Technical Note

Project:	Land Between Shelfanger Road and Heywood Road, Diss		
Subject:	Flood Risk		
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Client signoff

Client	Scott Properties
Project	Land Between Shelfanger Road and Heywood Road, Diss
Project No.	5153233
Client signature / date	

Table of contents

1. Introduction

Atkins has been commissioned by M Scott Properties Ltd. to prepare a Flood Risk Technical Note to provide background information to support an initial assessment for a proposed residential development on Land North of the cemetery, West of Shelfanger Road and east of Heywood Road allocated for residential development, in Diss, Norfolk. The proposed development location is shown in Figure 1.1, the Policy Number is GNLP0250/0342/0119/0291, the area of the development is approximately 8.91 ha and is likely to accommodate at least 200 homes.

The scope at this stage does not include contacting the drainage Authorities. However for this location the lead drainage Authorities are the Environment Agency, the Lead Local Flood Authority (LLFA -South Norfolk Council) the local Internal Drainage Board (ID-(Waveney, Lower Yare & Lothingland) and Anglian Water.

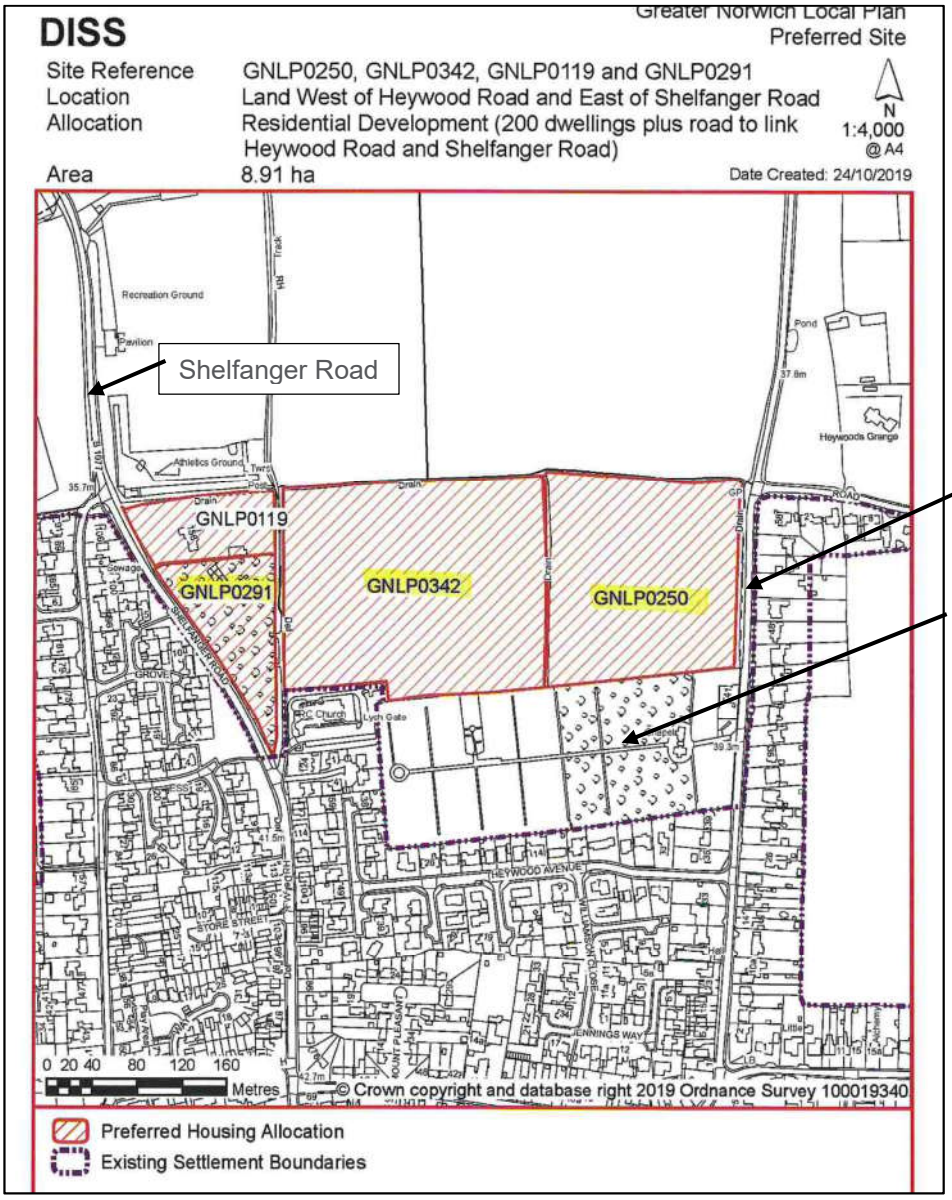

Figure 1.1 Location Plan

2. Site Description

2.1. Location

The proposed development site is located to the North the village of Diss, Norfolk. It is bounded to the east by Heywood Road, to the south by the Cemetery and church, to the west by Shelfhanger Road and the North by arable land.

Figure 2-1-The Proposed Development Site

2.2. Topography

The proposed development site has a total area of approximately 8.91ha. The Google Earth levels are shown in Figure 2.2 below, with the site sloping from south to north and with a in a crown formation, with slopes both to the east and west. The lowest level on the site is in the north west corner at 38m AOD. The highest elevation is in the south of the site at the west of the cemetery near the church at 42m AOD.

2.3. Land Use

2.3.1. Historic

A review of old Ordnance Survey maps shows that the majority of the site has been arable farming land which has remained undeveloped since before 19th century with a cemetery in the south. A new church has recently been constructed. The field drains have been in place since before 1984, and in the plot adjacent to Shelfhanger Road the Royal Ordinance Corps buildings and greenhouses are abandoned. The property in GNLP0119 has been in place since before 1984.

The site includes well-established hedgerows along its western boundary and there is a large Oak tree in the southern central location.

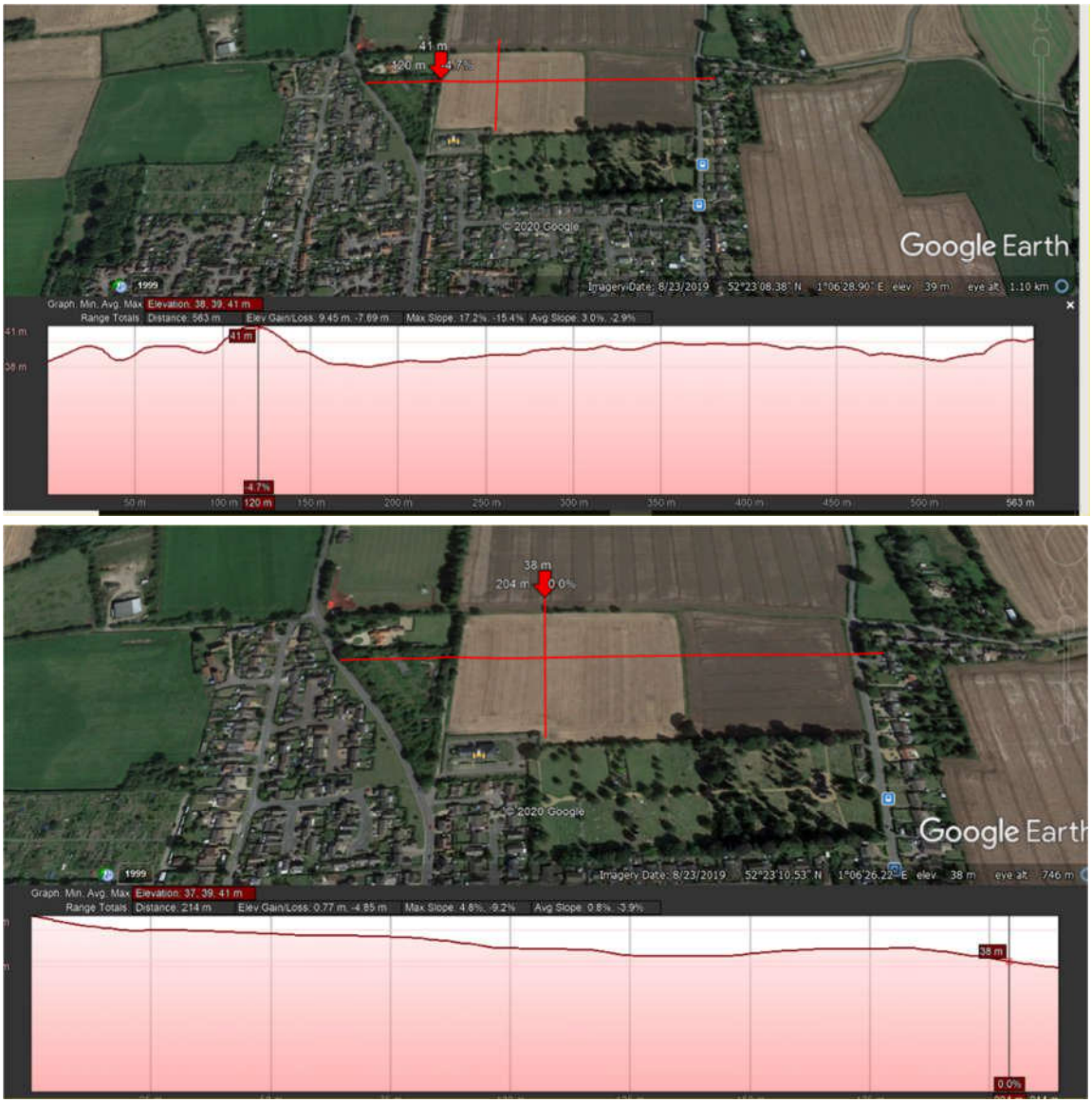

Figure 2.2- Ground levels and Cross Sections

2.4. Ground Conditions

2.4.1. Geology and Ground water

British Geological Survey maps identify the bedrock beneath the proposed development site to be Chalk Formation, Culver Chalk Formation and Portsdown chalk Formation, shown on Figure 2.3.

The nearest borehole is TM188W56 shown on Figure 2.4 and the Borehole Log in Figure 2.5. The chalk bedrock is found 27m below ground, and the ground water 24.5 deep from ground level at the Borehole of 35m AOD. The soil is sandy dark brown, overlaying 9 to 10m of clayey pebbly sand and then a 9 to 10m layer of pebbly sand, overlying the chalk bedrock. The overlying Clayey sands are described by Soilscapes as slowly permeable and seasonally wet, refer to Figure 2.6.

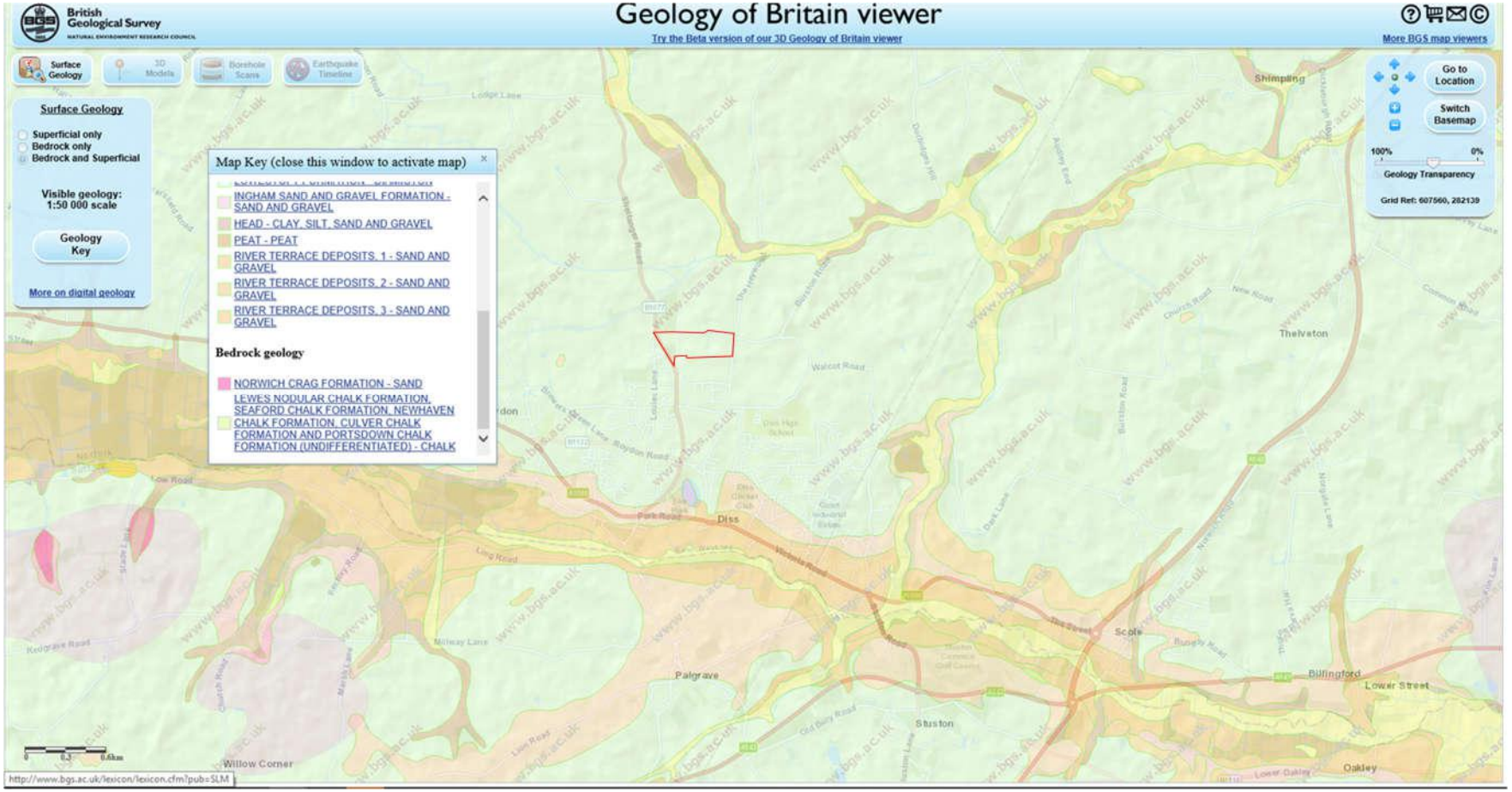

Figure 2.3- Bedrock Geology

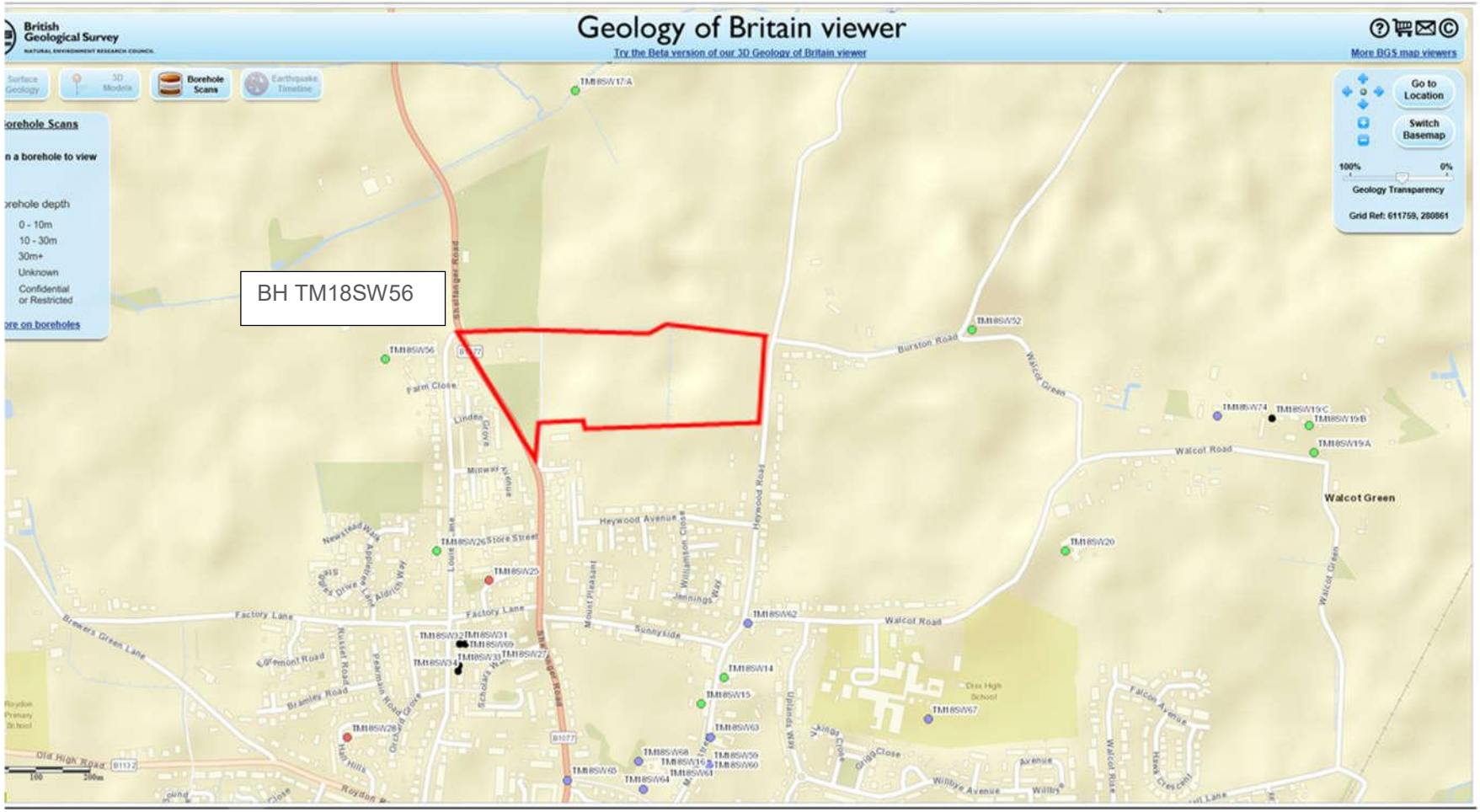

Figure 2.4 – Borehole Location

TM 18 SW 56 1117 8092 **Sturgeon's Farm, Roydon** **Block**

Surface level +35.0 m (+115 ft)
Water struck at +24.5 m
Shell and auger 152 mm
August 1981

Overburden	
Mineral	1
Waste	1
Mineral	2
Waste	0
Mineral	8
Bedrock	2

LOG

Geological classification	Lithology	Thickness m	De
	Soil, sandy, dark brown	0.5	
Boulder Clay	Pebbly clay, silty, medium grey with moderate yellowish brown, firm, many pebbles of rounded to subangular chalk, with some angular to subangular flint and a trace of rounded quartz and quartzite pebbles	1.7	
	Pebbly clay, dark grey to olive grey, very hard, many pebbles of chalk with rounded brown mudstone	8.3	1
Glacial Sand and Gravel	a 'Clayey' pebbly sand Gravel: fine with coarse, subangular flint with rounded quartz and quartzite and some flint Sand: medium with fine and some coarse, rounded brown-stained quartz with some rounded chalk	1.4	1
Glacial Silt	Silt, very sandy, light olive grey and very light grey, soft to firm, with abundant chalk sand	1.4	1
Glacial Sand and Gravel	b Pebbly sand Gravel: fine and coarse, subangular flint with rounded quartz, quartzite and some flint Sand: medium with fine, mostly flint with quartz	2.3	1
Boulder Clay	Clay, sandy, grey, pebbles of flint with some quartz, quartzite and chalk	0.5	1
Glacial Sand and Gravel	c Pebbly sand Gravel: coarse and fine, angular to subrounded flint with rounded quartz and quartzite and some well rounded flint Sand: medium with fine and coarse, rounded quartz and quartzite with some flint and chalk	8.9	2
Upper Chalk	Chalk, soft	2.0+	2

GRADING

	Mean for deposit percentages			Depth below surface (m)	Percentages						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					-¼	+¼ -1	+1 -4	+4 -16	+16 -64	+64 mm	
a	19	65	16	10.5-11.9	19	11	50	4	11	5	0
b	9	78	13	13.3-14.5	8	25	54	2	5	6	0
				14.5-15.6	10	23	47	3	10	7	0
				Mean	**9**	**24**	**51**	**3**	**7**	**6**	**0**
c	3	78	19	16.1-17.0	6	17	46	5	15	11	0
				17.0-18.0	6	14	49	5	11	15	0
				18.0-19.0	3	27	42	3	10	15	0
				19.0-20.0	2	15	44	7	14	18	0
				20.0-21.0	3	18	62	8	8	1	0
				21.0-23.0	3	11	77	7	2	0	0
				23.0-25.0	1	8	59	6	11	15	0
				Mean	**3**	**14**	**58**	**6**	**9**	**10**	**0**
a+b+c	6	76	18	**Mean**	**6**	**16**	**55**	**5**	**9**	**9**	**0**

73

Figure 2.5- Borehole Log

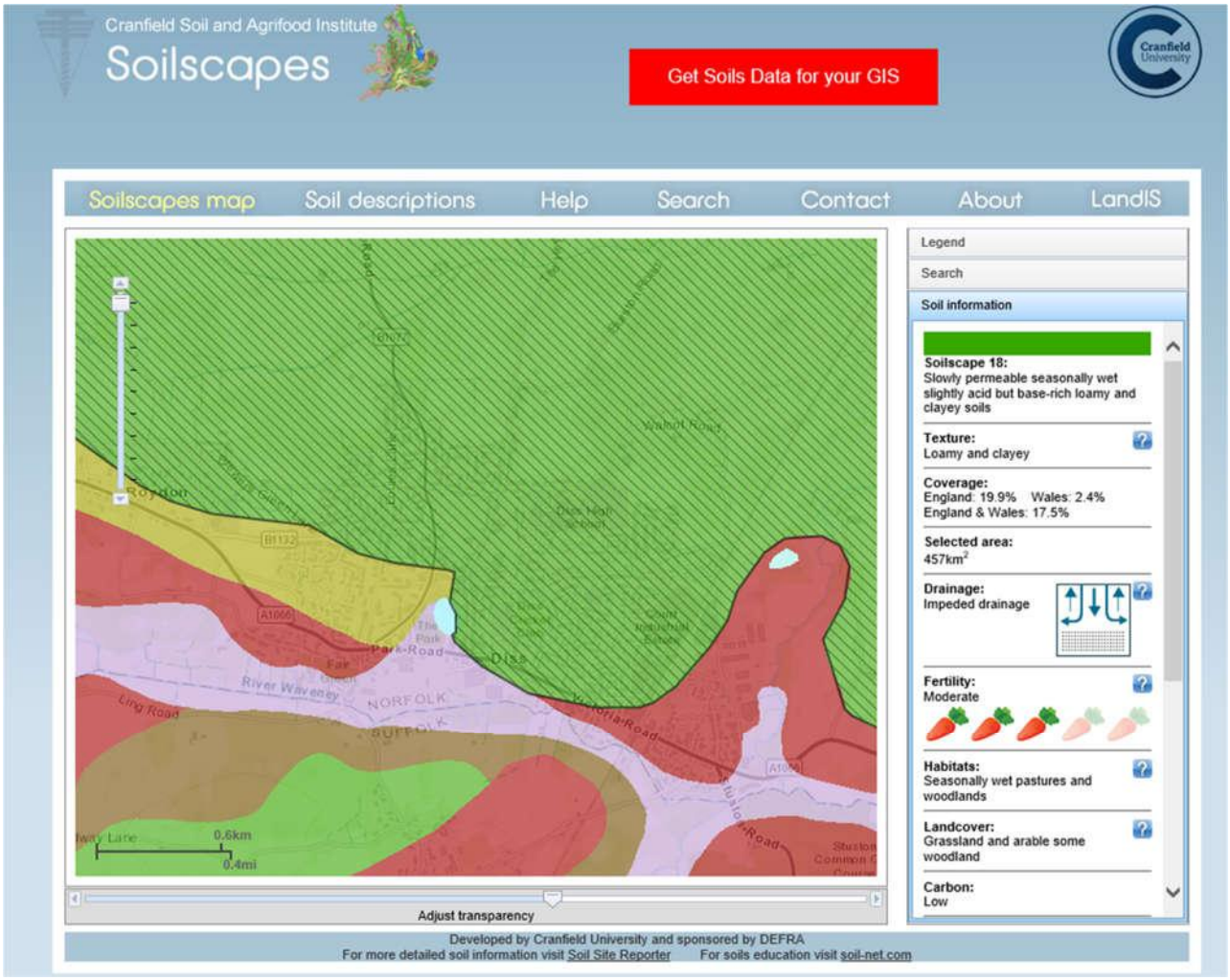

Figure 2.6 – Soilscape Soil Summary

3. Drainage

3.1. Identification of Flooding Sources

At the later stages to support Outline Planning Approvals a Flood Risk Assessment (FRA) will be required, in this FRA the NPPF requires that the risk of flooding from the following sources be considered, below some of the main elements that will form part of the FRA are discussed:

- **Fluvial (river)** – the Environment Agency Flood Map, shown in Figure 3.1, shows the proposed development site to be located wholly within Flood Zone 1 (low risk). If flooding were to occur from the ditch running along the Northern, eastern and western boundaries, local topography would direct the flood water to flow away from the site in a northerly direction. On this basis, the risk of fluvial flooding is considered to be low and does not require further assessment.
- **Coastal, tidal and estuarine** – the proposed development site is remote from coastal, tidal and estuarine waters; therefore, the risk associated with this source is negligible.
- **Surface water** – The site is classified as being at low risk of surface water flooding according to the Environment Agency Surface Water Flood Map (Figure 3.2); however, both the Environment Agency and the IDB maps (Figures 3.3 and 3.4) suggest that the site and its surrounding area are potentially at risk from surface water flooding. On this basis, the risks associated with this source will be considered further.
- **Groundwater** – According to the Strategic Flood Risk Assessment[1], the risk of groundwater flooding at the site is <25%. Therefore, the risk of groundwater flooding is considered low and not require further assessment.
- **Sewers** – Anglian Water have not advised of any capacity or other issues that could result in sewer flooding; therefore, the risk of sewer flooding affecting the proposed development is considered low and does not require further assessment.
- **Artificial sources** – there are no impounded waterbodies at an elevation above that of the site. Furthermore, the site is located outside of the areas potentially affected by reservoir flooding hence the risk of flooding from artificial sources is negligible.

The risks associated with fluvial, coastal, groundwater, sewers and artificial sources are considered to be low or negligible.

The drainage routes are shown in figures 3.5, 3.6, and 3.7. Although the majority of the drainage ditches are well maintained, there are flat spots and areas of overgrowth restricting the flow and causing ponding.

3.2. Risk Assessment

3.2.1. Surface Water

The Environment Agency Surface Water Flood Map is shown in Figure 3.2, this shows that there are some isolated areas within the southern section of the proposed development site that are at low risk (>1 in 1,000-year; <1 in 100-year) of surface water flooding. The maximum depth of flooding is estimated to be less than 300mm.

All of the predicted surface water flooding originates from within the proposed development site itself; there are no adjacent areas of land that will direct run-off into the site. Local topography dictates that any run-off will tend to flow in a southerly direction; therefore, the surface water flooding will not affect the proposed development site.

On this basis the risk of surface water flooding from beyond the site boundary is considered to be low. It should be noted, however, that the proposed development will introduce new paved areas onto the site which will tend to increase surface run-off. This will need to be managed to ensure that it does not adversely affect the proposed development itself or areas surrounding the site.

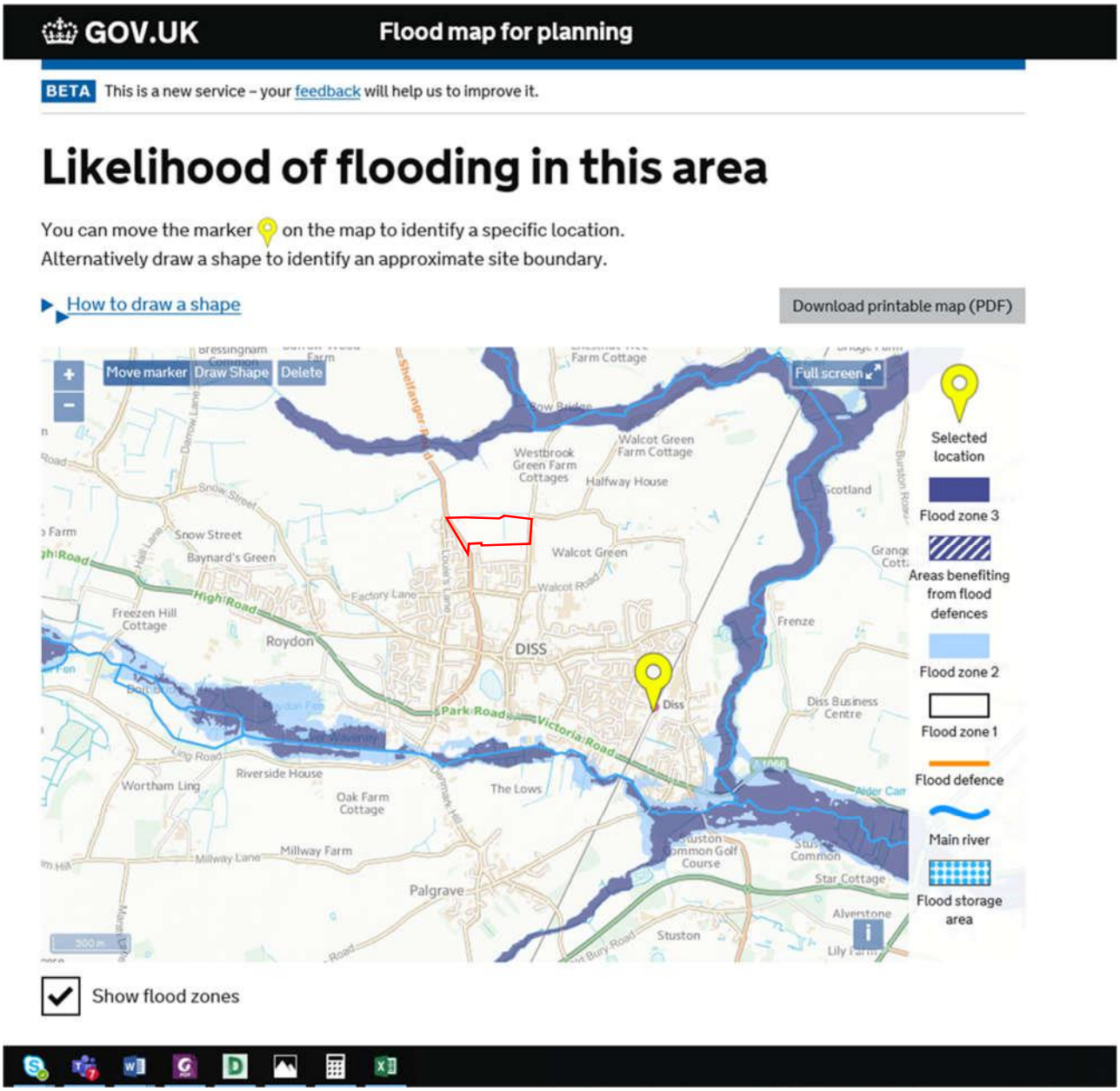

Figure 3.1 Environment Agency Flood Map

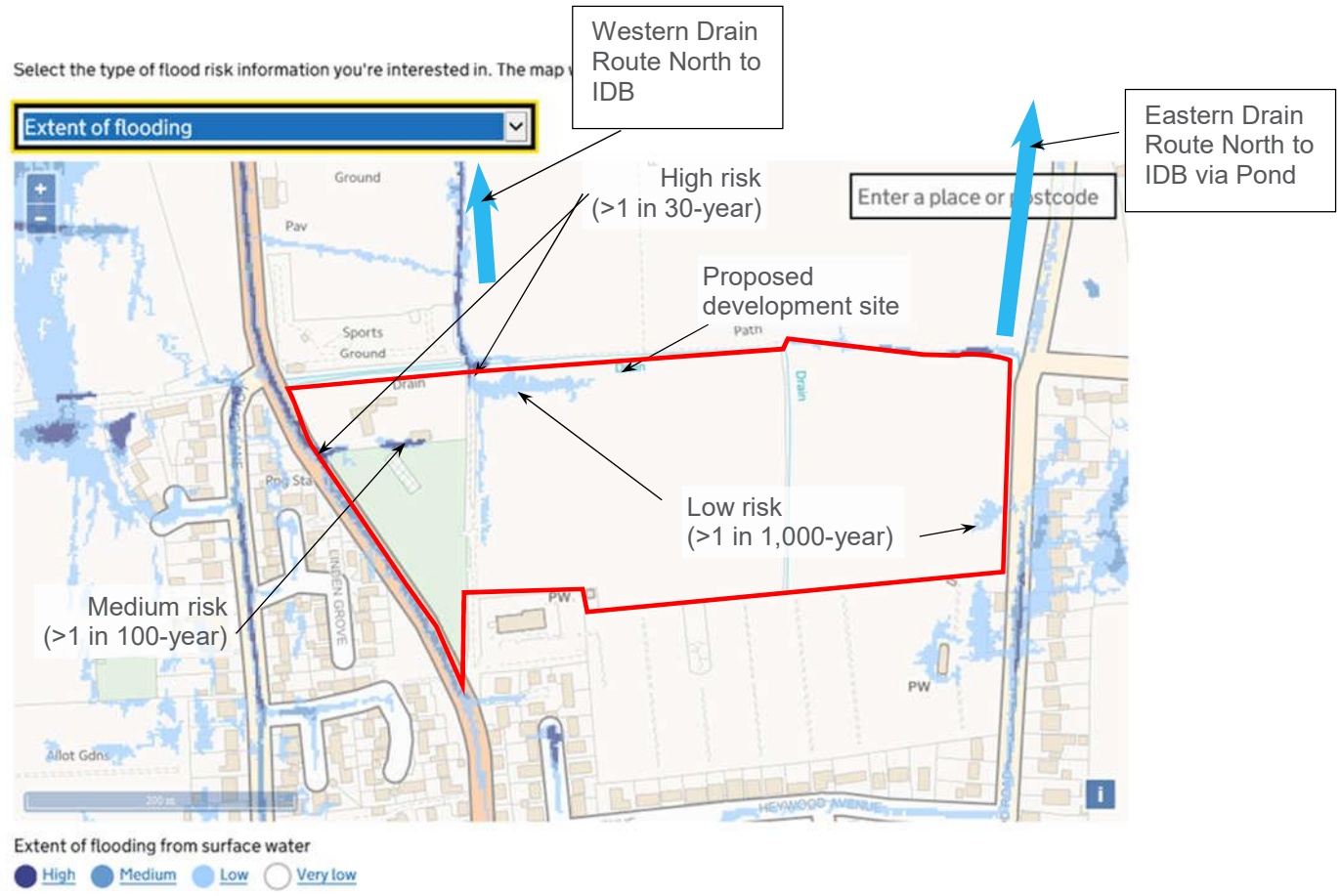

Figure 3.2 Environment Agency Surface Water Flood Map

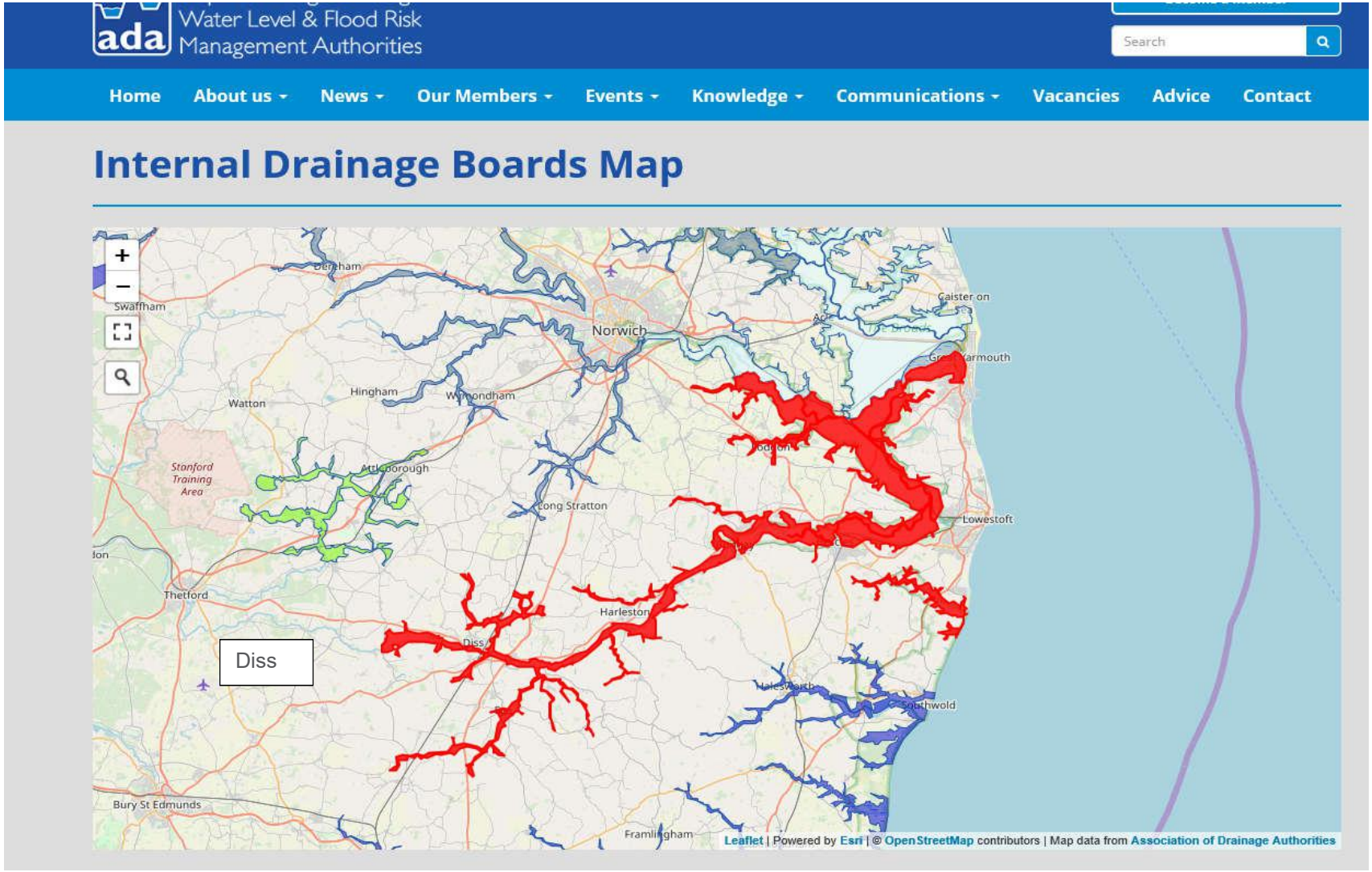

Figure 3.3 - Location the Waveney, Lower Yare & Lothingland IDB

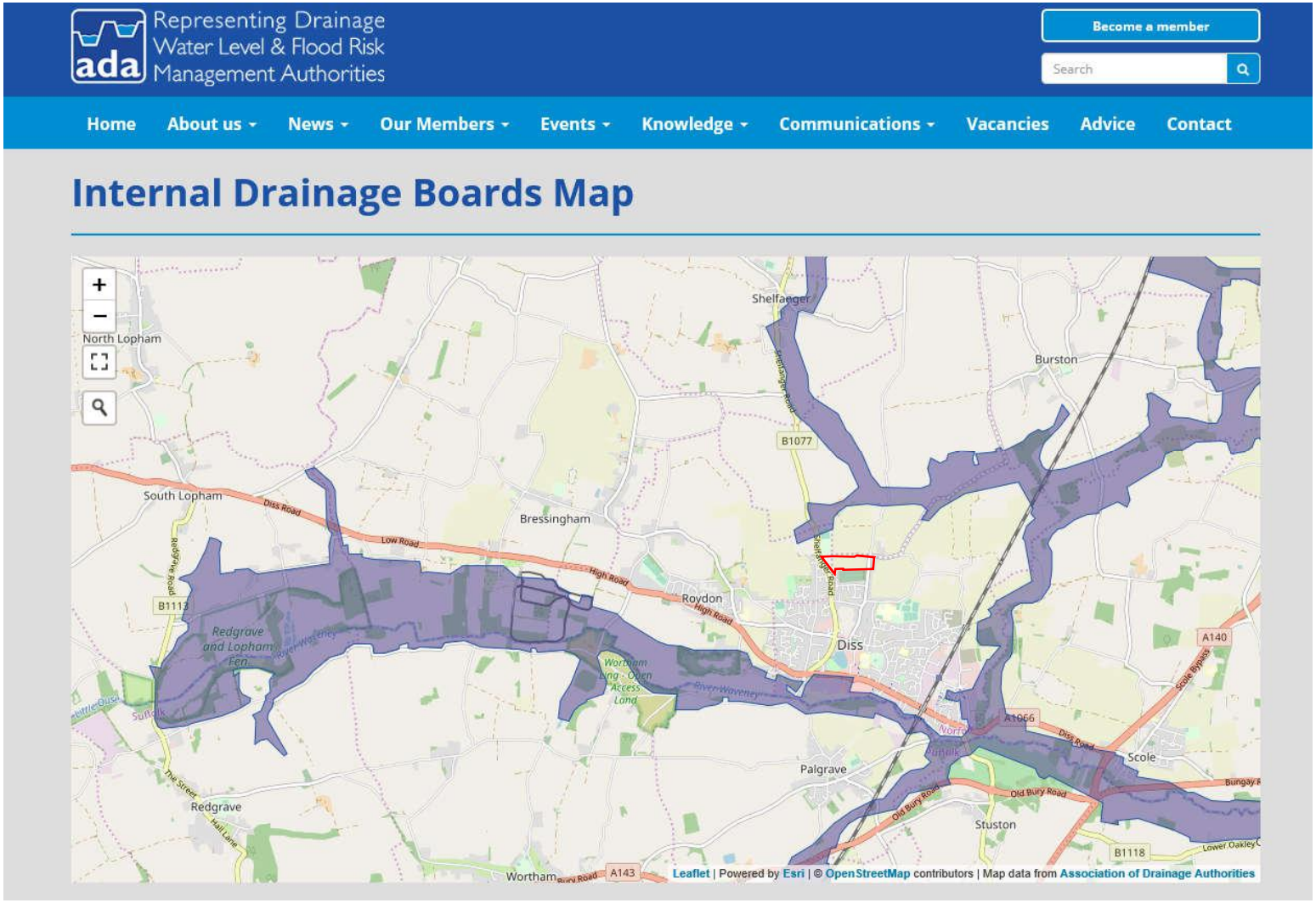

Figure 3.4 - Location of Proposed Site to the Waveney, Lower Yare & Lothingland IDB

Figure 3.5 –Western Drainage Ditches leading to connection with IDB in the North

Figure 3.6 –Eastern Drainage Ditches leading to connection with IDB in the North, with pond.

Figure 3.7 – Central and Southern Drainage Ditches (some ponding in flatter locations

4. Development Proposals

4.1. Description

The development proposals comprise at least 200 residential properties with associated access roads, landscaping and public open space.

4.2. Sequential Test

According to the Environment Agency Flood Map, the site is located wholly within *Flood Zone 1*.

According to the Planning Practice Guidance, Table 2, the proposed development is classified as *More Vulnerable* as it is a residential development. Planning Practice Guidance, Table 3 shows that *More Vulnerable* development within *Flood Zone 1* is compatible hence the proposed development is deemed to pass the Sequential Test.

4.3. Foul Water Flow Rates

The proposed development will comprise at least 200 dwellings. Based on Sewers for Adoption (7th Edition), each dwelling generates 4,000 l/dwelling/day; therefore, the peak foul water flow rate generated by the proposed development will be 9.3l/s (based on 6 dry weather flow (DWF)).

The proposed development is on the outskirts of Diss Village, the Diss Waste Water Treatment Works (WwTW) is located 1.7km to the south of the proposed development (refer to Figure 4.1), at an elevation of approximately 27m AOD.. It is likely that a foul drainage pumping station will be required, although Anglian Water have not been contacted at this stage of the project.

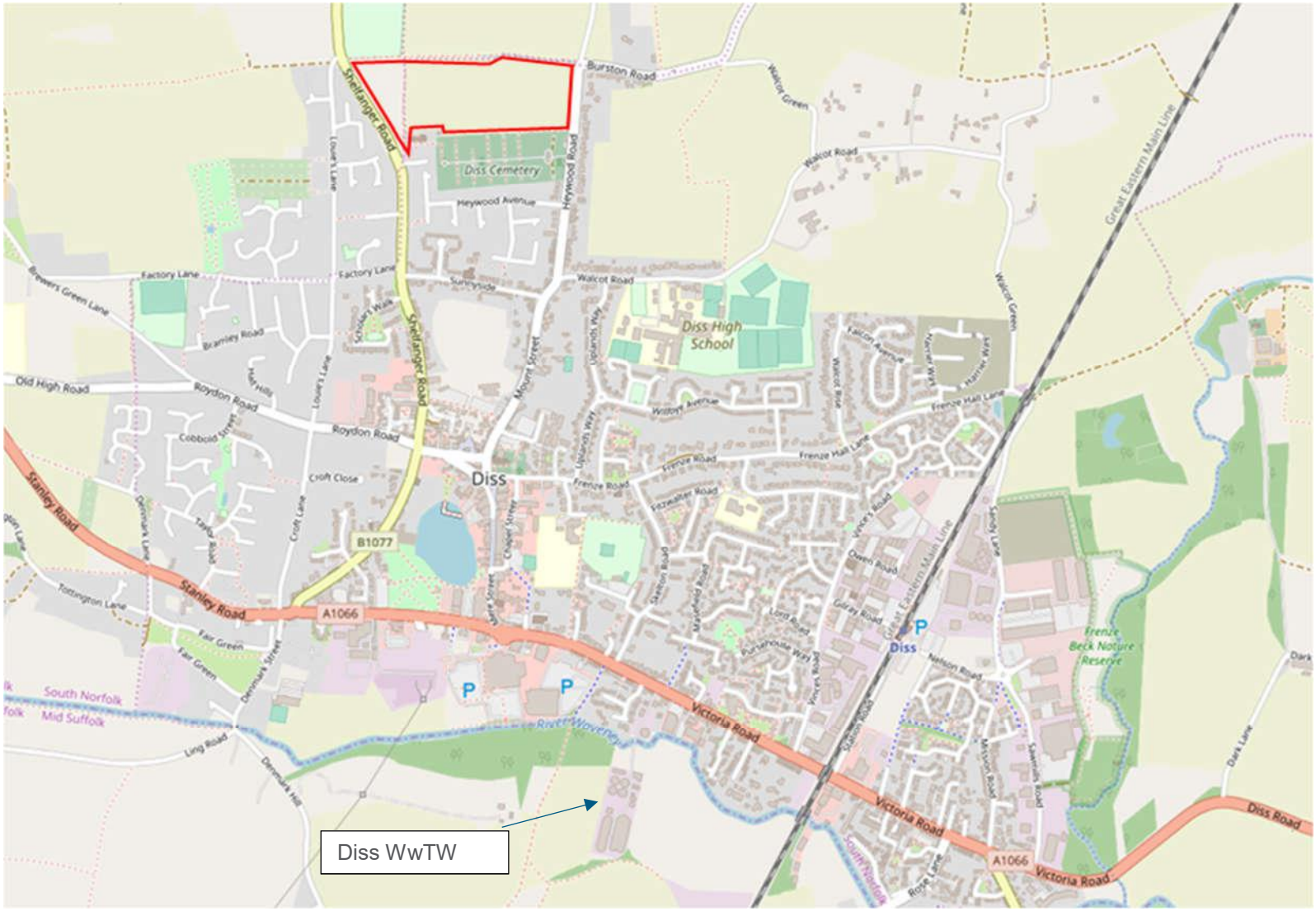

Figure 4.1 Foul Drainage To Diss WwTW

5. Conclusions & Recommendations

The risk of flooding from fluvial, coastal, sewers, groundwater and artificial sources is considered to be low or negligible.

The site is potentially at risk from surface water flooding; however, the risk is considered to be low and upon initial inspection, there are no areas (subject to more detailed stages of a FRA) beyond the site boundary that drain into the site.

The proposed development will be required to incorporate the following flood risk management measures:

- All finished floor levels will be at least 0.15m above adjacent external ground levels.
- The external ground profile around buildings will, where possible, be designed such that surface water is directed away from the building.
- A positive surface water drainage system to intercept and convey run-off from roofs and paved areas.
- SUDS attenuation, probably at the lowest point, with controlled discharge not exceeding the approved green field runoff rate, as agreed with the Authorities.

The primary residual risks affecting the proposed development are an extreme rainfall event that exceeds the capacity of the proposed surface water drainage system or a failure to maintain the on-site drainage systems correctly leading to blockages. The risk to properties will be reduced by the flood risk management measures outlined above. During an extreme flood event, a flood route for exceedance flows will need to be identified, possibly to the North.

The proposed surface water drainage system serving the proposed development will outfall into the ditch running along the southern boundary of the site. The maximum discharge rate will be limited to the annual average (QBAR) greenfield equivalent rate to be calculated in the FRA and to include at least 40% climate change.

Retention basins, subsurface storage, swales, permeable paving, bio-retention/filter strips and filter trenches are suitable SuDS techniques for use within the proposed development. These can be configured to provide the necessary degree of water treatment to mitigate the anticipated pollutants from the different parts of the proposed development.