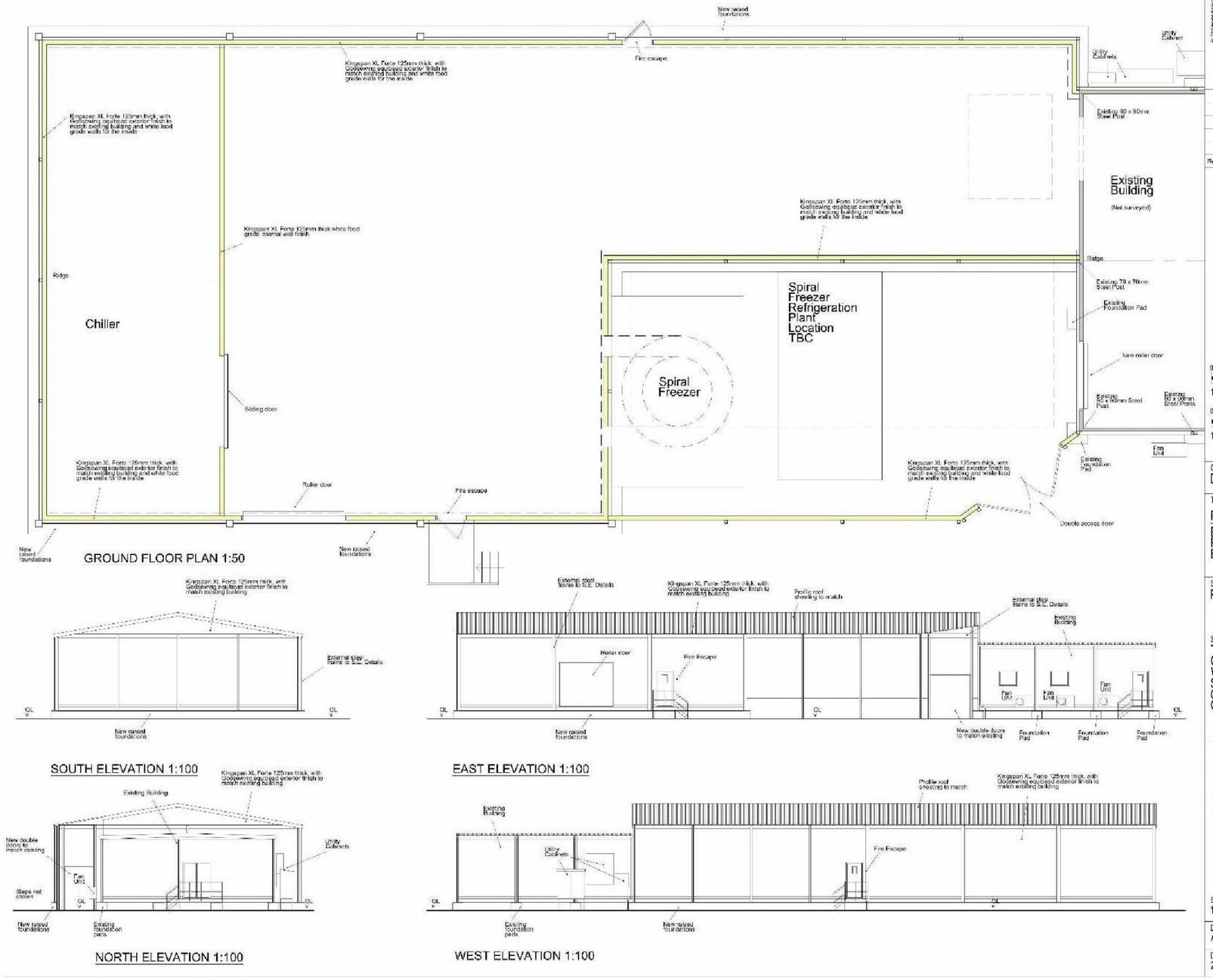
Halcrow Group Limited, March 2012, Stroud District Council Strategic Flood Risk Assessment for Local Development Framework Level 2

Monument Geomatics Limited, November 2017, Q Park Woodchester

Appendices

Appendix A

Existing and Proposed Site Layouts



NOTES:
1. Figured dimensions to be taken in preference to scaled dimensions.
2. Large scaled drawings to be taken in preference to small scale.
3. Critical dimensions to be taken from site.
4. If in doubt, the contractor must ask for clarification.
5. These drawings and designs are the copyright of JBM Planning Ltd and may not be reproduced or used without permission.

Rev ID	Rev.date	Rev.by	Comment

0 2 4 6 8 10m
1:100

0 1 2 3 4 5m
1:50

CLIENT:
Devils Kitchen Ltd

TITLE:
Proposed Ground Floor Extension
Propsoed Ground Floor Plan & Elevations

STAGE:
Planning

SITE:
The Devils Kitchen,
Q Park,
Woodchester,
Stroud
Glos
GL5 5HT

JBM PLANNING LTD
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Gloucestershire

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SCALES:
1:50 @ A1

DATE:	DRAWN:	CHECKED:
Apr. 2021	IM	

DRAWING NUMBER:
21-114-101

REV:

Key Plan:

Notes:

1. Some layers are frozen.
2. The survey has been orientated to a local grid based on the OSGB 36 National Grid (OSTN15 via OSGM15). The level datum GPS derived at S001.
3. Station Co-Ordinates

Station	Easting	Northing	Level
S001	384183.437	202161.229	46.776
S002	384180.433	202129.696	46.872
S003	384185.279	202977.158	47.271
S004	384178.404	202933.514	47.535
S005	384263.733	202042.411	49.268
S006	384158.670	201976.434	47.648

4. Wall heights have been surveyed as string information.
5. Trees are positioned accurately, Poles & Canopys are to scale.
6. All dimensions are in metres.

Survey Key:

The following are a list of codes used to identify various street furniture and surfaces for Monument Surveys. Service covers have an outline to define the size/orientation.

General Abbreviations

AB	Air Brick	MH	Manhole
AV	Air Valve	MK	Marker Post
BB	Belisha Beacon	MO	Mooring
BE	Bench	MS	Mile Stone
BH	Bore Hole	OBM	Bench Mark
BI	Bin	PB	Post Box
BO	Bollard	PI	Existing Pin
BS	Bus Stop Sign	PO	Post
BT	British Telecom	PM	Parking Meter
BX	Junc Box etc.	PS	Private Sign
CA	Camera	PU	Petrol Pump
CB	Crash Barrier	RD	Ridge Heights
CL	Cellar	RE	Rodding Eye
CU	Culvert (invert)	RP	Reflector Post
DP	Down Pipes	RS	Road Sign
DPC	Damp Proof Course	SD	Steps Down
DR	Drains	SO	Soffit Level
EA	Eave Heights	SP	Sign Post
EC	Electricity Cover	ST	Stop Tap
EP	Electricity Pole	SU	Steps Up
ER	Earth Rod	SV	Stop Valve
SVP	Soil/Vent Pipe	FH	Fire Hydrant
TY	Stay	FL	Flood Light
TAP	Water Tap	TB	Telephone Call Box
FP	Flag Pole	TH	Water Trough
GA	Gas Valve	TK	Storage Tank
GB	Gauge Board	TM	Telephone Mast
GP	Gate Post	TP	Telegraph Pole
GU	Gully	TL	Traffic Light
IC	Inspection Cover	TV	Cable TV Cover
IN	Invert Level	VP	Vent Pipe
KI	Kerb Inlet	WL	Water Level
LBX	Traffic Loop Box	WM	Water Meter
LE	Spot Level (Threshold)	WO	Wash Out
LP	Lamp Post		

Surface Abbreviations

BP	Block Paving
BR	Bricks
CB	Cobbles
CO	Concrete
GR	Grass
SL	Slabs
TA	Tarmac
TC	Tactile Paving

Fence Abbreviations

BWF	Barb Wire
CBF	Close Board
CLF	Chain Link
PAF	Palisade (Security)
PCF	Post & Chain
PRF	Post & Rail
PWF	Post & Wire
WPF	Wooden Panel

Trees — Diameter of Bole / Canopy / Species / Approx. Tree Height

Tree Stumps

S1 to S3 – 0.1 dia. to 0.5 dia.

Pipes (Invert Level)

P1 to P5 – 0.1 dia. to 0.5 dia.

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www.monumentgeomatics.co.uk

Project

Q PARK
WOODCHESTER

Drawing

EXISTING LAYOUT
2D ANNOTATED
TOPOGRAPHICAL SURVEY

Drawn by: AD	Date: NOV 17
Checked by: MA	Date: NOV 17
Approved by: MONUMENT GEOMATICS	Date: NOV 17
Drawing No: MG1171_2D_S1	Revision

Drawing Scale: 1:200 @ A1

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Key Plan:

Notes:

1. Some layers are frozen.
2. The survey has been orientated to a local grid based on the OSGB 36 National Grid (OSTN15 via OSGM15). The level datum GPS derived at S001.
3. Station Co-Ordinates

Station	Easting	Northing	Level
S001	384183.437	202161.229	46.776
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BX	Junc Box etc.	PS	Private Sign
CA	Camera	PU	Petrol Pump
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DP	Down Pipes	RS	Road Sign
DPC	Damp Proof Course	SD	Steps Down
DR	Drains	SO	Soffit Level
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EP	Electricity Pole	SU	Steps Up
ER	Earth Rod	SV	Stop Valve
SVP	Soil/Vent Pipe	FH	Fire Hydrant
TY	Stay	FL	Flood Light
TAP	Water Tap	TB	Telephone Call Box
FP	Flag Pole	TH	Water Trough
GA	Gas Valve	TK	Storage Tank
GB	Gauge Board	TM	Telephone Mast
GP	Gate Post	TP	Telegraph Pole
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IW	Invert Level	VP	Vent Pipe
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Project

Q PARK
WOODCHESTER

Drawing

EXISTING LAYOUT
2D ANNOTATED
TOPOGRAPHICAL SURVEY

Drawn by: AD	Date: NOV 17
Checked by: MA	Date: NOV 17
Approved by: MONUMENT GEOMATICS	Date: NOV 17
Drawing No: MG1171_2D_S2	Revision

Drawing Scale: 1:200 @ A1

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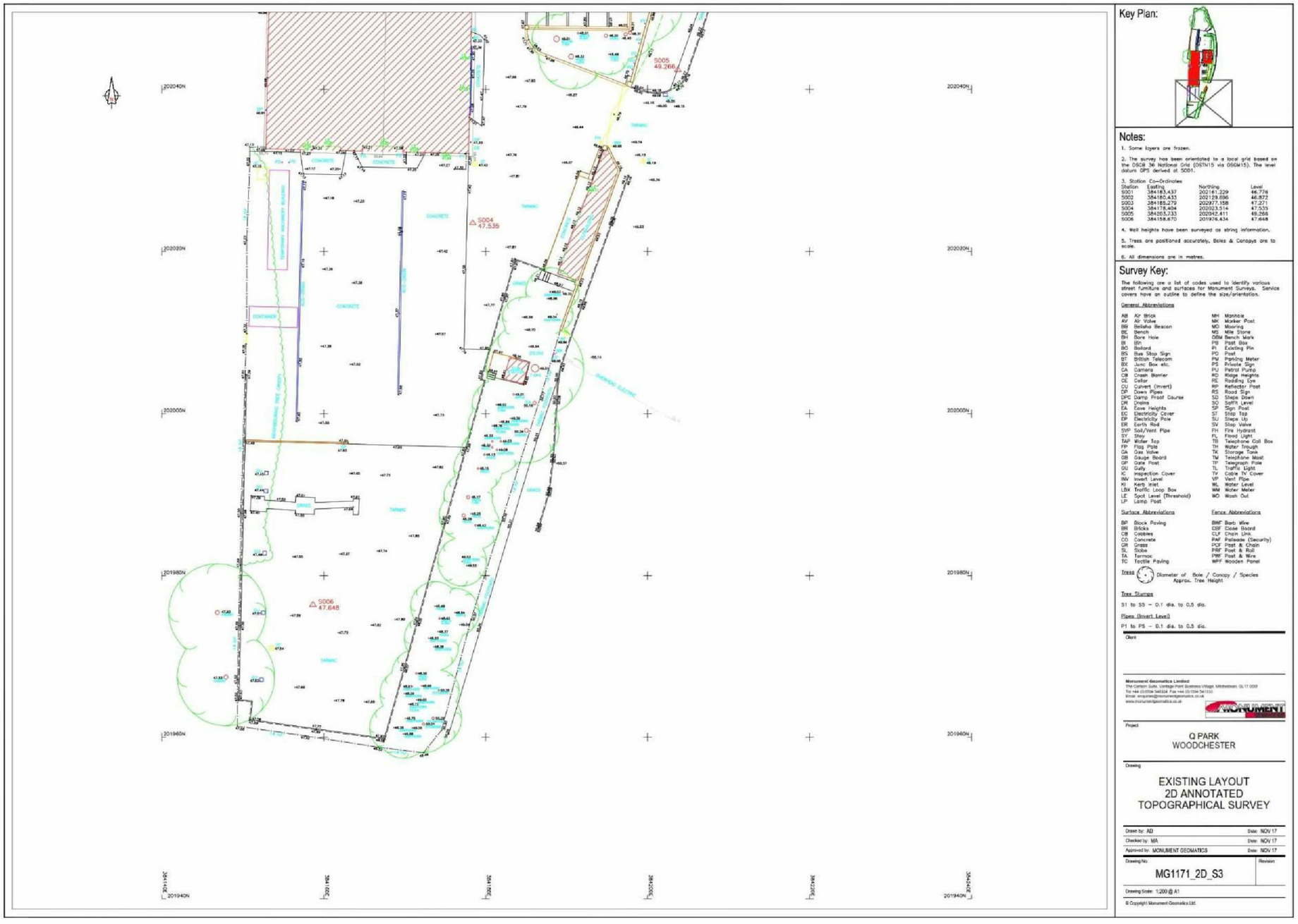

Key Plan:

Notes:

1. Some layers are frozen.
2. The survey has been orientated to a local grid based on the OSGB 36 National Grid (OSTN15 via OSGM15). The level datum GPS derived at SD01.
3. Station Co-Ordinates

Station	Easting	Northing	Level
S001	384183.437	202161.229	46.776
S002	384180.433	202129.696	46.872
S003	384185.279	202977.158	47.271
S004	384178.404	202023.514	47.535
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CL	Cellar	RE	Rodding Eye
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DP	Down Pipes	RS	Road Sign
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EC	Electricity Cover	ST	Stop Tap
EP	Electricity Pole	SU	Steps Up
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TY	Stay	FL	Flood Light
TAP	Water Tap	TB	Telephone Call Box
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Project

Q PARK
WOODCHESTER

Drawing

EXISTING LAYOUT
2D ANNOTATED
TOPOGRAPHICAL SURVEY

Drawn by: AD	Date: NOV 17
Checked by: MA	Date: NOV 17
Approved by: MONUMENT GEOMATICS	Date: NOV 17
Drawing No: MG1171_2D_S3	Revision
Drawing Scale: 1:200 @ A1	

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Appendix B
Consultation Responses

Product 4 (Detailed Flood Risk Data) for 'site in Nailsworth', GL5 5HT

Reference number: 212699
Date of issue: 05 May 2021

Model Information

The following information and attached maps contain a summary of the modelled information relevant to the area of interest. The information provided is based on the best available data as of the date of issue.

Model Name	Release Date
Nailsworth Stream	2018

Flood Map for Planning (Rivers and Sea)

The Flood Map for Planning (Rivers and Sea) indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring in any year for fluvial (river) flooding (Flood Zone 3). It also shows the extent of the Extreme Flood Outlines (Flood Zone 2) which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. The Flood Zones refer to the land at risk of flooding and **do not** refer to individual properties. It is possible for properties to be built at a level above the floodplain but still fall within the risk area.

This Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered that flooding may occur from other sources such as surface water, sewers, road drainage, etc.

To find out which flood zone a location is in please use: https://flood-map-for-planning.service.gov.uk/

Definition of flood zones

- **Zone 1** - The area is within the lowest probability of flooding from rivers and the sea, where the chance of flooding in any one year is less than 0.1% (i.e. a 1000 to 1 chance).

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Website: www.gov.uk/government/organisations/environment-agency

- **Zone 2** - The area which falls between the extent of a flood with an annual probability of 0.1% (i.e. a 1000 to 1 chance) fluvial and tidal, or greatest recorded historic flood, whichever is greater, and the extent of a flood with an annual probability of 1% (i.e. a 100 to 1 chance) fluvial / 0.5% (i.e. a 200 to 1 chance) tidal. (Land shown in light blue on the Flood Map).
- **Zone 3** - The chance of flooding in any one year is greater than or equal to 1% (i.e. a 100 to 1 chance) for river flooding and greater than or equal to 0.5% (i.e. a 200 to 1 chance) for coastal and tidal flooding.

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

Areas Benefitting From Defences

Where possible we show the areas that benefit from the flood defences, in the event of flooding:

- from rivers with a 1% (1 in 100) chance in any given year, or;
- from the sea with a 0.5% (1 in 200) chance in any given year.

If the defences were not there, these areas would flood. Please note that we do not show all areas that benefit from flood defences.

The associated Dataset is available here: https://data.gov.uk/dataset/flood-map-for-planning-rivers-and-sea-areas-benefiting-from-defences

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Website: www.gov.uk/government/organisations/environment-agency

Environment Agency

Node Data/ Modelled Levels

The attached map will show a selection of 1D model node points near to your site. The fluvial levels for these node points are shown below.

Flood Levels (m AOD)

The modelled levels are given in m AOD (N), m AOD indicates metres Above Ordnance Datum (Newlyn).

The information is taken from the model referenced above and may not include the updated climate change figures.

			Annual Exceedance Probability - Maximum Water Levels (m AOD) (undefended)										
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	4% (1 in 25)	3.33% (1 in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	0.5% (1 in 200)	0.1% (1 in 1000)
1.047	384133	201662	47.84	48.06	48.23	48.54	48.54	48.54	48.63	48.72	48.77	48.89	49.52
1.046	384119	201677	47.84	48.05	48.21	48.53	48.53	48.53	48.60	48.68	48.73	48.84	49.49
1.045	384102	201702	47.78	47.99	48.14	48.44	48.44	48.44	48.49	48.57	48.62	48.73	49.43
1.044	384098	201717	47.68	47.85	47.98	48.23	48.23	48.24	48.31	48.36	48.38	48.43	48.97
1.043	384111	201790	47.21	47.06	47.32	47.55	47.56	47.58	47.68	47.78	47.85	48.03	48.91
1.043_I2	384133	201862	46.59	46.78	46.92	47.17	47.18	47.20	47.29	47.39	47.44	47.53	47.93
1.042	384115	201900	46.45	46.66	46.81	47.09	47.10	47.13	47.25	47.37	47.43	47.53	47.94
1.041	384134	202068	46.24	46.43	46.57	46.86	46.87	46.90	47.07	47.20	47.26	47.34	47.57
1.041_I1	384142	202146	46.13	46.30	46.43	46.72	46.73	46.77	46.96	47.12	47.17	47.26	47.48
1.040	384128	202203	45.88	46.05	46.18	46.49	46.52	46.56	46.82	47.01	47.08	47.19	47.56
1.040_I2	384124	202230	45.76	45.91	46.05	46.31	46.32	46.35	46.44	46.53	46.61	46.76	47.35
1.039	384127	202248	45.42	45.57	45.71	46.00	46.02	46.05	46.16	46.30	46.43	46.63	47.33
1.038	384135	202260	45.06	45.29	45.44	45.77	45.79	45.83	45.97	46.12	46.26	46.47	47.08
1.037	384134	202274	44.90	45.11	45.27	45.60	45.62	45.66	45.80	45.97	46.10	46.31	46.96

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Website: www.gov.uk/government/organisations/environment-agency

			Annual Exceedance Probability - Maximum Water Levels (m AOD) (undefended)					
Node Label	Easting	Northing	1% (1 in 100) inc. 20% increase in inflows	1% (1 in 100) inc. 25% increase in inflows	1% (1 in 100) inc. 35% increase in inflows	1% (1 in 100) inc. 70% increase in inflows	0.5% (1 in 200) inc. 20% increase in inflows	0.1% (1 in 1000) inc. 20% increase in inflows
1.047	384133	201662	48.89	48.91	48.99	49.31	49.08	49.71
1.046	384119	201677	48.84	48.87	48.95	49.27	49.04	49.67
1.045	384102	201702	48.73	48.76	48.84	49.19	48.94	49.63
1.044	384098	201717	48.43	48.45	48.51	48.77	48.58	49.17
1.043	384111	201790	48.03	48.09	48.21	48.52	48.30	48.91
1.043_I2	384133	201862	47.53	47.56	47.60	47.78	47.65	48.12
1.042	384115	201900	47.53	47.56	47.61	47.80	47.66	48.12
1.041	384134	202068	47.33	47.36	47.39	47.50	47.42	47.67
1.041_I1	384142	202146	47.26	47.28	47.31	47.42	47.34	47.54
1.040	384128	202203	47.19	47.22	47.27	47.44	47.32	47.68
1.040_I2	384124	202230	46.76	46.80	46.87	47.14	46.93	47.50
1.039	384127	202248	46.62	46.68	46.76	47.08	46.84	47.49
1.038	384135	202260	46.46	46.52	46.60	46.86	46.67	47.24
1.037	384134	202274	46.30	46.36	46.44	46.70	46.51	47.21

Email: Enquiries_Westmids@environment-agency.gov.uk
Website: www.gov.uk/government/organisations/environment-agency

Environment Agency

Modelled Flood Extents

Available modelled flood outlines produced as part of the detailed modelling have been provided to you in GIS format, these show modelled flood extents. Climate change will increase flood risk due to overtopping of defences.

https://ea.sharefile.com/d-sd3111aaedb84e749

Climate Change

The 'Flood Risk Assessments: Climate Change Allowances' are published on gov.uk. This is in replacement of previous climate change allowances for planning applications. The data provided in this product does not include the new allowances. You will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding. The climate change factors are now more complex and a single uplift percentage across England cannot be justified.

The Environment Agency will incorporate the new allowances into future modelling studies. For now it remains the applicant's responsibility to demonstrate through their proposal and flood risk assessments that new developments will be safe in flood risk terms for its lifetime.

Recorded Flood Outlines

Following an examination of our records of historical flooding we do hold records of flooding for this area, please find tabulated information below for these recorded flood events.

Flood Event Date	Source of Flooding	Cause of Flooding
July 1968	Nailsworth Stream	Channel capacity exceeded (no raised defences)

The corresponding recorded flood outline/s can be accessed here:
https://data.gov.uk/dataset/recorded-flood-outlines1

Please note; the records of flooding from between October 2019 and March 2020 and beyond are still being reviewed, the outcomes of which have not yet been published or reflected within this request for information.

The Recorded Flood Outlines take into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding. It includes flood extents that may have been affected by overtopping, breaches or blockages. Any flood extents shown do not necessarily indicate that properties were flooded internally. It is also possible that the pattern of flooding in this area has changed and that this area would now flood or not flood under different circumstances.

Please note that our records are not comprehensive and that the map is an indicative outline of areas which have previously flooded, not all properties within this area will have flooded. It is possible that other flooding may have occurred that we do not have records for.

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Website: www.gov.uk/government/organisations/environment-agency

You may also wish to contact your Local Authority or Internal Drainage Board (where relevant), to see if they have other relevant local flood information.

Flood Defences

Flood defences do not completely remove the chance of flooding. They can be overtopped by water levels which exceed the capacity of the defences.

If flood defences are located in your area, you can access this data here:
https://data.gov.uk/dataset/spatial-flood-defences-including-standardised-attributes

Planning developments

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments. You can also request pre application advice:

https://www.gov.uk/planning-applications-assessing-flood-risk
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Supporting Information

Surface Water

Managing the risk of flooding from surface water is the responsibility of Lead Local Flood Authorities. The 'risk of flooding from surface water' map has been produced by the Environment Agency on behalf of government, using information and input from Lead Local Flood Authorities.

You may wish to contact your Local Authority who may be able to provide further detailed information on surface water.

It is not possible to say for certain what the flood risk is but we use the best information available to provide an indication so that people can make informed choices about living with or managing the risks. The information we supply does not provide an indicator of flood risk at an individual site level. Further information can be found on the Agency's website:

https://flood-warning-information.service.gov.uk/long-term-flood-risk

Flood Risk from Reservoirs

The Flood Risk from Reservoirs map can be found on the Long Term Flood Risk Information website:

Email: Enquiries_Westmids@environment-agency.gov.uk
Website: www.gov.uk/government/organisations/environment-agency

https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?map=Reservoirs

Flood Alert & Flood Warning Area

We issue flood alert/warnings to specific areas when flooding is expected. If you receive a flood warning you should take immediate action.

You can check whether you are in a Flood Alert/Warning Area and register online using the links below:

https://www.gov.uk/check-flood-risk

https://www.gov.uk/sign-up-for-flood-warnings

If you would prefer to register by telephone, or if you need help during the registration process, please call Floodline on 0345 988 1188.

The associated dataset for flood warning areas is available here: https://data.gov.uk/dataset/flood-warning-areas3

The associated dataset for flood alert areas is available here: https://data.gov.uk/dataset/flood-alert-areas2

Flood Risk Activity Permits

We now consider applications for works, which may be Flood Risk Activities, under Environmental Permitting Regulations. This replaces the process of applying for a Flood Defence Consent. You may need an environmental Permit for flood risk activities if you want to do work:

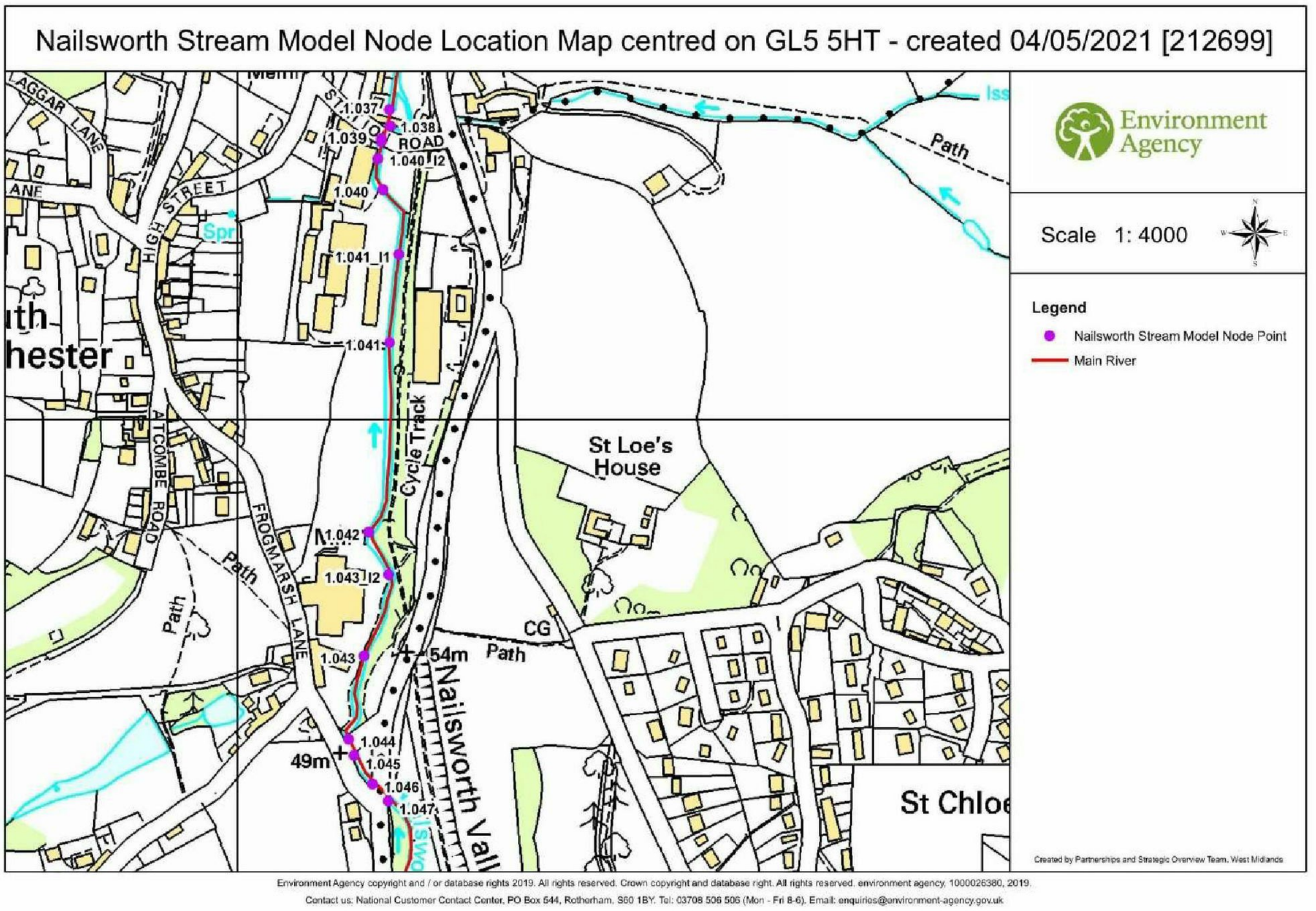
- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

Please go to this website to find out more about how to apply: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.
Please be aware that Bespoke and Standard Rules permits can take up to 2 months to determine and will incur a charge.

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

Email: Enquiries_Westmids@environment-agency.gov.uk
Website: www.gov.uk/government/organisations/environment-agency



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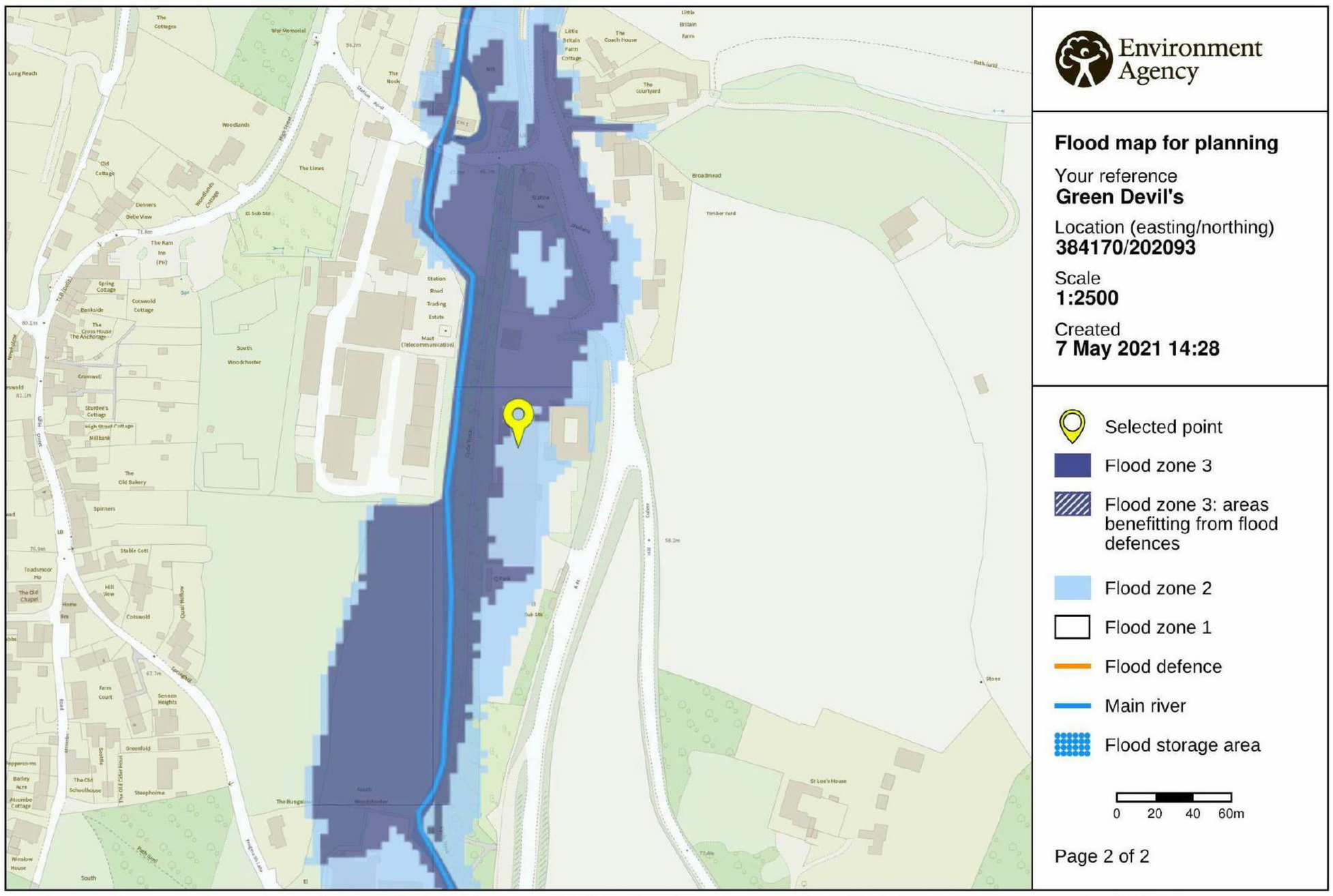
Contact us: National Customer Contact Center, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon - Fri 8-6). Email: enquiries@environment-agency.gov.uk



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[redacted]

Sent: 11 December 2017 13:16
To: katherine@katherinecolby.com
Subject: RE: Q-park Bath Road, Woodchester, Stroud, Gloucestershire GL5 5HT OUR REF: ME/2017120503487

[redacted]

Thank you for your email dated 4th December, regarding the named site.
Having reviewed our data, I can confirm we do not have any recorded flooding history, in the area.

I trust you find the above in order, however, if you have any further enquiries please do not hesitate to contact us.

[redacted]
Asset Protection (wastewater)
Severn Trent Water Ltd

[redacted]

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Severn Trent Plc (registered number 2366619) and Severn Trent Water Limited (registered number 2366686) (together the "Companies") are both limited companies registered in England & Wales with their registered office at Severn Trent Centre, 2 St John's Street, Coventry, CV1 2LZ

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