

ID	Distance	Direction	Details		
	[m]				
1A	317.0	NE	Type of Site: Recycling Centre (Conversion) Site Address: WGC Metals Ltd, Bridgefields, Bridge Works, WELWYN GARDEN CITY, Hertfordshire, AL7 1RX	Planning Application Reference: N6/2010/1121/CD Date: 28/06/2011	Further Details: Scheme comprises change of use of site from industrial (b2) use to waste use (sui generis) for end of life vehicle dismantling and de-pollution and metal recycling and construction of a 3m high concrete wall. An application (ref: N6/2010/1121/CD) for detailed planning permission was submitted to Welwyn Hatfield D.C. A detailed planning application has been submitted. Data Source: Historic Planning Application Data Type: Point
2A	321.0	NE	Type of Site: Recycling Unit (Alterations) Site Address: Welwyn Garden City Metals, Tewin Road, WELWYN GARDEN CITY, Hertfordshire, AL7 1BD	Planning Application Reference: N6/2009/1443/CD Date: -	Further Details: Scheme comprises change of use of the site from Class B2 industrial use to waste use (sui generis) for end of life vehicle (elv) dismantling and depollution and metal recycling, the construction of a 2 metre high wall with chain link above to an overall height of 4 metres in the south west corner of the site and a 3 metre high fence along the northern boundary. Construction - fencing site works. An application (ref: N6/2009/1443/CD) for detailed planning permission was submitted to Welwyn Hatfield D.C. Data Source: Historic Planning Application Data Type: Point

Records of Environment Agency licensed waste sites within 1500m of the study site:

7

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance [m]	Direction	NGR	Details	
7A	343.0	NE	524550,213245	Site Address: Bridgefields, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1RX Type: 75kte Vehicle Depollution Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WGC004 Operator: W G C Metals Ltd Surrendered Date: - Waste Management licence No: 102412 Annual Tonnage: 74999.0	Issue Date: 21/02/2011 Expiry Date: - Effective Date: - Status: Issued Modified: - Site Name: Bridge Works Cancelled Date: - Correspondence Address: -

Report Reference: 15857007

If you would like any further assistance regarding this report then please contact
TM Group on (T) 0844 249 9202, email: helpdesk@tmgroup.co.uk

8	564.0	NE	524756,213340	<p>Site Address: Welwyn Hatfield District Council, Tewin Rd Depot, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BD</p> <p>Type: Special Waste Transfer Station</p> <p>Size: < 25000 tonnes</p> <p>Environmental Permitting Regulations (Waste) Licence Number: WEL002</p> <p>Operator: Welwyn Hatfield District Council</p> <p>Surrendered Date: -</p> <p>Waste Management licence No: 80190</p> <p>Annual Tonnage: 24999.0</p>	<p>Issue Date: 20/05/1999</p> <p>Expiry Date: -</p> <p>Effective Date: -</p> <p>Status: Modified</p> <p>Modified: 01/09/2015</p> <p>Site Name: Tewin Rd Depot, Welwyn Gc</p> <p>Cancelled Date: -</p> <p>Correspondence Address: -</p>
Not shown	950.0	S	523700,211700	<p>Site Address: John Dicks, 30, Burrowfields, Welwyn Garden City, Hertfordshire, AL7 4SR</p> <p>Type: Special Waste Transfer Station</p> <p>Size: < 25000 tonnes</p> <p>Environmental Permitting Regulations (Waste) Licence Number: DIC001</p> <p>Operator: John L Dicks & R M Dicks</p> <p>Surrendered Date: -</p> <p>Waste Management licence No: 80279</p> <p>Annual Tonnage: 0.0</p>	<p>Issue Date: 30/08/1996</p> <p>Expiry Date: -</p> <p>Effective Date: -</p> <p>Status: Issued</p> <p>Modified: -</p> <p>Site Name: Burrowfields (jl Dicks), Welwyn Garden City</p> <p>Cancelled Date: -</p> <p>Correspondence Address: J L Dicks & R M Dicks (Honeywagon Co), 30, Burrowfields, Welwyn Garden City, Hertfordshire, AL7 4SR</p>
Not shown	950.0	S	523700,211700	<p>Site Address: John Dicks, 30, Burrowfields, Welwyn Garden City, Hertfordshire, AL7 4SR</p> <p>Type: Household, Commercial & Industrial Waste T Stn</p> <p>Size: < 25000 tonnes</p> <p>Environmental Permitting Regulations (Waste) Licence Number: DIC001</p> <p>Operator: John L Dicks & R M Dicks</p> <p>Surrendered Date: 10/08/2009</p> <p>Waste Management licence No: 80279</p> <p>Annual Tonnage: 0.0</p>	<p>Issue Date: 30/08/1996</p> <p>Expiry Date: -</p> <p>Effective Date: -</p> <p>Status: Surrendered</p> <p>Modified: 18/06/2008</p> <p>Site Name: Burrowfields (J L Dicks), Welwyn Garden City</p> <p>Cancelled Date: -</p> <p>Correspondence Address: -</p>
Not shown	1172.0	S	523600,211500	<p>Site Address: Burrowfields Waste Ltd, 50-52, Burrowfields, Welwyn Garden City, Hertfordshire, AL7 4SR</p> <p>Type: 75kte HCI Waste TS + treatment</p> <p>Size: < 25000 tonnes</p> <p>Environmental Permitting Regulations (Waste) Licence Number: BUR089</p> <p>Operator: Burrowfields Waste Ltd</p> <p>Surrendered Date: -</p> <p>Waste Management licence No: 100923</p> <p>Annual Tonnage: 74999.0</p>	<p>Issue Date: 11/05/2009</p> <p>Expiry Date: -</p> <p>Effective Date: -</p> <p>Status: Issued</p> <p>Modified: -</p> <p>Site Name: Burrowfields Waste Ltd</p> <p>Cancelled Date: -</p> <p>Correspondence Address: -</p>
Not shown	1172.0	S	523632,211488	<p>Site Address: 50-52, Burrowfield Ind Est, Welwyn Garden City, Hertfordshire, AL7 4SR</p> <p>Type: 75kte HCI Waste TS + treatment</p> <p>Size: < 25000 tonnes</p> <p>Environmental Permitting Regulations (Waste) Licence Number: BWS008</p> <p>Operator: Burrowfields Waste Solutions Limited</p> <p>Surrendered Date: -</p> <p>Waste Management licence No: 100923</p> <p>Annual Tonnage: 74999.0</p>	<p>Issue Date: 11/05/2009</p> <p>Expiry Date: -</p> <p>Effective Date: 05/10/2011</p> <p>Status: Transferred</p> <p>Modified: -</p> <p>Site Name: 50-52 Burrowfield</p> <p>Cancelled Date: -</p> <p>Correspondence Address: -</p>

Report Reference: 15857007

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TM Group on (T) 0844 249 9202, email: helpdesk@tmgroup.co.uk

Not shown 1172.0 S 523632,211488

Site Address: 50-52,
Burrowfield, Welwyn Garden
City, Hertfordshire, AL7 4SR
Type: 75kte HCI Waste TS +
treatment
Size: < 25000 tonnes
Environmental Permitting
Regulations (Waste) Licence
Number: ACS018
Operator: A & C Skips North
London Limited
Surrendered Date: -
Waste Management licence No:
100923
Annual Tonnage: 74999.0

Issue Date: 11/05/2009
Expiry Date: -
Effective Date: 17/09/2013
Status: Revoked
Modified: -
Site Name: Burrowfield
Cancelled Date: -
Correspondence Address: -

4. Current Land Use Map



Current Land Use Legend

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4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site:

89

The following records are represented as points on the Current Land Uses map.

ID	Distance [m]	Direction	Company	Address	Activity	Category
1	0.0	On Site	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
2	0.0	On Site	Tank	AL7	Tanks (Generic)	Industrial Features
3	0.0	On Site	Factory	AL7	Unspecified Works Or Factories	Industrial Features
4	0.0	On Site	Factory	AL7	Unspecified Works Or Factories	Industrial Features
5	0.0	On Site	Chimney	AL7	Chimneys	Industrial Features
6	0.0	On Site	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
7	23.0	W	Warehouse	AL7	Container and Storage	Transport, Storage and Delivery
8A	29.0	E	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
9	30.0	N	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
10 A	36.0	E	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
11	42.0	E	Bounty	29, Broadwater Road, Welwyn Garden City, AL7 3BQ	Distribution and Haulage	Transport, Storage and Delivery
12 B	45.0	E	Welwyn Services	21A, Broadwater Road, Welwyn Garden City, AL7 3BQ	Construction and Tool Hire	Hire Services
13 B	45.0	E	Pod Drinks Plc	21a, Broadwater Road, Welwyn Garden City, AL7 3BQ	Food and Beverage Industry Machinery	Industrial Products
14	48.0	N	Tank	AL7	Tanks (Generic)	Industrial Features
15	52.0	N	Tank	AL7	Tanks (Generic)	Industrial Features
16	68.0	SW	Works	AL7	Unspecified Works Or Factories	Industrial Features
17	71.0	W	Welwyn Garden City Rail Station	AL8	Railway Stations, Junctions and Halts	Public Transport, Stations and Infrastructure
18 B	73.0	E	Uniclip Ltd	23b, Broadwater Road, Welwyn Garden City, AL7 3BQ	General Construction Supplies	Industrial Products
19 B	73.0	E	Hertz Car Hire	23a, Broadwater Road, Welwyn Garden City, AL7 3BQ	Vehicle Hire and Rental	Hire Services
20	77.0	N	Warehouse	AL7	Container and Storage	Transport, Storage and Delivery
21	89.0	E	Super Tyres Motorists Centre	23a, Broadwater Road, Welwyn Garden City, AL7 3BQ	Vehicle Parts and Accessories	Motoring
22 D	89.0	S	Tanks	AL7	Tanks (Generic)	Industrial Features
23 C	91.0	E	Lemsford Metal Products 1982 Ltd	24, Hyde Way, Welwyn Garden City, AL7 3UQ	Metalworkers Including Blacksmiths	Construction Services
24 C	91.0	E	Cleamax Engineering Ltd	24, Hyde Way, Welwyn Garden City, AL7 3UQ	General Purpose Machinery	Industrial Products
25E	103.0	SW	Works	AL7	Unspecified Works Or Factories	Industrial Features

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26 D	107.0	S	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
27 D	108.0	S	Tank	AL7	Tanks (Generic)	Industrial Features
28	113.0	W	Bus Station	AL8	Bus and Coach Stations, Depots and Companies	Public Transport, Stations and Infrastructure
29 G	114.0	E	Kwik-Fit (GB) Limited	Unit A Bridge Park 27, Bridge Road East, Welwyn Garden City, AL7 1JE	Vehicle Repair, Testing and Servicing	Repair and Servicing
30E	118.0	SW	Mirage Health Group	Broadwater Road, Welwyn Garden City, AL7 3AX	Medical Equipment, Supplies and Pharmaceuticals	Industrial Products
31E	119.0	SW	Cnbio Innovations	Bio-Park, Broadwater Road, Welwyn Garden City, AL7 3AX	Measurement and Inspection Equipment	Industrial Products
32F	123.0	E	Aqua Calma	26, Bridge Road East, Welwyn Garden City, AL7 1HL	Disability and Mobility Equipment	Consumer Products
33F	123.0	E	Pure Offices	26, Bridge Road East, Welwyn Garden City, AL7 1HL	Business Parks and Industrial Estates	Industrial Features
34F	123.0	E	Mitie	26, Bridge Road East, Welwyn Garden City, AL7 1HL	Electronic Equipment	Industrial Products
35 K	123.0	S	Tank	AL7	Tanks (Generic)	Industrial Features
36J	126.0	E	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
37I	126.0	E	S G S Supplies	23, & 24 Peartree Farm Industrial Estate, Welwyn Garden City, AL7 3UW	Stationery, Stamps, Tags and Labels	Industrial Products
38 G	129.0	E	Halfords Autocentre	Unit B Bridge Park 27, Bridge Road East, Welwyn Garden City, AL7 1JE	Vehicle Repair, Testing and Servicing	Repair and Servicing
39 H	131.0	W	Boots Hearing Care	Unit 31-31a The Howard Centre, Howardsgate, Welwyn Garden City, AL8 6HA	Disability and Mobility Equipment	Consumer Products
40 H	131.0	W	Car Valet UK	Unit 25 The Howard Centre, Howardsgate, Welwyn Garden City, AL8 6HA	Vehicle Cleaning Services	Personal, Consumer and Other Services
41 H	131.0	W	Shopmobility	Unit 53a The Howard Centre, Howardsgate, Welwyn Garden City, AL8 6HA	Disability and Mobility Equipment	Consumer Products
42 M	134.0	E	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
43I	137.0	E	Prompt Fire Protection	Unit 25 Peartree Farm, Peartree Lane, Welwyn Garden City, AL7 3UW	Special Purpose Machinery and Equipment	Industrial Products
44 G	139.0	E	National Tyres and Autocare	Unit C Bridge Park 27, Bridge Road East, Welwyn Garden City, AL7 1JE	Vehicle Repair, Testing and Servicing	Repair and Servicing
45J	143.0	E	F R E S C H	26-28, Hyde Way, Welwyn Garden City, AL7 3UQ	Recycling, Reclamation and Disposal	Recycling Services
46	145.0	NE	Works	AL7	Unspecified Works Or Factories	Industrial Features
47 K	148.0	S	Electricity Sub Stations	AL7	Electrical Features	Infrastructure and Facilities
48	150.0	N	Tank	AL7	Tanks (Generic)	Industrial Features
49	152.0	W	Messages	9, Stonehills, Welwyn Garden City, AL8 6NA	Giftware	Consumer Products
50 N	152.0	N	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
51L	155.0	E	L J Whiteman & Son Welwyn Test Centre	27b, Hyde Way, Welwyn Garden City, AL7 3UQ	Vehicle Repair, Testing and Servicing	Repair and Servicing
52L	155.0	E	Imedco Ltd	27, Hyde Way, Welwyn Garden City, AL7 3UQ	Medical Equipment, Supplies and Pharmaceuticals	Industrial Products
53 M	157.0	E	HSS Hire Service Group Ltd	Unit D Bridge Park 27, Bridge Road East, Welwyn Garden City, AL7 1JE	Construction and Tool Hire	Hire Services
54 N	165.0	N	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities

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55	166.0	W	Specsavers Hearcare	57, Howardsgate, Welwyn Garden City, AL8 6BB	Disability and Mobility Equipment	Consumer Products
56	177.0	E	Chimney	AL7	Chimneys	Industrial Features
57 O	179.0	E	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
58 O	184.0	E	Bandero	Unit 6 Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH	Vehicle Components	Industrial Products
59 O	184.0	E	Oakwood Textiles	Unit 6 Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH	Textiles, Fabrics, Silk and Machinery	Industrial Products
60 O	184.0	E	Welwyn Merx Ltd	Unit 6 Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH	Vehicle Repair, Testing and Servicing	Repair and Servicing
61	184.0	E	British Lead	Peartree Lane, Welwyn Garden City, AL7 3UB	Metals Manufacturers, Fabricators and Stockholders	Industrial Products
62	190.0	S	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
63 R	191.0	E	Peartree Welding Centre	Unit 2 Peartree Farm, Peartree Lane, Welwyn Garden City, AL7 3UW	Vehicle Repair, Testing and Servicing	Repair and Servicing
64	191.0	E	Factory	AL7	Unspecified Works Or Factories	Industrial Features
65	196.0	N	Warehouse	AL7	Container and Storage	Transport, Storage and Delivery
66	197.0	SE	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
67P	200.0	N	Bennetts	3 Prime Point, Bessemer Road, Welwyn Garden City, AL7 1HB	Vehicle Parts and Accessories	Motoring
68 O	200.0	E	Auto Wiz	Unit 4 Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH	Vehicle Repair, Testing and Servicing	Repair and Servicing
69P	201.0	N	Barco	Barco House, 15 Bessemer Road, Welwyn Garden City, AL7 1HB	Distribution and Haulage	Transport, Storage and Delivery
70 Q	201.0	W	C D G	Gate House, Fretherne Road, Welwyn Garden City, AL8 6RD	Aviation Engineers	Engineering Services
71 Q	201.0	W	Pace 2000 Trading Ltd	Gate House, Fretherne Road, Welwyn Garden City, AL8 6NS	Wood Products Including Charcoal, Paper, Card and Board	Industrial Products
72	205.0	N	Pakex UK Plc	Unit 1 Prime Point, Bessemer Road, Welwyn Garden City, AL7 1FE	Rubber, Silicones and Plastics	Industrial Products
73 S	209.0	E	Master Fit Tyres	Unit 3 Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH	Vehicle Repair, Testing and Servicing	Repair and Servicing
74	220.0	W	Scrivens Hearing Care	47, Howardsgate, Welwyn Garden City, AL8 6AP	Disability and Mobility Equipment	Consumer Products
75 R	220.0	E	Aces Tyres	Unit 6 Peartree Farm, Peartree Lane, Welwyn Garden City, AL7 3UW	Vehicle Repair, Testing and Servicing	Repair and Servicing
76	223.0	E	British Premium Meats	32, Hyde Way, Welwyn Garden City, AL7 3UQ	Fish, Meat and Poultry Products	Foodstuffs
77 S	225.0	E	Mark Tempest Autocentre Ltd	Unit 1-2 Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH	Vehicle Repair, Testing and Servicing	Repair and Servicing
78 U	226.0	E	Lane Signs	Unit 8 Peartree Farm, Peartree Lane, Welwyn Garden City, AL7 3UW	Signs	Industrial Products
79T	227.0	E	Esso	Bridge Road East, Welwyn Garden City, AL7 1LE	Petrol and Fuel Stations	Road and Rail
80T	227.0	E	Eastbridge Service Station	Bridge Road East, Welwyn Garden City, AL7 1LE	Petrol and Fuel Stations	Road and Rail
81 V	228.0	NE	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
82 U	229.0	E	Welham Travel Ltd	Unit 9-12 Peartree Farm, Peartree Lane, Welwyn Garden City, AL7 3UW	Vehicle Hire and Rental	Hire Services
83 V	230.0	N	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities

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84	235.0	NW	Electricity Sub Station	AL8	Electrical Features	Infrastructure and Facilities
85	236.0	E	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
86 W	237.0	E	Electricity Sub Station	AL7	Electrical Features	Infrastructure and Facilities
87 W	240.0	E	ATS Euromaster Ltd	17, Tewin Road, Welwyn Garden City, AL7 1BD	Vehicle Parts and Accessories	Motoring
88	241.0	E	Factory	AL7	Unspecified Works Or Factories	Industrial Features
89 W	244.0	E	Depot	AL7	Container and Storage	Transport, Storage and Delivery

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site:

2

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance [m]	Direction	NGR	Company	Address	LPG	Status
90S	207.0	E	524495,212958	Esso	Mrh Eastbridge, Bridge Road East, Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1LE	No	Open
91	207.0	W	523825,212796	Obsolete	Central Garage, Church Road, Welwyn Garden City, Hertfordshire, AL8 6PW	Not Applicable	Obsolete

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site:

0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site

0

Database searched and no data found.

Report Reference: 15857007

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
LOFT	LOWESTOFT FORMATION	DIAMICTON
KGCA	KESGRAVE CATCHMENT SUBGROUP	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

5.3 Bedrock and Solid Geology

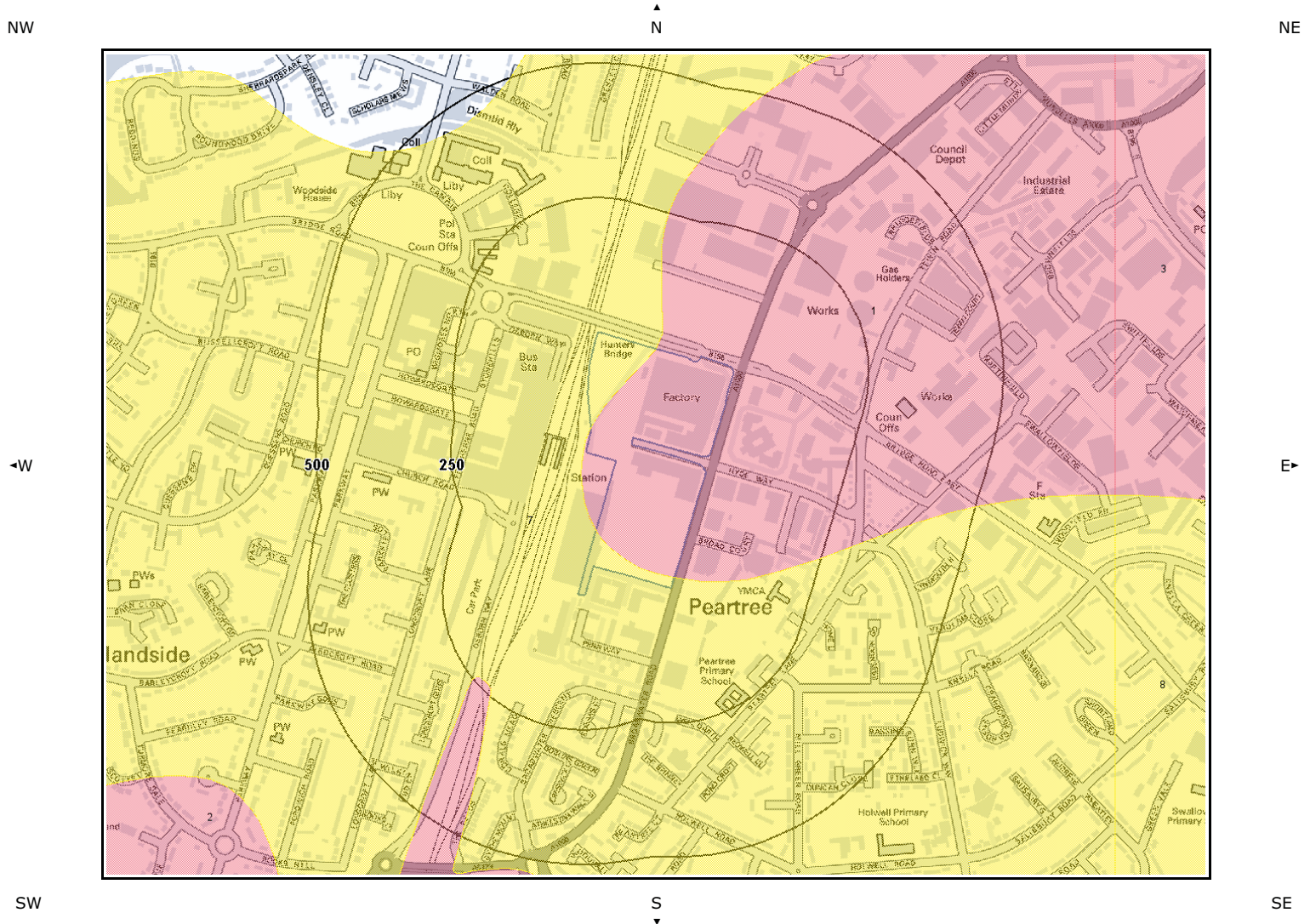
The database has been searched on site, including a 50m buffer.

LEX Code	Description	Rock Type
LESE-CHLK	LEWES NODULAR CHALK FORMATION AND SEAFORD CHALK FORMATION (UNDIFFERENTIATED)	CHALK

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

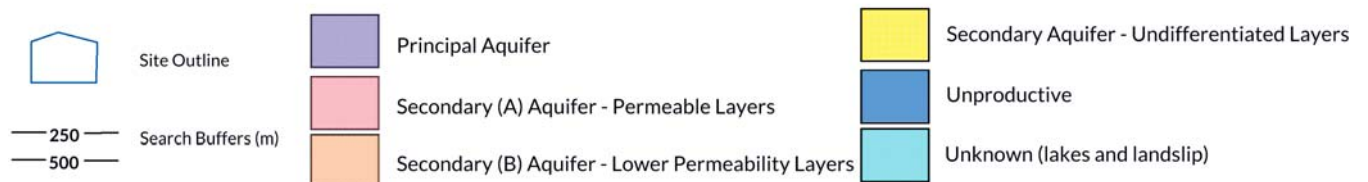
For more detailed geological and ground stability data please refer to the "Groundsure Geology and Ground Stability Report". Available from our website.

6a. Hydrogeology - Aquifer Within Superficial Geology



Aquifer Within Superficial Geology Legend

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6b. Hydrogeology - Aquifer Within Bedrock Geology and Abstraction Licenses

NW

N

NE

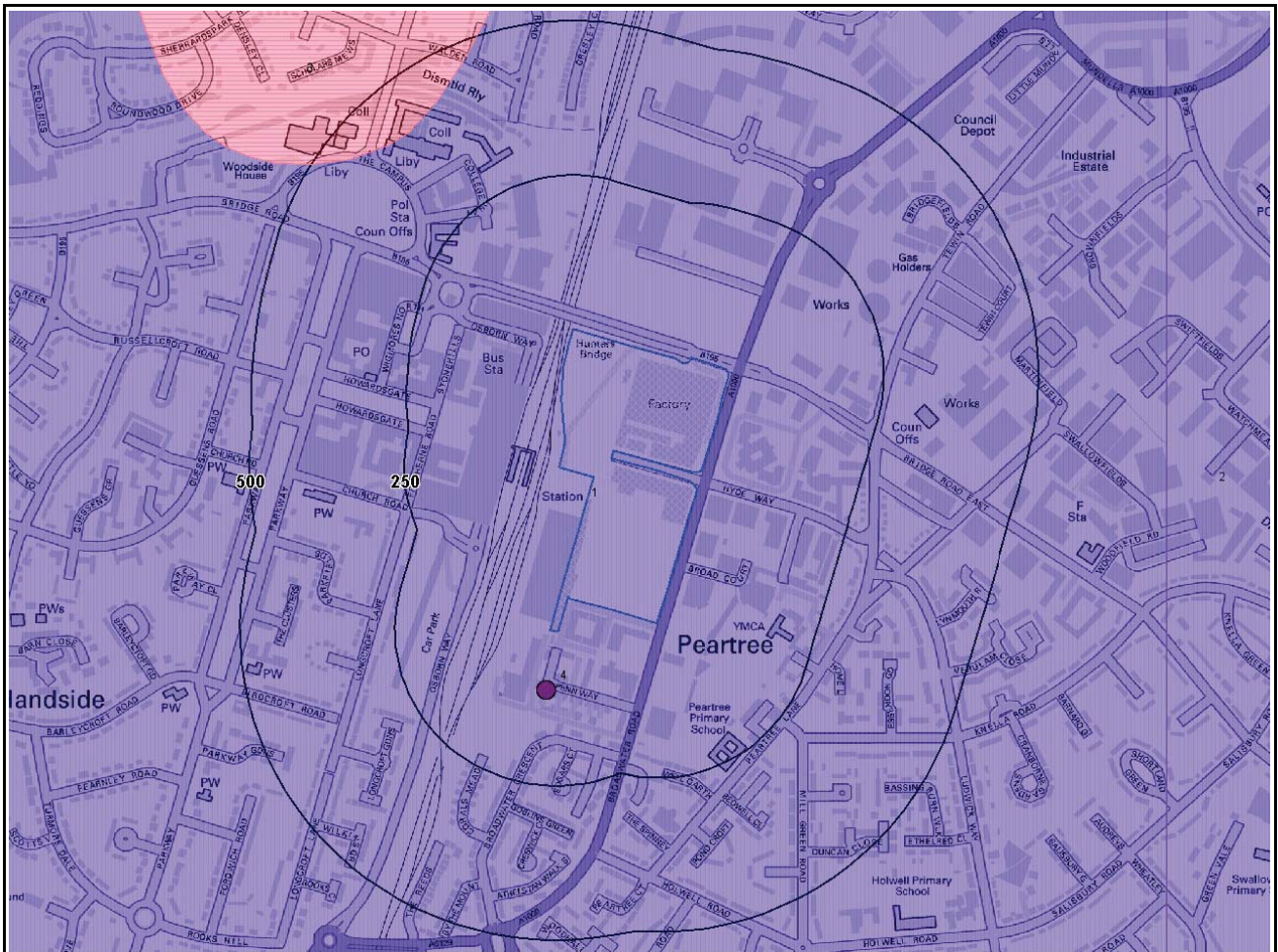
W

E

SW

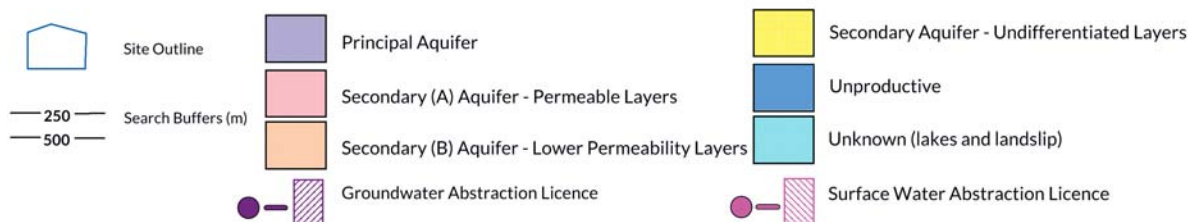
S

SE



Aquifer Within Bedrock Geology Legend

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NW



NE



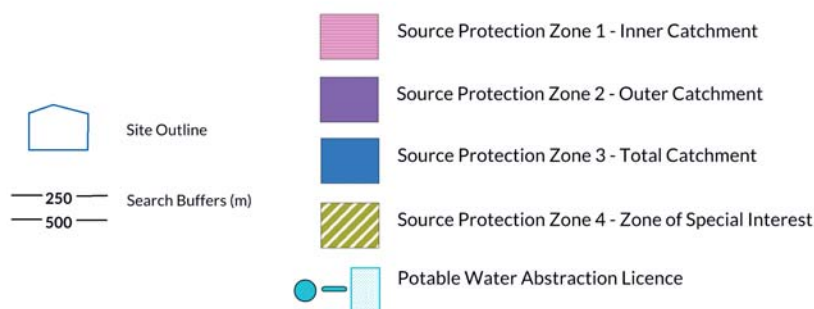
E▶

SW

S
▼

E

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6d. Hydrogeology Source Protection Zones within confined aquifer

NW

N

NE

W

E

SW

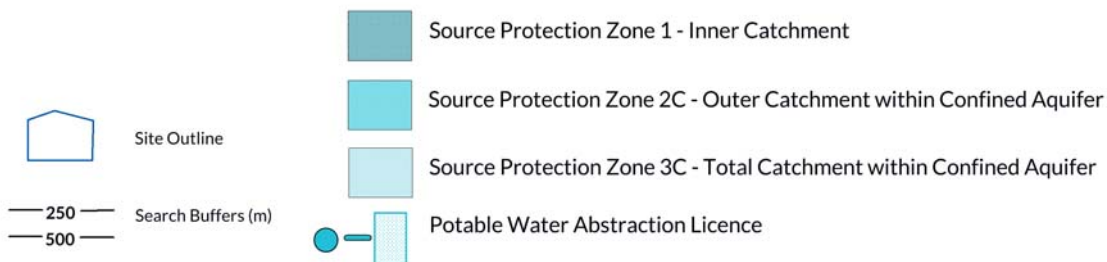
S

SE



Hydrogeology Source Protection Zones within confined aquifer Legend

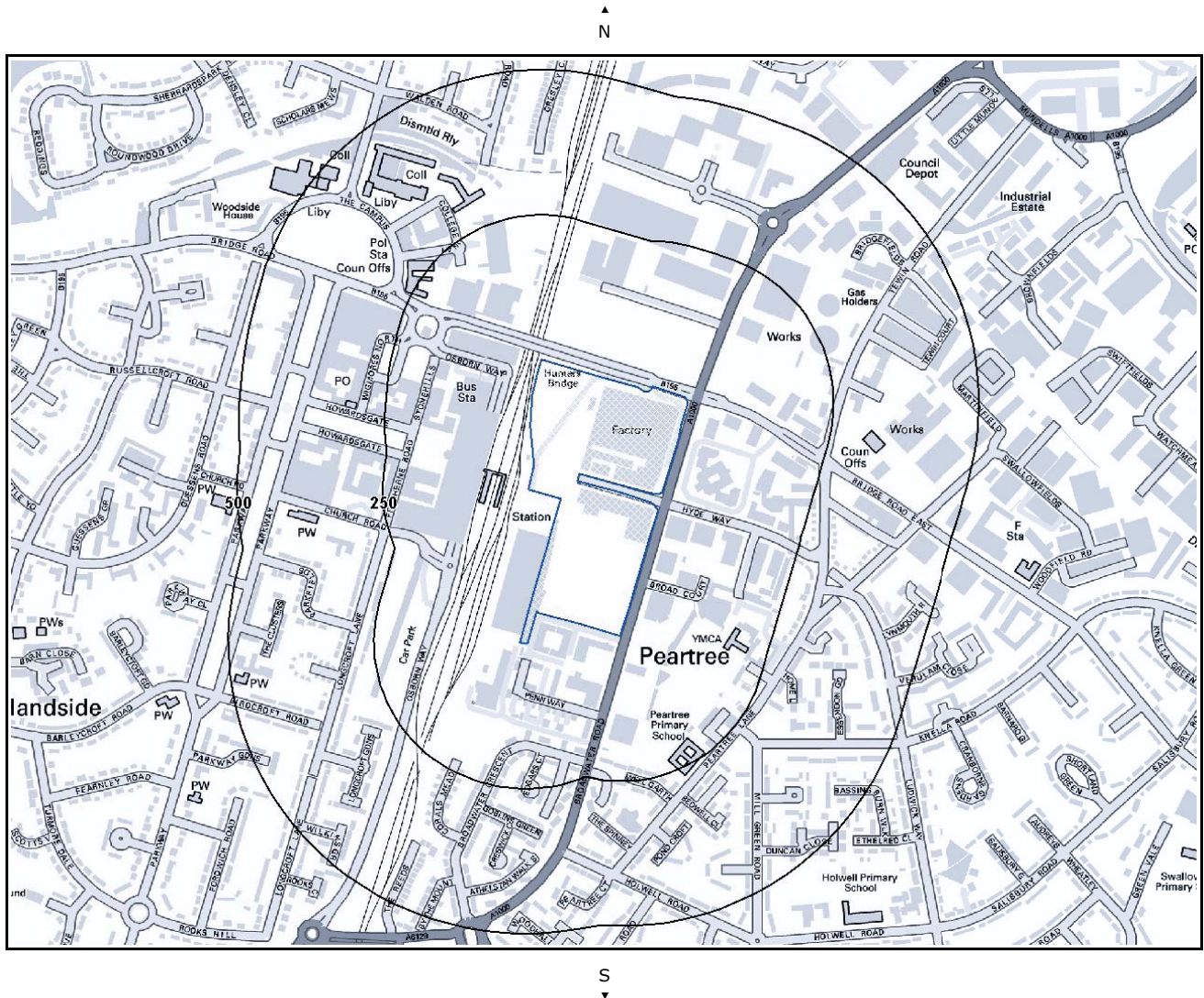
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6e. Hydrology – Detailed River Network and River Quality



Hydrology Legend



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6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of productive strata within the superficial geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance [m]	Direction	Designation	Description
1	0.0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
7	0.0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
2	236.0	SW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Are there records of productive strata within the bedrock geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance [m]	Direction	Designation	Description
1	0.0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
3	416.0	NW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 1000m of the study site? **Yes**

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

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ID	Distance	Direction	NGR	Details	
4	97.0	S	524000, 212500	Licence No: 29/38/02/0007 Details: Process Water Direct Source: Thames Groundwater Point: Broadwater Road, Welwyn Garden City - 2 Boreholes Grouped Data Type: Point	Annual Volume (m³): 318200 Max Daily Volume (m³): 1364 Original Application No: - Original Start Date: 20/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 7/2/2007 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 1000m of the study site? **No**

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? **No**

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? **Yes**

The following Source Protection Zones records are represented on the SPZ and Potable Water Abstraction Map (6c):

ID	Distance	Direction	Type	Description
1	0.0	On Site	3	Total catchment

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 River Quality

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Is there any Environment Agency information on river quality within 1500m of the study site?

No

Biological Quality:

Database searched and no data found.

Chemical Quality:

Database searched and no data found.

6.9 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site?

No

Database searched and no data found.

6.10 Surface Water Features

Are there any surface water features within 250m of the study site?

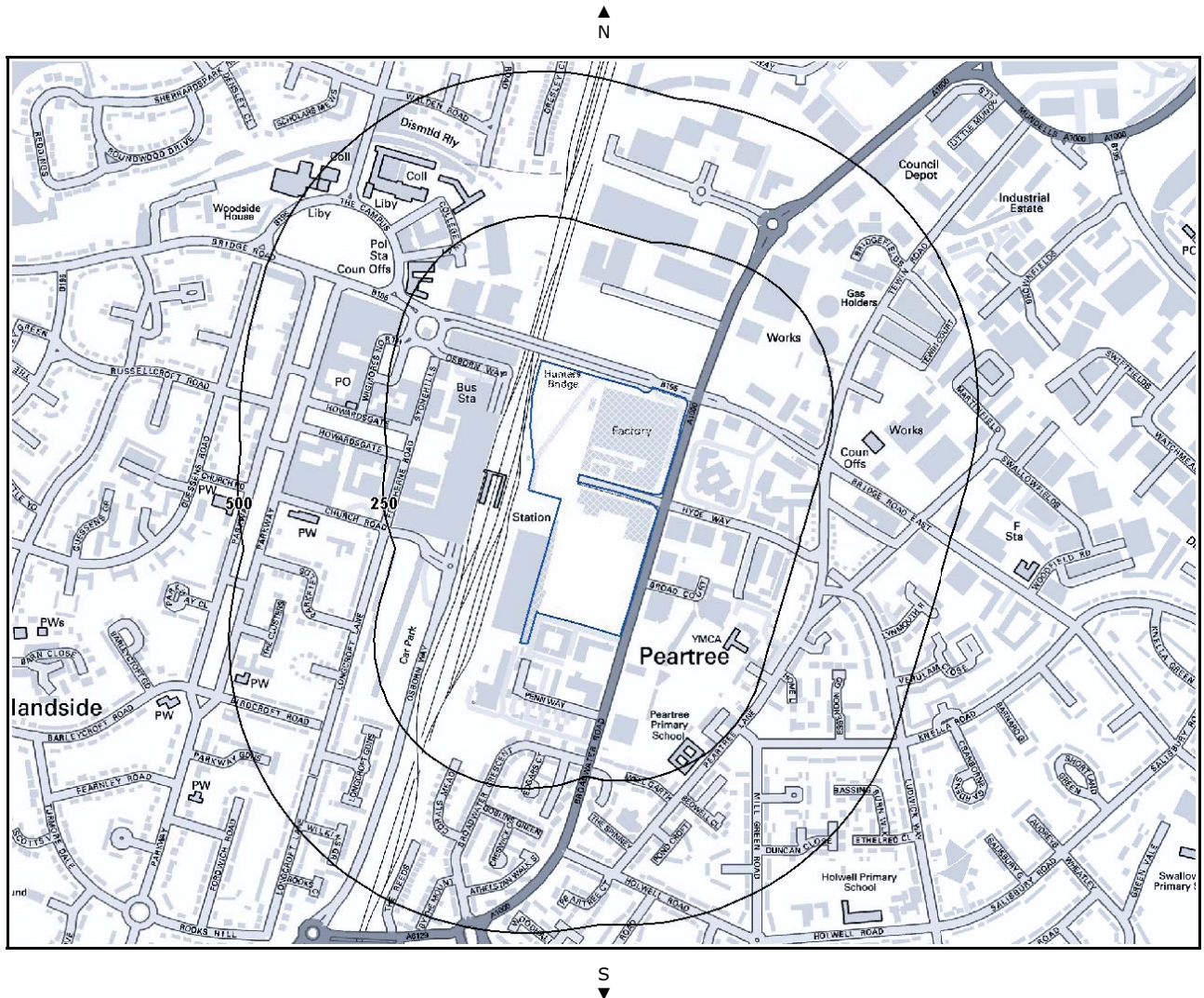
Yes

The following surface water records are not represented on mapping:

Distance to Surface Water (m)	on-site	0-50	51-250
Surface water features within 250m of the study site	No	Yes	No

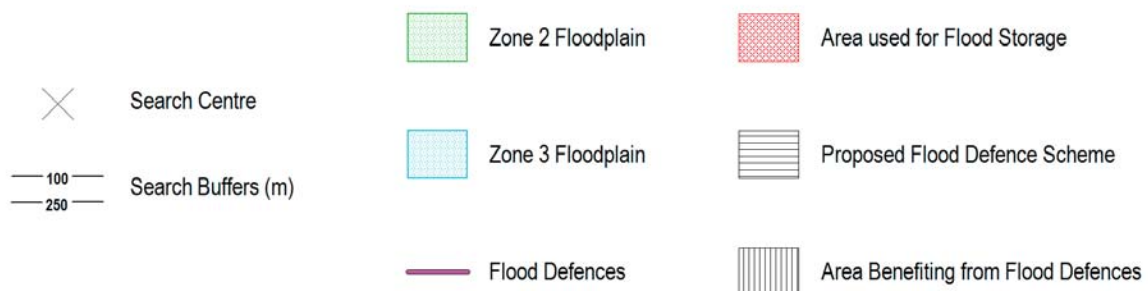
This information is taken from [Ordnance Survey OpenData](#)TM. Contains Ordnance Survey data © Crown copyright and database right 2013.

7a. Environment Agency Flood Map for Planning (from rivers and the sea)



Environment Agency Flood Map for Planning (from rivers and the sea)
Legend

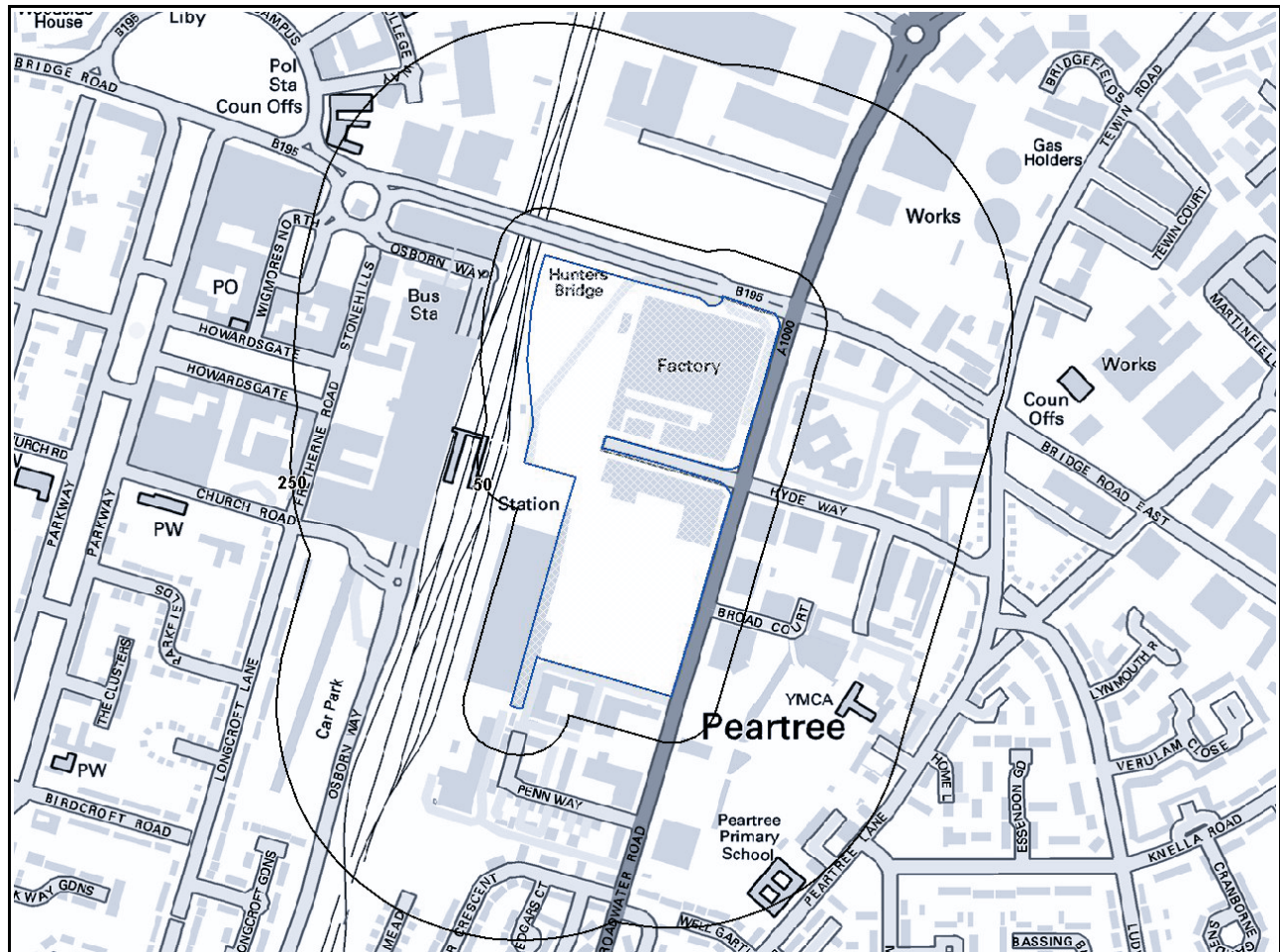
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7b. Environment Agency RoFRaS Flooding Map

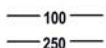


Environment Agency RoFRaS Flood
Legend

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100035207.



Site Outline



Search Buffers (m)

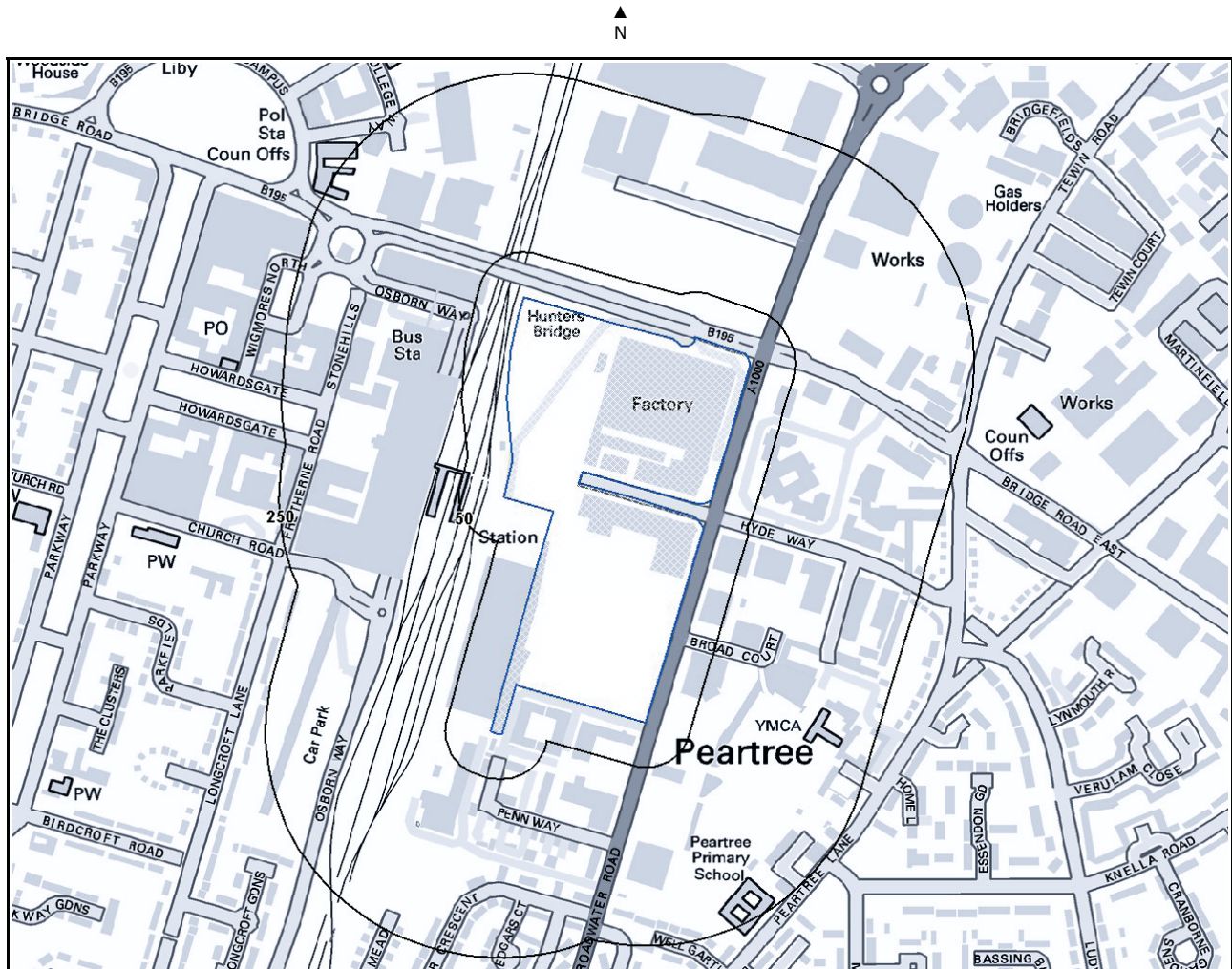
RoFRaS Rating



Report Reference: 15857007

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7c. Environment Agency Historic Flooding Events



Environment Agency Historic Flooding
Legend

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Site Outline



Search Buffers (m)

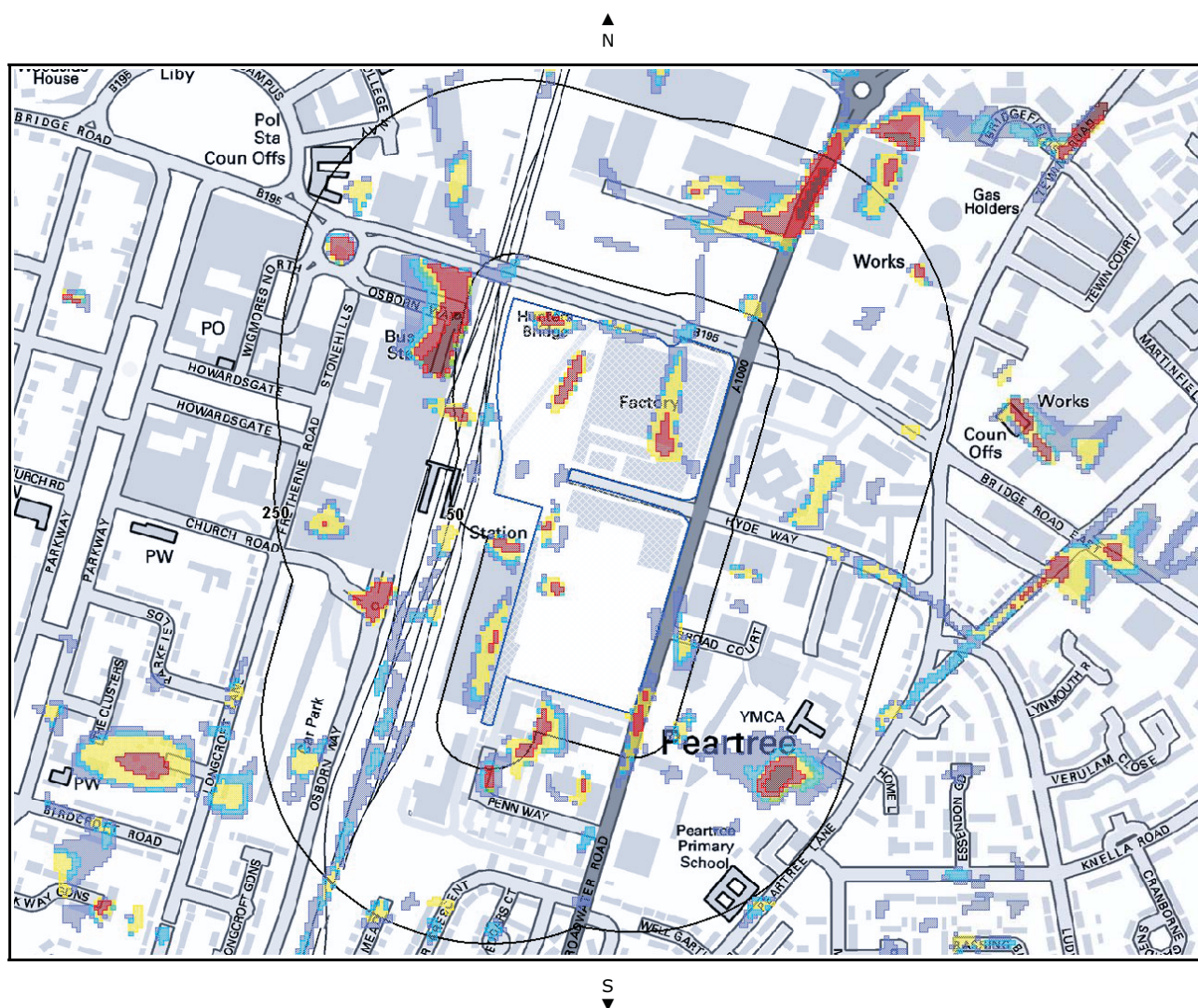


Historic Flood Events

Report Reference: 15857007

If you would like any further assistance regarding this report then please contact
TM Group on (T) 0844 249 9202, email: helpdesk@tmgroup.co.uk

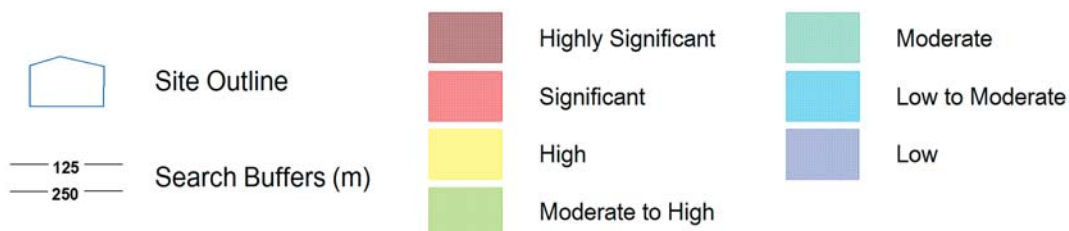
7d. JBA Surface Water (Pluvial) Flood Map



JBA Surface Water (Pluvial) Flood
Legend

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7. Flooding

7.1 River and Coastal Zone 2 Flooding

Environment Agency Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning.

Is the site within 250m of an Environment Agency Zone 2 floodplain?

No

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

Is the site within 250m of an Environment Agency Zone 3 floodplain?

No

Database searched and no data found.

7.3 River and Coastal Flood Defences

Are there any Flood Defences within 250m of the study site ?

No

Guidance: This search consists only of flood defences present in the dataset provided by the Environment Agency. Any relevant data is represented on Map 7a – Flood Map for Planning.

7.4 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site?

No

Any relevant data is represented on Map 7a – Flood Map for Planning.

7.5 Proposed Flood Defences

Are there any Proposed Flood Defences within 250m of the study site?

No

Guidance: This search consists only of proposed flood defences present in the dataset provided by the Environment Agency. Please note that proposed flood defence schemes will not influence the current RoFRaS ratings for the site

Any relevant data is represented on Map 7a – Flood Map for Planning.

This information is taken from the Environment Agency's database of Areas to Benefit from New and Reconditioned Flood Defences under the Medium Term Plan (MTP). The dataset contains funding allocation for the first financial year (from April). Funding for the following four financial years is not guaranteed, being only indicative, and will be reviewed annually. Projects within the Medium Term Plan qualify for inclusion in this dataset if:

- the investment leads to a change in the current standard of protection (change projects);
- the investment is a replacement or refurbishment in order to sustain the current standard of protection (sustain projects);
- the project has an initial construction budget of £100,000 or more; and
- the project is included within the first five years of the MTP

The data includes all the Environment Agency's projects over £100K that will change or sustain the standards of flood defence in England and Wales over the next 5 years. It also includes the equivalent schemes for all Local Authority and Internal Drainage Boards. The number of households and areas of land contributing to DEFRA's Outcome Measures (OM) are also attributed i.e. could benefit from major work on flood defences.

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These data also contain Intermittence Flood Maintenance Programme that show the annual maintenance programme of work scheduled to be carried by the Environment Agency, Local Authority or Internal Drainage Board on flood defences. Data details routine maintenance as well as intermittent work that has been funded for the coming year. The data contains a start and end coordinate defining the relevant river section where work is planned.

Information Warning

Please note that the maps show the areas where investment is being made to reduce the flood and coastal erosion risk and are not detailed enough to account for individual addresses. Individual properties may not always face the same risk of flooding as the areas that surround them. Also note that funding figures are indicative and any use or interpretation should account for future updates where annual values may change.

Every possible care is taken to ensure that the maps reflect all the data possessed by the Environment Agency and that they have applied their expert knowledge to create conclusions that are as reliable as possible. The Environment Agency consider that they have created the maps as well as they can and so should not be liable if the maps by their nature are not as accurate as might be desired or are misused or misunderstood, despite their warnings. For this reason, they are not able to promise that the maps will always be accurate or completely up to date.

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7.6 Areas used for Flood Storage

Are there any areas used for Flood Storage within 250m of the study site?

No

Guidance: Flood Storage Areas are considered part of the functional floodplain, and are areas where water has to flow or be stored in times of flood. The *National Planning Policy Framework* states that only water-compatible development and essential infrastructure should be permitted within flood storage areas, and existing development within this area should be relocated to an area with a lower risk of flooding. Any relevant data is represented on Map 7a – Flood Map for Planning.

7.7 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating (River and Coastal)

What is the highest risk of flooding onsite?

Very Low

The Environment Agency RoFRaS database provides an indication of flood river and coastal risk at a national level on a 50m grid as used by many of the insurance companies.

Any relevant data within 250m is represented on Map 7b– RoFRaS Flooding.

RoFRaS data is based on a 50m grid system, with the flood rating at the centre of the grid calculated and given below. The data considers the probability that the flood defences will overtop or breach, and the distance from the river or the sea.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.8 Historic Flood Outlines

Has the site or any area within 250m been subject to historic flooding as recorded by the Environment Agency?

No

This database shows the individual footprint of every flood event recorded by the Environment Agency and previous bodies. Absence of a historic flood event outline does not mean the site has never flooded, and a record of a flood event at the site does not necessarily mean that the site will flood again.

7.9 JBA Surface (Pluvial) Water Flooding

Surface Water (pluvial) flooding is defined as flooding caused by rainfall-generated overland flow before the runoff enters a watercourse or sewer. In such events, sewerage and drainage systems and surface watercourses may be entirely overwhelmed.

Report Reference: 15857007

What is the risk of pluvial flooding at the study site?

This data is provided by JBA Risk Management, © Jeremy Benn Associates Limited 2008-2014

[illegible]

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LOCATION INTELLIGENCE

0.0	On Site	Low
0.0	On Site	Low
0.0	On Site	Low
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
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0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Moderate
0.0	On Site	Moderate
0.0	On Site	Significant
0.0	On Site	Significant
0.0	On Site	Significant
0.0	On Site	Significant
0.0	On Site	Significant
0.0	On Site	Significant
1.0	E	Low
1.0	N	Low to Moderate
1.0	E	Significant
2.0	N	Low
2.0	W	Low
3.0	W	High
3.0	W	High
3.0	N	Low
3.0	W	Low
3.0	S	Low
3.0	W	Low to Moderate
3.0	E	Significant
4.0	W	Low
4.0	E	Low
5.0	W	Low
5.0	W	Low
5.0	W	Low to Moderate
6.0	W	Low
6.0	W	Significant
8.0	W	Low to Moderate
8.0	W	Moderate
8.0	W	Significant
9.0	W	High
9.0	W	Low
9.0	S	Low
9.0	N	Low
10.0	W	Significant
11.0	S	Low to Moderate
11.0	W	Low to Moderate
12.0	E	Low
12.0	E	Low
12.0	W	Low to Moderate
13.0	S	High
13.0	S	Low
13.0	W	Low to Moderate
14.0	W	Low
14.0	E	Low
15.0	N	Low
15.0	S	Low to Moderate
16.0	W	Low
16.0	W	Low
16.0	NW	Low
16.0	E	Low to Moderate
17.0	W	Low

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18.0	W	High
18.0	E	Low to Moderate
19.0	S	High
19.0	E	High
19.0	W	Low
19.0	SE	Low
19.0	SE	Low
20.0	S	Low
21.0	W	Low
21.0	W	Low
21.0	W	Low to Moderate
22.0	W	Low
22.0	S	Low to Moderate
22.0	S	Significant
23.0	W	Low to Moderate
24.0	S	Low
24.0	S	Low to Moderate
24.0	N	Low to Moderate
25.0	W	Low
25.0	W	Low
26.0	W	High
27.0	E	Low
27.0	E	Low
27.0	W	Low to Moderate
28.0	S	High
28.0	E	Low
29.0	W	Low
31.0	S	Low
31.0	SE	Low to Moderate
32.0	W	Low
32.0	E	Low to Moderate
32.0	W	Moderate
33.0	W	Low to Moderate
34.0	W	Low to Moderate
34.0	S	Low to Moderate
35.0	W	Low
35.0	E	Low to Moderate
36.0	S	Low
36.0	W	Significant
37.0	W	High
38.0	W	High
38.0	W	Low
39.0	E	Low
39.0	W	Low
39.0	S	Low
39.0	E	Low
39.0	S	Low
39.0	E	Low to Moderate
39.0	W	Low to Moderate
40.0	W	High
40.0	W	High
40.0	E	Low to Moderate
41.0	S	Low
41.0	S	Low to Moderate
42.0	W	Low
42.0	E	Low to Moderate
43.0	NE	Low
43.0	W	Low
43.0	W	Moderate to High
44.0	S	High
44.0	N	Low
44.0	W	Low
44.0	W	Low
44.0	W	Significant
45.0	S	Low
45.0	E	Low
45.0	W	Low to Moderate
45.0	NE	Low to Moderate
45.0	W	Moderate to High
46.0	N	High
46.0	W	High
46.0	S	Moderate
46.0	S	Significant
46.0	W	Significant
47.0	E	High
47.0	W	Moderate to High
48.0	W	Low
48.0	E	Low to Moderate
48.0	W	Moderate to High

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TM Group on (T) 0844 249 9202, email: helpdesk@tmgroup.co.uk

LOCATION INTELLIGENCE

49.0	W	Highly Significant
49.0	NW	Low
49.0	N	Low to Moderate
49.0	S	Low to Moderate
49.0	W	Significant
50.0	W	High
50.0	E	Low

7.10 BGS Groundwater Flooding Susceptibility Areas

Are there any British Geological Survey groundwater flooding susceptibility flood areas within 50m of the boundary of the study site? **Yes**

What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions? **Limited potential for groundwater flooding**

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? **Clearwater Flooding**

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

7.11 BGS Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? **High**

Notes:

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The **confidence rating** is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

7.12 BGS Geological Indicators of Flooding

Are there any geological indicators of flooding within 250m of the study site? **No**

Guidance: This dataset identifies the presence of superficial geological deposits which indicate that the site may be, or have been in the past, vulnerable to inland and/or coastal flooding. This assessment does not take account of any man-made factors such as flood protection schemes, and the data behind the report are purely geological.

7.13 JBA Reservoir Failure Impact Modelling

Is the property located in an area identified as being at potential risk in the event of a reservoir failure? **No**

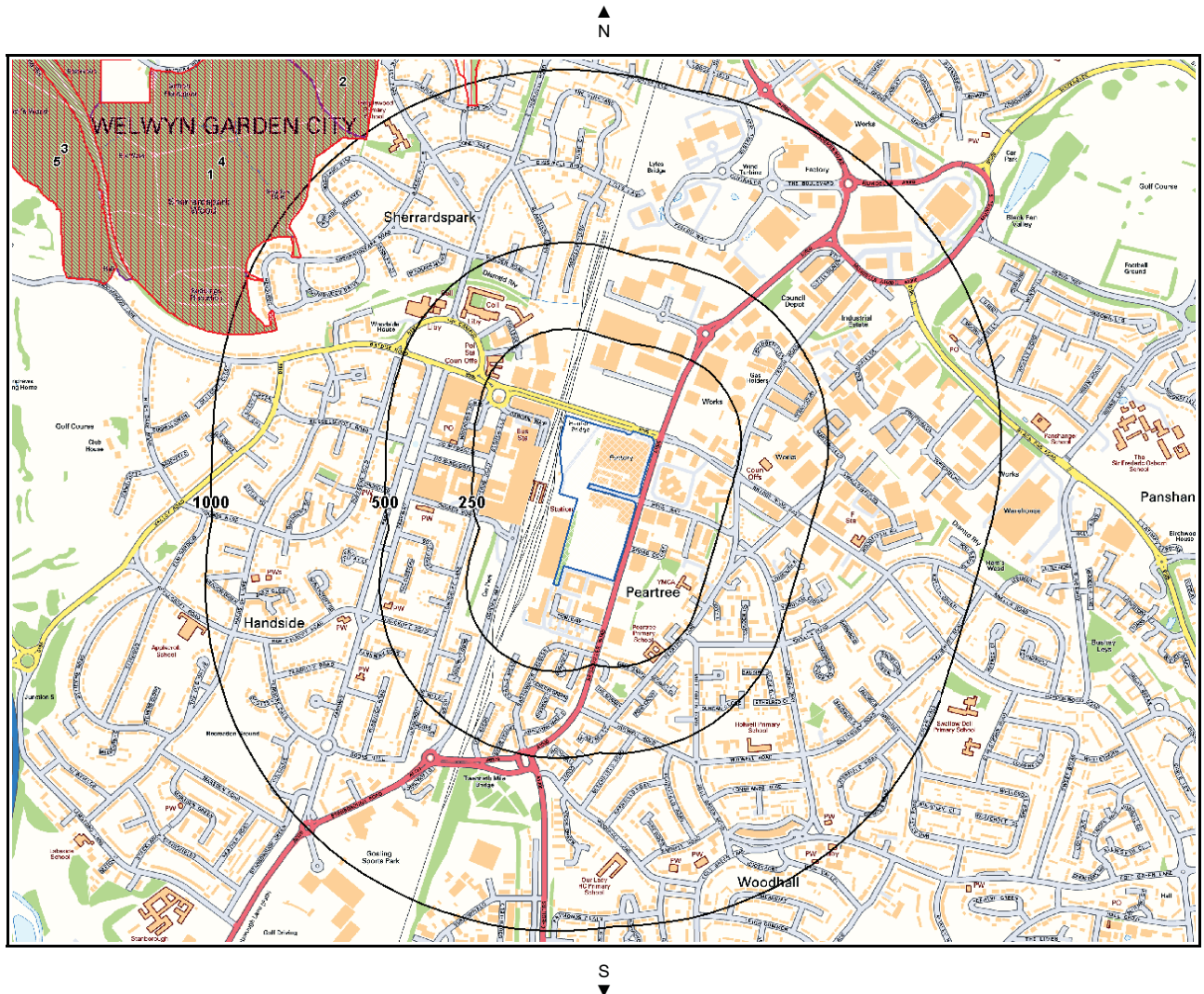
JBA Risk Management have modelled the flooding impact from 1,700 reservoirs in England and Wales, should there be a catastrophic failure of a reservoir wall or embankment.

Guidance: None required

Report Reference: 15857007

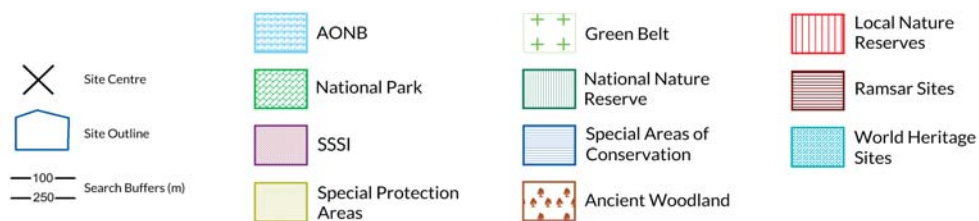
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8. Designated Environmentally Sensitive Sites Map



Designated Environmentally Sensitive Sites Legend

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8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site? **Yes**

Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site: **3**

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance [m]	Direction	SSSI Name	Data Source
1	868.0	W	Sherrardspark Wood	Natural England
2	987.0	NW	Sherrardspark Wood	Natural England
3	1308.0	W	Sherrardspark Wood	Natural England

Records of National Nature Reserves (NNR) within 2000m of the study site: **0**

Database searched and no data found.

Records of Special Areas of Conservation (SAC) within 2000m of the study site: **0**

Database searched and no data found.

Records of Special Protection Areas (SPA) within 2000m of the study site: **0**

Database searched and no data found.

Records of Ramsar sites within 2000m of the study site: **0**

Database searched and no data found.

Records of Local Nature Reserves (LNR) within 2000m of the study site: **3**

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance [m]	Direction	LNR Name	Data Source
4	868.0	W	Sherrardspark Wood	Natural England
5	1362.0	W	Sherrardspark Wood	Natural England
Not shown	1891.0	SE	The Commons	Natural England

Records of World Heritage Sites within 2000m of the study site: **0**

Database searched and no data found.

Records of Environmentally Sensitive Areas within 2000m of the study site: **0**

Database searched and no data found.

Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site: **0**

Database searched and no data found.

Records of National Parks (NP) within 2000m of the study site: **0**

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Database searched and no data found.

Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Additional Information

8.1 Ofcom Sitefinder Mobile Phone Mast Records

Have any mobile phone transmitters registered with Ofcom been identified within 500m of the study site?

Yes

The following records within 500m have been found within this search:

Distance (m)	Direction	Operator	Type	Antenna Height (m)	Band	Power (dBW)
149.0	W	Vodafone	GSM	24.0		26.0
149.0	W	Vodafone	UMTS	24.0		28.6
149.0	W	Vodafone	GSM	24.0		26.1
149.0	W	Vodafone	UMTS	24.0		28.5
149.0	W	Vodafone	UMTS	24.0		29.1
149.0	W	Vodafone	GSM	24.0		26.4
160.0	W	O2	GSM	8.0		7.5
298.0	W	O2	GSM	21.0		27.09
298.0	W	O2	UMTS	21.0		29.09
298.0	W	O2	UMTS	21.0		29.69
304.0	W	Three	UMTS	19.3		25.65
304.0	W	T-Mobile	GSM	20.0		26.0
304.0	W	T-Mobile	UMTS	20.0		18.0
360.0	E	O2	UMTS	24.65		27.89
360.0	E	O2	GSM	22.5		25.0
360.0	E	O2	GSM	22.5		24.0
424.0	NE	Airwave	TETRA	26.25		21.0

This database is taken from Ofcom's Sitefinder database, the Government's database of mobile phone base stations. The last update to this database was applied in May 2012, although some operators ceased providing updates some years before then. Neither Ofcom nor Groundsure can accept any liability for any inaccuracies or omissions in the data provided within Sitefinder.

The most recent update is based on the following datasets received at the specified times by Ofcom: O2 (May 2012), Network Rail (April 2012), Hutchison (February 2012), Vodafone (October 2011), Airwave (February 2010), Orange (February 2010) and T-Mobile (August 2005). Sites added since these dates will not appear in the database.

8.2 Mobile Phone Mast Planning Records

Have any planning records relating to telecommunication masts been identified within 500m of the study site?

Yes

The following records within 500m have been found within this search:

Distance (m)	Direction	Application Number	Application Date	Applicant	Details
131.0	W	No Details	Mar 3 2006	Vodafone Ltd	Scheme comprises installation of two 300mm transmission dishes and ancillary development.
282.0	N	No Details	Sep 24 2008	Vodafone Ltd	Scheme comprises installation of a 12 metre replacement lamppost accommodating a luminaire at 8 metre, with 3 shrouded antennas above and 1 equipment cabinet and an electrical metre cabinet at ground level.
306.0	W	No Details	Oct 2 2007	Mr. P James	Scheme comprises rooftop installation of three additional pole mounted antennas, radio equipment housing and repositioning of equipment.

This database is taken from Glenigan's collection of planning records dating back to 2006 and relates to sites which have applied for planning permission involving mobile phone masts. The database is normally updated quarterly.

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TM Group on (T) 0844 249 9202, email: helpdesk@tmgroup.co.uk

8.3 Pylons and Electricity Transmission Lines

Have any overhead transmission lines or pylons been identified in proximity to the study site? **No**

Database searched and no data found.

Guidance:None required.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information, please obtain a Groundsure Geology and Ground Stability Report. Available from our website. The following information has been found:

10.1.1 Shrink Swell

What is the maximum Shrink-Swell* hazard rating identified on the study site? **Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

10.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? **Very Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

10.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? **Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant soluble rocks are present. Low possibility of subsidence occurring naturally, but may be possible in adverse conditions such as high surface or subsurface water flow. Consider implications for stability when changes to drainage or new construction are planned. For new build, site investigation should consider potential for dissolution problems on the site and its surroundings. Care should be taken with local drainage into the bedrock. Some possibility groundwater pollution. For existing property, possible increase in insurance risk due to soluble rocks.

10.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? **Negligible**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

10.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? **Very Low**

Report Reference: 15857007

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

10.1.6 Running Sand

What is the maximum Running Sand* hazard rating identified on the study site?

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

* This indicates an automatically generated 50m buffer and site.

9.2 Radon

What is the maximum radon potential at the study site?

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level

Is the property in an area where radon protection measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?

No radon protective measures are necessary

Guidance: The responses given on the level of radon protective measures required are based on a joint radon potential dataset from Public Health England (PHE) and the British Geological Survey (BGS). No radon protection measures are required.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site?

No

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary?

Yes

The following non-coal mining information is provided by the BGS:

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

Past underground mine workings are uncommon, localised and of limited area. The rock types present in this area are such that minor mineral veins may be present within them on which it is possible that there have been attempts to work these by underground methods and/or it is possible that small scale underground extraction of other materials may have occurred. All such occurrences are likely to be restricted in size and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Area

Are there any brine affected areas within 75m of the study site?

No

Guidance: No Guidance Required.

11. Contacts



British Geological Survey (England & Wales)



British Centre
Geological Survey
15 936 3143 Fax: 0115 936 3276. Email:
enquiries@bgs.ac.uk

Web: www.bgs.ac.uk

BGS Geological Hazards Reports and general geological enquiries

Environment Agency



**Environment
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Business Pk, Hatfield, AL10 9EX

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JBA Risk Management

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**Public Health
England**

Ordnance Survey

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Report Reference: 15857007

If you would like any further assistance regarding this report then please contact
TM Group on (T) 0844 249 9202, email: helpdesk@tmgroup.co.uk

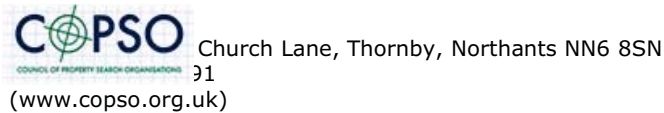
Local Authority

Welwyn Hatfield Council

Phone: 01707 357 000

Web: <http://www.welhat.gov.uk/>

Address: Council Offices, The Campus, Welwyn Garden City,
Hertfordshire, AL8 6AE



Acknowledgements

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The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

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If you would like any further assistance regarding this report then please contact
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APPENDIX 13.2 – FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

FLOOD RISK ASSESSMENT

Proposed Mixed Use
Development

Welwyn Garden City
London

Prepared for:
ENTRAN

30th January 2018

Project Number:
RMA-C1787



environmental planning consultancy

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RMA Environmental Limited has prepared this report in accordance with the instructions of the above named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

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Appendix E:	Pitman Associates' Surface Water Drainage Strategy

1 INTRODUCTION

Background

- 1.1 RMA Environmental Limited was commissioned by ENTRAN to prepare a Flood Risk Assessment (FRA) to support a detailed planning application for a proposed mixed use development in Welwyn Garden City, Hertfordshire.
- 1.2 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF), associated Planning Practice Guidance (PPG) and Environment Agency (EA) standing advice on flood risk for new development.

Site Location and Land Use

- 1.3 The site comprises brownfield land and extends to an area of approximately 8.8 hectares (ha); it is located at National Grid Reference TL 24140 12770 (refer to Figure 1.1).
- 1.4 The site is located within Welwyn Garden City and, as a result, the surrounding area is heavily urbanised. The site has previously been developed with a number of commercial and industrial buildings.
- 1.5 The following land uses border the site:
 - Bridge Road (B195), a public highway, forms the northern site boundary;
 - Broadwater Road (A1000), a public highway, forms the eastern site boundary; and
 - a railway line is located beyond the western site boundary.
- 1.6 Access to the site is currently via Hydeway and Broadwater Road to the east of the site. Further details on site topography, geology and hydrology are set out in Section 2.

Proposed Development

- 1.7 The proposed development will incorporate the residential-led, mixed use development of a brownfield site, including approximately 1,471 residential units and 12,858 m² of commercial and community floorspace (refer to the illustrative layout at Appendix A). The proposed development includes the retention and regeneration of the listed buildings within the site.
- 1.8 The site has outline planning permission for a similar scheme comprising 850 residential units and 14,359 m² of commercial floorspace (reference N6/2015/0293/LB and N6/2015/0294/PP).

Requirements for a Flood Risk Assessment

- 1.9 The requirements for FRA are provided in the NPPF and associated PPG. Paragraph 103 of the NPPF requires that a site-specific FRA should be submitted with planning applications for all sites greater than 1 ha in Flood Zone 1; for sites of any size within Flood Zones 2 or 3; or in an area within Flood Zone 1 which has critical drainage problems.

- 1.10 Flood Zone 1 is defined as land with little or no flood risk (an annual exceedance probability [AEP] of flooding of less than 0.1%); Flood Zone 2 is defined as having a medium flood risk (an AEP of between 0.1% and 0.5% for tidal areas or 0.1% and 1.0% for rivers); and Flood Zone 3 is defined as high risk (with an AEP of greater than 0.5% for tidal areas or greater than 1.0% for rivers).
- 1.11 FRAs should describe and assess all flood risks (from rivers, the sea, sewers and groundwater) to and from the development and demonstrate how they will be managed, including an evaluation of climate change effects.

2 BASELINE ENVIRONMENTAL CONDITIONS

Topography

- 2.1 A site specific topographical survey has been undertaken and is provided in Appendix B. This indicates that the site is generally flat with a gentle slope downwards towards the north. Levels vary from approximately 85.3 metres Above Ordnance Datum (mAOD) near the southern boundary, falling to approximately 84.3 mAOD along the northern boundary.
- 2.2 Bridge Road forms higher ground along the northern site boundary with a bridge rising to an elevation of approximately 87 mAOD adjacent to the north-west site boundary. A railway passes beneath the bridge and runs along the western site boundary at an elevation of approximately 85.1 mAOD.

Hydrology

- 2.3 The closest 'main river'¹ is the Mimram River located approximately 1.7 km to the north of the site.
- 2.4 From a review of EA and Ordnance Survey mapping, no other 'main rivers' or open-channel ordinary watercourses have been identified within a 2 km radius of the site.
- 2.5 Surface water runoff currently drains from the site via an existing drainage system associated with the previous site use, which has an unrestricted discharge to the Thames Water sewer.

Geology and Hydrogeology

- 2.6 As reported on the British Geological Survey (BGS) online Geology of Britain Viewer, the majority of the site is underlain by the superficial geology of the Kesgrave Catchment Subgroup, comprising sand and gravel. An area in the north-western part of the site and along the southern boundary is underlain by the superficial geology of the Lowestoft Formation, comprising diamicton.
- 2.7 The Kesgrave Catchment Subgroup is classified as Secondary A Aquifer by the EA. Secondary A Aquifers are defined as *"permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers."*
- 2.8 The Lowestoft Formation is classified as undifferentiated Secondary Aquifer by the EA, which is *"assigned in cases where it has not been possible to attribute either category A or B to a rock type."*

¹ Main river is defined by the EA as any watercourse that contributes significantly to the hydrology of a catchment.

- 2.9 According to the BGS online Geology Britain Viewer, the site is further underlain by the bedrock geology of the Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated), comprising chalk.
- 2.10 The bedrock geology is classified as Principal Aquifer by the EA. Principal Aquifers are defined as *“layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.”*
- 2.11 The site lies within a Total Catchment (Zone 3) groundwater Source Protection Zone (SPZ).

3 EXTERNAL FLOOD RISK

Flooding Mechanisms

- 3.1 The EA's flood map for planning shows that the site lies entirely within Flood Zone 1 (low risk). Land located within Flood Zone 3 (high risk) is located approximately 1.7 km to the north. It is therefore concluded that the site will remain in Flood Zone 1 for its operational lifetime (assumed to be 100 years).
- 3.2 The EA's risk of flooding from surface water mapping identifies that most of the site has a very low risk of flooding from surface water (refer to Figure 3.1). An area near the northern site boundary and other isolated areas have up to a high risk of surface water flooding and this is discussed further below.
- 3.3 A review of the Welwyn Hatfield Council Strategic Flood Risk Assessment (SFRA; JBA, 2016) has identified that the site is potentially at risk from sewer flooding and this is discussed further below.
- 3.4 The Delta-Simons Geotechnical Report (2015) indicated groundwater levels of between 21.23 and 22.62 m below ground level and, as a result, the site is not considered to be at risk of groundwater flooding.
- 3.5 Based on a review of available information, no other significant sources of flooding (i.e. reservoirs) have been identified for the site.

Historic Flooding

- 3.6 The Welwyn Hatfield Council Strategic Flood Risk Assessment (SFRA; JBA, 2016) has been reviewed to establish any records of flooding at or in close proximity to the application site. The SFRA outlines records of sewer flooding in the postcode area and this is discussed further in the Sewer Flooding section below.
- 3.7 Consultation with the LLFA has indicated that the Highway Authority hold a number of records of surface water flooding on Hydeway (Appendix C). Two records of surface water flooding on Hydeway were recorded on 28/10/2015 near the post box and where the railway station footbridge joins Hydeway; both of which are located immediately adjacent to the site boundary. Another report was recorded on 22/11/2016 concerning a "long flood" on Hydeway which impeded pedestrians from safely crossing the road, although the exact location was not provided.
- 3.8 A review of the EA's Historic Flood Map indicates that there are no records of flooding of the site itself.

Surface Water Flooding

- 3.9 The EA's risk of flooding from surface water map shows that the majority of the site has a very low risk of surface water flooding. Very low surface water flood risk is defined where *"each year, this area has a chance of flooding of less than 1 in 1000 (0.1%)."*

- 3.10 An area along the northern boundary has up to a high risk of surface water flooding (i.e. greater than 3.3% annual chance). The surface water flooding in this part of the site appears to interact with land outside the site boundary to the north. The EA's mapping shows a potential flow path in the north-western corner (from the adjacent railway line) where surface water may enter the north of the site. An area at risk of surface water flooding also extends to the northern part of the site from the north-eastern site entrance at the lower part of Bridge Road.
- 3.11 Although the low risk extent (i.e. between 0.1% and 1% annual chance) covers a relatively large area in the north of the site, the medium risk (i.e. between 1% and 3.3% annual chance) and high risk (i.e. greater than 3.3% annual chance) extents are comparatively limited. Therefore, there would not be a significant risk to the development up to and including the 1% AEP event.
- 3.12 Ground floor levels for the proposed buildings within the area of medium to high surface water flood risk would be elevated 300 mm above existing ground levels to reduce their risk of surface water flooding. The flow path in the north of the site would be maintained by ensuring that ground levels along the northern boundary are set at a lower elevation than the adjacent buildings to allow the conveyance of surface water (via internal roads, where possible).
- 3.13 The areas at risk of surface water flooding are located in the existing topographical depressions of the site. Post-development, it is considered that any ponding of surface water in extreme events will be re-distributed to the new low points within the site (i.e. areas of open space and roads).
- 3.14 There are a number of other confined areas at risk of surface water flooding within the site. The EA's mapping indicates that these areas are limited in size and do not appear to have connectivity to areas outside of the site boundary (i.e. they originate within the site boundary). These small areas of surface water flood risk are expected given the brownfield nature of the site and the urbanised nature of the surrounding area.
- 3.15 The EA's surface water flood risk mapping shows what *"happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead."* It is noted that this type of flooding is difficult to predict and was based on the best information available to the EA regarding ground levels and drainage.
- 3.16 Consultation with the LLFA has established that although the Highways Authority do hold records of flooding on Hydeway, the LLFA incident record does not hold any records of surface water flooding within the area (refer to Appendix C). Given the lack of historic records in the north of the site and Bridge Road, the surface water flood risk to the site may be less than that shown on the EA's mapping.
- 3.17 The risk of surface water flooding originating within the site would be reduced through the implementation of the proposed drainage strategy discussed in Section 4 and the proposed development will provide a significant betterment compared to the existing drainage arrangement. Therefore, it is considered unlikely that surface water flooding would adversely affect the site.

Sewer Flooding

- 3.18 Sewer flooding can be associated with surface water flooding and occurs when the sewers are overwhelmed by heavy rainfall, become blocked or are of inadequate capacity. Typically, surface water sewers are designed with capacity for the 1 in 30 year event.
- 3.19 Historical incidents of sewer flooding are recorded by Thames Water in their DG5 register and this data is outlined in the SFRA (JBA, 2016). The site is located within the postcode area of AL73 and this has 19 records of internal flooding of property and 32 records of external flooding of property or areas. Furthermore, Thames Water surface water and combined sewers are located within the site boundary, although these have not been specifically identified in the SFRA as at risk of flooding.
- 3.20 A drainage survey at the site has determined that there are currently separate connections for foul and surface water which discharge at unrestricted rates. Previous consultation with Thames Water has indicated that there may be capacity limitations associated with the foul sewer downstream of the site and, therefore, appropriate mitigation will be required within the foul drainage strategy.
- 3.21 As outlined for surface water flooding, the risk of sewer flooding could be reduced through the implementation of the proposed drainage strategy. Surface water from the site currently discharges to the Thames Water sewer at an unrestricted rate and, therefore, the proposed attenuated discharge from the development would provide a significant betterment.
- 3.22 To further mitigate the risk of sewer flooding, it is recommended that non-return valves or other suitable devices are installed to avoid the risk of backflow.

Safe Access/Egress

- 3.23 Access/egress to the site would not be affected by fluvial or tidal flooding; the site is located entirely within Flood Zone 1, as is Hydeway and Broadwater Road to the east, Bridge Road to the north and all of the surrounding area used to access the site.
- 3.24 The access/egress route via Bridge Road to the north and Hydeway to the east could be affected by surface water flooding, as discussed above. However, if access/egress is impeded then an alternative route would be available via Broadwater Road.

Land Use Vulnerability

- 3.25 Table 2 of the NPPF PPG sets out a schedule of land uses based on their vulnerability or sensitivity to flooding. As set out in Table 2, the development is classified as a land use that is 'more vulnerable' to flooding. Referring to Table 3 of the PPG, all land uses are considered appropriate within Flood Zone 1.
- 3.26 Therefore, on the basis of land use vulnerability, the development should be deemed appropriate in planning policy terms in the proposed location.

4 DRAINAGE ASSESSMENT

Introduction

- 4.1 The NPPF states that those proposing development are responsible for drainage designs which reduce flood risk to the development and elsewhere, potentially through the use of Sustainable Drainage Systems (SuDS). Surface water arising from a developed site should, as far as is practicable, be managed to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere.

Existing Runoff Arrangements

- 4.2 Currently any surface water runoff generated within the site is dealt with via the existing drainage infrastructure associated with the site which discharges to the Thames Water public sewer via a number of lateral drains in Broadwater Road and Bridge Road, at an unrestricted rate.

Previously Approved Application

- 4.3 The surface water drainage strategy completed for the consented scheme for the site proposed to restrict the runoff rate to 310 l/s with a discharge to the Thames Water sewers (refer to Appendix D). This was based on a 50% reduction of the existing 1 in 1 year rate; proposed discharge rate was agreed with Thames Water (refer to email correspondence in Appendix D).

Drainage Strategy

- 4.4 The detailed surface water drainage strategy, which has been prepared by Pitman Associates, is provided as Appendix E.
- 4.5 The proposed surface water drainage strategy has been designed to accommodate the 1 in 100 year rainfall event including a 40% allowance for climate change. The site has been divided into six sub-catchment areas and each area has a separate proposed discharge point to the Thames Water surface water sewer.

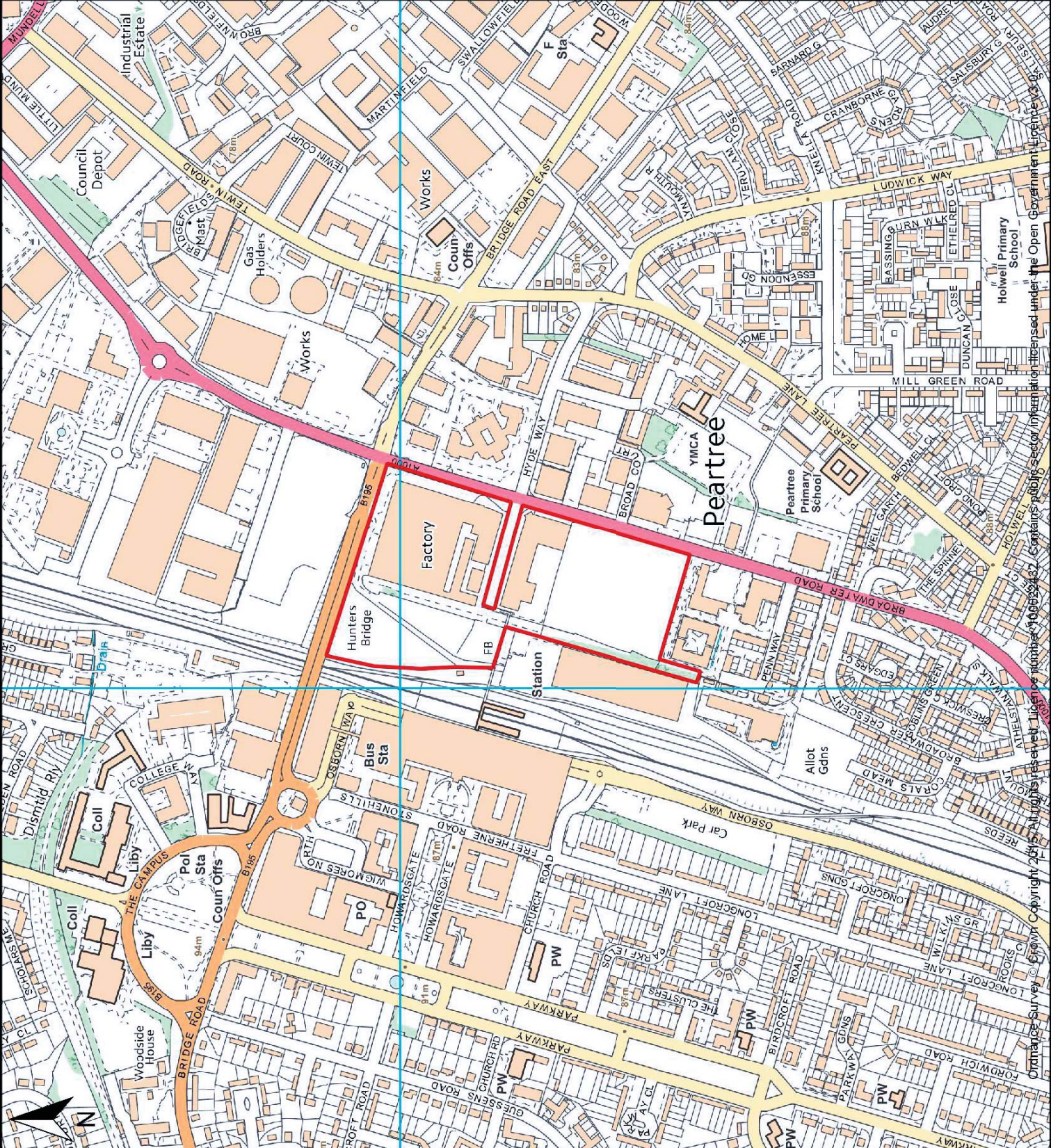
Foul Drainage

- 4.6 An assessment of foul drainage is not included within the scope of this FRA. However, Thames Water have indicated that, following initial investigation, it has been identified that the existing wastewater infrastructure does not have the capacity to accommodate the needs of the proposed development. Appropriate mitigation will need to be provided following further consultation with Thames Water. This may include the use of foul pumping stations to attenuate foul flows and restrict the discharge rate to the sewer.

5 CONCLUSIONS

- 5.1 The requirements for Flood Risk Assessment are provided in the National Planning Policy Framework and its associated Planning Practice Guidance, together with the Environment Agency's Guidance Notes. This policy and associated guidance have been followed in the preparation of this FRA.
- 5.2 The EA's flood map for planning for the area identifies that the entire site lies within Flood Zone 1 and, therefore, flood risk from rivers and the sea is considered to be low. A review of further information has identified that the site is potentially at risk from surface water and sewer flooding. No other significant sources of flooding have been identified at the site, i.e. from reservoirs or groundwater.
- 5.3 An area along the northern boundary has up to a high risk of surface water flooding (i.e. greater than 3.3% annual chance). The EA's mapping shows a potential flow path in the north-western corner (from the adjacent railway line) where surface water may enter the north of the site. An area at risk of surface water flooding also extends to the northern part of the site from the north-eastern site entrance on Bridge Road.
- 5.4 Ground floor levels in the proposed buildings within the area of medium to high surface water flood risk would be elevated 300 mm above the existing ground levels to reduce their risk of surface water flooding. The flow path in the north of the site would be maintained by ensuring the ground levels along the northern boundary are set at a lower elevation than the adjacent buildings to allow the conveyance of surface water (via internal roads, where possible).
- 5.5 Historical incidents of sewer flooding are recorded by Thames Water in their DG5 register and this data is outlined in the SFRA. The site is located within the postcode area of AL73 and this has 19 records of internal flooding of property and 32 records of external flooding of property or area. To mitigate the risk of sewer flooding, it is recommended that non-return valves or other suitable devices are installed to avoid the risk of backflow.
- 5.6 The risk of surface water and sewer flooding would be reduced through the implementation of the drainage strategy and the proposed development will provide a significant betterment compared to the existing drainage arrangement.
- 5.7 The detailed surface water drainage strategy has been prepared by Pitman Associates and is provided as Appendix E.
- 5.8 This FRA has therefore demonstrated that the proposed development will be safe and that it would not increase flood risk elsewhere. The proposed land use is classified as 'more vulnerable' development and is considered appropriate in relation to the flood risk vulnerability classifications set out in Table 3 of the NPPF. The development should therefore be considered acceptable in planning policy terms.

Figures



Key
Application Site



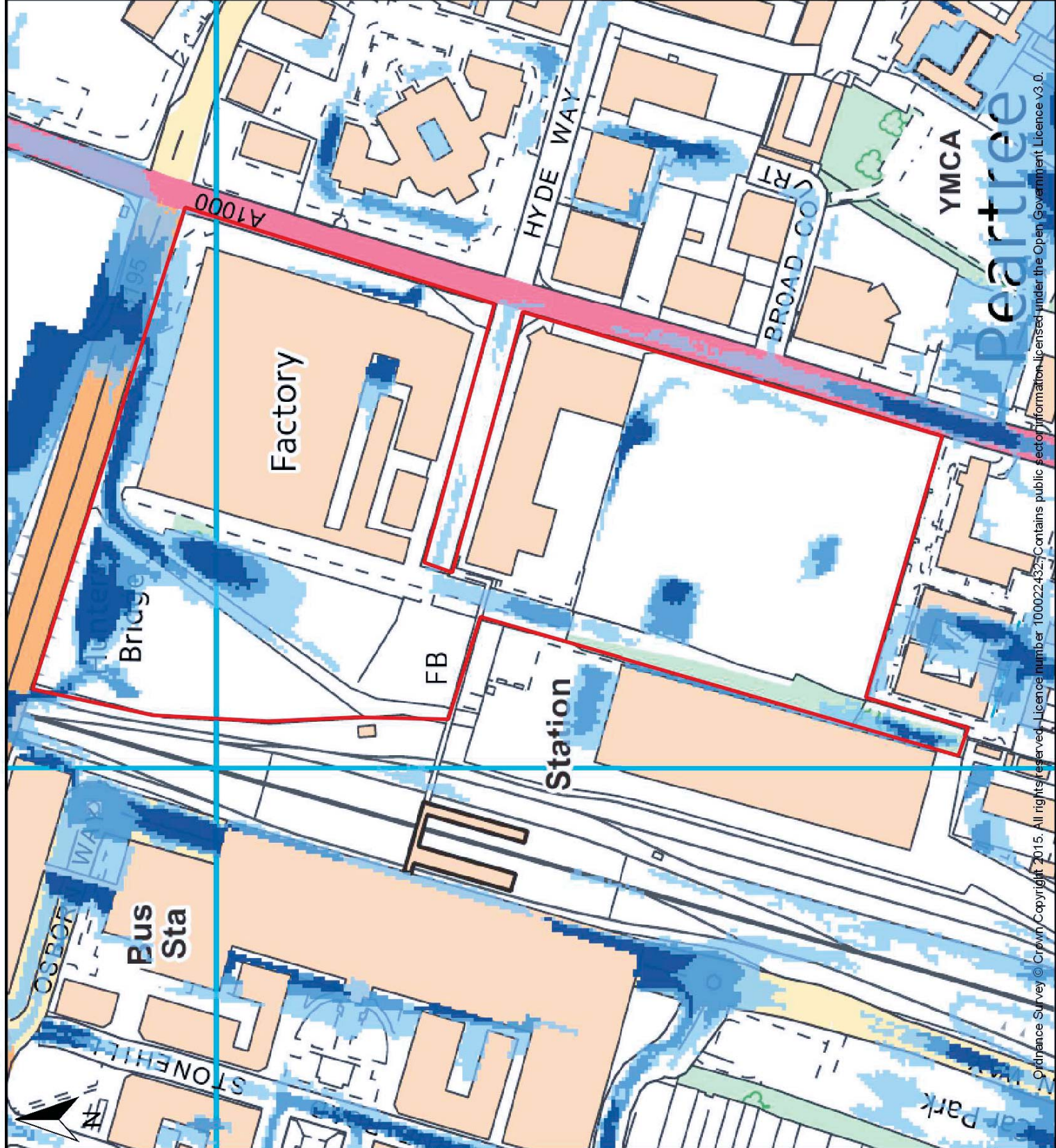
Figure 1.1: Site Location Plan

Client: ENTRAN

Project: Welwyn Garden City

Title: Flood Risk Assessment

Drawn: NY	Checked: RM	Date: 27/11/2017	Scale: 1:5,000@A3
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Key



Application Site

Low Risk (0.1%-1.0% AEP)

Medium Risk (1.0%-3.3% AEP)

High Risk (>3.3% AEP)



Figure 3.1: EA's Surface Water Flood Map

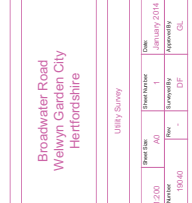
Client:	ENTRAN	Checked:	ML	Date:	27/11/17	Scale:	1:2,000@A3
Project:	Welwyn Garden City	Drawn:	NY	Title: Flood Risk Assessment			

Appendix A: Proposed Development Layout

New	Description	Date
INFORMATION		
	Purposes of Issue	
	Bradley Murnigh Design Ltd The Courtyard National Technology Park Dart Lane Hullion Wendebishish CV78 8BQ	BMD LANDSCAPE DESIGN PLANNING
	01906 675646 info@bradleymurnighdesign.co.uk www.bradleymurnighdesign.co.uk	
Client:	PLUTUS ESTATES (WG) LTD & METROPOLITAN HOUSING TRUST	
Project:	Broadwater Road, Welwyn Garden City	
Drawing Title:	Illustrative Landscape Masterplan	
Drawn by	Checked by	Approved by
JLB	LJB	DL
Date	Scale	Sheet Size
17/03/23	1:500	A0
Drawing Number	Revision	
HAUL-17-03-23 (Rev 00)	-	

New	Description	Date	
INFORMATION			
Bradley Murnigh Design Ltd The Courtyard Hendon Technology Park Dart Lane Hendon Borehamwood WY3 8JG		BMD LANDSCAPE DESIGN PLANNING	
01935 675656 info@bradleymurnighdesign.co.uk www.bradleymurnighdesign.co.uk			
Client:			
PLUTUS ESTATES (WGC) LTD & METROPOLITAN HOUSING TRUST			
Project: Broadwater Road, Welwyn Garden City			
Drawing Title: Illustrative Landscape Masterplan			
Drawn	Checked	Approved	Date
John N	LB	LB	11/01/2018
Scale	Sheet Size	Revision	
1:7,500	A0		
Drawing Number	AD		
19/01/23			

Appendix B: Topographical Survey



Notes:

1. ALL INFORMATION IS BASED ON THE DATA PROVIDED TO THE SURVEYOR.
2. THE SURVEYOR HAS NOT CONDUCTED A VISUAL INSPECTION OF THE SITE.
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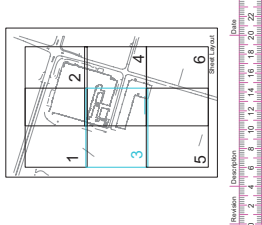
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KEY	
GENERAL	1. SURVEYED AREAS OF ACCESS TO VEHICLES
CONCRETE	2. CONCRETE
ASPHALT	3. ASPHALT
GRAVEL	4. GRAVEL
BRICK	5. BRICK
STONE	6. STONE
WOOD	7. WOOD
IRON	8. IRON
STEEL	9. STEEL
ALUMINUM	10. ALUMINUM
COPPER	11. COPPER
ZINC	12. ZINC
LEAD	13. LEAD
GLASS	14. GLASS
PAPER	15. PAPER
PLASTIC	16. PLASTIC
TEXTILE	17. TEXTILE
PAINT	18. PAINT
ADHESIVE	19. ADHESIVE
SEALANT	20. SEALANT
INSULATION	21. INSULATION
ROOFING	22. ROOFING
CLADDING	23. CLADDING
SKYLIGHT	24. SKYLIGHT
GLAZING	25. GLAZING
SCREENING	26. SCREENING
SHADING	27. SHADING
VENTILATION	28. VENTILATION
HEATING	29. HEATING
Cooling	30. COOLING
Lighting	31. LIGHTING
Sound	32. SOUND
Security	33. SECURITY
Accessibility	34. ACCESSIBILITY
Health	35. HEALTH
Environment	36. ENVIRONMENT
History	37. HISTORY
Geography	38. GEOGRAPHY
Topography	39. TOPOGRAPHY
Hydrology	40. HYDROLOGY
Atmosphere	41. ATMOSPHERE
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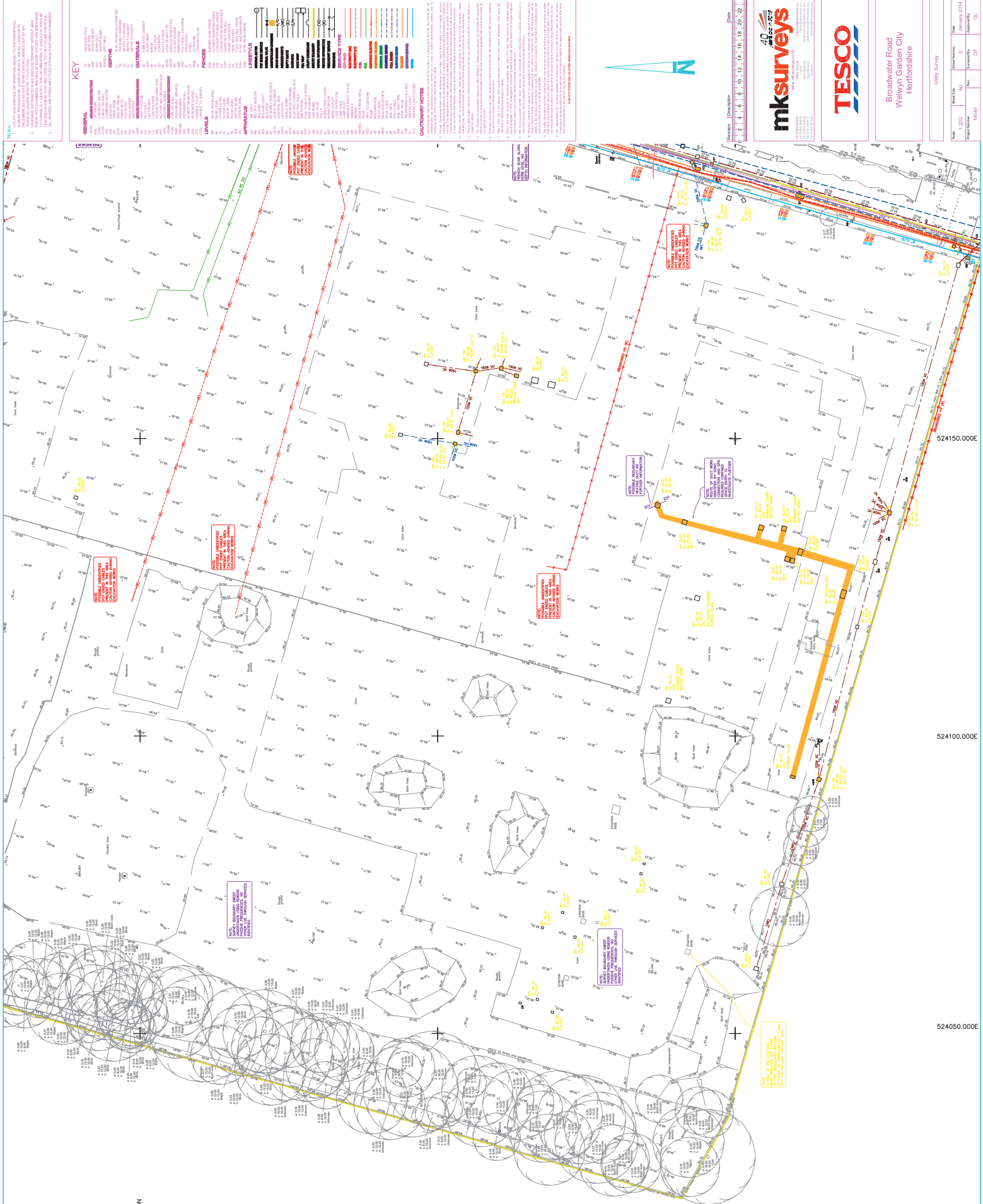
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mksurveys.co.uk
01454 812345
100 High Street
Walsley, West Yorkshire
WF4 1JH

TESCO

Broadwater Road
Welwyn Garden City
Hertfordshire

Utility Survey

Date	2020	Sheet	10	Scale	1:100
Project Name	10040	Drawn	DF	Approved	GL
Client	TESCO	Project Manager	DF	Project Engineer	GL

Appendix C: LLFA Consultation

From: James Lester [<mailto:James.Lester@hertfordshire.gov.uk>] **On Behalf Of** Flood and Water Management

Sent: 02 November 2017 12:40

To: Nick Yeo <nick.yeo@rma-environmental.co.uk>

Cc: Flood and Water Management <FloodandWaterManagement@hertfordshire.gov.uk>

Subject: RE: Pre-application enquiry at land off Hyde Way, Welwyn Garden City, AL7 3UQ

Nick

The LLFA incident record does not hold any records of surface water flooding in this area. However, absence of records does not mean that there has never been any surface water flooding.

There have been reports to the Highway Authority about Hydeway flooding:

- Flooding of the footway on Hydeway near the post box being flooded on 28/10/2015.
- The road where the footbridge from the railway station joins Hydeway flooding also on 28/10/2015.
- There was another report on 22/11/2016 of a long flood on Hydeway impeding pedestrians ability to cross safely, however I do not know where on the road this flooding occurred.

Yours sincerely,
James Lester

James Lester

Investigations Officer, Lead Local Flood Authority [HCC]

Postal Point CHN215

Hertfordshire County Council, County Hall, Pegs Lane, Hertford, SG13 8DN

t: 01992 555532 **Comnet / Internal:** 25532

From: Nick Yeo [<mailto:nick.yeo@rma-environmental.co.uk>]

Sent: 26 October 2017 15:43

To: Flood and Water Management

Subject: Pre-application enquiry at land off Hyde Way, Welwyn Garden City, AL7 3UQ

Good Afternoon

We have been instructed to undertake a Flood Risk Assessment for a mixed use development at land off Hyde Way, Welwyn Garden City, AL7 3UQ. The approximate grid reference is TL 24142 12774 and I have attached a site location plan.

The EA's surface water flood mapping shows the site has an area of surface water flood risk in the north of the site. We would welcome any initial comments you have on the development of the site and whether you have any records of surface water flooding at the site or in the vicinity of the site.

Kind regards
Nick

Nick Yeo
Environmental Consultant, RMA Environmental

Office: 01884 842740

Email: nick.yeo@rma-environmental.co.uk
Web: www.rma-environmental.co.uk

Office Address: Suite 4, Swallow Court, Devonshire Gate, Tiverton, Devon, EX16 7EJ
Registered Office: 2 Chartfield House, Castle Street, Taunton, TA1 4AS
Registered in England No: 6915388

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Please consider the environment before printing this email

Appendix D: Consented Application FRA Addendum

SPEN HILL DEVELOPMENTS LIMITED

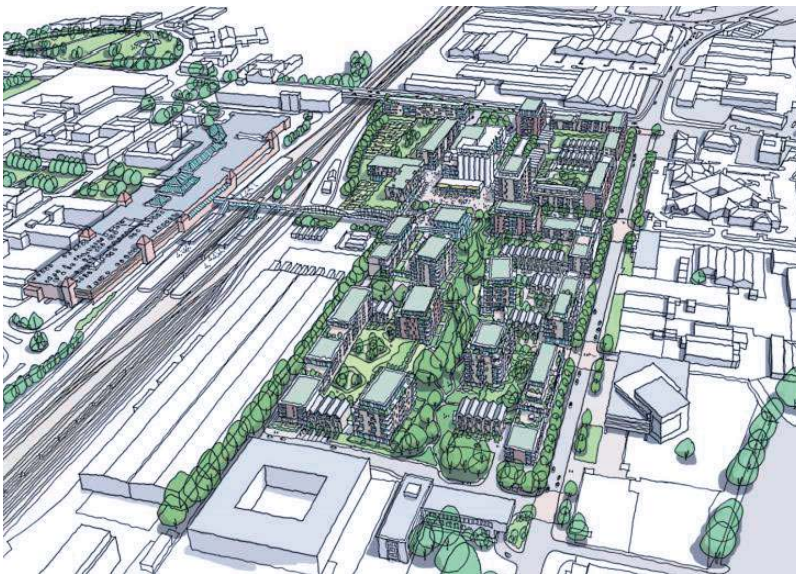
FORMER SHREDDED WHEAT FACTORY
WELWYN GARDEN CITY

Flood Risk Assessment & Drainage Strategy ADDENDUM REPORT 2

Application N6/2015/0293/PP

July 2016

Rev -



Former Shredded Wheat Factory, Welwyn Garden City

Contents

Summary.....	2
1.0 Consultation.....	3
2.0 Conclusion.....	5
3.0 Appendix.....	6

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Authors: Gavin Clifford BEng CEng FICE gavin.clifford@icis-design.co.uk

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Barrington House, Heyes Lane, Alderley Edge, Cheshire SK9 7LA. tel 0161 883 1401

Former Shredded Wheat Factory, Welwyn Garden City

Summary

This second addendum to the Flood Risk Assessment (FRA) and Drainage Strategy report is provided as supplementary information following consultation with the LLFA.

The LLFA has requested that Thames Water be consulted, such that they agree surface water discharge rates to the public sewer, in order that the LLFA withdraw their objection to the proposed development.

ICIS Design Limited have met with Thames Water to discuss surface water drainage strategy, subsequently submitting a proposal to limit maximum surface water discharge from the full development site to the public sewer to 310 l/s. Thames Water have responded positively to this proposal, confirming that they would accept discharge at this rate.

Relevant correspondence is included within this addendum.

This addendum is therefore submitted with the request that the LPA approve the proposed application, subject to appropriate condition(s) requiring agreement and approval of detailed design prior to construction of each phase of the works. Each phase of works should take account of the overall strategy, such that total discharge is no more than the agreed rate of 310 l/s.

Former Shredded Wheat Factory, Welwyn Garden City

1.0 Consultation

As part of the statutory consultation process for the proposed redevelopment of the site at Broadwater Road, Welwyn Garden City (App N6/2015/0293/PP), Hertfordshire County Council acting as Lead Local Flood Authority (LLFA), requested that Thames Water be consulted to obtain their confirmation of acceptable surface water discharge to the public sewer.

The LLFA letter request, dated 16th May 2016 is Appendix A. It requires that Thames Water confirm acceptance of discharge from the site, in order for the LLFA to lift its objection.

ICIS Design met with Thames Water on 25th May 2016 at TW, Clearwater Court, Reading RG1 8DB.

Attendees:

Graeme Kasselmann – TW Network Planner

Shaun Picart – TW Development Engineer

Gavin Clifford – ICIS Design, Civil & Structural Engineers

Geoff Nokes – TW Development Engineer (absent due to illness)

Thames Water explained that their overall position is that they do not object to development on the site.

For surface water discharge, TW accept that due to the absence of an accessible open watercourse and despite extensive SuDS measures to reduce run-off, there will need to be a surface water discharge from the site to the public sewer. Having discussed the current condition of the site, TW acknowledged that historic discharge from the site to the public sewer was at an unrestricted rate, under gravity. Whilst the historic use of the site was largely developed with buildings and hard-standing, calculations for existing run-off should reflect that demolished buildings with broken or removed ground floor slabs should be considered as 'greenfield' for the purposes of run-off rates.

Given the condition and utilisation of the existing surface water sewer network, TW indicated that subject to confirmation of numerical discharge rates, they would be likely to accept a reduction of discharge to 50% of the peak 1 in 1 year storm event. Points of connection should ideally use existing connections, or be close to them. ICIS Design were requested to submit a written confirmation of what this would equate to, for approval purposes.

ICIS Design submitted a summary calculation to TW on 8 July 2016, confirming calculation parameters thus:

Overall site area = 8.903 ha

Current impermeable area = 50% (4.45 ha)

Current impermeable area includes only those parts of the site currently covered by buildings and hard landscape. Areas which were previously developed but subsequently demolished, with ground slabs broken up are assumed to generate 'greenfield' run-off only in the current condition.

Former Shredded Wheat Factory, Welwyn Garden City

The drained surface water run-off rates are calculated, based on the existing and proposed impermeable areas of the site, data given by the Flood Studies Report (FSR) and Wallingford Procedure, using the XP Solution WinDes computer software.

The variables used (within the computer software) to calculate the existing and proposed surface water run-off rates for the site are:

- $M5 - 60 \text{ (mm)} = 20.000$
- Ratio $R = 0.420$
- $C_v \text{ (Summer)} = 0.750$
- $C_v \text{ (Winter)} = 0.840$
- Time of Entry = 5 minutes
- Climate Change = 0

This results in a calculated, existing peak 1 in 1 year SW run-off rate of 620 l/s.

A 50% betterment of this existing rate would equate to 310 l/s.

ICIS Design therefore proposed that irrespective of whether individual phases of development or increased SuDS provision resulted in lower calculated flows, the peak discharge to Thames Water sewers would be no more than 310 l/s.

Thames Water confirmed via email on 11 July 2016 that this is acceptable.

Former Shredded Wheat Factory, Welwyn Garden City

2.0 Conclusion

In consultation with Thames Water, it has been determined that TW would accept a maximum peak surface water discharge from the application site of 310 l/s.

SuDS proposals described within the FRA & Drainage Strategy Report, Architectural proposals and Landscape Architect's design may well result in discharge rates below this figure, but within the context of the proposed Detailed and Outline Planning Applications, 310 l/s should be used as an overall upper limit for final detailed design.

Former Shredded Wheat Factory, Welwyn Garden City

3.0 Appendix

1. HCC (LLFA) letter 1 May 2016, Ref N6/2015/0294/PP - Former Shredded Wheat Factory, Bridge Road, Welwyn Garden City, AL8 6UN
2. Email chain ICIS Design/Thames Water 8/11 July 2016

Environment Director & Chief Executive:
John Wood



Andrew Windscheffel
Welwyn Hatfield Borough Council
The campus
Welwyn Garden City
Herts
AL8 6AE

Post Point CHN 215
Hertfordshire County Council
County Hall, Pegs Lane
HERTFORD SG13 8DN

Contact Francisco Aguilar
Tel 01992 556075
Email FRMConsultations@hertfordshire.gov.uk

Date 16th May 2016

RE: N6/2015/0294/PP - Former Shredded Wheat Factory, Bridge Road, Welwyn Garden City, AL8 6UN

Dear Andrew,

In the absence of an acceptable FRA we object to the grant of planning permission and recommend refusal on this basis for the following reasons:

The Flood Risk Assessment & Drainage Strategy addendum report prepared by ICIS design, reference 10007.gc dated February 2016 submitted with this application does not comply with the requirements set out in the Planning Practice Guide (as revised 6 April 2015) to the National Planning Policy Framework. The submitted FRA does not therefore; provide a suitable basis for assessment to be made of the flood risks arising from the proposed development.

In order for the Lead Local Flood Authority to advise the relevant local planning authority that the site will not increase flood risk to the site and elsewhere and can provide appropriate sustainable drainage techniques, the following information is required as part of the flood risk assessment;

- 1) Confirmation by Thames Water that the proposed discharge is accepted.

Overcoming our objection

Given that it is proposed to discharge surface water runoff into the sewer network, the applicant needs to provide confirmation by Thames Water that the proposed discharge rates can be accepted into the sewer network.

For further guidance on HCC's policies on SuDS, HCC Developers Guide and Checklist and links to national policy and industry best practice guidance please refer to our surface water drainage webpage

<http://www.hertsdirect.org/services/envplan/water/floods/surfacewaterdrainage/>

Informative to the LPA

Our understanding is that the changes introduced in the addendum to the original FRA presents will seek to minimize the required underground storage volume, but that some will be needed. We would expect that at the reserved matters stage detailed drainage calculations are submitted and that the proposed above ground SuDS features provide a significant proportion of the total attenuation volume.

The original FRA dated February 2015 stated that there would be 4 discharge points into the existing sewer network. We understand that these discharge points are still planned, however once the detailed design is undertaken, the applicant will need to confirm the location and the number of the proposed discharge points.

We ask to be re-consulted with the results of the FRA. We will provide you with bespoke comments within 21 days of receiving formal re-consultation. Our objection will be maintained until an adequate FRA has been submitted

Yours sincerely,

Francisco Aguilar

Hertfordshire County Council

01992 556075

FRMConsultations@hertfordshire.gov.uk

Gavin Clifford

From: Geoff Nokes <geoff.nokes@thameswater.co.uk>
Sent: Monday, July 11, 2016 2:08 PM
To: Gavin Clifford
Subject: RE: DTS 26322 - Former Shredded Wheat Factory Complex Welwyn AL10 9EZ

Gavin

This will be acceptable to us.

Regards

Geoff Nokes

Development Engineer - Waste

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From: Gavin Clifford [mailto:gavin.clifford@icis-design.co.uk]
Sent: 08 July 2016 18:26
To: Geoff Nokes
Cc: Graeme Kasselmann; Shaun Picart
Subject: DTS 26322 - Former Shredded Wheat Factory Complex Welwyn AL10 9EZ

Dear Geoff

Following your previous email I met with Graeme Kasselmann and Shaun Picart and we had a very useful discussion regarding the proposed foul and surface water discharge from the above site, including alternative methods for calculating appropriate storage, discharge and points of connection. Graeme also explained the notes that you have sent to the Planning Officer, requesting an appropriate planning condition regarding the foul water in particular. All of this was helpful in terms of understanding the condition of the TW network and how you would prefer development to be brought forward. I appreciate that you have indicated to WHBC that you do not have any objection to the proposed development.

I also explained to Graeme that we have received a request from Herts CC (acting as LLFA), that we obtain confirmation from you that our proposed surface water discharge is acceptable. We discussed how a reduction in discharge could be achieved and the benefit of this to the TW network. Whilst we have opportunity on site to use various SuDS techniques to control the rate of discharge, ultimately we need to discharge in to the TW surface water sewer, because there is no direct connection available to an open watercourse.

We have therefore calculated discharge rates, as summarised below. The end result is that **we propose to limit discharge from the entire application site to 310 l/s, which represents a 50% reduction from the existing peak 1 in 1 year SW run-off rate.**

Please would you confirm your acceptance of this, so that we can forward it to the Planning Officer.

For your information, the calculation is based on the following:

The drained surface water run-off rates are based on the existing and proposed impermeable areas of the site, data given by the Flood Studies Report (FSR) and Wallingford Procedure, which have been calculated within the XP Solution WinDes computer software.

Overall site area = 8.903 ha

Current impermeable area = 50% (4.45 ha)

Current impermeable area includes only those parts of the site currently covered by buildings and hard landscape. Areas which were previously developed but subsequently demolished, with ground slabs broken up, have been assumed to generate 'greenfield' run-off only in the current condition.

The variables used (within the computer software) to calculate the existing and proposed surface water run-off rates for the site are as follows:

- M5 – 60 (mm) = 20.000
- Ratio R = 0.420
- Cv (Summer) = 0.750
- Cv (Winter) = 0.840
- Time of Entry = 5 minutes
- Climate Change = 0

Existing peak 1 in 1 year SW run-off rate = 620 l/s

50% betterment of existing rate = 310 l/s

Thank you for your assistance.

Regards
Gavin

Gavin Clifford
Director

icis design limited

Civil & Structural Consulting Engineers

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Appendix E: Pitman Associates' Surface Water Drainage Strategy

SCOPE

This design addresses runoff from all areas within the red line boundary for the planning application.

DESIGN CONSTRAINTS

Infiltration

A ground investigation undertaken by Delta Simons Environmental ('Factual and Interpretive Geotechnical Report 2342.18 Nov 2014') identified significant dissolution features within the chalk bedrock underlying the site. These features preclude the use of concentrated infiltration within the development.

Thames Water

In correspondence regarding a previous application to develop the site (N6/2015/0293/PP) Thames Water agreed to take a peak flow of 310l/s from the site for all events up to the 100year plus climate change (ICIS Design 'Addendum to FRA July 2016').

DESIGN STANDARDS

The proposed surface water drainage system is to be designed to ensure that all runoff from the 100year rainfall event plus an allowance for climate change is managed in accordance with the above constraints and the requirements of the DEFRA document Non-Statutory Technical Standards for Sustainable Drainage Systems.

DESIGN - STRATEGY

The site has been divided into six subcatchments, each with a point of discharge to the public surface water sewer. Five of the six catchments share similar characteristics i.e. tall buildings around/adjacent to a landscaped podium; roads and parking; and soft landscaped areas at ground level. The remaining catchment comprises existing buildings which are to be retained, set in a hard landscape.

The drainage design for the five subcatchments is based on the following approach:

- Runoff from roofs and podiums will drain to low profile attenuation tanks at podium level. The outflow from the tanks will be controlled by orifices;
- Runoff from roads and parking areas will either discharge to ground via infiltration, or will be attenuated within a lined sub-base prior to discharge to a carrier drain serving the subcatchment;
- Runoff from soft landscaped areas will either discharge to ground via infiltration, or will be attenuated in surface features such as swales, ponds and bio-retention areas, prior to disposal to the carrier drain.

The drainage design for the subcatchment comprising the existing buildings is based on attenuating runoff in a buried geocellular tank prior to discharge to the public surface water sewer.

The Source Control module of the MicroDrainage software suite has been used to establish a baseline design. It is intended that the baseline is developed to further improve the quality of runoff from the site as part of the detailed design process. Models and simulation results are included in Appendix A. The subcatchments to which the models refer are shown on SK001.

MODELLING/CALCULATION NOTES

The models have been based on the following parameters:

- Approximately 80% of a podium area will comprise a 235mm deep geocellular attenuation tank with a 95% void ratio. Runoff from roofs will be conveyed to the tank via a number of downpipes;
- The discharge rate from podium tanks will be controlled by one or more orifices;
- Runoff from roads will be attenuated in a 200mm deep granular sub-base with a minimum void ratio of 30%. The invert of the sub-base will be no steeper than 1 in 500. The outlet from every 500m² of road will be controlled with an orifice, and will discharge to a carrier drain. The discharge from each 500m² area will be limited to a maximum of 1.5l/s using one or more orifices.
- The maximum discharge rate for landscaped areas has been calculated on the basis of the 100year greenfield rate for type 4 SOIL i.e. 15l/s/ha.




Subcatchment	Roof	Podium	Roads & Parking	Landscaping	Total
SC1	Area (ha) 0.115 Attenuation To podium level attenuation storage 200mm deep sub-base 40mm dia. orifices – 7.8/s	0.115 900m ² 225mm deep attenuation tank 100mm dia. orifices – 7.4/s	0.260 200mm deep sub-base 40mm dia. orifices – 7.8/s	0.360 Infiltration + surface level attenuation features 5.4/s	0.900 -
SC2	Area (ha) 0.330 Attenuation To podium level attenuation storage 200mm deep sub-base 40mm dia. orifices – 9.0/s	2N/ 0.160 (total) 2N/ 640m ² 225mm deep attenuation tank 2N/ 100mm dia. orifice – 16.4/s (total)	0.300 200mm deep sub-base 40mm dia. orifices – 9.0/s	0.380 Infiltration + surface level attenuation features 5.7/s	1.170 -
SC3	Area (ha) 0.160 Attenuation To podium level attenuation storage 200mm deep sub-base 40mm dia. orifices – 7.8/s	0.160 N/ 1280m ² 225mm deep attenuation tank N/ 800m ² 225mm deep attenuation tank N/ 100mm dia. orifice – 7.8/s	0.366 200mm deep sub-base 40mm dia. orifices – 7.8/s	0.380 Infiltration + surface level attenuation features 5.7/s	1.550 -
	Flow Control (l/s) -	N/ 100mm dia. orifice – 7.8/s N/ 100mm dia. orifice – 7.8/s N/ 100mm dia. orifice – 8.1/s	40mm dia. orifices – 7.8/s	5.7/s	36.6/s
SC4	Area (ha) 0.662 Attenuation To podium level attenuation storage 200mm deep sub-base 40mm dia. orifices – 12.3/s	0.463 N/ 1110m ² 225mm deep attenuation tank N/ 800m ² 225mm deep attenuation tank N/ 120mm dia. orifice – 12.0/s	0.408 200mm deep sub-base 40mm dia. orifices – 12.3/s	0.280 Infiltration + surface level attenuation features 4.2/s	1.810 -
SC5	Area (ha) 0.388 Attenuation To podium level attenuation storage 200mm deep sub-base 40mm dia. orifices – 7.8/s	- To buried attenuation tank 600m ² plan area x 1.2m deep Hydro-Brake 150/s @ 1.2m head	-	-	1.920 -
SC6	Area (ha) 0.610 Attenuation To podium level attenuation storage 200mm deep sub-base 40mm dia. orifices – 5.8/s	0.610 N/ 1500m ² 225mm deep attenuation tank N/ 2500m ² 225mm deep attenuation tank N/ 1500m ² 225mm deep attenuation tank N/ 100mm dia. orifice – 4.1/s N/ 100mm dia. orifice – 7.8/s N/ 100mm dia. orifice – 5.8/s	0.025 200mm deep sub-base 40mm dia. orifices – 0.8/s	0.37 Infiltration + surface level attenuation features 5.5/s	150.0/s -
	Flow Control (l/s) -	N/ 100mm dia. orifice – 7.8/s N/ 100mm dia. orifice – 5.8/s	40mm dia. orifices – 0.8/s	5.5/s	23.8/s


CLIENT PROJECT
PROJECT
DRG TITLE
SCALE

Shredded Wheat Factory, Welwyn Garden City
Surface Water Drainage Strategy
NTS

SOUTH LODGE
OLD DAWLISH ROAD
EXMINSTER DEVON EX6 8AT
Telephone: +44(0) 1392 824616
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South Lodge Exminster Devon EX6 8AT							
Date 26/11/2017 20:25 File SC1 - lined paving.SRCX				Designed by Pitman Checked by			
XP Solutions				Source Control 2017.1.2			
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Half Drain Time : 163 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	90.851	0.151	0.0	1.2	1.2	15.2	Flood Risk
30 min Summer	90.880	0.180	0.0	1.3	1.3	19.4	Flood Risk
60 min Summer	90.902	0.202	0.0	1.4	1.4	22.8	Flood Risk
120 min Summer	90.914	0.214	0.0	1.5	1.5	24.5	Flood Risk
180 min Summer	90.913	0.213	0.0	1.5	1.5	24.4	Flood Risk
240 min Summer	90.911	0.211	0.0	1.5	1.5	24.0	Flood Risk
360 min Summer	90.903	0.203	0.0	1.4	1.4	22.9	Flood Risk
480 min Summer	90.895	0.195	0.0	1.4	1.4	21.7	Flood Risk
600 min Summer	90.887	0.187	0.0	1.4	1.4	20.5	Flood Risk
720 min Summer	90.879	0.179	0.0	1.3	1.3	19.3	Flood Risk
960 min Summer	90.865	0.165	0.0	1.3	1.3	17.2	Flood Risk
1440 min Summer	90.842	0.142	0.0	1.2	1.2	13.8	Flood Risk
2160 min Summer	90.817	0.117	0.0	1.0	1.0	10.1	Flood Risk
2880 min Summer	90.800	0.100	0.0	0.9	0.9	7.5	Flood Risk
4320 min Summer	90.777	0.077	0.0	0.8	0.8	4.4	Flood Risk
5760 min Summer	90.762	0.062	0.0	0.7	0.7	2.9	Flood Risk
7200 min Summer	90.754	0.054	0.0	0.6	0.6	2.2	Flood Risk
8640 min Summer	90.749	0.049	0.0	0.5	0.5	1.8	Flood Risk
10080 min Summer	90.745	0.045	0.0	0.5	0.5	1.5	Flood Risk
15 min Winter	90.851	0.151	0.0	1.2	1.2	15.2	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	142.716	0.0	16.1	18			
30 min Summer	92.222	0.0	21.2	33			
60 min Summer	56.713	0.0	26.3	62			
120 min Summer	33.722	0.0	31.4	120			
180 min Summer	24.576	0.0	34.4	148			
240 min Summer	19.534	0.0	36.5	180			
360 min Summer	14.061	0.0	39.3	246			
480 min Summer	11.142	0.0	41.5	314			
600 min Summer	9.297	0.0	43.2	384			
720 min Summer	8.015	0.0	44.7	450			
960 min Summer	6.338	0.0	46.9	586			
1440 min Summer	4.546	0.0	50.2	838			
2160 min Summer	3.257	0.0	53.4	1212			
2880 min Summer	2.568	0.0	55.5	1560			
4320 min Summer	1.836	0.0	58.3	2252			
5760 min Summer	1.445	0.0	60.0	2944			
7200 min Summer	1.200	0.0	61.0	3672			
8640 min Summer	1.031	0.0	61.7	4408			
10080 min Summer	0.906	0.0	62.0	5136			
15 min Winter	142.716	0.0	16.1	18			
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.950
Region	England and Wales	Cv (Winter)	0.950
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.439	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.050

Time (mins)	Area
From: To:	(ha)
0 4	0.050

Time Area Diagram

Total Area (ha) 0.001


Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.000	32 36	0.000	64 68	0.000	96 100	0.000
4 8	0.000	36 40	0.000	68 72	0.000	100 104	0.000
8 12	0.000	40 44	0.000	72 76	0.000	104 108	0.000
12 16	0.000	44 48	0.000	76 80	0.000	108 112	0.000
16 20	0.000	48 52	0.000	80 84	0.000	112 116	0.000
20 24	0.000	52 56	0.000	84 88	0.000	116 120	0.000
24 28	0.000	56 60	0.000	88 92	0.000		
28 32	0.000	60 64	0.000	92 96	0.000		

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0 4	0.000

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Model Details

Storage is Online Cover Level (m) 91.000


Porous Car Park Structure


Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	138.9	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	2
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.700	Membrane Depth (m)	100


Orifice Outflow Control

Diameter (m) 0.040 Discharge Coefficient 0.600 Invert Level (m) 90.700

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File SC1-roof and podium.SRCX		Checked by			
XP Solutions		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	90.803	0.103	3.9	93.0	Flood Risk
30 min Summer	90.831	0.131	5.6	117.9	Flood Risk
60 min Summer	90.855	0.155	6.8	139.2	Flood Risk
120 min Summer	90.871	0.171	7.3	153.5	Flood Risk
180 min Summer	90.874	0.174	7.4	156.7	Flood Risk
240 min Summer	90.875	0.175	7.4	157.9	Flood Risk
360 min Summer	90.875	0.175	7.4	157.9	Flood Risk
480 min Summer	90.874	0.174	7.3	156.5	Flood Risk
600 min Summer	90.871	0.171	7.3	154.2	Flood Risk
720 min Summer	90.868	0.168	7.2	151.3	Flood Risk
960 min Summer	90.861	0.161	7.0	145.0	Flood Risk
1440 min Summer	90.847	0.147	6.5	132.7	Flood Risk
2160 min Summer	90.832	0.132	5.7	118.8	Flood Risk
2880 min Summer	90.821	0.121	5.0	108.5	Flood Risk
4320 min Summer	90.804	0.104	4.0	93.9	Flood Risk
5760 min Summer	90.793	0.093	3.3	84.1	Flood Risk
7200 min Summer	90.785	0.085	2.9	76.9	Flood Risk
8640 min Summer	90.779	0.079	2.5	71.0	Flood Risk
10080 min Summer	90.773	0.073	2.3	66.1	Flood Risk
15 min Winter	90.803	0.103	3.9	93.1	Flood Risk
30 min Winter	90.831	0.131	5.7	118.0	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	142.716	0.0	78.4	19	
30 min Summer	92.222	0.0	105.2	33	
60 min Summer	56.713	0.0	142.0	62	
120 min Summer	33.722	0.0	170.3	120	
180 min Summer	24.576	0.0	186.8	156	
240 min Summer	19.534	0.0	198.4	186	
360 min Summer	14.061	0.0	214.6	250	
480 min Summer	11.142	0.0	226.9	318	
600 min Summer	9.297	0.0	236.7	386	
720 min Summer	8.015	0.0	244.9	454	
960 min Summer	6.338	0.0	257.9	586	
1440 min Summer	4.546	0.0	276.1	838	
2160 min Summer	3.257	0.0	306.6	1212	
2880 min Summer	2.568	0.0	321.6	1584	
4320 min Summer	1.836	0.0	340.8	2332	
5760 min Summer	1.445	0.0	366.4	3056	
7200 min Summer	1.200	0.0	379.5	3816	
8640 min Summer	1.031	0.0	389.8	4504	
10080 min Summer	0.906	0.0	396.5	5248	
15 min Winter	142.716	0.0	78.4	18	
30 min Winter	92.222	0.0	105.1	32	
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<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	90.855	0.155	6.8	139.6	Flood Risk
120 min Winter	90.872	0.172	7.3	154.5	Flood Risk
180 min Winter	90.875	0.175	7.4	157.5	Flood Risk
240 min Winter	90.875	0.175	7.4	157.8	Flood Risk
360 min Winter	90.873	0.173	7.3	156.1	Flood Risk
480 min Winter	90.870	0.170	7.2	152.6	Flood Risk
600 min Winter	90.865	0.165	7.1	148.3	Flood Risk
720 min Winter	90.860	0.160	6.9	143.7	Flood Risk
960 min Winter	90.850	0.150	6.6	134.7	Flood Risk
1440 min Winter	90.834	0.134	5.8	120.4	Flood Risk
2160 min Winter	90.817	0.117	4.8	105.0	Flood Risk
2880 min Winter	90.805	0.105	4.0	94.1	Flood Risk
4320 min Winter	90.788	0.088	3.1	79.6	Flood Risk
5760 min Winter	90.778	0.078	2.5	69.9	Flood Risk
7200 min Winter	90.769	0.069	2.1	62.3	Flood Risk
8640 min Winter	90.763	0.063	1.9	56.8	Flood Risk
10080 min Winter	90.759	0.059	1.7	52.7	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	56.713	0.0	142.0	60	
120 min Winter	33.722	0.0	170.3	118	
180 min Winter	24.576	0.0	186.8	170	
240 min Winter	19.534	0.0	198.4	190	
360 min Winter	14.061	0.0	214.6	266	
480 min Winter	11.142	0.0	226.9	340	
600 min Winter	9.297	0.0	236.7	414	
720 min Winter	8.015	0.0	244.9	484	
960 min Winter	6.338	0.0	257.9	618	
1440 min Winter	4.546	0.0	276.1	880	
2160 min Winter	3.257	0.0	306.6	1272	
2880 min Winter	2.568	0.0	321.6	1644	
4320 min Winter	1.836	0.0	340.9	2380	
5760 min Winter	1.445	0.0	366.4	3168	
7200 min Winter	1.200	0.0	379.6	3888	
8640 min Winter	1.031	0.0	390.0	4584	
10080 min Winter	0.906	0.0	397.0	5248	
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South Lodge Exminster Devon EX6 8AT		
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.950
Region	England and Wales	Cv (Winter)	0.950
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.439	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.280

Time (mins)	Area
From:	To: (ha)
0	4 0.280

Time Area Diagram

Total Area (ha) 0.001

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)	From:	To: (ha)	From:	To: (ha)
0	4 0.000	32	36 0.000	64	68 0.000	96	100 0.000
4	8 0.000	36	40 0.000	68	72 0.000	100	104 0.000
8	12 0.000	40	44 0.000	72	76 0.000	104	108 0.000
12	16 0.000	44	48 0.000	76	80 0.000	108	112 0.000
16	20 0.000	48	52 0.000	80	84 0.000	112	116 0.000
20	24 0.000	52	56 0.000	84	88 0.000	116	120 0.000
24	28 0.000	56	60 0.000	88	92 0.000		
28	32 0.000	60	64 0.000	92	96 0.000		

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To: (ha)
0	4 0.000

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South Lodge Exminster Devon EX6 8AT		
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Model Details

Storage is Online Cover Level (m) 91.000

Tank or Pond Structure


Invert Level (m) 90.700


Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	900.0	0.223	900.0	0.224	1.0


Orifice Outflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 90.700

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South Lodge Exminster Devon EX6 8AT					
Date 26/11/2017 20:26		Designed by Pitman			
File SC2 West -roof and podi...		Checked by			
XP Solutions		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	90.826	0.126	5.3	80.5	Flood Risk
30 min Summer	90.858	0.158	6.9	101.1	Flood Risk
60 min Summer	90.885	0.185	7.7	118.2	Flood Risk
120 min Summer	90.899	0.199	8.1	127.2	Flood Risk
180 min Summer	90.902	0.202	8.1	129.5	Flood Risk
240 min Summer	90.903	0.203	8.2	129.9	Flood Risk
360 min Summer	90.900	0.200	8.1	128.0	Flood Risk
480 min Summer	90.895	0.195	8.0	125.1	Flood Risk
600 min Summer	90.890	0.190	7.8	121.4	Flood Risk
720 min Summer	90.884	0.184	7.6	117.6	Flood Risk
960 min Summer	90.872	0.172	7.3	110.1	Flood Risk
1440 min Summer	90.852	0.152	6.7	97.2	Flood Risk
2160 min Summer	90.832	0.132	5.7	84.5	Flood Risk
2880 min Summer	90.819	0.119	4.9	76.1	Flood Risk
4320 min Summer	90.801	0.101	3.8	64.8	Flood Risk
5760 min Summer	90.790	0.090	3.1	57.4	Flood Risk
7200 min Summer	90.782	0.082	2.7	52.2	Flood Risk
8640 min Summer	90.775	0.075	2.3	47.8	Flood Risk
10080 min Summer	90.769	0.069	2.1	44.2	Flood Risk
15 min Winter	90.826	0.126	5.3	80.6	Flood Risk
30 min Winter	90.858	0.158	6.9	101.4	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	142.716	0.0	74.2	18	
30 min Summer	92.222	0.0	98.1	33	
60 min Summer	56.713	0.0	127.9	62	
120 min Summer	33.722	0.0	152.8	110	
180 min Summer	24.576	0.0	167.3	140	
240 min Summer	19.534	0.0	177.5	172	
360 min Summer	14.061	0.0	191.9	240	
480 min Summer	11.142	0.0	202.9	306	
600 min Summer	9.297	0.0	211.6	374	
720 min Summer	8.015	0.0	218.9	440	
960 min Summer	6.338	0.0	230.5	568	
1440 min Summer	4.546	0.0	247.1	820	
2160 min Summer	3.257	0.0	270.6	1188	
2880 min Summer	2.568	0.0	284.1	1556	
4320 min Summer	1.836	0.0	302.4	2288	
5760 min Summer	1.445	0.0	322.1	3000	
7200 min Summer	1.200	0.0	333.9	3744	
8640 min Summer	1.031	0.0	343.3	4496	
10080 min Summer	0.906	0.0	350.2	5176	
15 min Winter	142.716	0.0	74.2	18	
30 min Winter	92.222	0.0	98.1	32	
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XP Solutions			Source Control 2017.1.2		
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	90.885	0.185	7.7	118.6	Flood Risk
120 min Winter	90.900	0.200	8.1	128.1	Flood Risk
180 min Winter	90.902	0.202	8.1	129.2	Flood Risk
240 min Winter	90.901	0.201	8.1	128.7	Flood Risk
360 min Winter	90.895	0.195	7.9	124.5	Flood Risk
480 min Winter	90.886	0.186	7.7	119.3	Flood Risk
600 min Winter	90.878	0.178	7.5	113.8	Flood Risk
720 min Winter	90.869	0.169	7.2	108.4	Flood Risk
960 min Winter	90.854	0.154	6.7	98.8	Flood Risk
1440 min Winter	90.833	0.133	5.8	85.3	Flood Risk
2160 min Winter	90.813	0.113	4.5	72.6	Flood Risk
2880 min Winter	90.800	0.100	3.8	64.2	Flood Risk
4320 min Winter	90.784	0.084	2.8	53.7	Flood Risk
5760 min Winter	90.772	0.072	2.2	46.3	Flood Risk
7200 min Winter	90.764	0.064	1.9	41.1	Flood Risk
8640 min Winter	90.759	0.059	1.7	37.6	Flood Risk
10080 min Winter	90.755	0.055	1.5	35.4	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	56.713	0.0	127.9	60	
120 min Winter	33.722	0.0	152.8	114	
180 min Winter	24.576	0.0	167.3	144	
240 min Winter	19.534	0.0	177.5	182	
360 min Winter	14.061	0.0	191.9	256	
480 min Winter	11.142	0.0	202.9	328	
600 min Winter	9.297	0.0	211.6	398	
720 min Winter	8.015	0.0	218.9	468	
960 min Winter	6.338	0.0	230.6	596	
1440 min Winter	4.546	0.0	247.1	850	
2160 min Winter	3.257	0.0	270.6	1228	
2880 min Winter	2.568	0.0	284.1	1588	
4320 min Winter	1.836	0.0	302.5	2336	
5760 min Winter	1.445	0.0	322.1	3104	
7200 min Winter	1.200	0.0	333.9	3816	
8640 min Winter	1.031	0.0	343.4	4496	
10080 min Winter	0.906	0.0	350.6	5240	
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.950
Region	England and Wales	Cv (Winter)	0.950
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.439	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.245

Time (mins) Area
From: To: (ha)

0 4 0.245

Time Area Diagram

Total Area (ha) 0.001

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From: To:		From: To:		From: To:		From: To:	
0 4	0.000	32 36	0.000	64 68	0.000	96 100	0.000
4 8	0.000	36 40	0.000	68 72	0.000	100 104	0.000
8 12	0.000	40 44	0.000	72 76	0.000	104 108	0.000
12 16	0.000	44 48	0.000	76 80	0.000	108 112	0.000
16 20	0.000	48 52	0.000	80 84	0.000	112 116	0.000
20 24	0.000	52 56	0.000	84 88	0.000	116 120	0.000
24 28	0.000	56 60	0.000	88 92	0.000		
28 32	0.000	60 64	0.000	92 96	0.000		

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area
From: To: (ha)

0 4 0.000

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Model Details

Storage is Online Cover Level (m) 91.000

Tank or Pond Structure


Invert Level (m) 90.700

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	640.0	0.223	640.0	0.224	1.0

Orifice Outflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 90.700

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Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	90.826	0.126	5.3	80.5	Flood Risk
30 min Summer	90.858	0.158	6.9	101.1	Flood Risk
60 min Summer	90.885	0.185	7.7	118.2	Flood Risk
120 min Summer	90.899	0.199	8.1	127.2	Flood Risk
180 min Summer	90.902	0.202	8.1	129.5	Flood Risk
240 min Summer	90.903	0.203	8.2	129.9	Flood Risk
360 min Summer	90.900	0.200	8.1	128.0	Flood Risk
480 min Summer	90.895	0.195	8.0	125.1	Flood Risk
600 min Summer	90.890	0.190	7.8	121.4	Flood Risk
720 min Summer	90.884	0.184	7.6	117.6	Flood Risk
960 min Summer	90.872	0.172	7.3	110.1	Flood Risk
1440 min Summer	90.852	0.152	6.7	97.2	Flood Risk
2160 min Summer	90.832	0.132	5.7	84.5	Flood Risk
2880 min Summer	90.819	0.119	4.9	76.1	Flood Risk
4320 min Summer	90.801	0.101	3.8	64.8	Flood Risk
5760 min Summer	90.790	0.090	3.1	57.4	Flood Risk
7200 min Summer	90.782	0.082	2.7	52.2	Flood Risk
8640 min Summer	90.775	0.075	2.3	47.8	Flood Risk
10080 min Summer	90.769	0.069	2.1	44.2	Flood Risk
15 min Winter	90.826	0.126	5.3	80.6	Flood Risk
30 min Winter	90.858	0.158	6.9	101.4	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	142.716	0.0	74.2	18	
30 min Summer	92.222	0.0	98.1	33	
60 min Summer	56.713	0.0	127.9	62	
120 min Summer	33.722	0.0	152.8	110	
180 min Summer	24.576	0.0	167.3	140	
240 min Summer	19.534	0.0	177.5	172	
360 min Summer	14.061	0.0	191.9	240	
480 min Summer	11.142	0.0	202.9	306	
600 min Summer	9.297	0.0	211.6	374	
720 min Summer	8.015	0.0	218.9	440	
960 min Summer	6.338	0.0	230.5	568	
1440 min Summer	4.546	0.0	247.1	820	
2160 min Summer	3.257	0.0	270.6	1188	
2880 min Summer	2.568	0.0	284.1	1556	
4320 min Summer	1.836	0.0	302.4	2288	
5760 min Summer	1.445	0.0	322.1	3000	
7200 min Summer	1.200	0.0	333.9	3744	
8640 min Summer	1.031	0.0	343.3	4496	
10080 min Summer	0.906	0.0	350.2	5176	
15 min Winter	142.716	0.0	74.2	18	
30 min Winter	92.222	0.0	98.1	32	
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