

**FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY**

**GREAT WESTERN YARD, GLOUCESTER**

**EUTOPIA HOMES (GLOUCESTER) LTD**

**FRA&DS-22471-22-228**

**23 AUGUST 2022**

**IDOM**

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Reports\4.13.12 FRA & DS\FRA&DS-22471-22-228.docm

Document Revisions

Rev	Date	Author	Checked	Approved
A	24/06/22	JB	JR	MB
B	07/07/22	JR	JR	MB
C	<b>23/08/22</b>	<b>JR</b>	<b>MB</b>	<b>MB</b>

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**TABLE OF CONTENTS**

EXECUTIVE SUMMARY .....	1
PREAMBLE.....	II
<b>SECTION 1 DEVELOPMENT SITE AND LOCATION.....</b>	<b>1</b>
1.1 LOCATION.....	1
1.2 CURRENT USE .....	1
1.3 FLOOD ZONE.....	1
1.4 PROXIMITY TO MAIN RIVERS.....	1
1.5 GEOLOGY .....	1
<b>SECTION 2 DEVELOPMENT PROPOSALS .....</b>	<b>2</b>
2.1 OUTLINE OF THE PROPOSALS .....	2
2.2 VULNERABILITY TO FLOODING .....	2
2.3 LIFETIME OF THE DEVELOPMENT .....	2
<b>SECTION 3 SEQUENTIAL TEST.....</b>	<b>2</b>
<b>SECTION 4 CLIMATE CHANGE .....</b>	<b>3</b>
4.1 PEAK RAINFALL INTENSITY ALLOWANCE.....	3
<b>SECTION 5 SITE SPECIFIC FLOOD RISK ASSESSMENT .....</b>	<b>3</b>
5.1 POTENTIAL SOURCES OF FLOODING .....	3
5.2 PROBABILITY OF FLOODING.....	5
5.3 DESIGN FLOOD .....	5
5.4 INTERNAL FLOODING .....	5
5.5 FLOOD RESILIENCE AND RESISTANCE MEASURES .....	5
<b>SECTION 6 SURFACE WATER MANAGEMENT .....</b>	<b>5</b>
6.1 EXISTING RUNOFF RATES .....	6
6.2 SUDS HIERARCHY .....	6
6.3 SUDS APPRAISAL .....	7
6.4 WATER QUALITY.....	8
6.5 SURFACE WATER DRAINAGE PROPOSALS.....	10
6.6 ONGOING OPERATION & MAINTENANCE.....	11
<b>SECTION 7 OCCUPANTS AND USERS OF THE DEVELOPMENT.....</b>	<b>11</b>
7.1 NUMBER OF OCCUPANTS & USERS .....	11
7.2 NATURE OF USE .....	11
7.3 VULNERABLE OCCUPANTS.....	11
<b>SECTION 8 EXCEPTION TEST .....</b>	<b>11</b>
<b>SECTION 9 RESIDUAL RISK.....</b>	<b>12</b>
<b>SECTION 10 OTHER CONSIDERATIONS .....</b>	<b>12</b>
10.1 FOUL DRAINAGE.....	12
<b>APPENDIX 1 .....</b>	<b>13</b>
▪ Site Location Plan	13

▪ Topographic Survey	13
▪ Proposed Site Layout	13
▪ EA Flood Zone Plan	13
▪ Sewer Records	13
APPENDIX 2 .....	14
▪ Environment Agency Correspondence	14
▪ Lead Local Flood Authority Correspondence	14
▪ Severn Trent Water Correspondence	14
APPENDIX 3 .....	15
▪ Existing Runoff Rate Estimates	15
▪ Surface Water Storage Estimates	15
▪ 22471-IDM-XX-DR-D-0500 P0 Drainage GA	15
APPENDIX 4 .....	16
▪ SuDS Maintenance Schedule	16
▪ SuDS Inspection Checklist	16

**EXECUTIVE SUMMARY**

<b>Location</b>	Great Western Road, Gloucester GL1 3ND
<b>Current Use</b>	Brownfield – formerly railway services, timber merchants and vehicle repair shop
<b>Flood Zone</b>	Flood Zone 1
<b>Nearest Watercourse</b>	River Twyver (approx. 470 m west)
<b>Proposal</b>	315 residential units (flat blocks and townhouses)
<b>Vulnerability</b>	'More vulnerable'
<b>Design Life</b>	100 years
<b>Sequential Test</b>	Not Required
<b>Climate Change</b>	40% increase in rainfall intensities
<b>Potential Sources of Flooding</b>	Introduction of impermeable areas. Surface water flooding.
<b>Probability of Flooding</b>	The probability is 'Low' risk. 0.1% and 1% annual (surface water only)
<b>Design Flood</b>	N/A
<b>Surface Water Management</b>	Filter drains and soak-away (infiltration tests would be required)
<b>Surface Water Maintenance</b>	Management Company (Private)
<b>Risk to Occupants</b>	None
<b>Exception Test</b>	N/A
<b>Residual Risk</b>	The possibility of blockage or failure of the drainage system resulting in exceedance flows.

## PREAMBLE

Eutopia Homes (Gloucester) Ltd appointed Idom Merebrook Limited to undertake a Flood Risk Assessment to support the planning application for a proposed development of 315 no. of flat blocks and townhouses on land south of Great Western Road, the site is also referred to as Great Western Yard, Gloucester.

This Flood Risk Assessment has been prepared in accordance with the guidelines set out in the Ministry of Housing, Communities & Local Government publication, 'Flood Risk and Coastal Change'. This document is web based and can be found at the following link:

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

This Flood Risk Assessment includes consideration of flood risk from all sources and considers the effects of climatic change. The risks to the site and its occupant are identified along with any risk that the development imposes on the surrounding area.

Gloucestershire County Council's Local Flood Risk Management Strategy Annual Progress and Implementation Plan 2021/22 and Gloucester City Council Strategic Flood Risk Assessment for Local Development Framework Level 1 Volume 1 – FINAL September 2008, have been used as a reference and has guided some of the assessment criteria.

These can all be found at the following link:

<https://www.goucestershire.gov.uk/planning-and-environment/flood-risk-management/flood-planning-information/>

<https://www.goucestershire.gov.uk/planning-and-environment/flood-risk-management/flood-planning-information/goucestershire-county-councils-local-flood-risk-management-strategy-ifrms/>

This report has been prepared for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to this report should consult the applicant, Eutopia Homes (Gloucester) Ltd and Idom Merebrook Limited as to the extent to which findings may be appropriate for their use.

**SECTION 1 DEVELOPMENT SITE AND LOCATION****1.1 LOCATION**

- 1.1.1 The site occupies a parcel of land located to the south of Great Western Road within the County of Gloucestershire. The approximate OS Grid Reference SO 84091 18413 and the nearest post code is GL1 3ND.
- 1.1.2 The area defined by the site boundary is approximately 3.2 ha.
- 1.1.3 The site is bound to the south and south-west by Network Rail railway lines, the north by Great Western Road and the east boundary by Horton Road.
- 1.1.4 The site will be accessed from an existing entrance from Great Western Road which currently allows access to the timber merchants and 2 no. proposed accesses from the northwest of the site off Great Western Road.
- 1.1.5 A location plan has been provided for reference within **Appendix 1**.

**1.2 CURRENT USE**

- 1.2.1 The site is a Brownfield site formerly used as railway sidings, timber merchants and a vehicle repair shop. There is also an existing car park to the north west of the site.
- 1.2.2 A topographical survey of the site is included in **Appendix 1**.

**1.3 FLOOD ZONE**

- 1.3.1 The site is located within Flood Zone 1. **Appendix 1** contains the Flood Zone mapping obtained from <https://flood-map-for-planning.service.gov.uk/>.

**1.4 PROXIMITY TO MAIN RIVERS**

- 1.4.1 Approximately 470 m to the west of the site is a main river called the River Twyver which flows to the River Severn northwest to the southeast of the site.

**1.5 GEOLOGY**

- 1.5.1 A Site Investigation report is available under separate cover ref: 20775-HYD-XX-XX-RP-GE-1001 DATED 26/4/22.
- 1.5.2 Geological mapping has been studied with reference to the British Geological Survey mapping (via the Geology of Britain Viewer) which can be acquired from [https://mapapps.bgs.ac.uk/geologyofbritain/home.html?&\\_ga=2.212620828.983110538.1627572080-1688802548.1593791022](https://mapapps.bgs.ac.uk/geologyofbritain/home.html?&_ga=2.212620828.983110538.1627572080-1688802548.1593791022).
- 1.5.3 The west of the site has superficial deposits of Cheltenham Sand and Gravel – Sand and Gravel, the east has no recorded superficial deposits. The development site is underlain with bedrock geology comprises of the Blue Lias Formation and Charmouth Mudstone Formation (undifferentiated) - Mudstone.

- 1.5.4 The site has shallow groundwater reported as being within 0.7 m of the surface.
- 1.5.5 The site has made ground ranging between 0.1 m and 2.1 m deep. The made ground contains significant hydrocarbon contamination.

## **SECTION 2 DEVELOPMENT PROPOSALS**

### **2.1 OUTLINE OF THE PROPOSALS**

- 2.1.1 The proposal is to redevelop the site into 315 no. flat blocks and townhouses.
- 2.1.2 An illustrative site layout is provided within **Appendix 1**.

### **2.2 VULNERABILITY TO FLOODING.**

- 2.2.1 The vulnerability of the development is assessed by reference to Table 2 Flood risk vulnerability classification of the Ministry of Housing, Communities & Local Government publication, Flood Risk and Coastal Change (<https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-2-Flood-Risk-Vulnerability-Classification>).
- 2.2.2 The flood risk vulnerability of the proposed residential development is classified as 'More vulnerable'.
- 2.2.3 In accordance with the information provided within Table 3 Flood risk vulnerability and flood zone compatibility of the Ministry of Housing, Communities & Local Government publication, Flood Risk and Coastal Change ([https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/575184/Table\\_3\\_-\\_Flood\\_risk\\_vulnerability\\_and\\_flood\\_zone\\_compatibility\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone_compatibility_.pdf)), 'More vulnerable' developments are compatible with Flood Zones 1 and 2. 'More vulnerable' developments are compatible with Flood Zone 3a but an Exception Test is required. 'More vulnerable' developments are not permitted in Flood Zone 3b.

### **2.3 LIFETIME OF THE DEVELOPMENT**

- 2.3.1 The design life of the proposed development is assumed to be 100 years.

## **SECTION 3 SEQUENTIAL TEST.**

- 3.1 In accordance with Ministry of Housing, Communities & Local Government publication, Flood Risk and Coastal Change <https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section>, developments that are outside Flood Zones 2 or 3 do not require a Sequential Test.
- 3.2 The vulnerability of the development is compatible with the Flood Zone.

## SECTION 4 CLIMATE CHANGE

### 4.1 PEAK RAINFALL INTENSITY ALLOWANCE

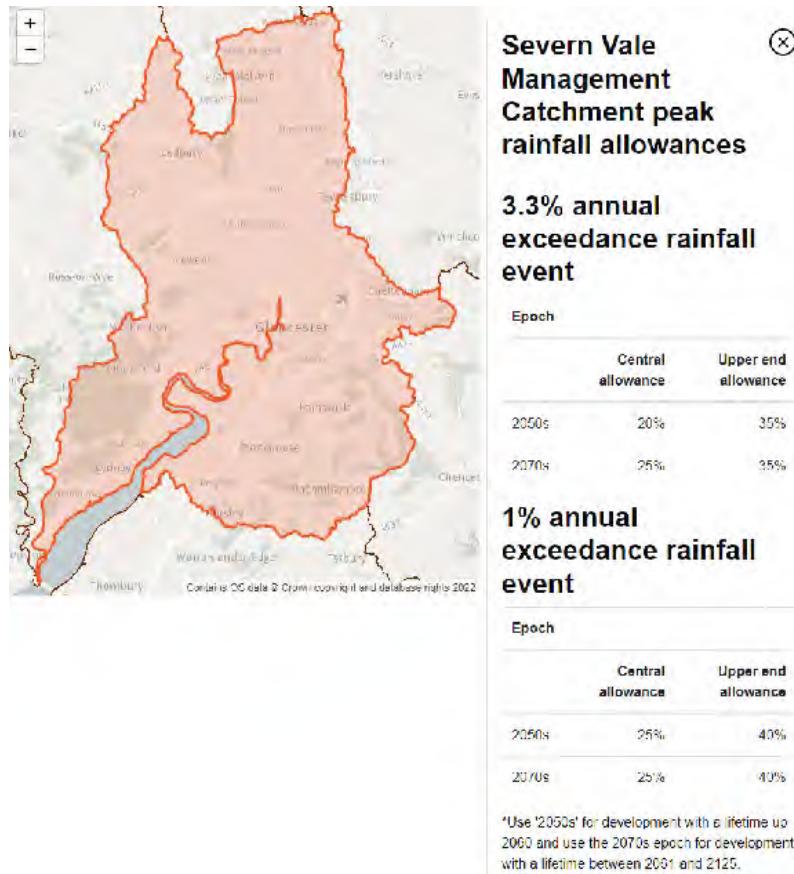


Figure 1: Severn Vale Management Catchment peak rainfall allowances  
(<https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3077>)

- 4.1.1 In accordance with the EA 2021 guidance publication on Flood Risk Assessments: Climate Change Allowances <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>, and assuming the design life for the proposed development is from 2061 and 2125, an upper end allowance of 35% and 40% is required to be applied to the 3.3% and 1% (respectively) annual exceedance rainfall events.
- 4.1.2 The current flood risk is explored further in **Section 5**.

## SECTION 5 SITE SPECIFIC FLOOD RISK ASSESSMENT

### 5.1 POTENTIAL SOURCES OF FLOODING

- 5.1.1 Watercourse flooding. Environment Agency (EA) flood mapping is provided in **Appendix 1**. This demonstrates that the site is shown to be at low risk of flooding. Consultation with the EA (**Appendix 2**) has confirmed this to be the case. Gloucestershire County Council's Local Flood Risk Management Strategy and Gloucester City Council's Strategic Flood Risk Assessment do not refer to the site as being at risk of flooding from watercourses.

- 5.1.2 Overland surface water flows. EA mapping demonstrates that there are some small areas of 'Low risk' surface water flooding on the site and a small narrow area of 'Medium risk' surface water flooding to the south of the site. Consultation with the EA (**Appendix 2**) has confirmed this to be the case. Gloucestershire County Council's Local Flood Risk Management Strategy and Gloucester City Council's Strategic Flood Risk Assessment make no reference to the site.
- 5.1.3 Groundwater. Gloucestershire County Council's Local Flood Risk Management Strategy and Gloucester City Council's Strategic Flood Risk Assessment have been reviewed but do not make any specific reference to the site.
- 5.1.4 Infrastructure flooding (from reservoirs/ponds/canals). There are no man-made water retaining structures within the vicinity of the development site. Environment Agency (EA) flood mapping demonstrates that the site is not shown to be at-risk from flooding. Consultation with the EA (**Appendix 2**) has confirmed this to be the case. Gloucestershire County Council's Local Flood Risk Management Strategy and Gloucester City Council's Strategic Flood Risk Assessment do not make reference to the site.
- 5.1.5 Sewer flooding. Foul and surface water sewers are absent on the site, the nearest combined water sewer is located north of the site in Great Western Road. The location of the combined sewer has been identified on Severn Trent Water Sewer Records (**Appendix 1**). Gloucestershire County Council's Local Flood Risk Management Strategy (LFRMS) has been reviewed and reference to the general post code area has been made. Table 4.5 (LFRMS): Flooding from Sewers as recorded in the Severn Trent Water DG5 Register indicates that the postcode area GL1 3 has been highlighted as an area at high risk of flooding from sewers. Gloucestershire County Council's Local Flood Risk Management Strategy however makes no specific reference to the site being affected by this risk.
- 5.1.6 EA flood mapping. The site is shown as being in Flood Zone 1 and is therefore in the lowest possible risk category. Consultation with the EA (**Appendix 2**) has confirmed this to be the case.
- 5.1.7 Strategic Flood Risk Assessment. Gloucester City Council's Strategic Flood Risk Assessment makes no specific reference to the development site as being at risk of flooding.
- 5.1.8 Local Flood Risk Management Strategy. Gloucestershire County Council's Local Flood Risk Management Strategy makes no specific reference to the development site as being at risk of flooding.
- 5.1.9 Historic records. Gloucester City Council's Strategic Flood Risk Assessment and Gloucestershire County Council's Local Flood Risk Management Strategy but do not make reference to the site. The EA have confirmed (**Appendix 2**) that they have no records of any historical flooding for this site.

5.1.10 The risk posed by the proposed development. Without mitigation the introduction of impermeable areas will increase the flood risk both within the site and to surrounding areas.

## 5.2 PROBABILITY OF FLOODING

5.2.1 The identified risks of flooding on the site are from the introduction of impermeable areas within the development and surface water flooding.

5.2.2 This risk posed by the introduction of impermeable areas needs to be mitigated by the provision of an adequate surface water drainage strategy. Flooding should be mitigated for all storms up to and including 1 in 100-year storm event (with an allowance for climate change). Therefore, with mitigation the probability is 'Low' risk.

5.2.3 The risk of surface water flooding is contained within the site and is identified in **Appendix 1** as being some small areas of 'Low risk' surface water flooding on the site and a small narrow area of 'Medium risk' surface water flooding to the south of the site.

5.2.4 In this context 'Low risk' is stated by the EA as having between 0.1% and 1% annual risk. 'Medium risk' is stated by the EA as having between 1% and 3.3% annual risk. The measures proposed to mitigate against the introduction of impermeable areas, in managing the SW drainage from the site as a whole, will also mitigate against the risk posed by the existing impermeable areas. Therefore, with mitigation the probability is 'Low' risk.

## 5.3 DESIGN FLOOD

5.3.1 The design flood is normally stated, along with expected level and depth of flooding with reference to Ministry of Housing, Communities & Local Government publication, Flood Risk and Coastal Change Paragraph 55, <https://www.gov.uk/guidance/flood-risk-and-coastal-change#design-flood>

5.3.2 For the external areas the annual risk is between 0.1% and 1%, as such there is no definable Design Flood level.

## 5.4 INTERNAL FLOODING

5.4.1 No internal flooding is expected.

## 5.5 FLOOD RESILIENCE AND RESISTANCE MEASURES

5.5.1 None required

## SECTION 6 SURFACE WATER MANAGEMENT

6.1.1 Adequate surface water management is required for the proposed development to control the risk of flooding associated with the increase of surface water runoff through the construction of areas of impermeable hardstanding.

## 6.1 EXISTING RUNOFF RATES

- 6.1.1 In the absence of any evidence of existing positive drainage it is assumed that the existing site runoff drains to the combined sewers in Great Western Road.
- 6.1.2 Pending a survey of the existing drainage, a Brownfield runoff assessment was completed for the site including the provision for 50% betterment over the existing runoff rates, using the MRM method. Outputs from hydraulic modelling software are included in **Appendix 3** and the results are summarised in **Table 1**.

Design Event	Runoff (l/s)
100% (1 in 1) annual event probability ( $Q_{1\text{yr}}$ )	149.8
33.3% annual event probability ( $Q_{30\text{yr}}$ )	349.5
1% annual event probability ( $Q_{100\text{yr}}$ )	440.4

Table 1 Brownfield Runoff Assessment

- 6.1.3 Should a drainage survey conclude that there is no existing offsite drainage, then the Greenfield runoff rate will apply. A greenfield runoff assessment was completed for the site, using the IH124 method. Outputs from hydraulic modelling software are included in **Appendix 3** and the results are summarised in **Table 2**.

Design Event	Runoff (l/s)
Development mean annual peak flow ( $Q_{\text{BAR}}$ )	8.4
100% (1 in 1) annual event probability ( $Q_{1\text{yr}}$ )	6.9
33.3% annual event probability ( $Q_{30\text{yr}}$ )	16.6
1% annual event probability ( $Q_{100\text{yr}}$ )	21.5

Table 2 Greenfield Runoff Assessment

## 6.2 SUDS HIERARCHY

- 6.2.1 The SuDS hierarchy defines the most appropriate method of disposal of surface water.
- 6.2.2 The favoured disposal method is by infiltration. For this development infiltration is not possible due to the following reasons:
  - i. Presence of hydrocarbon containing made ground
  - ii. High water table
  - iii. Underlying impermeable strata (mudstone).
- 6.2.3 Where infiltration is not possible, disposal to an offsite watercourse is preferred. This method of disposal is not possible for this development as there is no available watercourse within the proximity of the site.

6.2.4 Where disposal to an offsite watercourse is not possible, disposal to a public sewer is preferred. This method of disposal is possible for this development. The pre-development runoff route has been assessed and 2 no. combined sewers have been identified to the north of the site in Great Western Road.

### 6.3 SUDS APPRAISAL

6.3.1 A SuDS approach is required, and **Table 3** provides a comprehensive assessment of which SuDS techniques are viable for this development.

<b>SuDS Feature</b>	<b>Evaluation</b>	<b>Suitability</b>
Rainwater Harvesting	Low demand for re-use within the proposed usage	Not suitable
Green Roofs	Viable to provide surface water treatment but NOT storage.	Possible, subject to roof space.
Infiltration Systems	Not possible.	Not recommended.
Proprietary Treatment Systems	No reason to preclude the use of a proprietary treatment system if other components are not available; however, the preference should be towards SuDS components. Becomes a requirement in high-pollution risk areas.	Possible if required; however, not first choice. Will be required for high-pollution risk areas.
Filter Strips	Viable to provide surface water treatment and collection.	Possible.
Filter Drains	Viable to provide surface water treatment and collection.	Possible.
Swales	Subject to space/level constraints.	Possible.
Bioretention Systems	May be possible to include – should be considered alongside landscaping plan. Landscaping is limited and any volumetric benefit is likely to be minimal.	Possible, but landscaping is limited.
Trees	Landscaping opportunities are limited.	Likely to be insufficient quantity to be beneficial for drainage.
Pervious Surfaces	Viable to provide surface water treatment and collection.	Possible.
Attenuation Storage Tanks	Viable to provide surface water attenuation.	Possible. Not recognised as a SuDS feature.
Detention Basins	Subject to space/level constraints.	Possible if space is available
Ponds and Wetlands	Space constraints preclude the use of full wetlands	Not recommended

*Table 3 SuDS Evaluation*

6.3.2 Following the SuDS evaluation, there are a number of SuDS options available for use around the development that can be used in combination, however water quality benefits also require consideration.

## 6.4 WATER QUALITY

- 6.4.1 With the nature of the site and the preferred method of surface water disposal to a combined public sewer, there is a requirement to provide adequate treatment to ensure appropriate water quality management. The following possible options are available:
- i. Filtration using pervious surfaces including permeable paving or 'grasscrete' and filter strips.
  - ii. Detention by storing surface water runoff volumes and by using outflow controls to meet hydraulic design criteria this also allows sedimentation to take place, which contributes to water quality improvements.
- 6.4.2 Given the scale and nature of the development it is proposed that treatment stages *i.* and *ii.* will be incorporated within a SuDS based surface water management strategy.
- 6.4.3 CIRIA 753 (SuDS Manual) has been used to assess the water quality measures required to minimise the impact of the scheme refer to **Figure 2**.

FROM CIRIA SuDS MANUAL 2015 - SIMPLE INDEX APPROACH TO WATER QUALITY RISK MANAGEMENT  
SITE ASSESSMENT - Integra 61, Costa Site.

FROM Pollution hazard indicies for the land use classification

TABLE

26.2

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, Offices) ie <300 traffic	Low	0.5	0.4	0.4

FROM SuDS mitigation indices for discharges to surface waters

TABLE

26.3

Type of SuDS component used	Mitigation indices		
	Total suspended solids (TSS)	Metals	Hydro-carbons
Permeable pavement	0.7	0.6	0.7
<b>TOTAL OF MITIGATION INDICES</b>	<b>0.7</b>	<b>0.6</b>	<b>0.7</b>

**ASSESSMENT RESULT**

	Mitigation indices		
Totals from above	Total suspended solids (TSS)	Metals	Hydro-carbons
Required mitigation level	Low	0.5	0.4
Provided mitigation level	0.7	0.6	0.7
<b>REQUIRED STANDARDS MET</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>

Figure 2 SuDS Mitigation Indices

## 6.5 SURFACE WATER DRAINAGE PROPOSALS

- 6.5.1 The indicative surface water drainage strategy drawing provided in **Appendix 3** shows how a sustainable drainage system may be used to mitigate surface water runoff on the development site.
- 6.5.2 Consultation with Severn Trent Water **Appendix 2** has confirmed that a flow rate of 5 l/s/ha can be used if it is proved that infiltration and disposal to an offsite watercourse are not possible. However, following initial submission of the FRA, feedback from the LLFA has confirmed a requirement to use the rate of  $Q_{BAR}$  as the off-site discharge rate. From Table 2,  $Q_{BAR}$  is confirmed as 8.4 l/s.
- 6.5.3 Additionally, the LLFA have objected to the use of privately (home owner) owned permeable paving for attenuation purposes. This type of paving is therefore excluded from the assessment of attenuation.
- 6.5.4 The site has been split into 3 drainage catchment areas A, B and C. The surface water drainage proposals for each area are highlighted below and on the Drainage GA plan in **Appendix 3**.
- 6.5.5  $Q_{BAR}$  has been applied pro-rata to each catchment. Where the calculated rate of discharge (pro-rata  $Q_{BAR}$ ) is less than 2 l/s, then 2 l/s has been used as a minimum controllable flow rate. This is then balanced to ensure the maximum run-off from the entire site is limited to  $Q_{BAR}$ .

Methods	Use
Permeable Paving (commercial parking areas)	Provides water treatment and a method of collection and 14 m <sup>3</sup> of storage.
Hydro brake/Flow Control	Restricting flow to 2 l/s

Table 4 Area A Surface Water Drainage Proposals

Methods	Use
Permeable Paving (commercial parking areas)	Provides water treatment, a method of collection and storage.
Cellular Attenuation Tank	Provides 325 m <sup>3</sup> of surface water attenuation.
Hydro brake/Flow Control	Restricting flow to 2 l/s

Table 5 Area B Surface Water Drainage Proposals

Methods	Use
Permeable Paving (parking areas & driveways)	Provides water collection and treatment
Cellular Attenuation Tanks	Provides 1409 m <sup>3</sup> of surface water attenuation.
289 m of 1200 mm dia. Oversized Pipes	Provides 326 m <sup>3</sup> of surface water attenuation.
Hydro brake/Flow Control	Restricting flow to 4.4 l/s

*Table 6 Area C Surface Water Drainage Proposals***6.6 ONGOING OPERATION & MAINTENANCE**

- 6.6.1 It is assumed that the majority of below ground drainage will be offered to the water authority for adoption, the developer is to set up a management company who will retain overall responsibility for the remaining assets using the maintenance schedule prepared in accordance with CIRIA 735, provided in **Appendix 4**.
- 6.6.2 During the first year, inspections should be carried out monthly and after significant storm events to ensure the system is functioning as designed and that no damage is evident. As a minimum, an annual maintenance inspection and report should be undertaken by a competent contractor.
- 6.6.3 Routine inspections will indicate when occasional or remedial maintenance is required. A routine inspection checklist is included within **Appendix 4**. Records of all inspections and maintenance should be kept by the building manager.

**SECTION 7 OCCUPANTS AND USERS OF THE DEVELOPMENT****7.1 NUMBER OF OCCUPANTS & USERS**

- 7.1.1 Exact figures of occupancy are not yet available; however, we know the development will provide 315 no of residential units (flat blocks and townhouses), this is assumed to be an increase over the existing.

**7.2 NATURE OF USE**

- 7.2.1 The change from an industrial site to a residential site will affect the pattern of occupancy. However, there is no change to the degree of flood risk to occupants.

**7.3 VULNERABLE OCCUPANTS**

- 7.3.1 The site is at the lowest possible risk of flooding and no further mitigation to protect occupants and residents is required.

**SECTION 8 EXCEPTION TEST**

- 8.1 The requirement for undertaking an Exception Test is defined in Table 3 of Ministry of Housing, Communities & Local Government publication, Flood Risk and Coastal Change ([https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/575184/Table\\_3\\_-\\_Flood\\_risk\\_vulnerability\\_and\\_flood\\_zone\\_compatibility.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone_compatibility.pdf)), The Vulnerability Classification of this site is compatible with the flood zone and so the exception test is not required.

## SECTION 9 RESIDUAL RISK

- 9.1 The residual risk for this site includes the possibility of blockage or failure of the drainage system resulting in exceedance flows as such there remains minimal risk to persons or property.
- 9.2 As an additional precautionary measure, finished floor levels should be raised above the road level by a minimum of 300mm.
- 9.3 The measures described in the report demonstrate that the land can be developed in compliance with the requirements set out in **Section 1**, in compliance with the NPPF and in accordance with the requirements of the LLFA.

## SECTION 10 OTHER CONSIDERATIONS

- 10.1 **FOUL DRAINAGE**
- 10.2 The proposed development means that there will be foul flows generated from the 315 dwellings. It has been highlighted in **Section 5.1.5**, that the nearest foul sewers are 2 combined sewers which are located within Great Western Road. The Drainage GA plan in **Appendix 3** shows this arrangement.
- 10.3 Severn Trent Water have confirmed that a connection can be made to the existing 300 mm diameter combined sewer but would prefer a connection to the 600 mm diameter combined sewer. They have also confirmed that 322 properties would generate approximately 5 l/s. The confirmation letter from Severn Trent Water can be found in **Appendix 2**.

## **APPENDIX 1**

- Site Location Plan
- Topographic Survey
- Proposed Site Layout
- EA Flood Zone Plan
- Sewer Records

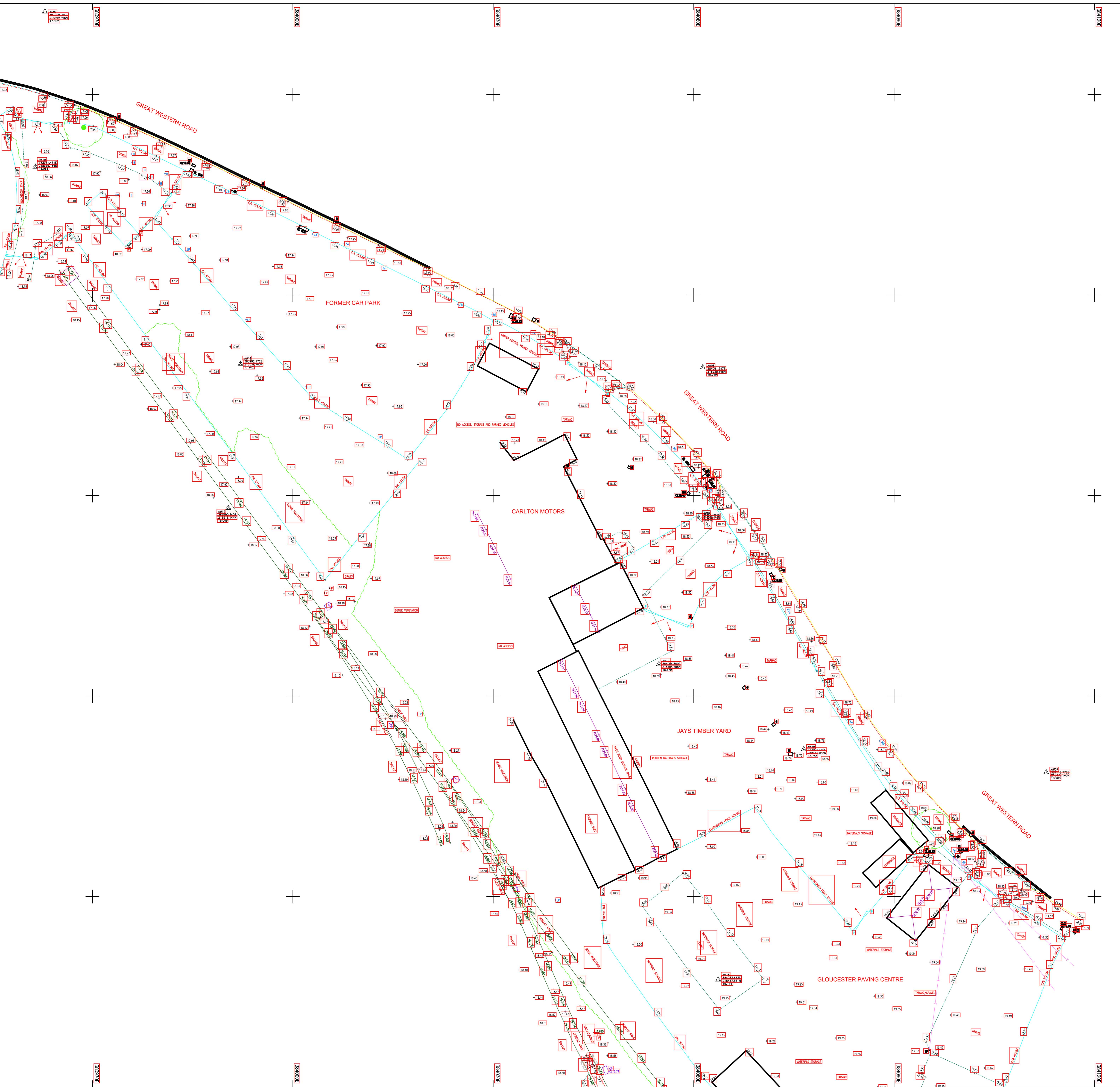


FIRST ISSUE	01-06-2022	P0
	JB	JR MB
ISSUE DETAILS	DWN	CHD APP'D
DWG NO.	REVISION	
22471-IDM-XXDR-D-0100	P0	
SCALE	DATE	FRAME DIMS (mm)
1:2000	JUNE 2022	(A4) 250x181
DRAWN	CHECKED	APPROVED
JB	JR	MB

**IDOM**

EUTOPIA HOMES  
GREAT WESTERN YARD  
SITE LOCATION PLAN

Cromford Mills, Mill Lane, Matlock, Derbyshire DE4 3RQ  
t: +44(0)1773 829 988 f: +44(0)1773 829 393 e: info.derbyshire@idom.com



Local plane metric related to National Grid fixed at Stn AW02

is:  
OS Datum from GNSS positioning converted using the  
National GEOID model OSM15

## Topographical Survey Legend

### BUILDINGS AND WALLS

### SYMBOLS AND DESCRIPTIONS

### STREET FURNITURE

### CHAMBERS AND PIPES

### TECHNICAL INFORMATION

### GENERAL INFORMATION

### OVERHEAD FEATURES

### WATER FEATURES

### RELIEF AND VEGETATION

### LEVEL AND HEIGHT INFORMATION

Standard Spot Height	123.45
Precision Spot Height	123.456
Bed Level	BL23.92
Water Level	WL24.92
Soffit Level	SL25.92
Threshold Level	TH26.98
Cover Level	CL26.45
Invert Level	IL25.15
Pipe Soffit Level	PSL5.00
Floor Level	FL6.00
Finished Floor Level	FFL6.00
Top of Tank Level	TT7.00
Eave Level	EL7.00
Ridge Level	RL9.00
Roof Hip Level	RHL8.50
Flat Roof Level	FRL7.00
Top of Canopy Level	TOP/C7.00
Underside of Canopy Level	SOF/C6.50
Window Sill Level	WSL8.00
Window Head Level	WHL9.00
Springing Level	SPL8.50
Arch Level	AL7.00
Cable Level	CHT8.55
Top of Wall Level	TWL10.00
Underside of Beam Level	UBL9.55
General Height	HT9.00

### SURVEY INFORMATION SIGNS

## Description

The logo for Malcolm Hughes Chartered Surveyors. It features the company name 'MALCOLM HUGHES' in a bold, sans-serif font, with 'CHARTERED SURVEYORS' in a smaller font below it. The 'M' and 'H' are larger than the other letters. The background is divided into three horizontal sections: black at the top, yellow in the middle, and white at the bottom.

ECUS LTD  
ROOK HOLT, 3 BLACKBURN ROAD  
SHEFFIELD, S61 2DW


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
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GREAT WESTERN ROAD  
GLOUCESTER

## TOPOGRAPHICAL SURVEY

11/02/19	Survey Date	JANUARY 2019
11/02/19	Scale	A0@1:200
53083/TOPO-1		Revision





Survey Notes:  
Grid: Local plane metric related to National Grid fixed at Stn AW02  
Level: OS Datum from GNSS positioning converted using the National GEOID model OSM15

Notes

Topographical Survey Legend	
BUILDINGS AND WALLS	GENERAL INFORMATION
Building	PP
Building Foundation	BL
Ruin	RR
Passage	PS
Footbridge	FB
Wall with Height	WH
Retaining Wall	RW
FENCE STYLES AND DESCRIPTIONS	
Closed Boarded	C/B
Corrugated Iron	CI
Cheshire	CH
G/L	GL
Intervening	IN
Vegetation	VEG
Lattice	LT
Miscellaneous	MIS
Poles	PO
Post & Chain	PC
Post & Wire	P/W
Post & Barbed Wire	P/BW
Wire Fence	WF
Gate	GT
Fence Style	FS
OVERHEAD FEATURES	
Power Pole	PPOL
Telephone Pole	TPOL
Water Feature	WF
ROADS	
Knife Edge of Surfacing	KES
Pedestrian Crossing	PC
Track	TRK
Footpath	FP
STREET FURNITURE	
Bus Stop	BS
Bollard	BL
Car Park	CP
Cost Chute	CC
Cross Cut TV	CCV
Dome	DM
Electricity Pole	EP
Flag Lamp	FL
Flag Staff	FS
Letter Box	LB
Home Plate (street)	HP
Brake Block	BB
Mile Post or Milepost	MP
Signpost	SP
Mile Stone	MS
Parking Meter	PM
Reflector Post	RP
Road Sign	RS
Information Sign	IS
Stop	ST
Traffic Light	TL
Telegraph Pole	TP
Cover Bridge	CB
Cover Lane	CL
Curve	CR
Curve Box	CBX
Curve Box Top	CBT
Curve Box Bottom	CCB
Traffic Light Control	TLC
Control Box	CB
Control Box Top	CBT
Control Box Bottom	CCB
Electricity Box	EB
Electricity Box Top	EBC
Electricity Box Bottom	ECC
INSPECTION CHAMBERS AND PIPES	
Inspection Cover (Dome)	IC
Inspection Cover (Cyl)	ICY
Inspection Cover (Square)	ICSQ
British Telecom Cover	BTC
Inspection Cover (Cone)	ICCON
Gas TV	GTV
Inspection Cover Traffic Signals	ICTS
Gas Valve	GV
Kerb Outlet	KO
Man Hole	MH
Down Pipe	DP
Rain Water Pipe	RWP
Sewer Pipe	SP
Gas Pipe	GP
Water Pipe (HT cover)	WP
Stop Valve	SV
Locating Valve	LV
Hydrant	H
Earth Rod	ER
Gas Valve	GV
Water Meter	WM
Hydromat	HM
Roofing Eye	RE
GEOTECHNICAL INFORMATION	
Borehole	BO
Test Pit	TP
Monitor Pit	MP
Reconnaissance	RC
Window Sample	WS
SURVEY INFORMATION SIGNS	
Permanent Ground Marker	PGM
OS Tug Station	OTS
OS Bench Mark	OBM
Sheet Index	

Rev	Date	Description

Malcolm Hughes Chartered Land Surveyors	
Accreditations	
Client	ECUS LTD BROOK HOLT, 3 BLACKBURN ROAD SHEFFIELD, S61 2DW
Project	GREAT WESTERN ROAD GLOUCESTER
Drawing Title	TOPOGRAPHICAL SURVEY
Drawn By	ZS 11/02/19
Survey Date	JANUARY 2019
Checked by	CT 11/02/19
Scale	A0@1:200
Drawing No	53083/TOP0-3
Revision	

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THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT CONSULTANT'S DRAWINGS.

### LEGEND: SOFTSCAPE: PROPOSED PLANTING

Existing Trees to be retained							
<b>Standard Trees</b>							
Tree Type / Species	Dia	Height	Spec	Comments			
Az - Acacia	25-30m	6.0-6.5m	Tree	(R/B)			
Az - Anna glabra 'Imperial'	25-30m	6.0-6.5m	Tree	(R/B)			
M - Malus	16-18m	4.5-5.5m	Tree	(R/B)			
M - Malus domestica	20-30m	5.5-6m	Tree	(R/B)			
Po - Prunus	16-18m	4.5-5.5m	Tree	(R/B)			
Po - Prunus padus	20-30m	5.5-6m	Tree	(R/B)			
Po - Pyrus	16-18m	4.5-5.5m	Tree	(R/B)			
Ti - Tilia cordata 'Greigii'	25-30m	6.0-6.5m	Tree	(R/B)			
<b>Multistem Trees</b>							
Ar - Acer palmatum	2.0-2.5m	3m	Hedge	2.0-2.5m			
Ba - Betula utilis var jacquemontii	2.0-2.5m	3m	Hedge	2.0-2.5m			
Ma - Malus sylvestris 'Evereste'	3.5-4.0m	3m	Hedge	3.5-4.0m			
Me - Malus	2.0-2.5m	3m	Hedge	2.0-2.5m			
<b>Hedge Planting</b>							
Low Hedge							
C - Cytisus battandieri	0.5-1.0m	1.0m	Spec	0.5-1.0m			
<b>Shrubs, Perennials, Grasses</b>							
Naturalistic Planting Mix							
Coronilla emerus	G3	60-80cm	Branched	2m			
Coreopsis verticillata 'Ooker'	G3	60-80cm	Branched	2m			
Eryngium planum	G3	60-80cm	Branched	2m			
Saxifraga hirsutissima	G3	60-80cm	Branched	2m			
Echinacea purpurea	G3	60-80cm	Branched	4m			
Penstemon digitalis 'Firecracker'	G3	60-80cm	Branched	2m			
Lavandula angustifolia 'Hidcote'	G3	60-80cm	Branched	4m			
Alcea rosea	G3	60-80cm	Branched	4m			
Rubus fruticosus 'Globose'	G3	60-80cm	Branched	5m			
Actaea rubra	G3	60-80cm	Branched	4m			
Allium schoenoprasum	G3	60-80cm	Branched	4m			
Veronica spicata	G3	60-80cm	Branched	4m			
Dianthus barbatus	G3	60-80cm	Branched	4m			
Heuchera	G3	60-80cm	Branched	4m			
Macrorhiza 'White Fountain'	G3	60-80cm	Branched	4m			
Heuchera	G3	60-80cm	Branched	4m			
Heuchera 'Tetra'	G3	60-80cm	Branched	4m			
Cordyline australis	G3	60-80cm	Branched	2m			
Hardyonia non-scripta	G3	60-80cm	Branched	3m			
Hydrophyllum occidentale	G3	60-80cm	Branched	2m			
SUDs Buffer Planting Mix							
Rubus fruticosus	G3	60-80cm	Branched	1m			
Prunus spinosa	G3	60-80cm	Branched	1m			
Geum urbanum	G3	60-80cm	Branched	2m			
Cotinus coggygria	IP	200-300cm	Bushy	2m			
Hebe 'Nana'	G3	60-80cm	Branched	2m			
Private gardens							
Wildflower Meadow Mix							
Lawn							
Lawn areas need to be mown 1-2 times per month. 80% Perennial ryegrass + 20% Festuca Creeping Red Fescue + 5% Lolium perenne + 5% Agrostis capillaris							

### HARDSCAPE: PROPOSED HARD LANDSCAPING

Tarmac	Private parking
Paving 1	Grasscrete
Paving 2	Seating / Furniture
Paving 3 (B440)	
Paving 4	

Description	Revision Notes	Date
Job No: 7594	PLANNING	09/06/2022

Status: PLANNING



Client: Eutopia Homes

Project: Great Western Yard Gloucester

Title: Proposed Landscape Plan

Job No: 7594 Scale: A0 1:500 Date: June 2022

Drawing Number

Project Originator Volume Level Type Role Number Revision

7594 PHL SW XX DR L 1000 00



# Flood map for planning

Your reference  
**Great Western Yard**

Location (easting/northing)  
**384152/218375**

Created  
**1 Jun 2022 11:16**

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

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

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

## Notes

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

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

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

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>



Environment  
Agency

## Flood map for planning

Your reference

**Great Western Yard**

Location (easting/northing)

**384152/218375**

Scale

**1:2500**

Created

**1 Jun 2022 11:16**



Selected point



Flood zone 3



Flood zone 3: areas  
benefitting from flood  
defences



Flood zone 2



Flood zone 1



Flood defence



Main river



Water storage area



Page 2 of 2



## **EA Flood Maps**

### **Extent of flooding from rivers or the sea**



Extent of flooding from rivers or the sea

● High ● Medium ● Low ● Very low Ⓞ Location you selected

### **Extent of flooding from surface water**



Extent of flooding from surface water

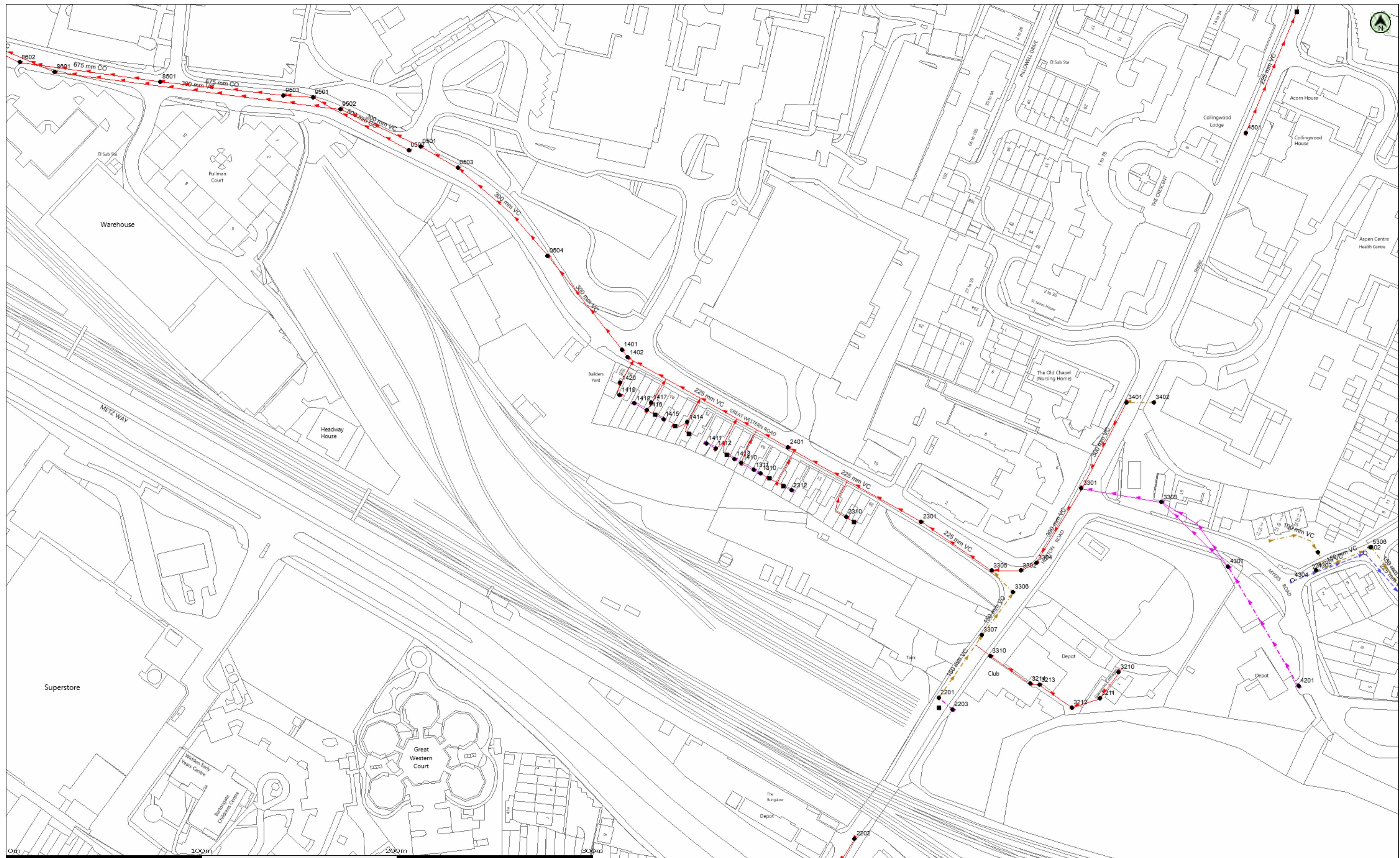
● High ● Medium ● Low ● Very low Ⓞ Location you selected

### **Extent of flooding from reservoirs**



Maximum extent of flooding from reservoirs:

● when river levels are normal ⚡ when there is also flooding from rivers Ⓞ Location you selected



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Date: 30/05/22

Scale: 1:1250

Map Centre: 384160,218418

Data updated: 14/03/22

Our Ref: 867523 - 1

## Wastewater Plan A2

Do not scale off this Map. This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2004. All rights reserved. Ordnance Survey licence number: 100031673. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright; therefore, no further copies should be made from it.



TBC - G.W Yard

**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 or 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 2**

- Environment Agency Correspondence
- Lead Local Flood Authority Correspondence
- Severn Trent Water Correspondence

**From:** Enquiries\_Westmids [REDACTED]  
**Sent:** 08 June 2022 15:08  
**To:** [REDACTED]  
**Subject:** Our ref: 265778 Product 4. Customer request reference XA56PGG5AAP5  
**Attachments:** P4.doc; 3\_CC Guidance\_Aug2021.pdf

Dear [REDACTED]

**Request for Product 4.**

Thank you for your request for a Product 4 as detailed above received by us on XX

Please see the attached supporting information document.

We have considered your request under the provision of the Freedom of Information Act 2000 / Environmental Information Regulations 2004 (EIR). The Act requires that we respond to requests by advising you whether or not information is held, and if so by providing you with that information.

EIR Regulation 3(2) states that information is held if it is in our possession and has been produced or received by us, or is held by another person on our behalf at the time the request is made.

**Information not held**

We are unable to provide you with a Product 4 response because the site is in Flood Zone 1 and the information you have requested is not held by the Environment Agency. There is no detailed modelled information available for this site and we have no records of flooding in the area. We are therefore refusing this part of your request on the grounds that there is no information we can provide.

The Lead Local Flood Authority may have more information on how surface water flooding is managed in the local area.

As a public body we are required under the Freedom of Information Act / Environmental Information Regulations (EIR) to give reasons for this refusal. We also need to show that we have considered the Public Interest balance between refusal and disclosure.

The duty to make information available to you under EIR Regulation 5(1) does not arise because in accordance with EIR Regulation 3(2) we do not hold the information you have requested. Regulation 12(4)(a) also applies – we cannot supply the information because we do not hold it. It is not possible to conduct a meaningful public interest test when a refusal is made on this ground.

If you are not satisfied you can contact us within 2 calendar months to ask for our decision to be reviewed. We shall review our response to your request and give you our decision in writing within 40 working days.

If you are still not satisfied following this, you can raise a concern with the Information Commissioner, who is the statutory regulator for Freedom of Information and the Environmental Information Regulations. The contact details are:

Information Commissioner's Office  
Wycliffe House  
Water Lane  
Wilmslow  
Cheshire, SK9 5AF.

[REDACTED]  
Website: <http://ico.org.uk>

Yours sincerely

[REDACTED]  
Customers & Engagement Officer  
West Midlands Area

For further information please contact the Customers & Engagement Team

[REDACTED]

[REDACTED]

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

# Flood Risk and Coastal Change

## Climate Change allowances for planning (SHWG area)

August 2021

The National Planning Practice Guidance refers to Environment Agency guidance on considering climate change in planning decisions which is available online: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

This has been updated and replaces the March 2016 guidance.

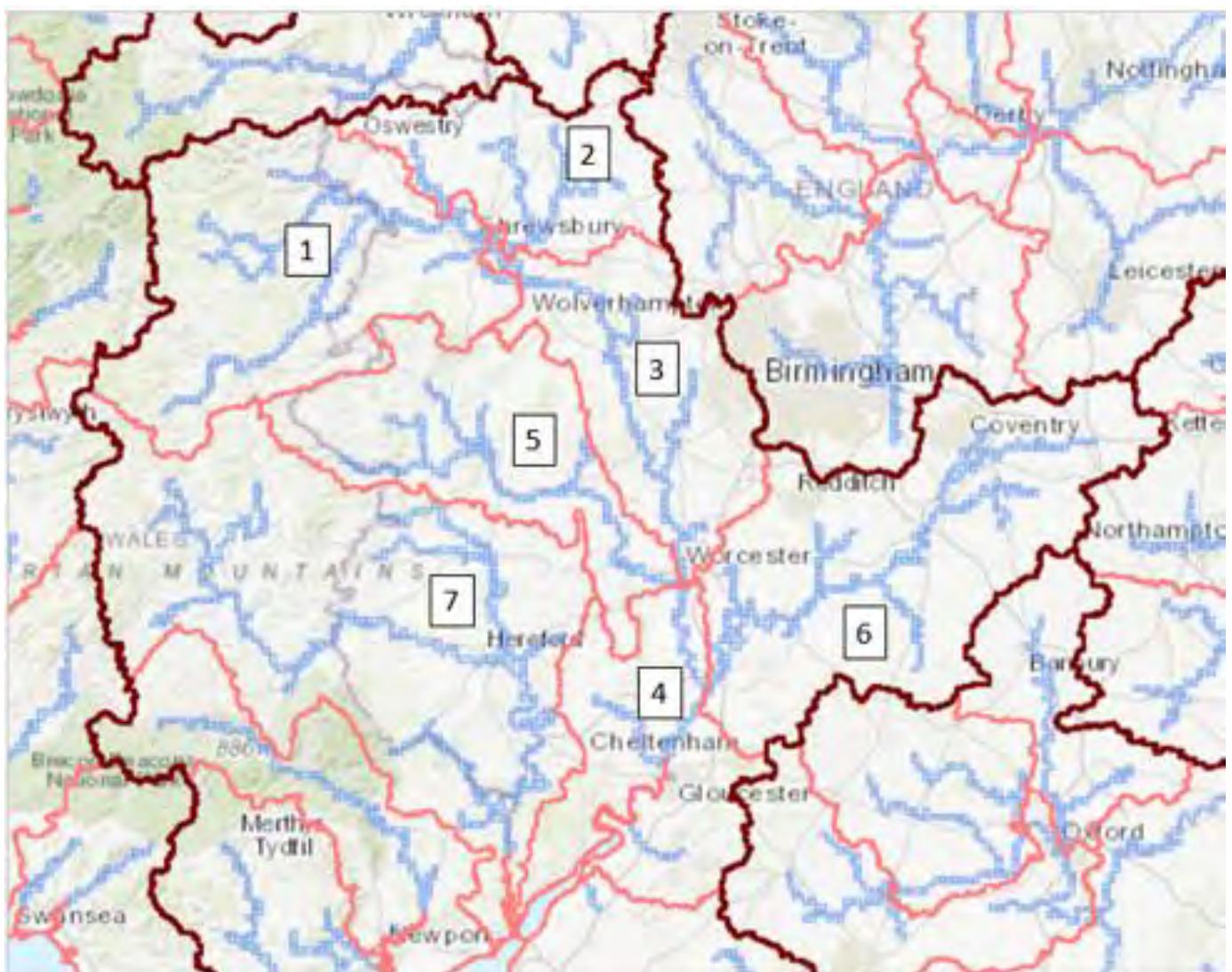
It should be used to help planners, developers and advisors implement the National Planning Policy Framework (NPPF)'s policies and practice guidance on flood risk. It will help inform Flood Risk Assessments (FRA's) for planning applications, local plans, neighbourhood plans and other projects.

### Fluvial flooding – peak river flows

NPPG advises that an allowance should be added to 'peak river flows' to account for 'climate change' which should be specific to a 'management catchment' and development type (vulnerability). To work out which management catchment allowances to use, you need to: access the climate change allowances for [peak river flow map](#)

In Shropshire, Herefordshire, Worcestershire and Gloucestershire area, we would refer you to the map extract on page 2 below. This outlines the '**peak river flows**' within the specific 'Management catchments' for the Severn River Basin District, and specifies the range of percentage allowances to reflect individual development's vulnerability and lifetime. The following allowances should be used:

Development Vulnerability	Allowance (lifetime)
Essential Infrastructure	Higher Central - 2080's
Highly Vulnerable and More Vulnerable (residential)	Central - 2080's
Less Vulnerable and Water Compatible	Central - 2050's



Management Catchment	2020's	2050's	2080's	Management Catchment	2020's	2050's	2080's
1. Severn Uplands Peak River Flows				5. Teme Peak River Flows			
Higher Central	17%	24%	43%	Higher Central	21%	33%	60%
Central	13%	18%	33%	Central	16%	24%	45%
2. Severn Middle Shrops Peak River Flows				6. Avon Peak River Flows			
Higher Central	20%	25%	44%	Higher Central	12%	14%	32%
Central	15%	18%	33%	Central	7%	8%	21%
3. Severn Middle Worcs Peak River Flows				7. Wye Peak River Flows			
Higher Central	16%	21%	40%	Higher Central	19%	27%	49%
Central	12%	15%	30%	Central	14%	20%	37%
4. Severn Vale Peak River Flows							
Higher Central	20%	28%	53%				
Central	14%	19%	37%				

**Extract: Management Catchments within the Severn River Basin District** – refer to interactive [peak river flow map](#) for more detail. The Environment Agency also provide these allowances in the [peak river flow climate change allowances by management catchment table](#) – you have to know your management catchment to get the information you need. (Allowances reflect the latest projections in UKCP18 and subsequent research that models how the latest rainfall projections are likely to affect peak river flows).

## Sea Level rise allowances

Table 3 of the guidance (extract below) indicates that net sea level risk is as follows (updated from the 2013 version).

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
South West	Higher central	5.8 (203)	8.8 (264)	11.7 (351)	13.1 (393)	1.21
South West	Upper end	7 (245)	11.4 (342)	16 (480)	18.4 (552)	1.62

**Note - For sites utilising the Severn tidal model the above allowances should be considered and applied. As of August 2020, specific updated flood level data is now available for the 2096 to 2125 epoch based upon the Environment Agency's Tidal Severn model within the West Midlands area and will be provided where relevant as part of our Request For Information service; contact [Enquiries\\_Westmids@environment-agency.gov.uk](mailto:Enquiries_Westmids@environment-agency.gov.uk)**

## Flood Risk Assessment considerations:

The design flood (1% flood level fluvial, or 0.5% tidal, plus climate change allowance) should be used to inform the sequential test, including appropriate location of built development; consideration of flood risk impacts, mitigation/enhancement and ensure 'safe' development.

### Vulnerability classification

- Development classed as 'Essential Infrastructure' (as defined within Table 2 - Flood Risk Vulnerability Classification, Paragraph: 066 Reference ID: 7-066-20140306 of the NPPG) should be designed to the 'higher central' climate change allowance (2080).
- For highly vulnerable or more vulnerable development e.g. housing, the FRA should use the 'central' climate change allowance (2080), as a minimum, to inform built in resilience.
- For water compatible or less vulnerable development e.g. commercial, the FRA should use the 'central' climate change allowance (2050), as a minimum, to inform built in resilience.

### Assessing off-site impacts and calculating floodplain storage compensation

The appropriate allowance to assess off-site impacts and calculate floodplain storage compensation depends on land uses in affected areas. Use the central 2080 allowance for most cases (including where more vulnerable or highly vulnerable is affected) but apply the higher central allowance when the affected area contains essential infrastructure.

### Modelling approach

- **Major Development:**

For 'major' development (as defined within The Town and Country Planning Development Management Procedure (England) Order 2015)\*, see definition note below, we would expect a detailed FRA to provide an appropriate assessment (hydraulic model) of the 1% with relevant climate change ranges.

There are two options:

Scenario 1 - Produce a model and incorporate relevant climate change allowances within your Management catchment area location.

Scenario 2 - Re-run an existing model and incorporate relevant climate change allowances as specified in the Management catchment area data.

- Non Major Development:**

For 'non major' development, we would advise that a model is produced or existing model is re-run, similar to the above approach (Scenario 1 and 2). This would give a greater degree of certainty on the design flood extent to inform a safe development.

However, for 'non major' development only, in the absence of modelled climate change information it may be reasonable to utilise an alternative approach. To assist applicants and Local Planning Authorities we have provided some 'nominal' climate change allowances within the 'Table of nominal allowances' below. These should be considered as appropriate within any FRA. There are three additional options:

Scenario 3 - Where previous modelled data (for a variety of return periods) is available, you could interpolate your own climate change figure (see note iv below).

Scenario 4 - Where the 1% level is available from an existing model add on the relevant 'nominal climate change allowance' provided in the 'Table of nominal allowances' below.

Scenario 5 - Establish the 1% level, for example using topographical levels (including LiDAR) and assessment of watercourse flow and nature and then add on the relevant 'nominal climate change allowances' provided in the 'Table of nominal allowances' below.

- \*Note: For definitions of 'major' development see 'Interpretation 2.—(1)', on page 5, at: [www.legislation.gov.uk/uksi/2015/595/pdfs/uksi\\_20150595\\_en.pdf](http://www.legislation.gov.uk/uksi/2015/595/pdfs/uksi_20150595_en.pdf)

**Table of Nominal Allowances**

Watercourse	Central allowance (2050) Water compatible and Less Vulnerable.	Central allowance (2080) More Vulnerable
Upper Severn	600mm	850mm
River Wye		
River Teme		
River Avon	200mm	400mm
Lower Severn	400mm	600mm
Tributaries and 'ordinary watercourses'	200mm	300mm

Notes to above:-

(i) Watercourse definition:

The "Upper Severn"/"Lower Severn" boundary is taken as Bevere Weir, North of Worcester, (national grid reference SO8376859428). These do not directly relate to management catchments.

Use of the Avon nominal is only valid upstream of the M5 crossing and downstream of that point the Lower Severn nominals should be used.

An 'Ordinary Watercourse' is a watercourse that does not form part of a main river. Main Rivers are indicated on our Flood Map. You can also check the classification of the watercourse with the LLFA, some of which have produced Drainage and Flooding Interactive Maps.

(ii) Where a site is near the confluence of two, or more, watercourses, the FRA should use the larger river climate change allowances.

(iii) We may hold more precise information for some of the "tributaries". We would recommend that you seek this information from us via a 'pre-planning enquiry/data request', to the email address below.

(iv) We would also recommend that you contact us for our modelled '20%' allowances and associated flow data. This is available for some rivers. This data may help inform a more detailed climate change analysis (where necessary), including any interpolation of levels or flow to create a 'stage discharge rating' in order to estimate the required percentage; or be of assistance to inform 'less vulnerable' or 'water compatible' development proposals.

#### IMPORTANT NOTE

Please note the nominal climate change allowances are provided as a pragmatic approach, for consideration, in the absence of a modelled flood level and the applicant undertaking a detailed model of the watercourse. Use of nominal climate change allowances are not provided/ recommended as a preference to detailed modelling and historical data.

The Local Planning Authority may hold data within their Strategic Flood Risk Assessment (SFRA), or any future updates, which may help inform the above.

#### FREEBOARD NOTE

It is advised that Finished Floor Levels should be set no lower than '600mm' above the 1% river flood level plus climate change. Flood proofing techniques might be considered where floor levels cannot be raised (where appropriate). This 600mm freeboard takes into account any uncertainties in modelling/flood levels and wave action (or storm surge effects).

## Surface Water

Table 2 of the guidance also indicates the relevant increases that surface water FRA should consider for an increase in peak rainfall intensity.

The following table is for '**peak rainfall intensity**' allowance in small and urban catchments. Please note that **surface water (peak rainfall intensity) climate change allowances should be discussed with the Lead Local Flood Authority (LLFA)**.

Peak Rainfall Intensity - Applies across all of England	Total potential change anticipated for 2010-2039	Total potential change anticipated for 2040-2069	Total potential change anticipated for 2070-2115
Upper end	10%	20%	40%
Central	5%	10%	20%

Note to above:-

For river catchments around or over 5 square kilometres, the peak river flow allowances are appropriate.

Produced by: [WestMidsPlanning@environment-agency.gov.uk](mailto:WestMidsPlanning@environment-agency.gov.uk)

West Midlands Area -

Shropshire, Herefordshire, Worcestershire and Gloucestershire Sustainable Places Team.

customer service line  
03708 506 506

[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

incident hotline  
0800 80 70 60

floodline  
0845 988 1188

# Product 4 (Detailed Flood Risk Data) for 384153, 218397 (easting and northing coordinates)

**Reference number:** 265778 [XA56PGG5AAP5]

**Date of issue:** 01 June 2022

*Product 4 requests are usually only provided for sites within flood zone 2 and/or 3 to help inform detailed flood risk assessments within these zones.*

The location you have requested information for is within **flood zone 1**, defined as the area 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), and as such we do not have any detailed modelling for this site to provide as a Product 4 request.

Should you wish to download a Flood Map for Planning (rivers and sea) map which displays the area and associated flood zones, please use the following website (<https://flood-map-for-planning.service.gov.uk/>) and select the 'Download printable map (PDF)' option.

## 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 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.

The 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.

## 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).
- **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>

## Recorded Flooding

Following examination of our records of historical flooding we have no record of flooding in the area. The absence of coverage for an area does not mean that the area has never flooded, only that we do not currently have records of flooding in this area. 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; 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.

You may also wish to contact your Local Authority or Internal Drainage Board 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 overtapped 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

### River Modelling: Technical Standards and Assessment Guidance

The link below contains standards for the flood risk management industry on how to build and review hydraulic models and provide evidence for flood risk management decisions.

<https://www.gov.uk/government/publications/river-modelling-technical-standards-and-assessment>

## 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:

<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>

**From:** [REDACTED]  
**Sent:** 08 June 2022 13:31  
**To:** [REDACTED]  
**Subject:** RE: General Enquiry - Reference: GEN-2240938  
**Attachments:** PreApp advice - Great Western Road.docx

Hi [REDACTED]

Please find attached our pre-app advice.

I hope this helps, but if you have any further questions please don't hesitate to ask.

Kind regards,  
[REDACTED]

[REDACTED]  
**Flood Risk Management Officer**  
Flood Risk Management (Strategic Infrastructure)  
Gloucestershire County Council  
1st Floor (West), Block 5, Shire Hall, Gloucester, GL1 2TH

Go to [www.goucestershire.gov.uk](http://www.goucestershire.gov.uk) to find information on any County Council service.  
It couldn't be easier to find information instantly and in some cases apply for services online.



You can now report property flooding online using **FORT**

If your home or business has been affected by flooding and you would like the Council to investigate the cause, you can report the incident on FORT. Click here or visit "Flooding and Drainage" at [www.Gloucestershire.gov.uk](http://www.Gloucestershire.gov.uk).

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**From:** [REDACTED]  
**Sent:** 01 June 2022 14:57  
**To:** [REDACTED]  
**Cc:** F [REDACTED]  
**Subject:** RE: General Enquiry - Reference: GEN-2240938

Good afternoon

Your enquiry has been received by Customer Services at Gloucestershire County Council.

We have copied in the relevant department, and they will respond accordingly. Please do not reply to this message, please respond directly to the enquirer or team.

Kind regards,

[REDACTED]  
Customer Service Officer  
Corporate Customer Services Team & Adult Support Services  
Gloucestershire County Council  
Block 4, 4th Floor (Block 5 end)  
Shire Hall, Westgate Street, Gloucester, GL1 2TG

[REDACTED]  
[REDACTED]  
Go to [www.goucestershire.gov.uk](http://www.goucestershire.gov.uk) to find information on any County Council service. It couldn't be easier to find information and in some cases to apply for services online.

This email is not secured, please be mindful of data security. If your response to this email contains personal or confidential information, we suggest you reply using Egress Switch. Gloucestershire County Council is one of many Councils using Egress Switch to protect personal and/or sensitive data in transit. You may already be a registered user of Egress Switch if you have been communicating securely with another organisation, if so, you will be able to use your existing Egress credentials to communicate securely with Gloucestershire County Council. Registration is free and is a very simple, one-time process that will take no longer than 5 minutes to complete. Details of how to register are provided in the 'GCC Egress Switch Recipient Guide' provided as a download from <http://www.goucestershire.gov.uk/egress-switch>

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**From:** [REDACTED]  
**Sent:** 01 June 2022 14:37  
**To:** [REDACTED]  
**Subject:** General Enquiry - Reference: GEN-2240938

**Submitted:** 01/06/2022 14:37:02

**What is the query in relation to:** Customer Services Team

**Your Name:** [REDACTED]

**Your Email Address** [REDACTED]

**Details of your enquiry:** Dear Sir/Madam We are preparing a Flood Risk Statement and Drainage Strategy in support of the planning application submission for the proposed development of c. 300 residential units (flat blocks and townhouses). For further information, the approximate OS Grid Reference SO 84091 18413 and the nearest post code is GL1 3ND. With reference to the flood map for planning, the site lies within Flood Zone 1. I would be grateful for any information you may hold in regards to this site and any constraints there may be. I look forward to your response. Best regards, [REDACTED]

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This email and any attachments are strictly confidential and intended for the addressee only.

If you are not the named addressee you must not disclose, copy or take any action in reliance of this transmission and you should notify us as soon as possible.

This email and any attachments are believed to be free from viruses but it is your responsibility to carry out all necessary virus checks and Gloucestershire County Council accepts no liability in connection therewith.

**From:** [REDACTED]  
**Sent:** 13 June 2022 15:22  
**To:** [REDACTED]  
**Subject:** Developer Enquiry Response: Great Western Road, Gloucester - 322 Dwellings  
Our Ref: 1047240  
**Attachments:** Severn Trent Surface Water Guidance Note (August 2021).pdf; Sewer Record Plan.pdf; Developer Enquiry Response.pdf

ST Classification: UNMARKED

Dear [REDACTED]

Please find attached below our Developer Enquiry response letter, along with a sewer record extract and supplementary guidance notes with regard to the above site.

If you have any further queries with regard to our response, please do not hesitate to contact us on the number / email address mentioned below. Please refrain from sending responses to a certain individual directly. Our email address below will ensure that your response is logged and tracked for a response. When responding, please quote our reference number above in all return correspondence.

Regards,

**Network Solutions**  
Developer Services

**Please reply to** [REDACTED]

For further information on guidance and applications please follow the link below:

<https://www.stwater.co.uk/building-and-developing/regulations-and-forms/application-forms-and-guidance/>

We have listened to our customers & local communities and as a result, Severn Trent have made a pledge to transform and protect the health of our rivers. For more information please follow the link below:

<https://www.stwater.co.uk/get-river-positive/our-river-pledges/>

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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. This email (which includes any files attached to it) is not contractually binding on its own, is intended solely for the named recipient and may contain CONFIDENTIAL, legally privileged or trade secret information protected by law. If you have received this message in error please delete it and notify us immediately by telephoning +44 2477715000. If you are not the intended recipient you must not use, disclose, distribute, reproduce, retransmit, retain or rely on any information contained in this email. Please note the Companies reserve the right to monitor email communications in accordance with applicable law and regulations. To the extent permitted by law, neither the Companies or any of their subsidiaries, nor any employee, director or officer thereof, accepts any liability whatsoever in relation to this email including liability arising from any external breach of security or confidentiality or for virus infection or for statements made by the sender as these are not

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Idom Merebrook Ltd,  
Cromford Mill,  
Mill Road,  
Cromford,  
Matlock,  
DE4 3RQ.

SEVERN  
TRENT

Severn Trent Water Ltd  
Leicester Water Centre  
Gorse Hill  
Anstey  
Leicester  
LE7 7GU

[REDACTED]  
[www.stwater.co.uk](http://www.stwater.co.uk)

[REDACTED]  
Our ref: 1047240

FAO: [REDACTED]

13<sup>th</sup> June 2022

Dear [REDACTED],

## Proposed Residential Development (322 Dwellings) at: Great Western Road, Gloucester GL1 3ND

**X: 486870 / Y: 411490**

I refer to your Development Enquiry Request submitted in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes (SGN) referred to below.

### **Public Sewers in Site – Required Protection**

There are no public sewers crossing the proposed development site.

Due to a change in legislation on 1 October 2011, there may be former private sewers on the site which have transferred to the responsibility of Severn Trent Water which are not shown on the statutory sewer records but are located in your client's land. These sewers would also have protective strips that we will not allow to be built over. If such sewers are identified to be present on the site, please contact us for further guidance.

### **Foul Water Drainage**

The sewer records demonstrate a 300mm diameter combined sewer within, Great Western Road. It is proposed to split flows from the development across three separate points of connection along the network: -

- Between manholes 1402 & 1401
- Between manholes 0504 & 0503

# WONDERFUL ON TAP

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- Between manholes 0501 & 9502

The proposed development of 322 properties will generate approximately 5 l/s (at 2DWF). The network demonstrates some surcharging on the sewer, along with the complex arrangement, within London Road. Alternatively, it is advised to connect onto the 600mm combined network northwest of the site which may have greater capacity. Modelling will be required to better understand the impact of the additional flows on the system.

In a change to our previous process, we no longer charge developers for the hydraulic modelling service. We will liaise with you over time with regards to the outcome of our investigations and any impact that may have on the planning status, occupation, or phasing of the site. However, while we can provide a brief summary of our findings if you need us to, we will no longer provide the full external capacity assessment report.

From the application you have submitted, I am assuming that the development has not been granted planning approval. Please inform us as and when planning has progressed as this will help determine how quick we carry out the modelling exercise. In the meantime, the site will be added to our modelling tracker and reviewed regularly until the site can be progressed for sewer modelling. I would therefore be grateful if you would forward as soon as possible the following details:

- Proposed submission of your Planning Application
- Proposed point of connection(s) and proportion of development to connect at each manhole (either in no. of houses or as a percentage of development).
- Proposed planned start and completion date
- Any phasing details of the proposed development
- Planned occupation date

## **Surface Water Drainage**

Under the terms of Section H of the Building Regulations 2000, the disposal of surface water by means of soakaways should be considered as the primary method. If this is not practical and no watercourse is available as an alternative, the use of sewerage should be considered. In addition, other sustainable drainage

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methods should also be explored before a discharge to the public sewerage system is considered.

In the event that following testing, it is demonstrated that soakaways would not be possible on the site; satisfactory evidence will need to be submitted. The evidence should be either percolation test results or a statement from the SI consultant (extract or a supplementary letter).

STW will need to be satisfied that all SUDs options have been exhausted before discharge to public sewer. Severn Trent Water expects all surface water from the development to be drained in a sustainable way to the nearest watercourse or land drainage channel, subject to the developer discussing all aspects of the developments surface water drainage with the Local Lead Flood Authority (LLFA). Any discharge rate to a watercourse or drainage ditch will be determined by the LLFA.

There are no separate surface water sewers within the vicinity of the site that can be accessed via gravity. The closest sewer is the 300mm combined network in Great Western Road. You may well be aware of the sensitivity of such an arrangement in relation to surface water flow, with the recent media coverage and the impact on the receiving watercourses. In this instance, we cannot accept additional surface water flows into this network due to the impact on the receiving network, CSO and the associated risks.

Our records do show a separate surface water network east of the site in Myers Road. Although not preferred by STW, a pumped surface water connection to this network would alleviate the need for additional flows in the combined network in Great Western Road.

Alternatively, it is suggested that further investigations are undertaken to determine any highway network within the vicinity and to contact the Local Highway Authority.

**Subject to all the above**, a connection to the public combined network may be considered as a last resort only if a previous connection can be proved, and all options mentioned above have been investigated with supplementary evidence to prove their unfeasibility.

On all brownfield sites, Severn Trent propose at least 50% reduction of surface water flows in comparison to the existing development's discharge. For us to be in a position to confirm your proposed

# WONDERFUL ON TAP

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discharge rate, please provide supporting evidence demonstrating the betterment of existing discharge rate.

Evidence should be in the form of a survey, demonstrating what flows positively discharged into the network (and which sewer) and supporting calculations showing the reduction. If former connections cannot be proved, greenfield rates of 5l/s/ha will apply.

Regardless of what option is chosen for surface water, modelling will be needed for either option. Therefore, please submit discharge rate proposals and preferred point of connection as soon as possible.

## New Connections

For any new connections including the use, reuse and indirect to the public sewerage system, the developer will need to submit Section 106 application. Our Developer Services department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call [REDACTED] or download from [www.stwater.co.uk](http://www.stwater.co.uk)

Please quote the above reference number in any future correspondence (including e-mails) with STW Limited. Please send **all correspondence** to the [REDACTED] email inbox address, a response will be made within 15 days.

If you require a VAT receipt for the application fee please email [REDACTED] quoting the above Reference Number.

Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

Yours sincerely,

[REDACTED]

# WONDERFUL ON TAP

SEVERN  
TRENT

[REDACTED]  
**Senior Evaluation Technician**  
**Network Solutions**  
**Developer Services**

### **APPENDIX 3**

- Existing Runoff Rate Estimates
- Surface Water Storage Estimates
- 22471-IDM-XX-DR-D-0500 P0 Drainage GA

## **EXISTING RUNOFF RATE ESTIMATES**

### **BROWNFIELD**

#### Pre-development discharge

Site Makeup	Brownfield
Brownfield Method	MRM
Contributing Area (ha)	2.220
PIMP (%)	100
CV	0.800
Time of Concentration (mins)	5.00
Betterment (%)	50
<b>Calc</b>	

Return Period (years)	Q (l/s)
1	149.8
30	349.5
100	440.4

### **GREENFIELD**

#### Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	IH124
Positively Drained Area (ha)	3.200
SAAR (mm)	645
Soil Index	3
SPR	0.37
Region	4
Betterment (%)	0
<b>Calc</b>	
QBar (l/s)	8.4

Return Period (years)	Growth Factor	Q (l/s)
1	0.83	6.9
30	1.99	16.6
100	2.57	21.5

## SURFACE WATER STORAGE ESTIMATES

### AREA A

#### Storage Estimate

Return Period (years)	<input type="text" value="100"/>
Climate Change (%)	<input type="text" value="40"/>
Impermeable Area (ha)	<input type="text" value="0.037"/>
Peak Discharge (l/s)	<input type="text" value="2.000"/>
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	<input type="text"/>
Required Storage (m <sup>3</sup> )	<input type="button" value="Calc"/>
from	<input type="text" value="8"/>
to	<input type="text" value="14"/>

### AREA B

#### Storage Estimate

Return Period (years)	<input type="text" value="100"/>
Climate Change (%)	<input type="text" value="40"/>
Impermeable Area (ha)	<input type="text" value="0.441"/>
Peak Discharge (l/s)	<input type="text" value="2.000"/>
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	<input type="text"/>
Required Storage (m <sup>3</sup> )	<input type="button" value="Calc"/>
from	<input type="text" value="244"/>
to	<input type="text" value="325"/>

### AREA C

#### Storage Estimate

Return Period (years)	<input type="text" value="100"/>
Climate Change (%)	<input type="text" value="40"/>
Impermeable Area (ha)	<input type="text" value="2.286"/>
Peak Discharge (l/s)	<input type="text" value="4.400"/>
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	<input type="text"/>
Required Storage (m <sup>3</sup> )	<input type="button" value="Calc"/>
from	<input type="text" value="1579"/>
to	<input type="text" value="1836"/>



**APPENDIX 4**

- SuDS Maintenance Schedule
- SuDS Inspection Checklist

### SuDOS Maintenance Schedule

	Maintenance Activity	Frequency of activity (months)				
		1	3	6	12	A/R
<b>A</b>	<b>Manholes (General)</b>					
1	Check cover is not damaged and fits securely			X		
2	Check inlet and outlet are free flowing and not obstructed			X		
3	Check security of fitting for all manhole ironmongery			X		
4	Check benching for scour or build-up of debris			X		
5	Check joints in construction for damage or inflow				X	
6	Record maintenance inspection in logbook			X		
<b>B</b>	<b>Conveyance Pipes</b>					
1	Carry out flow test between manholes to ensure free flow of system				X	
2	Jetting and clearance of blockages, debris or silt					X
3	Inspection by CCTV – should problem arise as a result of the flow test					X
4	Cutting of growth into pipe					X
5	Record maintenance inspection in logbook					X
<b>C</b>	<b>Flow Controls</b>					
1	Check flow control mount to ensure secure fitting		X			
2	Check inlet to flow control is free flowing and not obstructed		X			
3	Remove silt from the sump				X	
4	Record maintenance inspection in logbook	X				
<b>D</b>	<b>Porous Pavement</b>					
1	Initial inspection (monthly for 3 months after installation)	X				
2	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action					Three-monthly, 48 hrs after long storms in first six months
3	Inspect for silt accumulation to establish appropriate brushing frequencies. Identify any depressions which may require re-setting.				X	
4	Monitor any inspection chambers. Check for water level and silt at base of pavement.				X	
5	Brushing and vacuuming (adjust equipment to avoid removing jointing material)				X	X
6	Removal of weeds (treat directly with glyphosate – no spray)					X
7	Record maintenance inspection in logbook	X				
<b>E</b>	<b>Landscape adjacent to Porous Pavements</b>					
1	Grass cutting to public areas (clean grass from porous paving)					X
2	Re-level landscaping which has become level with porous paving through vegetation maintenance or soil slip					X

3	Record maintenance inspection in logbook	X				
F	<b>Cellular attenuation Tank</b>					
1						

**SuD Inspection Checklist**

<b>DRAINAGE &amp; SUDS INSPECTION CHECKLIST</b>	
<b>ACTIVITY</b>	<b>OBSERVATION</b>
Are inlets or outlets blocked?	OK/ACTION REQUIRED
Does any part of the system appear to be leaking (in or out)?	OK/ACTION REQUIRED
Is the surrounding vegetation healthy and well kept?	OK/ACTION REQUIRED
Is maintenance access unimpeded?	OK/ACTION REQUIRED
Is there evidence of poor water quality (algae/oils/milky froth/odour/unusual colourings)?	OK/ACTION REQUIRED
Is there evidence of sediment build-up?	OK/ACTION REQUIRED
Is there evidence of oil accumulation?	OK/ACTION REQUIRED
Is there evidence of ponding?	OK/ACTION REQUIRED
Is there evidence of structural damage that requires repair?	OK/ACTION REQUIRED
Is there any evidence of regular or unplanned overtopping flooding or ponding?	OK/ACTION REQUIRED
Is water flowing freely through the network?	OK/ACTION REQUIRED
Are there any concerns that require further investigation?	OK/ACTION REQUIRED
Recommended maintenance or re-inspection for the following 12 months	
ITEMS REQUIRING IMMEDIATE MAINTENANCE	
ITEMS REQUIRING IMMEDIATE FURTHER INSPECTION	
ITEMS REQUIRING MORE REGULAR INSPECTION	

**IDOM**

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**offices** Birmingham London Kent Derbyshire Cardiff Manchester Stirling

# **Great Western Road Gloucester**

## **Train Induced Vibration Assessment Report**

29454/VAR1

1 September 2022

For:  
Eutopia House  
40 Craven Street  
London  
England  
WC2N 5NG



**Hann Tucker Associates**  
Consultants in Acoustics Noise & Vibration





## Train Induced Vibration Assessment Report

### 29454/VAR1

#### Document Control

Rev	Date	Comment	Prepared by	Authorised by
0	01/06/2022	-		
1	01/09/2022	Updated for planning submission purposes		



## Train Induced Vibration Assessment Report 29454/VAR1

Contents	Page
1.0 Introduction	1
2.0 Objectives	1
3.0 Acoustic Terminology	1
4.0 Site Description	2
5.0 Proposed Development	3
6.0 Planning Policy, Standards & Guidance	4
7.0 Baseline Vibration Survey	6
8.0 Building Response	7
9.0 Predicted Levels of Vibration and Groundborne Noise	7
10.0 Conclusions	9

## Attachments

References

Appendix A – Vibration Terminology

Appendix B – Noise Terminology

Appendix C – Vibration Survey Graphs



## 1.0 Introduction

Hann Tucker Associates Limited (HTA) has been commissioned by Eutopia Homes to undertake a vibration assessment for a site in Gloucester.

The site, which is located off Great Western Road, is being considered for residential development. The proposals are for approximately 315No. units across houses and apartments with a mixture of private gardens and communal outdoor amenity spaces.

The site is subject to vibration from the rail line which runs along the southern boundary of the site.

Baseline vibration conditions have therefore been established by means of a detailed vibration survey. These measurements have subsequently been used to predict the likely train induced vibration and ground borne noise levels in the proposed development.

## 2.0 Objectives

To establish by means of site measurements at accessible locations the magnitude and frequency distribution of ground borne vibration resulting around the movement of nearby trains.

Where possible, the potential response of the proposed building structures to the magnitude and frequency distribution of train induced ground borne vibration from train pass-bys will be analysed in conjunction with the Structural Engineer. The results will be interpreted with reference to BS 6472 : 2008: "Guide to evaluation of human exposure to vibration in buildings".

Advice will be given to the Design Team evaluating the potential effect of such perceived noise and vibration, and whether as a result, it will be necessary to consider vibration isolation of all or part of the building structure.

## 3.0 Acoustic Terminology

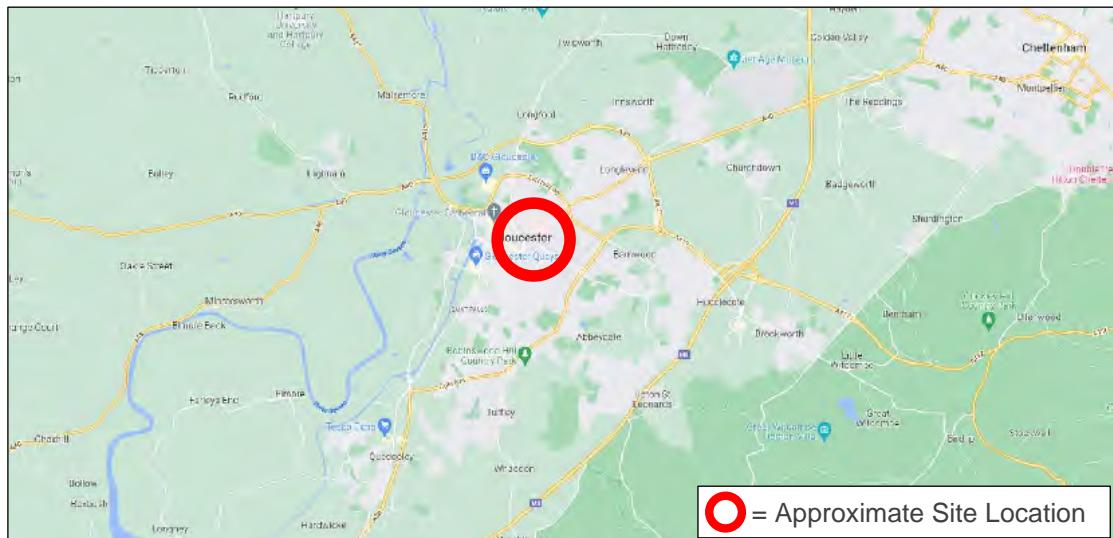
For an explanation of the acoustic terminology used in this report please refer to Appendix A and Appendix B enclosed.



## 4.0 Site Description

### 4.1 Location

The site is located in Gloucester and falls within the jurisdiction of Gloucester City Council. See Location Map below.



Location Map (@maps.google.com)

### 4.2 Description

The site lies off Great Western Road in Gloucester with Great Western Road and existing and established residential premises to the North, Horton Road to the East and railroad to the south. At the North boundary of the site beyond Great Western Road, lies Gloucestershire Royal Hospital, south of the site lies the railway close to Gloucester Train Station, and to the east of the site beyond Horton Road lies Allstones sand and gravel crushing. See Site Plan below.



Site Plan (@earth.google.com)

## 5.0 Proposed Development

A site layout plan illustrating the site boundary and building massing is provided in the figure below for ease of context.



Proposed Site Plan (c/o Darling Associates Architects)



## 6.0 Planning Policy, Standards & Guidance

### 6.1 Tactile Vibration

British Standard BS 6472: 2008 “*Guide to Evaluation of Human Exposure to Vibration in Buildings*” advises that intermittent vibration events should not be judged based on perception alone but using the corresponding vibration dose value over a long period.

BS6472:2008 advises that “the VDV defines a relationship that yields a consistent assessment of continuous, intermittent, occasional and impulsive vibration and correlates well with subjective response” and also “the VDV is much more strongly influenced by vibration magnitude than by duration. A doubling or halving of the vibration magnitude is equivalent to an increase or decrease of exposure duration by a factor of sixteen.”

The table below details the Vibration Dose Values ( $\text{m/s}^{1.75}$ ) above which various degrees of adverse comment may be expected in Residential Buildings.

Time Period	Low probability of adverse comment	Adverse comment possible	Adverse comment probable
Daytime (07:00– 23:00)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Night-time (23:00–07:00)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

The perception threshold for continuous whole-body vibration varies widely among individuals. Approximately half a typical population, when standing or seated, can perceive a vertical weighted peak acceleration of  $0.015 \text{ m/s}^2$ . The weighting used is  $W_b$ . A quarter of the population would perceive a vibration of  $0.010 \text{ m/s}^2$  peak, but the least sensitive quarter would only be able to detect a vibration of  $0.020 \text{ m/s}^2$  peak or more. Perception thresholds are slightly higher for vibration duration of less than about 1 second.

### 6.2 Groundborne Noise

Currently no British Standards exist that recommend a method by which to assess intermittent ground-borne or structure-borne noise, such as that induced by trains.

Whilst there is no widely accepted method of evaluation of groundborne noise, there is some consensus that for levels at and above  $50 \text{ dBA } L_{\text{Smax}}$  during daytime, there is likely to be significant adverse reaction. For residential situations the  $L_{\text{Smax}}$  noise levels for which there is likely to be little adverse comment can be taken as around  $30 \text{ dBA}$  during the daytime and around  $25 \text{ dBA}$  during night-time. Some local authorities recommend in their planning policies a level of  $35 \text{ dBA } L_{\text{Smax}}$ .



The Association of Noise Consultants (ANC) - "Measurement and Assessment of Groundborne Noise & Vibration" (Third Edition), presents the following impact classification tables for residential and non-residential receptors, which have been drawn from major railway projects in the UK and Ireland, e.g. Crossrail, the Jubilee Line, Dublin Area Rapid Transit (DART) and HS1.

Groundborne Noise Impact Criteria for Residential Receptors presented in ANC "Measurement and Assessment of Groundborne Noise & Vibration"		
Impact Classification	Groundborne Noise Level dBA $L_{s\max}$ (measured indoors, near the centre of any dwelling room on the ground floor)	
Negligible	<35	Not significant
Low	35-39	
Medium	40-44	Significant impact
High	45-49	
Very High	>49	

Groundborne noise is of greatest concern when it is the dominant noise, and also when the source cannot be seen, as in the case of trains in a tunnel. Criteria for groundborne noise are therefore generally intended to apply to sources such as underground trains.

A criterion of 35dBA( $L_{s\max}$ ) is usually considered suitable for a residential development. This equates to train movement being audible but not to an extent likely to cause significant adverse comments.

It is generally accepted however, that people are more tolerant of noise from sources which can also be seen. Furthermore, where sources are visible, airborne noise intrusion through the façade in most cases masks the ground-borne noise which is radiated simultaneously.

The table below summarises the proposed assessment criteria:

Environment	Proposed $L_{s\max}$ Limit of Train Induced Groundborne Noise Level (dBA)
Residential	45

Where bedroom façades are likely to be exposed to relatively high levels of train airborne noise, it could be considered reasonable to apply the same criteria for both groundborne and airborne noise. For airborne noise intrusion, higher noise levels are generally considered acceptable, of around 45dBA  $L_{A\max}$  in the case of residential buildings - corresponding to a low probability of sleep disturbance according to the general consensus of research into this field.



## 7.0 Baseline Vibration Survey

### 7.1 Procedure

A vibration survey was undertaken on Thursday 13 January 2022 between approximately 14:00 hours and 15:00 hours. Vibration measurements were undertaken to establish the prevailing noise and vibration levels due to train movements.

The surveys were performed by Thomas Jebson.

### 7.2 Measurement Positions

The measurement positions were as described and illustrated below.

Position	Type	Description
1	Unattended	The measurement position was located approximately 20m from the nearest trainline. The measurement position was representative of the closest proposed dwelling to the trainline.



Site Plan (© maps.google.co.uk)



### 7.3 Instrumentation

The following instrumentation was used for the survey and subsequent analysis:

- 1No. Dytran Accelerometer
- 01dB –dB4 Hardware Interface
- 01dB – dBTrig Vibration Acquisition Software
- 01dB – dBTrait Vibration Analysis Software
- Microsoft Windows Based Laptop Computer

The 01dB hardware connects one accelerometer via a multi-channel USB interface to the laptop computer. The system can record data in real-time to a laptop computer allowing simultaneous analysis in both the time and frequency domains.

The analysis chain was calibrated prior to the measurements to enable subsequent analysis.

The vibration measurements were undertaken with the accelerometer attached to the surfaces using magnetic coupling to a magnetic mounting plate bonded to the ground via metal upstands fixed directly within the ground.

### 8.0 Building Response

The building development superstructure will modify the surveyed vibration levels, superstructures often amplifying foundation vibration levels. Our analysis assumes the following:

- Empirically researched floor amplification factors as given within "A Prediction for Rail Transportation Ground-borne Noise and Vibration" (Ref 1) and "Handbook for Urban Noise and Vibration Control" (Ref 2).
- The maximum recorded vibration levels for different train pass-bys shall be used.
- The proposed building structure is understood to be small masonry on spread footing.

### 9.0 Predicted Levels of Vibration and Groundborne Noise

#### 9.1 Tactile Vibration Impact

The following table presents our estimates of the number of train passes for daytime (07:00 hours to 23:00 hours) and night-time (23:00 hours to 07:00 hours) periods. These predictions are based upon online train movement data and schedules accessible to the public.



Train Type/Description	Daytime (07:00 – 23:00)	Night-Time (23:00 – 07:00)
Passenger	152	20
Freight	8	2

Based on the typical maximum recorded vibration levels we have calculated predicted VDV levels within the proposed development at the worst affected noise sensitive floor. Predictions are made using the measurement data, the estimated train movement frequency detailed in the table above, and high amplification factors based on the proposed building structure. The following table presents approximate predicted VDV levels based on our understanding of the proposed development.

Period	VDV ( $\text{m/s}^{1.75}$ )
Daytime (07:00 – 23:00)	0.15
Night-Time (23:00 – 07:00)	0.09

## 9.2 Groundborne Noise Levels

Based on the maximum recorded vibration levels we have calculated predicted groundborne noise levels within the proposed development at each floor. Predictions are made using the measurement data and high amplification factors based on the proposed building structure. Noise levels will also decay slightly with height.

The table below presents the predicted approximate groundborne ( $L_{AS\max}$ ) noise levels, based on our understanding of the proposed development.

Location	Level (dB $L_{AS\max}$ )
Nearest residential Receptor	35

## 9.3 Discussion

Our calculations indicate a worst-case estimated vibration dose values in the worst affected apartments (habitable rooms located closest to the train line) below the proposed target. In accordance with BS 6472, this would indicate a “low probability of adverse comment”.

Calculations of re-radiated noise indicate re-radiated noise level targets should be achievable in the majority of dwellings with the use of most modern residential building methods (e.g. traditional concrete spread footing foundations with natural frequencies of slabs in the region of 5-15 Hz).



Whilst it would be prudent to analyse vibration (and re-radiated noise) levels through design – i.e. to verify the suitability of the preferred structural design – at this stage we would not anticipate any specific train-induced vibration mitigation measures being required.

## 10.0 Conclusions

Due to train lines being within the vicinity of the development site, a detailed survey has been undertaken to establish the existing levels of train-induced vibration. The results of the survey have been used to undertake a preliminary estimate of the resultant vibration level within the proposed residential apartments.

Our findings indicate vibration levels in the worst-case houses are expected to fall below the suggested upper limit to avoid adverse comment. Similarly, it should be possible to achieve the suggested re-radiated noise limits in all of houses with most conventional structural designs (e.g. traditional concrete spread footing foundations with natural frequencies of slabs in the region of 5-15 Hz).

Based on the findings of this vibration impact assessment report, other than due diligent checks with the structural design, we would not anticipate any specific train-induced vibration mitigation measures being required.

HT: 29454      1 September 2022

Great Western Road

References

"A Prediction Procedure for Rail Transportation Ground-borne Noise and Vibration" James Turner Nelson and High Saurenman Transportation Research Record 1143.

"Handbook of Urban Rail Noise and Vibration Control" Saurenman, Nelson, Wilson US Department of Commerce National Technical Information Services – February 1982.

"Measurement and Assessment of Groundborne Noise and Vibration" (Third Edition), The Association of Noise Consultants. ISBN 978-0-9572543-2-9 ('ANC Red Book')

## Appendix A – Vibration Terminology

### Vibration Units

The vibratory motion of a surface can be described by either:

- (a) displacement (m),
- (b) velocity (m/s), or
- (c) acceleration ( $\text{m/s}^2$ ).

Furthermore the vibration magnitude can be quantified in several ways:

peak to peak : This value gives the total excursion of the oscillation about the zero datum. The unit is often used where the vibratory displacement of a component is critical for maximum stress or mechanical clearance calculations.

peak : This value gives the maximum excursion of the oscillation above or below the zero datum. This value is useful for indicating the level of short duration shocks.

r.m.s : This value gives the root mean square of the time history over a specific time interval (time constant). This value is useful for indicating the energy content of the vibration.

dB : Decibel quantities are often encountered. A reference level of  $10^{-6} \text{ m/s}^2$  r.m.s is typically used for acceleration.

### Vibration Dose Value (VDV) ( $\text{m/s}^{1.75}$ )

This value assesses both the magnitude of vibration and its duration. Where possible the vibration dose value should be determined over the full exposure to vibration. It is often estimated from the magnitude and frequency weighted r.m.s value of the acceleration and the quantity of train pass-bys.

## **Appendix B – Noise Terminology**

**dB** : Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.

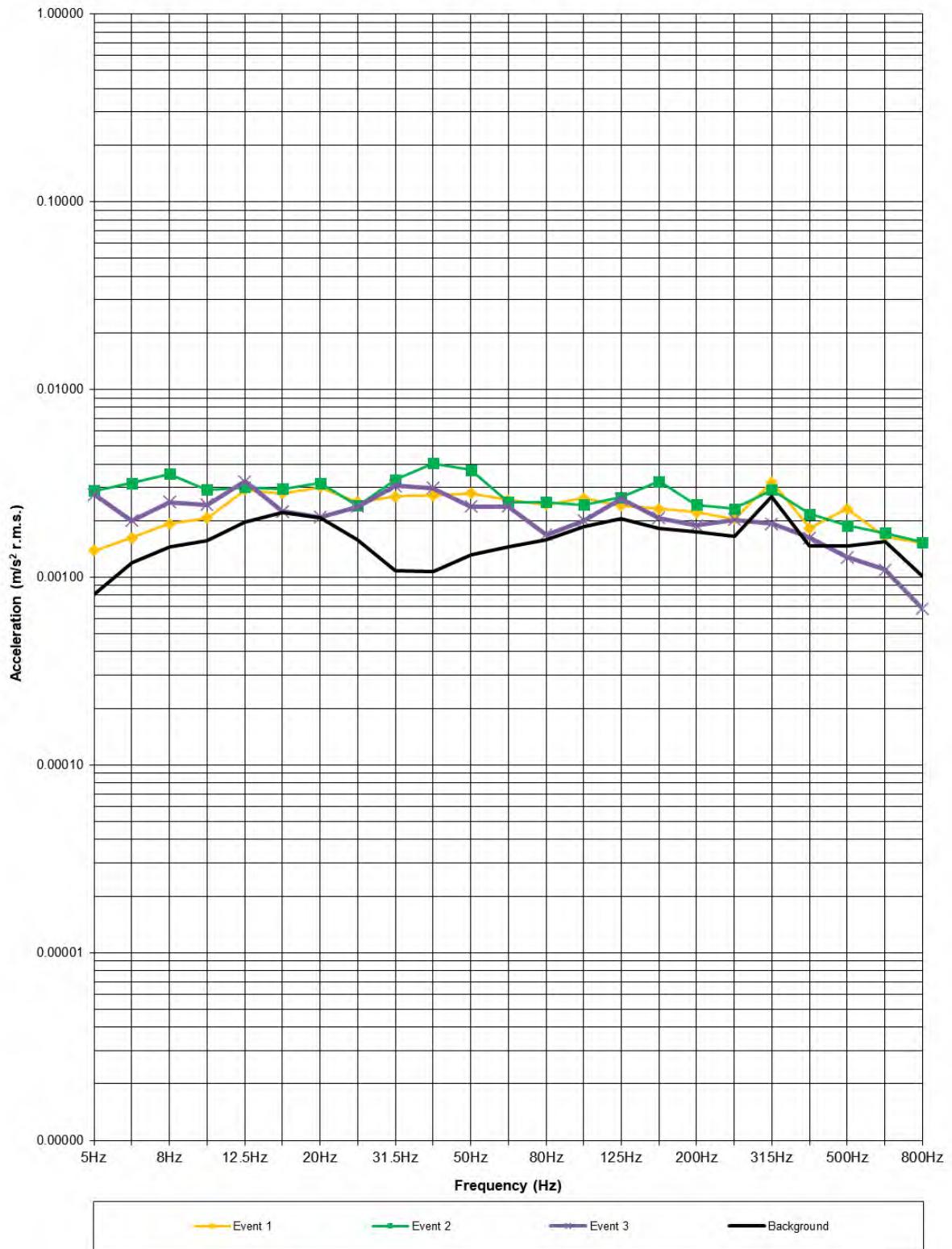
**dBA** : The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dBA level.

Because of being a logarithmic scale noise levels in dBA do not have a linear relationship to each other. For similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

**L<sub>max</sub>** : L<sub>max</sub> is the maximum sound pressure level recorded over the period stated. L<sub>max</sub> is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L<sub>eq</sub> noise level.

**L<sub>smax</sub>** : L<sub>smax</sub> is the maximum sound pressure level recorded over the period stated where the meter has a slow response (1 second) as opposed to a fast response which is usually set to 0.125 seconds.

**Great Western Road, Gloucester**  
**Measured Vibration (Vertical) of Train Passbys**  
**At Position 1 (20m) on Thursday 13 January 2022**



[REDACTED] response from [REDACTED] 01.09.22

### Noise

The submitted noise assessment appears satisfactory and predicts that, with the implementation of the recommended noise mitigation measures, internal noise levels should be acceptable. When the site design has been finalised, the applicant should submit a revised noise assessment detailing the proposed glazing and ventilation products to be installed and confirming that they will meet the recommended noise reduction specifications. In terms of external amenity area noise levels, the noise assessment recommends a 2m acoustic fence along the boundary with the railway line. Full details of the height, extent, construction and surface density of the recommended acoustic fence should be submitted for approval.

The points raised would be expected to be captured within forthcoming planning conditions as design progresses and exact solutions developed.

However, it is not clear if the railway sidings, to the west of the site, would remain in use, can the applicant clarify please.

During all our times on site during the noise and vibration surveys undertaken we did not witness the railway sidings used. That said, our noise survey was undertaken over a number of an 8 day period to ensure a robust data set for analysis.

It would not be considered unreasonable to assume the sidings were used within this period, although this is unconfirmed due to the nature of the survey (ie predominantly unattended).

The measured levels at MP1 (most representative of dwellings to the sidings) are notably quieter to that of the measured levels at MP2 (5-7dB), hence the reduce glazing specification. It should however be acknowledged that the glazing only reduces by 3dB, so there is likely some safety to guard against the sidings.

Ultimately, if further comfort is required further measurements could be undertaken as part of the design process to quantify via attended survey, but based on our previous time on-site there is no guarantee of marrying up a survey with when the sidings are in use without engagement with Network Rail.

In terms of noise from fixed plant / equipment associated with the development, the applicant shall submit further information to demonstrate that the BS4142 noise limits detailed in section 13.1 of the noise assessment will be complied with.

To complete this, a full plant noise assessment would need to be undertaken at planning stage which is a lengthy piece of work and reliant on significant information from others. Realistically, this is rare for residential developments whereby there is likely to be very little external noise generating plant items (ie small ventilation kit), and selections are unknown at this stage.

The limits are not considered to be onerous, and would be expected to readily achievable given the layout of the site and expected items of plant. A suitably worded planning condition would not be an unreasonable request to address this matter during the design phase.