Land at Longbridge, Warwick

Flood Risk Assessment

For
Warwick District Council

Issue 3

FAIRHURST

FAIRHURST

CONTROL SHEET

CLIENT: **Warwick District Council**

PROJECT TITLE: **Land at Longbridge, Warwick**

REPORT TITLE: **Flood Risk Assessment**

PROJECT REFERENCE: **113546 - 100**

Issue and Approval Schedule:

ISSUE 1	Name	Signature	Date
Prepared by	N Sproat	N Sproat	04/02/16
Reviewed by	M Hayward	M Hayward	08/02/16
Approved by	M Hayward	M Hayward	08/02/16

Revision Record:

Issue	Date	Status	Description	By	Chk	App
2	12.02.2016	Final	Revised after Client comments	mh	NS	NS
3	15.02.2016	Final	Revised after Client comments	mh	AH	NS

This report has been prepared in accordance with procedure OP/P02 of Fairhurst's Quality Management System.

Fairhurst,
Cornwall Buildings, 45-51 Newhall Street, Birmingham. B3 3QR
T: 0121 213 4892 Fax: 0844 3814412 E-mail: Birmingham@fairhurst.co.uk

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1.0 Introduction

1.1 Fairhurst have been commissioned by Warwick District Council to undertake a Flood Risk Assessment for the proposed allocation of land for development at Longbridge, Warwick.

1.2 This Flood Risk Assessment has been compiled in accordance with National Planning Policy Framework (March 2012) Section 10 (Meeting the challenge of climate change, flooding and coastal change) together with Sections 2 – 19 of the accompanying Technical Guidance and CIRIA C753: SUDS Manual.

2.0 Site Location and Description

2.1 The approximately 27.5ha site is located at NGR SP 272625 with the nearest postcode CV34 6RB being predominantly brownfield in the north and greenfield in the south. It is bounded to the north by a Severn Trent Water sewage works, to the east by the River Avon. To the south is the M40 motorway and to the west is the A429 Stratford Road.

2.2 The north eastern part of the site mainly consists of a Severn Trent Water depot and compound together with a grounds maintenance contractors offices and yard.

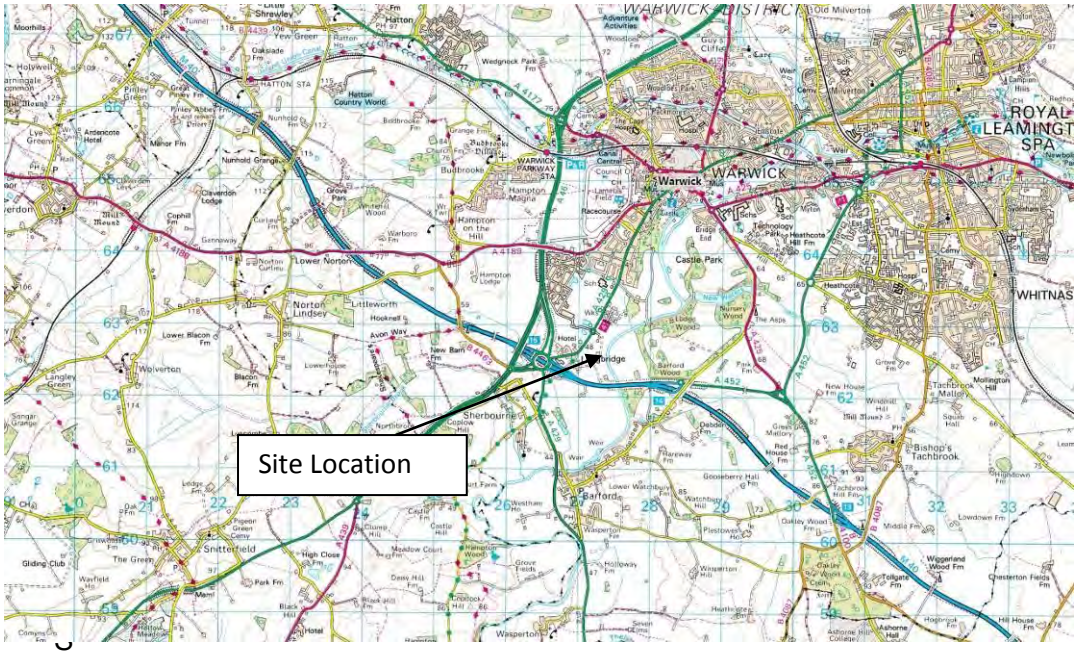
2.3 The North West and southern part of the site consists of open Greenfield farm land with isolated buildings.

2.4 The site is nominally flat with a general elevation of around 49m AOD. See Topographical Data in Appendix A. As a full topographical survey is not available this data has been compiled utilising digital map base together with Digital Terrain Height Data from Geostore.

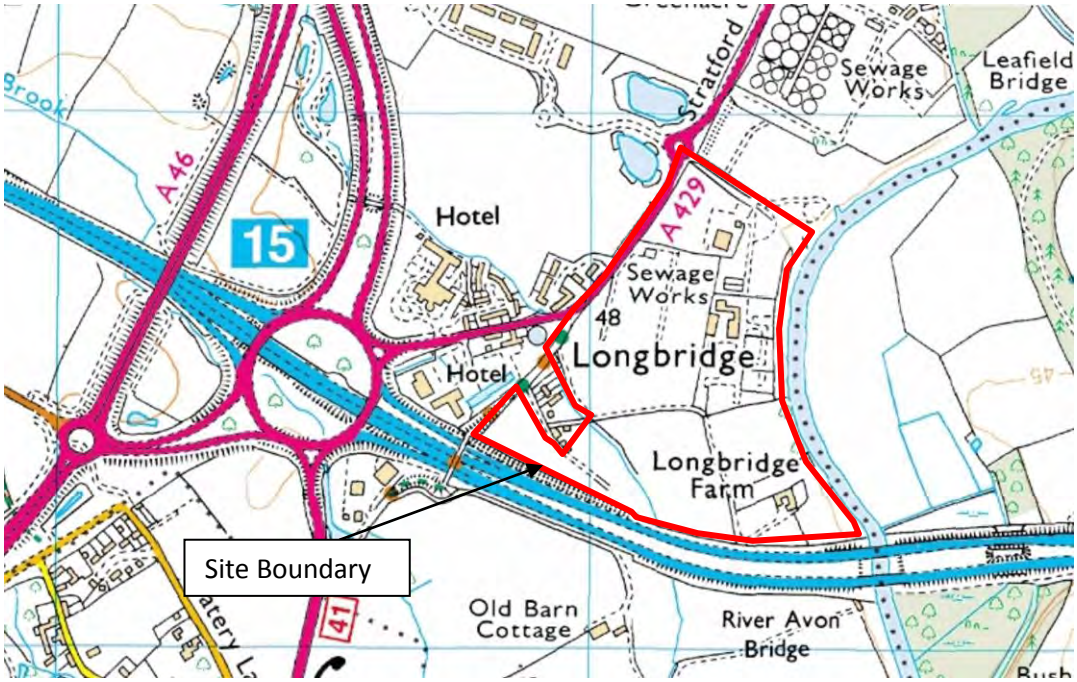
2.5 A site visit was undertaken on 27th January 2016. The site visit record and photos from this are given in Appendix B.

3.0 Development Proposals

3.1 The proposal is to allocate the site for employment use intended for Class B1 business, Class B2 general industrial and Class B3 Storage and distribution developments. This would include all associated infrastructure i.e. roads, parking, landscaping, drainage etc.



Site Location Plan Figure 1A



Site Location Plan Figure 1B

4.0 Geology

4.1 The British Geology Society (BGS) website indicates that the site is underlain by a bedrock of Mercia Mudstone and Siltstone with a superficial deposit of Alluvium containing Clays, Silt, Sands and Gravels, see Figures 2 and 3 below.

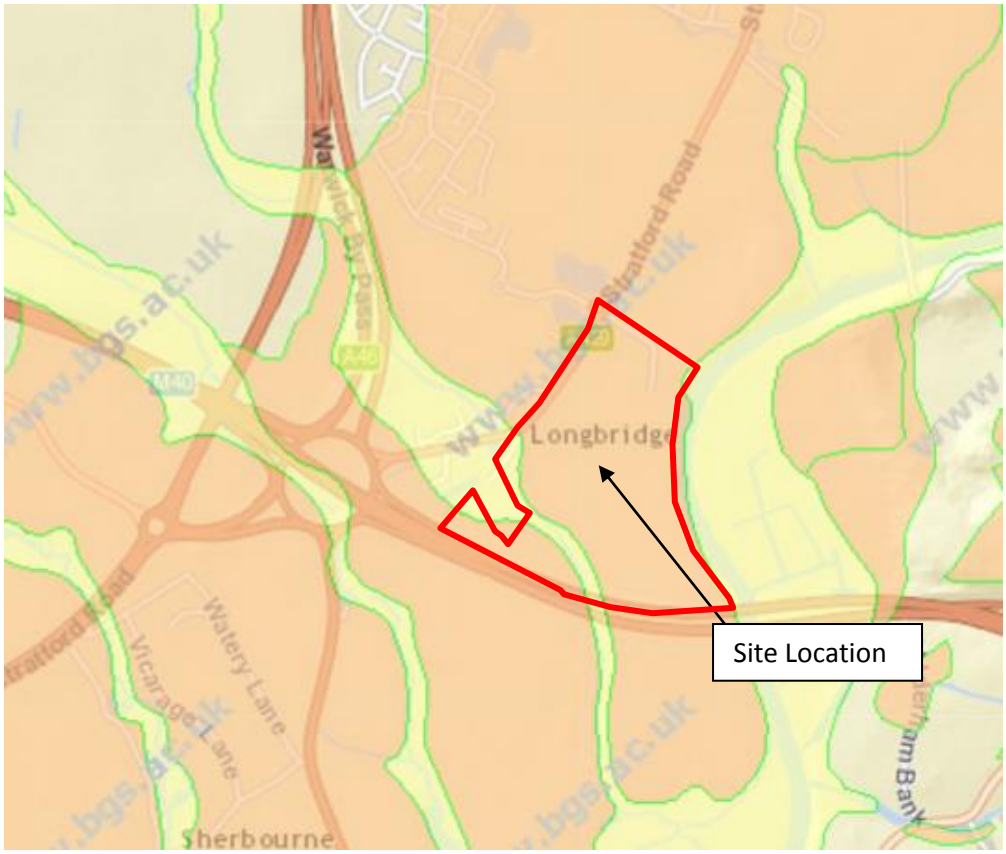


Figure 2 British Geological Survey (BGS). Mapping for superficial deposits

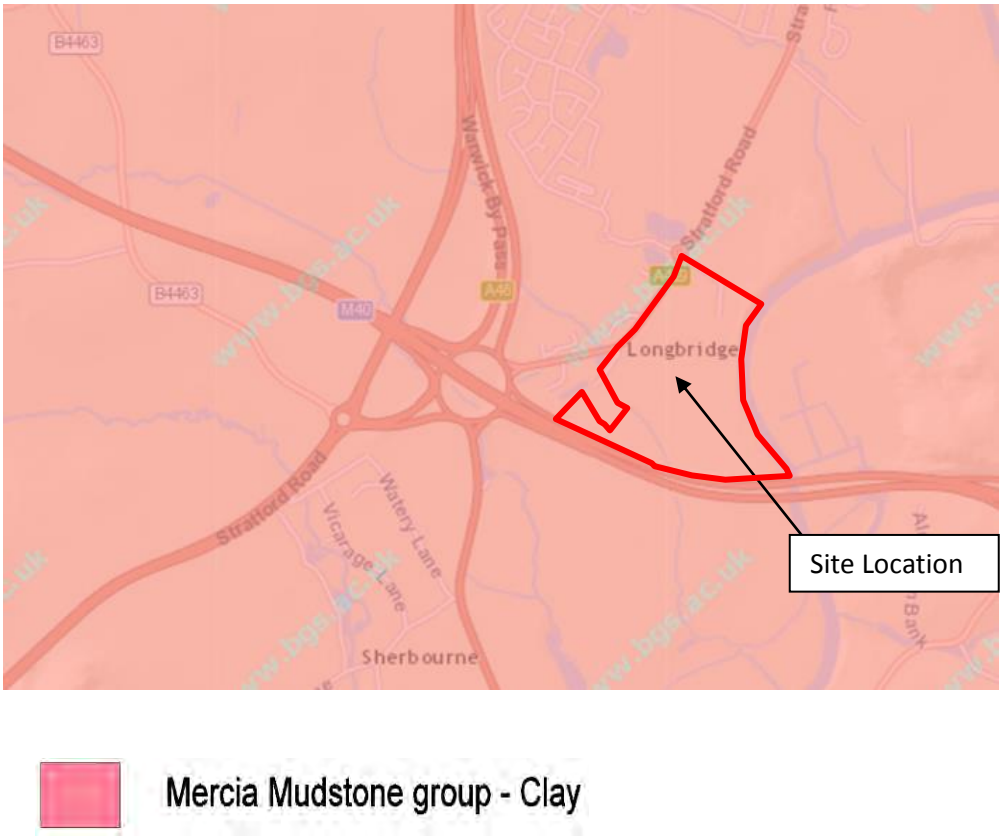


Figure 3 British Geological Survey (BGS). Mapping for bedrock deposits.

5.0 Hydrology

5.1 The River Avon lies on the eastern boundary of the site and flows in a southerly direction. The nearest large raised body of water in relation to the site is New Waters reservoir approximately 1 mile to the north. Draycote water also lies approximately 12 miles north “as the crow flies” from the site. There is an unnamed water course which runs north west to south east through the very southern part of the site. There are also two large attenuation ponds for the commercial development north west of the site on the other side of the A429

6.0 Hydrogeology

6.1 Plans from the Environmental Agency website show that there are no groundwater source protection zones within the vicinity of the site. The area is within the minor aquifer high zone which would indicate that pollutants could be easily transmitted through into the groundwater (due to the geology) but would have a minor effect on any aquifers within the area.

7.0 Flood History and Records

7.1 The Environment Agency indicative flood maps for planning show that the southern part of the site has a >1% of fluvial flooding, therefore falls within Flood Zone 3 (high probability), whereas the northern part of the site has a <0.1% chance or 1 in 1000 annual probability of fluvial flooding and therefore this section of the development falls within Flood Zone 1 (low probability). There are small areas which have an annual probability between 1 in 100 and 1 in 1000 of fluvial flooding therefore lie in Flood Zone 2 See Figure 4.

7.2 The Environment Agency Mapping also indicates that the site has <1% chance (very low) susceptible of surface water flooding. See figure 5.

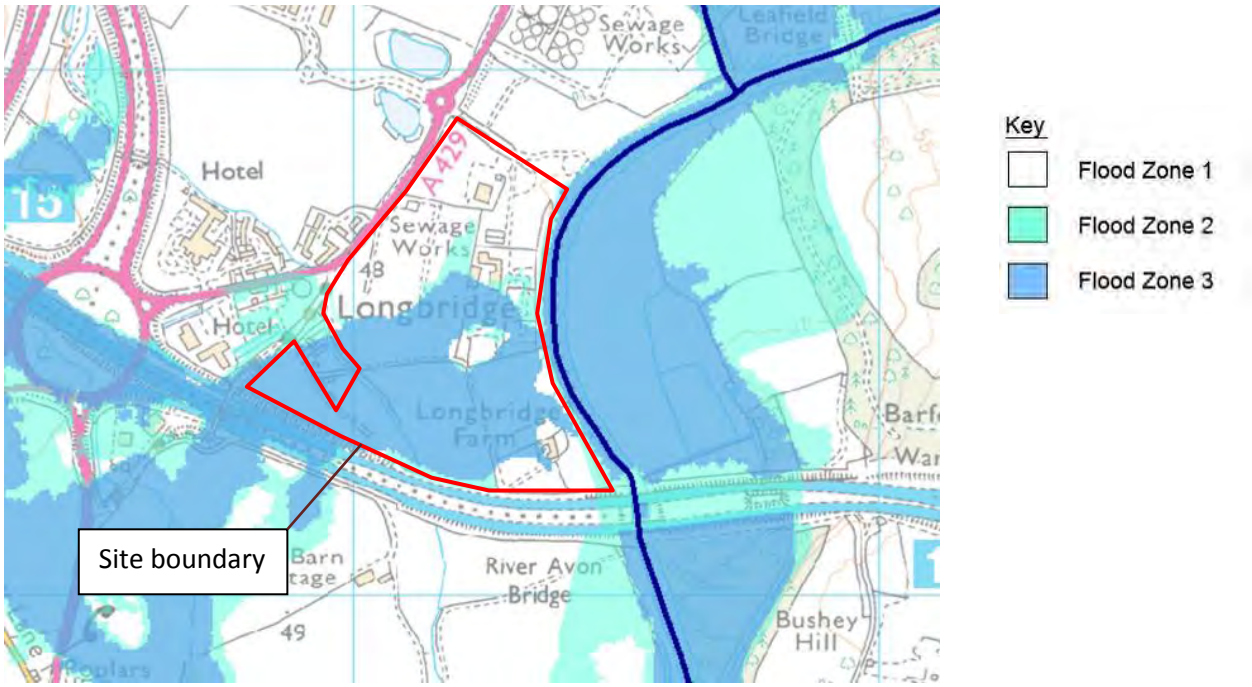


Figure 4 Environment Agency Fluvial Flood Mapping

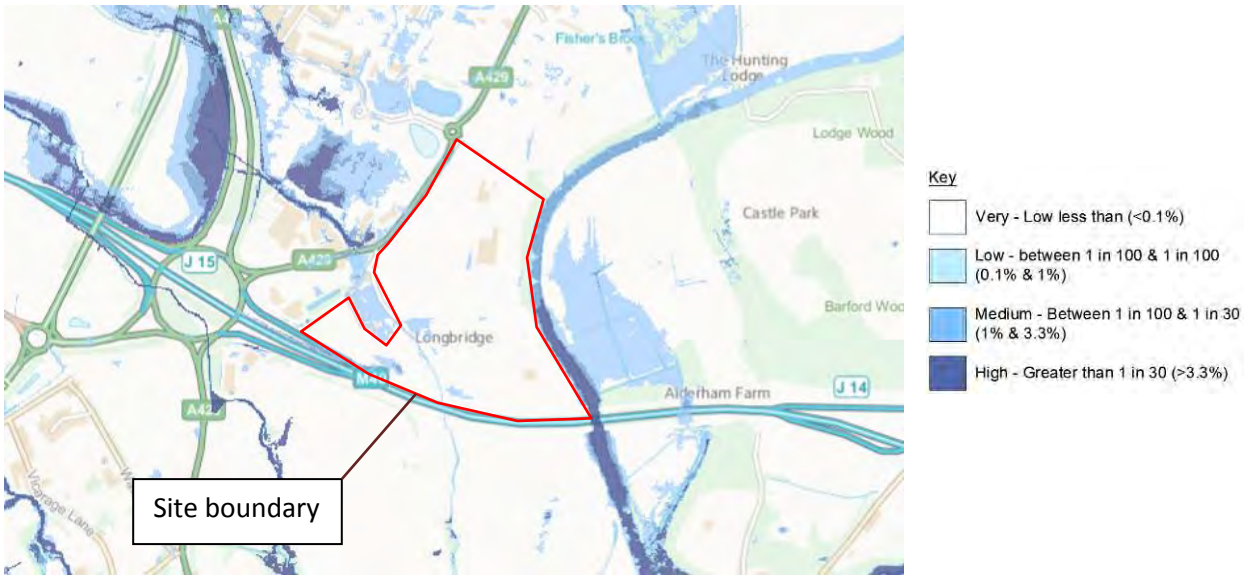


Figure 5 Environment Agency Surface Water Flood Mapping

8.0 Sequential and Exceptional Tests

8.1 Sequential testing is aimed at steering new developments to areas with the lowest probability of flooding. Table 1.0 in Appendix C shows the Flood Risk Vulnerability Classification as defined by the Environment Agency and the type of development compatible with that particular classification.

8.2 Exception testing is to demonstrate that the development provides wider sustainability benefits to the community that outweighs the flood risk if the development lies outside Flood Zone 1.

8.3 There are no firm development layout plans. However any proposed development within Flood Zones 3 and 2 would require a sequential and exception test.

9.0 Forms of Flooding

9.1 Flooding can originate from a number of different sources and CIRIA C624: Development and Flood Risk Guidance provides a list of those which need to be considered.

These are summarised in Table 3.0 below with a schedule of whether they need to be considered at this site. Source	Requires considering for this site?
Fluvial	√
Coastal and Tidal	x
Estuarine and Tidal Affected Watercourses	x
Groundwater	√
Overland flow and surface water flooding	√
Artificial Drainage Systems e.g. reservoirs	√
Infrastructure Failure e.g. water mains and sewers.	√

Table 3.0 Forms of Flooding

9.2 There are a number of potential flooding sources from the table above which require consideration in relation to the proposed development:-

- Fluvial – As discussed in Section 7.1 the site lies within Flood Zones 1, 2 & 3. Flood Zone 1 has a probability of less than a 1 in 1000 chance (<0.1%) whereas Flood Zone 3 has a 1 in 200 chance (>1%) of fluvial flooding. Development should be directed to Flood Zone 1 before Flood Zone 2 and preferably avoided in Flood Zone 3 as flood compensation would be required in this event.
- Groundwater – The Stratford-on-Avon DC, Warwickshire CC, North Warwickshire BC and Rugby BC Level 1 Strategic Flood Risk Assessment (SFRA) undertaken by URS in September 2013 indicates that the site lies in an area which has a greater than 75% chance of being susceptible to groundwater flooding.
- Overland Flow and Surface Water Flooding – This can occur, particularly in valley bottoms, when the underlying soils become saturated or are of clay deposits and infiltration of rainfall can not occur. It can also occur when the drainage infrastructure can not cope with the volume of rainfall in extreme events which are in excess of the design capacity of the surface

water system. From reviewing the general topography of the area, and from the Environment Agency's surface water mapping (see Figure5) it would suggest that the site would not be affected by overland flow or surface water flooding. The new infrastructure which will be constructed in the area will assist in mitigating any overland flow or surface water flooding should it occur.

- Artificial Drainage Systems – Artificial drainage systems are manmade structures that are designed and have the capability to hold water such as canals or reservoirs and if fail would cause catastrophic flooding downstream. As mentioned in Section 5.0 there are a number of reservoirs which could affect the site. The closest reservoir is New Waters which lies approximately 1.3km from the site, Reservoir Inundation Mapping for this reservoir would seem to show that if this structure were to fail it would not adversely affect the site. Environment Agency Reservoir Flood Mapping given as Figure 6 shows that there is a potential of flooding from reservoirs across much of the site. this mapping is derived from overlaying Reservoir Inundation maps from all reservoirs to produce the overall outline. Draycote Water which lies 12 miles north east of the site is the largest reservoir in the area and it is presumed the flooding from reservoir outline relates to it., However due to the monitoring requirements of the Reservoirs Act 1975 it is considered that a catastrophic failure which the flood mapping represents would be an extremely unlikely event.
- Infrastructure Failure – This can be caused if a high pressure water main bursts or a sewer blocks and floods. Whilst these types of events occur they are very uncommon, therefore not considered to be an issue at this site.

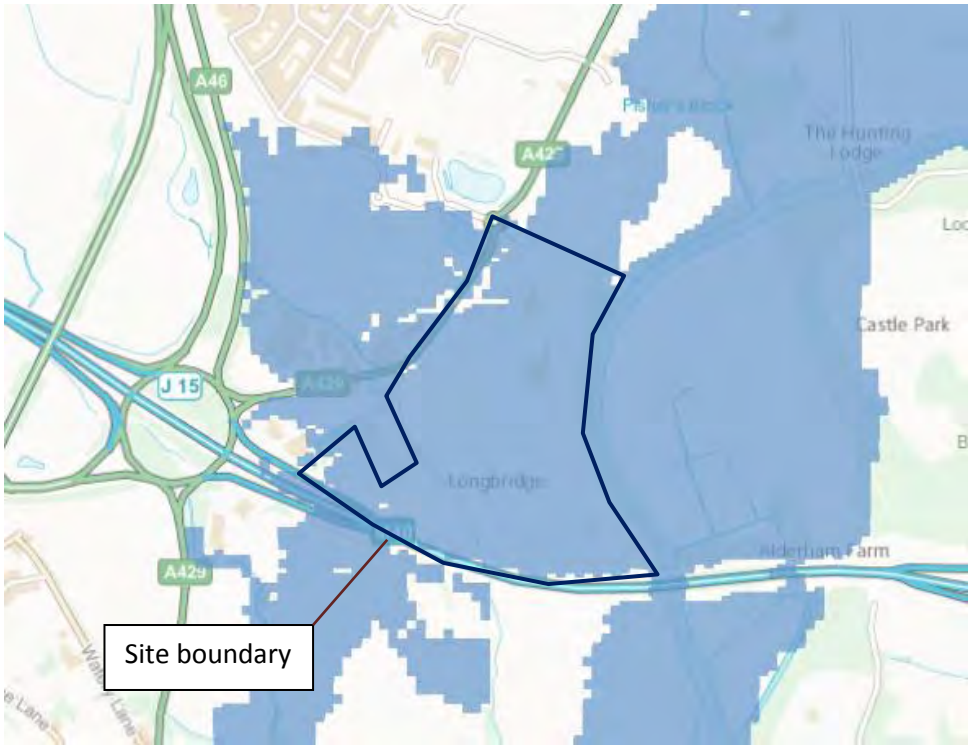


Figure 6 Environment Agency reservoir flooding map

10.0 Flood Risk and Mitigation Measures

10.1 The northern part of the site lies in fluvial Flood Zone 1, and no special features regarding flooding is envisaged to be required in this area. The southern section of the site according to the Environment Agency mapping lies within Flood Zones 2 and 3 and measures should be put in place to mitigate the effects of flooding if development is considered within them.

10.2 It would appear from reviewing the River Avon modelled flood levels obtained from the Environment Agency, that for a 1 in 100 plus climate change year event flood, the ground levels on the site are higher. Drawing 113546--1002 in Appendix D shows the site levels in relation to the modelled River Avon flood levels.

10.3 Therefore it is considered that the Zone 3 flooding indicated on the site would either originate from a source other than the River Avon or there are inaccuracies in the flood mapping.

10.4 Evidence of potential inaccuracy in the flood mapping is that Junction 15 of the M40 is shown as being flooded in a 1 in 200 year flood event although the levels are considerably higher than the surrounding area.

10.5 It is recommended that further flood studies are undertaken which should include the un-named watercourse in the southern part of the site which is the most likely source of the on site flooding.

10.6 From reviewing the Environment Agency mapping data in Figure 5, there are areas in the southern part of the site which are shown as Flood Zone 1 where potential for flood compensation could be undertaken. This could expand the potential buildable area of the northern part of the site.

11.0 Climate Change

11.1 Climate change is a well-documented occurrence which needs to be taken into account when looking at flooding. The proposed drainage infrastructure will be designed to take climate change into account therefore mitigating its' effects. The drainage infrastructure will be designed so as not to cause flooding offsite in the 1 in 100 plus 20% climate change rainfall event.

12.0 Existing Drainage

12.1 Severn Trent Water records which can be found in Appendix E indicate that there are two (one being 150mm, the other not identified) pressurised foul rising mains running from south to north towards the existing sewage treatment works north of the site boundary. The plans also identified a 100mm pressurised rising main running along the A429 in a northerly direction.

12.2 There is a single 1500mm surface water sewer heading in an easterly direction north of the development site from Tournament Fields to a head wall which outfalls into the River Avon.

12.3 Correspondence from Severn Trent Water has confirmed that there is no known flooding from the sewers within the area.

12.4 The method of draining surface water from the existing developed area is unknown.

13.0 Proposed Drainage

13.1 Any future developments on the proposed site must comply to the Building Regulations surface water drainage hierarchy. Part H3 states that storm water should discharge to (in descending order of priority):

a) an adequate soakaway or some other adequate infiltration system: or where that is not reasonably practicable,

b) a watercourse or where that is no reasonable practicable,

c) a sewer.

13.2 From reviewing the geological mapping and from the known potential properties of the River Terrace deposits there is potential for infiltration techniques to dispose of surface water on the site. However the thickness of potentially suitable strata together with insitu infiltration testing to BRE365 will be required.

13.3 Should infiltration techniques not be viable on all or parts of the site then it is proposed to discharge surface water to the River Avon. Warwickshire County Council are the Lead Local Flood Authority and their guidance requires that where possible regenerated brownfield sites discharge at green field run-off rates. If this is not technically or financially feasible then up to 50% betterment over existing rates is required. At the point of writing this report an enquiry had been sent to Warwickshire County Council as Lead Local Flood Authority but there has been no reply.

13.4 Basic drainage calculations using the ICP Suds Method which can be found in Appendix F have shown that the current Greenfield runoff Q/bar rate is 130.8l/s. This equates to 4.76l/s per hectare. This is assuming a site area of 27.5ha with 15% of the existing site being urban (impermeable).

13.5 Sustainable Urban Drainage techniques e.g.. infiltration / retention ponds, permeable paving, green roofs etc will be considered for inclusion into any future development where reasonably practicable.

13.6 Once the development proposals are more advanced then the proposed existing and proposed discharge rates and method of disposal can be firmed up.

14.0 Proposed Developable Areas

14.1 As discussed in Section 8 development should be directed to areas of least flood risk i.e. Flood Zone 1 should be developed before Flood Zone 2 and Flood Zone 3 should not be developed unless it is compatible or there is no viable alternative.

14.2 Based on the Environment Agency flood mapping the northern area of the site could be developed without any sequential testing. However any development in Flood Zone 2 or 3 would require flooding sequential and exception test.

14.3 The potential development areas together with possible flood compensation areas is shown on drawing 113546 -1003 in Appendix F. The areas wihin Flood Zone 1 and Flood Zone 2 together with additional area released by flood compensation is shown.

15.0 Conclusion

15.1 The site comprises of approximately 27 hectares of greenfield and brownfield land between Junction 15 of the M40 motorway, the River Avon and Stratford Road.

15.2 Environment Agency's indicative flood map shows that the northern part of the site is within Flood Zone 1, whereas the southern section of the site is within flood Zones 2 and 3.

15.3 Reviewing the topographical survey data and the modelled River levels it would suggest that the flooding shown in Figure 5 is not from the River Avon but from another source. It is suggested that a more detailed study is carried out in and around the site boundary to obtain a more detailed indication of any potential extents of flooding on the site.

15.4 Severn Trent Water has confirmed that there is no known flooding from the sewers in this area.

15.5 Based on the above, it is considered that there is no reason why parts of the site can’t be developed / re-developed from a flood risk point of view.

References:-

- National Planning Policy Framework (March 2012) Section 10 (Meeting the challenge of climate change, flooding and coastal change) together with Sections 2 – 19 of the accompanying Technical Guidance.
- CIRIA C624: Development and Flood Risk Guidance.
- CIRIA C753 The SUDS Manual
- The Building Regulations 2010 – Drainage and Waste Disposal Part H
- https://www.gov.uk/government/organisations/environment-agency
- www.bgs.co.uk
- Sewers for Adoption 6th Edition – Water Research Council.
- Stratford-on-Avon DC, Warwickshire CC, North Warwickshire BC & Rugby BC level 1 SFRA Report, - September 2013 – Written by URS
- BS8582 2013 Code Of Practice For Surface Water Management For Development Sites.
- Warwickshire County Council – Draft Flood Risk and Drainage Planning Advice

Appendix A

Topographical Information

Do not scale from this drawing.

Notes

- Existing levels area taken from Geostore digital terrain height data
- Modelled River Avon Levels taken from supplied Environment Agency data.
- This drawing is for information only.

Key

Approximate site Boundary

. Existing Site Levels

AVO**** **.** River 1:100+CC flood level

Rev.	Date	Description	Drwn.	Chkd.	Appd.

FAIRHURST

Cornwall Buildings
45-51 Newhall Street
Birmingham
B3 3QR

Tel: 0121 213 4892
Fax: 0844 381 4412

Client: WARWICK DISTRICT COUNCIL

Project Title:
LAND AT LONGBRIDGE
WARWICK

Drawing Title:
TOPOGRAPHICAL INFORMATION

Scale at A1:	Status:	
1:1250	For Information	
Drawn: AH	Checked: NJS	Approved: MH
Date: 05/02/16	Date: 08/02/16	Date: 08/02/16
Drawing No.: 113546/1001		Revision: –

Appendix B

Site Visit Records and Photos

Site visit Notes and Photos

The site was visited on 27th January 2016 and viewed from Stratford Road, Severn Trent Water access road and the fisherman's access.
A ditch – piped in places - was noted to the south of the main access road which outfalls to the River Avon at the north east corner of the site.
There are trees to much of the sites boundaries. Those along the river were mature with some having fallen into the river.
The area to the east outside the Severn Trent Water compound was covered in trees and brambles.
The area to the south and west was managed farmland laid to pasture.
The site is nominally flat and raised an estimated 3-4 m above the level of the River Avon.
The area to the east of the River Avon was much lower with a small bund along the top of the bank.
A second outfall was noted approximately half way along the east boundary which discharged to the river.

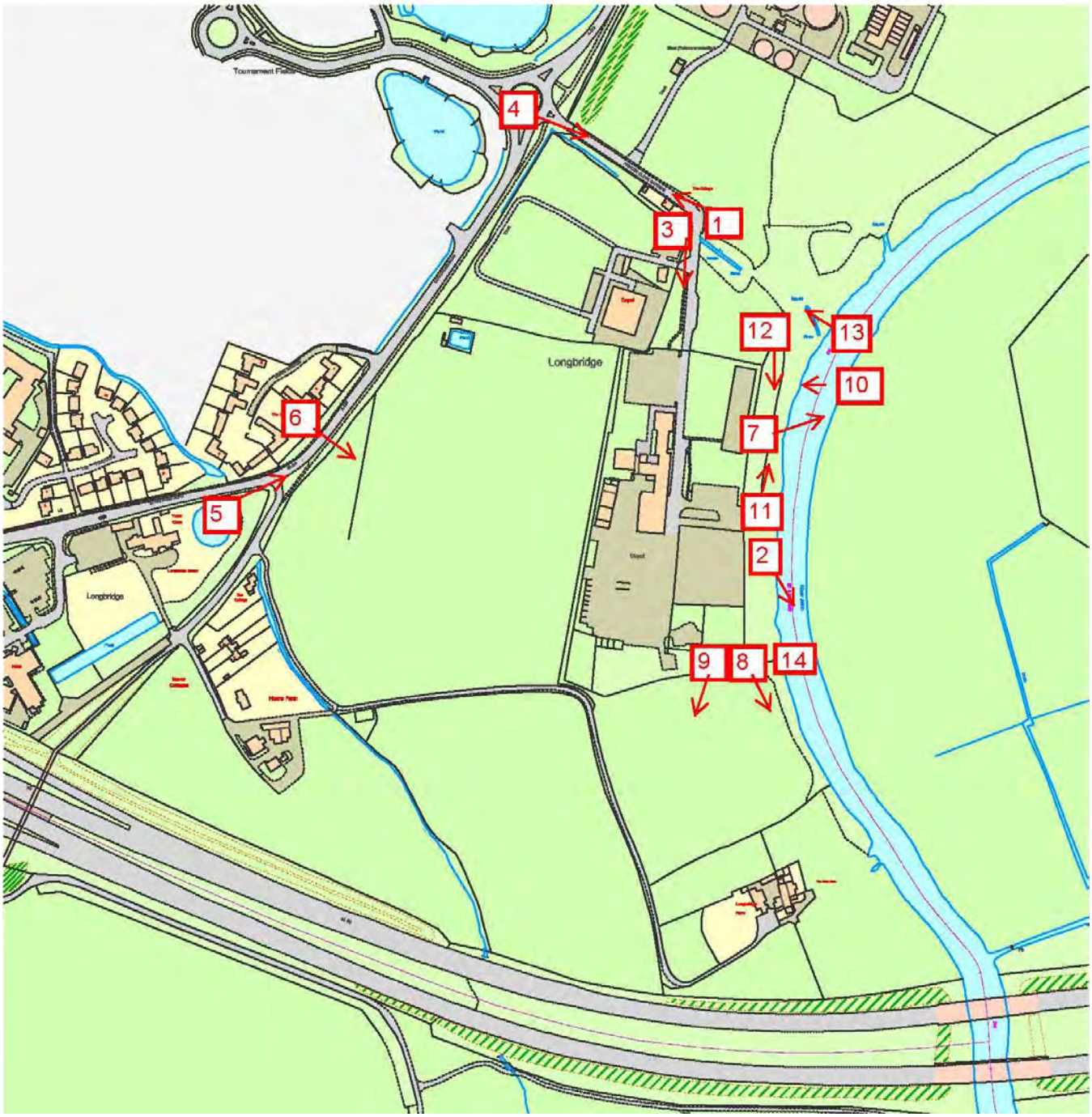


Photo Location Plan

Mark Hayward 28.01.2016

Photo 1 – Access road from fishermans car park. Stratford Road in distance.

Photo 2 – Severn Trent Water compound from eastern boundary.

Photo 3 – Severn Trent Water compound from main access road looking south.

Photo 4 – Ditch along northern boundary from Stratford Road.

Photo 5 – View north along west boundary up Stratford Road.

Photo 6 – View east across farmland from Stratford Road. Severn Trent Water compound in distance.

Photo 7 – View north east across River Avon.

Photo 8 – View south east across River Avon. M40 in distance.

Photo 9 – View south west across farmland from south end of Severn Trent Water compound.

Photo 10 – Typical view up to plateau from River Avon.

Photo 11 – Typical view along western bank of the River Avon.

Photo 12 – Typical view along western bank of the River Avon.

Photo 13 – Looking up ditch on north boundary from River Avon.

Photo 14 – Headwall near south end Severn Trent Water compound discharging to River Avon.

Appendix C

Sequential and Exception Test Tables

SEQUENTIAL TEST TABLES – CLASSIFICATION OF DEVELOPMENT TYPES AND FLOOD ZONE COMPATIBILITY

Vulnerability	Development type
Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines
Highly Vulnerable	• Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”).
More vulnerable	• Hospitals. • Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in “more vulnerable”, and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Vulnerability	Development type
Water compatible development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 1.0 Flood Zone Compatibility

Flood Risk Vulnerability classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exemption Test Required	✓	✓
	Zone 3a	Exemption Test Required	✓	×	Exemption Test Required	✓
	Zone 3b	Exemption Test Required	✓	×	×	×

Table 2.0 Flood Risk Vulnerability Classification and Flood Zone Compatibility

Tables taken from national planning policy framework (March 2012) technical appendices

Appendix D

Topographical and River Avon Flooding Levels Drawing

Do not scale from this drawing.

Notes

- Existing levels area taken from Geostore digital terrain height data
- Modelled Rover Avon Levels taken from supplied Environment Agency data.
- This drawing is for information only.

Key

Approximate site Boundary

. Existing Site Levels

AVO**** **.** River 1:100+CC flood level

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FAIRHURST

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45-51 Newhall Street
Birmingham
B3 3QR

Tel: 0121 213 4892
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Client: WARWICK DISTRICT COUNCIL

Project Title:
LAND AT LONGBRIDGE
WARWICK

Drawing Title:
TOPOGRAPHICAL AND RIVER AVON FLOODING LEVELS

Scale at A1:	Status:	
1:1250	For Information	
Drawn: AH	Checked: NJS	Approved: MH
Date: 05/02/16	Date: 08/02/16	Date: 08/02/16
Drawing No.: 113546/1002		Revision: –

Appendix E

Severn Trent Water records

Mark Hayward

From: Andrew.Biggins@severntrent.co.uk on behalf of net.dev.east@severntrent.co.uk
Sent: 03 February 2016 15:26
To: Mark Hayward
Subject: Re: 113456 – Land at Londbridge, Warwick. CV34 6RB
Attachments: Location Plan.pdf

Dear Mr Hayward,
Thank you for your enquiry and sorry it has taken a while to respond.

We have no record of any sewer related flooding at the specified site, or within 500m of the site. (based at grid 427100,262520).

Please note there are two pressurised sewers cross the site and a water main.

Regards,
Andy
Asset Protection Waste Water
Tel 0116 234 3834

(reply to net.dev.east@severntrent.co.uk)
Mark Hayward <mark.hayward@fairhurst.co.uk>

Mark Hayward
<mark.hayward@fairhurst.co.uk> To: <net.dev.east@severntrent.co.uk>
cc:
21/01/2016 13:50 Subject: 113456 – Land at Londbridge, Warwick. CV34 6RB

Dear Sirs,
With regard to the above site we have been asked by our client to undertake a Flood Risk Assessment for it's re-development as industrial / commercial use.
Please can you advise:-

- If there are any known non fluvial flooding incidents on or near the site e.g. from sewers.
- Any other pertinent information.

Attached is a location plan.
Should further information be required do not hesitate to contact me.
Regards,

Mark

Mark Hayward
Technical Manager

Fairhurst
Cornwall Buildings

SP2663SE

SP2562NW

SP2662NW

SP2662SE

Sewer Node **Sewer Pipe Data**

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SP26629900	48.67	nil	nil	S	U	U	1500	nil	0.00	nill
SP26629901	48.49	nil	nil	S	U	U	1500	nil	0.00	nill
SP26629902	48.69	43.23	43.06	F	CO	C	375	nil	463.13	2003
SP26629903	48.51	43.06	42.94	F	CO	C	375	nil	556.75	2003

- Abandoned Sewer
- Private Combined Gravity Sewer
- Private Foul Gravity Sewer
- Private Surface Water Gravity Sewer
- Public Combined Gravity Sewer
- Public Foul Gravity Sewer
- Public Surface Water Gravity Sewer
- Trunk Combined Gravity Sewer
- Trunk Foul Use Gravity Sewer
- Trunk Surface Water Gravity Sewer
- Combined Use Pressurised Sewer
- Foul Use Pressurised Sewer
- Surface Water Pressurised Sewer
- Highway Drain
- Combined Lateral Drain (SS)
- Foul Lateral Drain (SS)
- Surface Water Lateral Drain (SS)

- Cable, Earthing
- Cable Junction
- Cable, Optical Fibre/Instrumentation
- Cable, Low Voltage
- Cable, High Voltage
- Cable, Other
- Housing, Building
- Housing, Kiosk
- Disposal Site
- Sewage Treatment Works
- Housing, Other
- Pipe Support Structure
- Sewage Pumping Facility
- Sewer Facility Connection Inlet / Outlet

- Blind Shaft
- Combined Use Manhole
- Flushing Chamber
- Foul Use Manhole
- Grease Trap
- Head Node
- Hydrobrake
- Lamphole
- Outfall
- Overflow
- Penstock
- Petrol Interceptor
- Sewer Blockage
- Sewer Collapse

- Sewer Chemical Injection Point
- Sewer Junction
- Sewerage Air Valve
- Sewerage Hatch Box Point
- Sewerage Isolation Valve
- Soakaway
- Surface Water Manhole
- Vent Column
- Waste Water Storage
- Culverted Watercourse
- Pre-1937 Properties

MATERIALS

AC	- ASBESTOS CEMENT
BR	- BRICK
CC	- CONCRETE BOX CULVERT
CI	- CAST IRON
CO	- CONCRETE
CSB	- CONCRETE SEGMENTS (BOLTED)
CSU	- CONCRETE SEGMENTS (UNBOLTED)
DI	- DUCTILE IRON
GRC	- GLASS REINFORCED CONCRETE
MAC	- MASONRY IN REGULAR COURSES
MAR	- MASONRY RANDOMLY COURSED
PE	- POLYETHLENE
PF	- PITCH
PP	- POLYPROPYLENE
PSC	- PLASTIC STEEL COMPOSITE
PVC	- POLYVINYL CHLORIDE
RPM	- REINFORCED PLASTIC MATRIX
SI	- SPUN (GREY) IRON
XXX	- OTHER

CATEGORIES

W	- WEIR
C	- CASCADE
DB	- DAMBOARD
SE	- SIDE ENTRY
FV	- FLAP VALVE
BD	- BACK DROP
S	- SIPHON
HD	- HIGHWAY DRAIN
S104	- SECTION 104

SHAPE

C	- CIRCULAR
E	- EGG SHAPED
O	- OTHER
R	- RECTANGLE
S	- SQUARE
T	- TRAPEZOIDAL
U	- UNKNOWN

PURPOSE

C	- COMBINED
E	- FINAL EFFLUENT
F	- FOUL
L	- SLUDGE
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N
W E
S

SEVERN TRENT WATER

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0845 601 6616

SEWER RECORD (TABULAR)

O/S Map scale: 1:1250
Date of issue: 02.02.16
Sheet No. 1 of 1

This map is centred upon: O / S Tile reference:
SP2662NE

SP2662NE

SP2661NE

SP2662SW

SP2762SW

- Abandoned Sewer
- Private Combined Gravity Sewer
- Private Foul Gravity Sewer
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- Cable, Earthing
- Cable Junction
- Cable, Optical Fibre/Instrumentation
- Cable, Low Voltage
- Cable, High Voltage
- Cable, Other
- Housing, Building
- Housing, Kiosk
- Disposal Site
- Sewage Treatment Works
- Housing, Other
- Pipe Support Structure
- Sewage Pumping Facility
- Sewer Facility Connection Inlet / Outlet

- Blind Shaft
- Combined Use Manhole
- Flushing Chamber
- Foul Use Manhole
- Grease Trap
- Head Node
- Hydrobrake
- Lamphole
- Outfall
- Overflow
- Penstock
- Petrol Interceptor
- Sewer Blockage
- Sewer Collapse

- Sewer Chemical Injection Point
- Sewer Junction
- Sewerage Air Valve
- Sewerage Hatch Box Point
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- Waste Water Storage
- Culverted Watercourse
- Pre-1937 Properties

MATERIALS

AC	- ASBESTOS CEMENT
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MAR	- MASONRY RANDOMLY COURSED
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PVC	- POLYVINYL CHLORIDE
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SI	- SPUN (GREY) IRON
XXX	- OTHER

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SEWER RECORD (TABULAR)

O/S Map scale: 1:1250
Date of issue: 02.02.16
Sheet No. 1 of 1

This map is centred upon:
O / S Tile reference:

SP2662SE

SP2763SW

SP2762SW

SP2762NE

SP2862NE

Sewer Node / Sewer Pipe Data

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SP27620900	48.36	nil	nil	S	U	U	1500	nil	0.00	nill
SP27620901	48.46	nil	nil	S	U	U	1500	nil	0.00	nill
SP27620902	48.36	42.93	42.85	F	CO	C	375	nil	328.75	2003
SP27620904	48.39	42.86	42.73	F	CO	C	375	nil	736.46	nill
SP27621900	48.03	nil	nil	S	U	U	1500	nil	0.00	nill
SP27621901	46.92	nil	nil	S	U	U	nil	nil	0.00	nill
SP27621902	48.07	nil	nil	S	U	U	675	nil	0.00	nill
SP27621903	48.55	42.73	42.65	F	CO	C	375	nil	732.25	2003
SP27621904	48.85	42.65	42.56	F	CO	C	375	nil	719.67	nill
SP27622601	nil	nil	nil	F	AC		nil	nil	0.00	nill
SP27622701	nil	nil	nil	F	AC	C	150	nil	0.00	nill
SP27622702	nil	nil	155.77	F	VC	C	225	nil	0.00	nill
SP27622703	nil	nil	nil	F	AC		nil	nil	0.00	nill
SP27622800	47.56	nil	nil	S	U	U	1500	nil	0.00	nill
SP27622900	48.48	nil	nil	S	U	U	1500	nil	0.00	nill
SP27623700	46.62	nil	nil	S	U	U	1500	nil	0.00	nill
SP27623801	157.36	155.84	155.25	F	VC	C	225	nil	164.26	nill
SP27623801	157.36	155.71	nil	F	VC	C	225	nil	0.00	nill
SP27623802	46.09	nil	nil	S	U	U	1500	nil	0.00	nill
SP27623901	157.65	155.24	154.80	F	VC	C	225	nil	110.45	nill
SP27623902	157.75	154.77	154.57	F	VC	C	225	nil	343.00	nill
SP27624901	157.16	154.57	nil	F	CI	C	375	nil	0.00	nill

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SEWER RECORD (TABULAR)

O/S Map Scale: 1:1250

Date of issue: 02.02.16

Sheet No. 1 of 1

This map is centred upon: O / S Tile reference:

SP2762NW

SP2762NW

SP2662SE

SP2762SE

SP2761NW

Sewer Node **Sewer Pipe Data**

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SP27621001	nil	nil	nil	F	AC		nil	nil	0.00	nill
SP27621101	nil	nil	nil	F	AC		nil	nil	0.00	nill
SP27621102	nil	nil	nil	F	nil		nil	nil	0.00	nill
SP27621201	nil	nil	nil	F	AC	C	150	nil	0.00	nill
SP27621202	nil	nil	nil	F	nil	nil	nil	nil	0.00	nill

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SEWER RECORD (TABULAR)

O/S Map scale: 1:1250
Date of issue: 02.02.16
Sheet No. 1 of 1

This map is centred upon:
O / S Tile reference:
SP2762SW

Appendix F

Potential Development Areas Drawing

Do not scale from this drawing.

Notes
- Flood zones taken from environment agency mapping

Key

- Approximate site Boundary
- Zone 1 Developable areas
- Zone 2
- Zone 3
- Potential flood compensation areas
- Potential developable area post flood compensation

Note: Final developable area subject to confirmation by topographical survey of digital height data and final flood extents of unnamed watercourse.

Potential developable area post flood compensation inside dotted line

Rev.	Date	Description	Drwn.	Chkd.	Appd.
A	15/02/16	DEVELOPABLE AREA ADDED	AH	MH	MH

FAIRHURST
Cornwall Buildings
45-51 Newhall Street
Birmingham
B3 3QR
Tel: 0121 213 4882
Fax: 0844 381 4412

Client: WARWICK DISTRICT COUNCIL

Project Title:
LAND AT LONGBRIDGE
WARWICK

Drawing Title:
POTENTIAL DEVELOPABLE AREAS

Scale at A1:	Status:	
1:1250	For Information	
Drawn: AH	Checked: NJS	Approved: MH
Date: 15/02/16	Date: 09/02/16	Date: 09/02/16

Drawing No.: 113546/1003 | Revision: A

Appendix G

MicroDrainage Calculations

Rural Runoff Calculator

ICP SUDS

ICP SUDS Input (FSR Method)

Return Period (Years)	100
Area (ha)	27.500
SAAR (mm)	600
Soil	0.450
Growth Curve	(None)

Map

Calculate

Partly Urbanised Catchment (QBAR)

Urban 0.150

Region Region 4

Results

QBAR rural (l/s) 100.9

QBAR urban (l/s) 130.8

Return Period Flood

Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	130.8	295.0	111.2	235.3	295.0
Region 2	130.8	307.4	113.8	235.7	307.4
Region 3	130.8	256.1	112.5	222.4	256.1
Region 4	130.8	305.5	108.6	244.4	305.5
Region 5	130.8	407.2	113.8	293.7	407.2
Region 6/Region 7	130.8	371.4	111.2	279.2	371.4
Region 8	130.8	290.1	102.0	239.1	290.1
Region 9	130.8	263.9	115.1	222.0	263.9
Region 10	130.8	253.3	113.8	213.7	253.3
Ireland National	130.8	227.6	111.2	202.2	227.6
Ireland East	130.8	235.4	111.2	207.4	235.4
Ireland South	130.8	227.6	111.2	202.2	227.6
Ireland West	130.8	221.5	111.2	197.0	221.5
Ireland Greater Dublin	130.8	316.5	111.2	267.0	316.5

IH 124
ICP SUDS
ADAS 345
FEH
Greenfield Volume

OK Cancel Help

Enter Return Period between 1 and 1000

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Manchester
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Sheffield
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Wellesbourne

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