

Client: Spalding United FC

Spalding United Football Club, Winfrey Avenue, Spalding

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DOCUMENT CONTROL			
Revision	Author Initials	DATE OF ISSUE	REASON FOR ISSUE
V1	EP	01-25	Support of Planning Application

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1. Executive Summary

This Flood Risk Assessment (FRA) was prepared to support the planning application for proposed developments at Spalding United Football Club (SUFC), located in Flood Zone 3a, an area with a high probability of flooding. The development is categorized as "Water Compatible," making it appropriate for this zone. The assessment evaluates potential flood risks from various sources, including fluvial flooding, surface water, reservoirs, and groundwater, while also analysing the impact on adjacent properties.

The assessment identifies fluvial flooding as the primary risk; however, it concludes that by reason of the building use only flood resilient building measures need be included.

In conclusion, flood risk from the proposed development is acceptable, can be managed, and should not present a reason for objection.

Disclaimer: *This study is a risk-based assessment of the proposal based on the information that was available to Parsons Consulting Engineers Ltd. and is intended for the sole purpose of supporting the Permitted Development Planning Application for the proposed development. If either further information is found that contradicts the basis of this report or that alterations are made to the development or the water management in place, then the conclusions of this report would be invalidated and Parsons Consulting Engineers Ltd would accept no liability whatsoever.*

2. Introduction

2.1. The Brief

Parsons Consulting Engineers Ltd has been commissioned by Spalding United FC to prepare a Flood Risk Assessment, taking account of the proposed site use to accompany the planning application for the proposed development.

The objective is to demonstrate that based on the location's characteristics that flood risk is adequately managed.

2.2. Context and purpose of this Flood Risk Statement.

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied, including policy on appropriate consideration of flood risk for new developments. In addition to this, the National Planning Policy Framework – Technical Guidance (NPPF-TG) provides additional guidance on planning policy for the development of sites at risk of flooding. The general objective is to favour developments in areas with the lowest risk of flooding.

Local Planning Authorities have the authority to control development in accordance with their local plans, which are required to incorporate the policy and guidance from the NPPF and NPPF-TG.

This Flood Risk Assessment provides an evidenced assessment of the risk of flooding to the site from the rivers, surface water, reservoirs, and any other localised source. The objective is to allow the Planning Authority to determine whether the mitigations proposed are adequate to manage the risk of flooding to the development and any consequences elsewhere.

2.3. Strategic Flood Risk Assessment

In December 2009, the Environment Agency presented the River Welland Catchment Flood Management Plan. The overall catchment area is about 1,680 km². The main urban areas are Market Harborough, Oakham, Stamford, Market Deeping, Bourne, Spalding and the northern part of Peterborough, which includes the areas of Bretton, Dogsthorpe, Gunthorpe, New England, Ravensthorpe, Walton and Werrington.

The River Welland Catchment was divided into nine district sub-catchment areas which have similar characteristics, sources of flooding and level of risk. There has been demonstrated the most appropriate approach to managing flood risk for each of the sub-areas and allocated flood risk management policies.

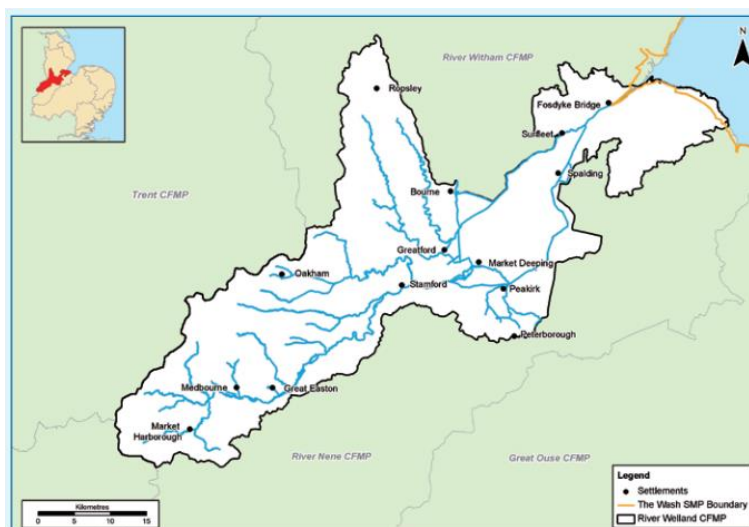


Figure 5: Location and extend of the River Welland CFMP area

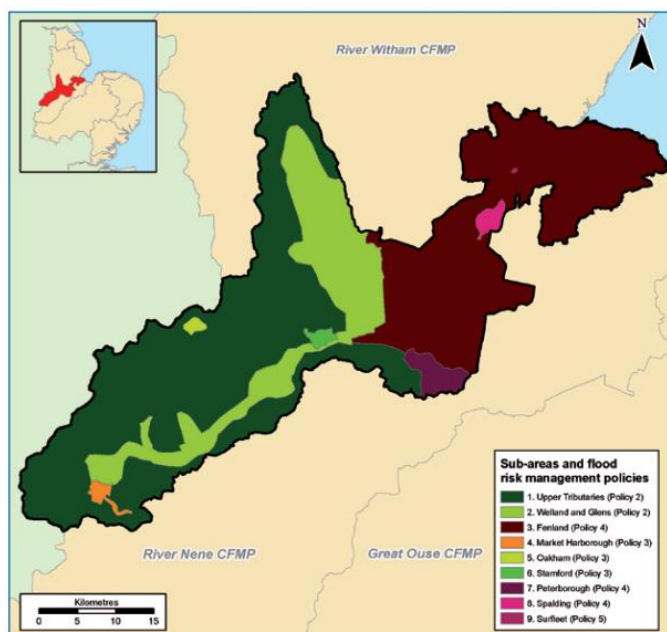


Figure 6: Sub-areas and flood Risk management policies

The examined site is located in the Fenland sub-catchment where policy 4 applies. This policy will tend to be applied where the risks are currently deemed to be appropriately-managed, but where the risk of flooding is expected to significantly rise in the future and more actions will be needed in the future to contain what would otherwise be increasing risk. Taking further action to reduce risk will require further appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

2.4. Location/ Site Description

The proposed development is currently Spalding United Football Club field, which is located in Spalding, Lincolnshire, with the postcode PE11 1DA.

The proposed development includes construction of two dugouts, one proposed steel canopy with concrete foundation and one proposed steel 10 seated stand with concrete foundation. The total site area is less than a hectare (0.0134 ha). The National Grid Reference is TF 24679 22992 (Eastings; 524679, Northings: 322992).

Figure 1 shows a satellite image of the site.



Figure 1 – Satellite view of the Site

2.5. Existing Topography & Drainage

The Proposed site is surrounded by a mix of residential and commercial developments. To the north and east, there are growing residential areas. To the south, the area features a combination of housing and open spaces, while the west has more residential developments. The nearest watercourse is the River Welland.

According to the Topography of the site, the existing level of the site is generally flat as the use of the site is for outdoor sport and the levels are sloping from circa 3.68m AOD on the Southern side down to 3.41m AOD at the Northwest corner of the site.

3. Flood Zone Utilisation

3.1. Flood Zone

Figure 2 below is an extract of the Environment Agency on-line flood maps, which shows that the proposed site is in Flood Zone 3a having high risk of flooding from rivers and/or sea. Additionally all surrounding land has the same flood zone categorisation.

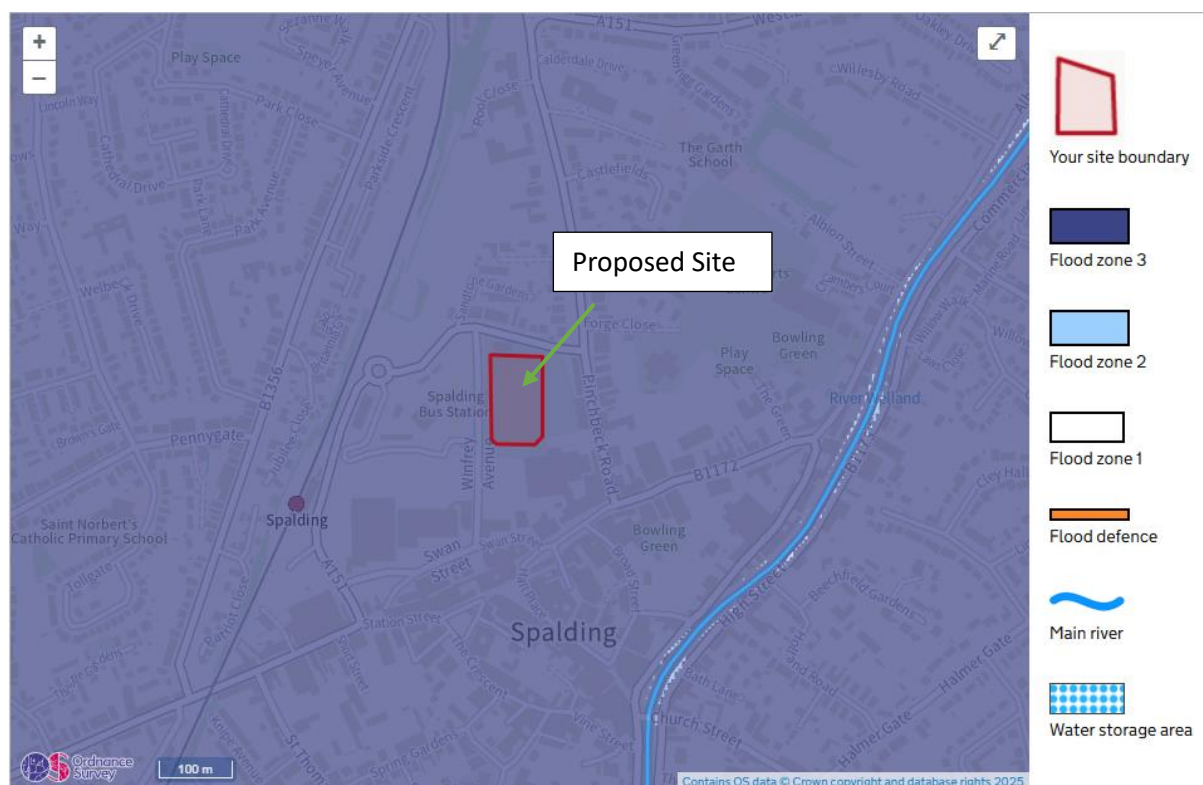


Figure 2 – Extract of the EA Flood Zone Mapping

3.2. Vulnerability Classification

The proposed development is associated with the current use of the site which is the outdoor sport. Therefore, it is classified as 'Water Compatible' development. Therefore, in accordance with Table 1 of NPPF (and as summarised in the table below), the proposed use is appropriate without the need for an Exception Test.

Flood Risk Vulnerability Classification (See Table 2 of NPPF)		Type of Development				
		Essential Infrastructure	Water Compatible	Less Vulnerable	More Vulnerable	Highly Vulnerable
Flood Zone See Table 1 of NPPF	Zone 1 (Low Risk)	✓	✓	✓	✓	✓
	Zone 2 (Medium Risk)	✓	✓	✓	✓	Exception Test required
	Zone 3a (High Risk)	Exception Test required	✓	✓	Exception Test required	✗
	Zone 3b (Functional Flood Plain)	Exception Test required	✓	✗	✗	✗

Summary of NPPF Table 1

3.3. Sequential Test

The National Planning Policy Framework (NPPF) aims to direct new development to areas with the lowest flood risk, applying the Sequential Test to ensure that reasonably available alternative sites with lower flood risks are considered before proceeding with a proposed site in a higher flood zone.

The proposed development is directly associated with an existing sports field and as such cannot be considered in an alternative location. This land use is defined as an 'Outdoor Sports' use and is therefore taken to be 'water compatible', suitable for situation in any Flood Zone.

Within the confines of the existing Spalding United Football Club field there are no lower flood risk areas and positioning of the particular facilities away from the football pitch would render them unsuitable for its intended use and disrupt the operational integrity of the football facility.

Moreover, the area of the development is only 0.0134 ha and the proposed drainage is limited with greenfield runoff rate to ensure minimal impact on the floodplain.

In conclusion, the essential functional relationship between the proposed development and the existing football club, the site is deemed uniquely suitable for the development and no lower flood risk sites are available. Therefore, the proposal is deemed to satisfy the Sequential Test.

4. Flood Risks

4.1. Understanding Flood Risk

Flood Risk includes a statistical probability of any particular event occurring / being exceeded. This can be referred to in one of two ways:

- Annual Exceedance Probability (AEP) is normally quoted as a percentage, such that an event with a 1% AEP, has a 1% chance of occurring or being exceeded within any year.
- Return Periods are an alternative way of referencing the same event. In this case a 1% AEP, would be referred to as a 1 in 100-year event (1 in 100, being equivalent to 1%).

For clarity the table below provides further clarity of the risks and categorisation given:

AEP %	Return Period	Categorisation	Flood Zone
100%	1 in 1-year (Annual event)	High Risk	Flood Zone 3
10%	1 in 10-year	(>3.3% AEP)	
3.3%	1 in 33-year	Medium Risk (3.3%> >0.1%)	
1%	1 in 100-year		Flood Zone 2
0.5%	1 in 200-year		
<0.1%	<1 in 1000-year	Low Risk (<0.1% AEP)	Flood Zone 1

4.2. Fluvial Flooding

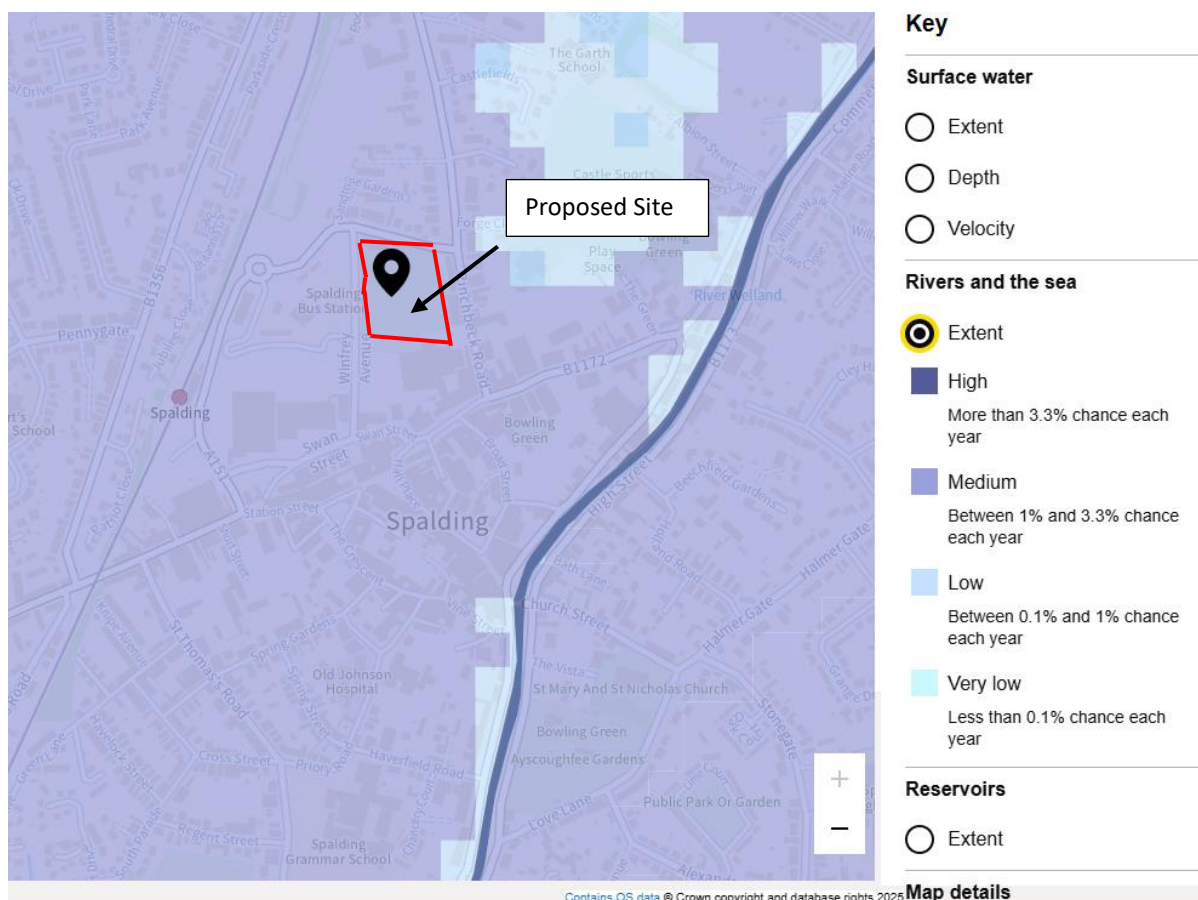


Figure 3 – Extract of EA Detailed Flood Risk Map – Fluvial Flooding

As shown in Figure 3 above, there is a medium risk of flooding from rivers or coastal sources across the entire Site. It is assumed that the fluvial flood risk is developed by flooding River Welland. Historically the River Welland flooded in 1947 causing widespread flooding of Spalding and the surrounded areas of the Fens. Following that event, in 1953 the Coronation Channel was opened to direct the main flow of the River Welland around the southern side of Spalding. The flows are returned to the original river course at Marsh Road Sluice, north of which the river is tidal.

The 2010 SFRA produced for the South Holland District Council (SHDC) provides estimates of the likely flood levels and freeboard available along the River Welland and other local water-courses, including Coronation Channel from Marsh Road Sluice, up to Cowbit Road Sluice (southern end of Spalding). Tables in the 2010 SFRA show the following lowest freeboard values occur at chainage 1.9-km upstream of Marsh Road Sluice (adjacent to disused railway bridge):

Coronation Channel	2007	2115
<u>Peak 1 in 100 year</u>		
Highest water level	4.35m AOD	4.69m AOD
Defence Crest Level	5.14m AOD	5.14m AOD

Freeboard	790mm	450mm
<u>Peak 1 in 1,000 year</u>		
Highest water level	4.37m AOD	4.69m AOD
Defence Crest Level	5.14m AOD	5.14m AOD
Freeboard	770mm	450mm

According to the 2010 SFRA, the above point is the most critical, although this clearly shows that even for storm events up to 1 in 1000-year event (0.01% AEP) there is still 450mm available freeboard in the Coronation Channel, indicating that the risk of flooding as a consequence of the flood defences being over-topped is considered to be Low.

4.3. Surface Water Flooding

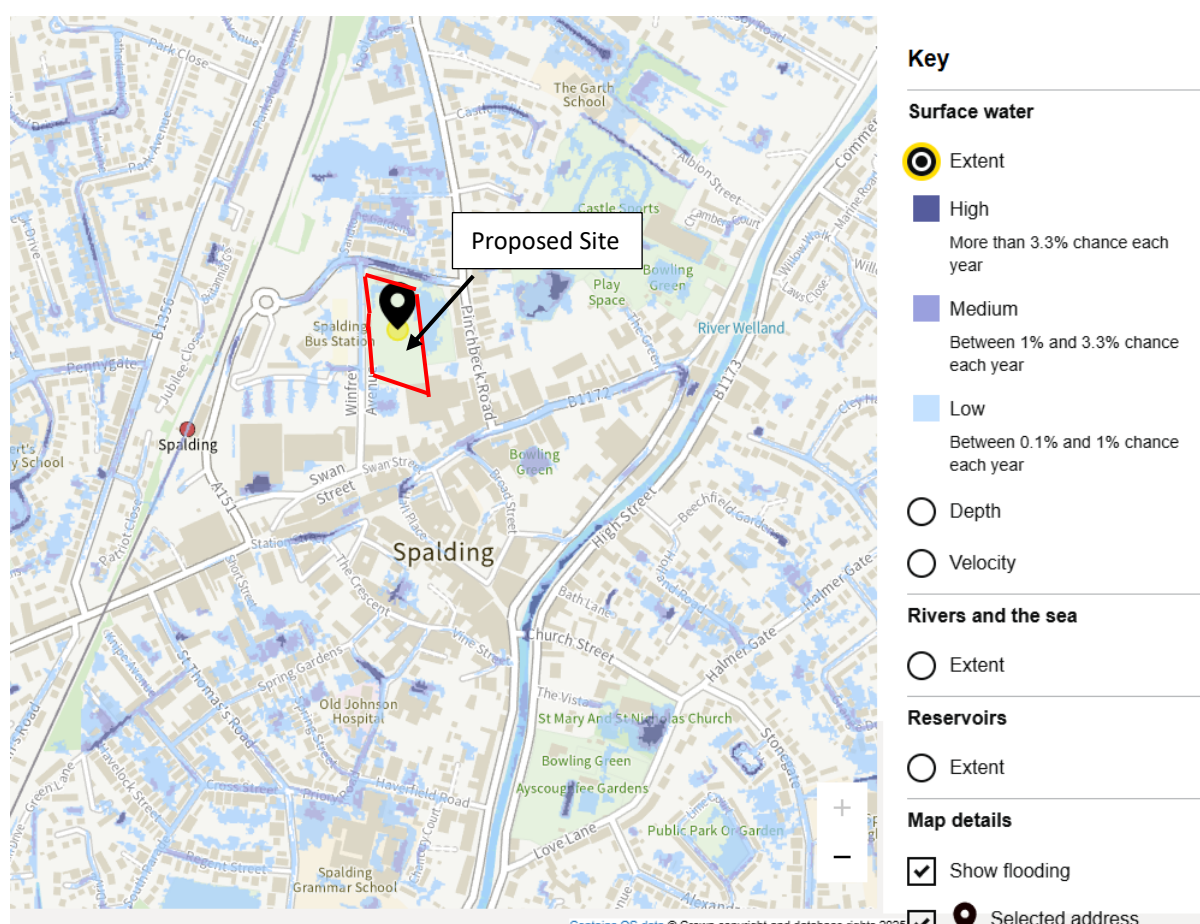


Figure 4 – Extract of EA Detailed Flood Risk Map – Surface Water

Figure 4 shows an extract of the Environmental Agency's Surface Water Flood Map for the area and shows that the probability of surface water flooding is very low which is only between 0.1% to 1% chance each year which will be eliminated by provision of the proposed Surface Water Drainage system for the site.

4.4. Reservoirs

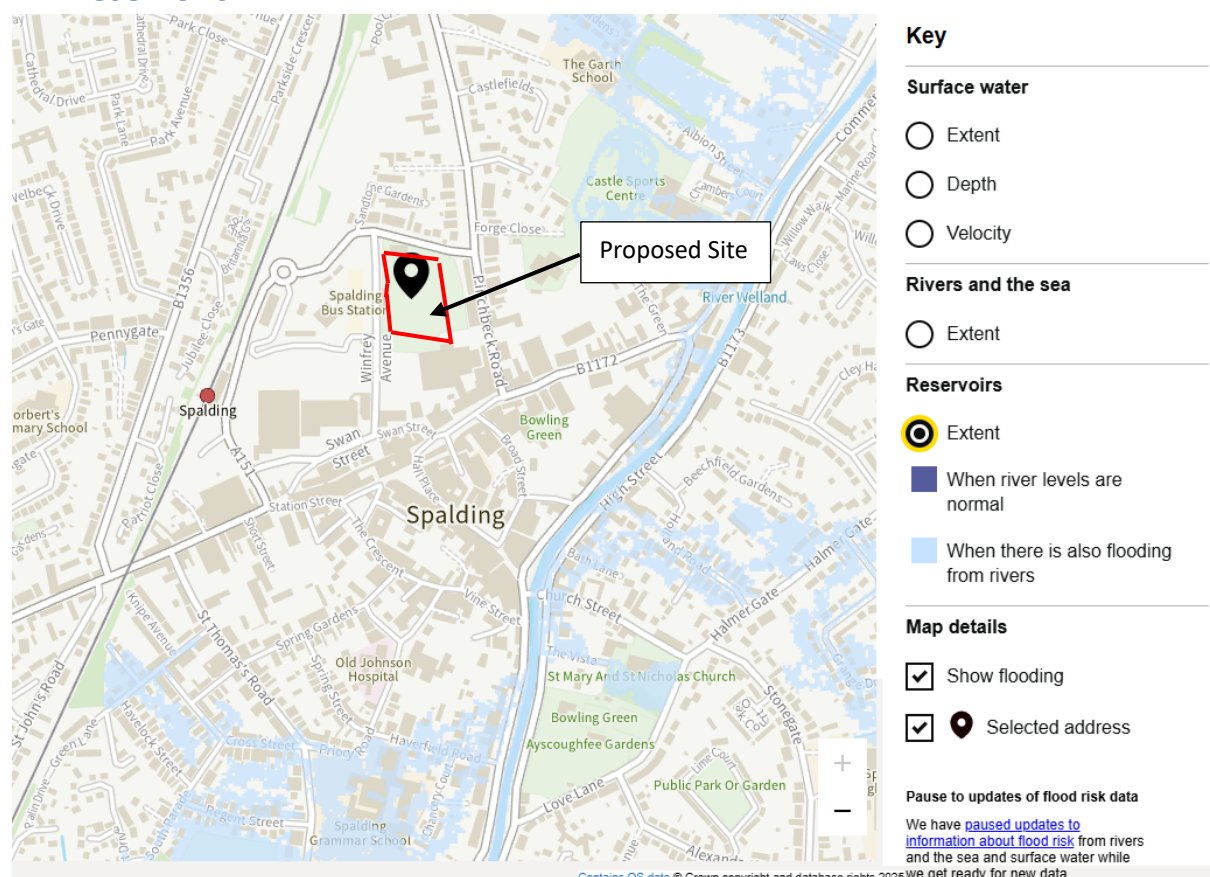


Figure 5 – Extract of EA Detailed Flood Risk Map - Reservoirs

Figure 5 above shows an extract of the EA Flood Maps for flood risk from reservoirs, which shows there is no risk of flooding at the proposed development and surround areas.

4.5. Ground Water

The British Geological Survey website contains a borehole record where the location is the South-east side of the site. This identifies that the ground conditions from Trial Pit (TP) 5 are as follows.

0.00 – 0.20 m is Made Ground: Concrete

0.20 – 0.40 m is Made Ground: Light brown gravelly Sand. Gravel is fine to coarse subangular of limestone and brick. Occasional Metal.

0.40 – 1.20 m is Made Ground: Dark brown silty very clayey sand.

1.20 – 1.70 m is Stiff grey, brown clay with partings of silt and occasional coal gravel.

1.70 – 2.90 m is Brown mottled black silty sand.

2.90 – 3.70 m is Brown silty sand with occasional firm clay bands (<0.1m).

A further borehole also taken from the South-west of the site from Trial Pit 6 and the records are similar ground conditions. The Ground Water Table is found at the level of 1.7m however, there is no record of flooding from the Ground Water. Therefore, it is not considered likely that ground water would create a risk of flooding at the proposed Site. All these records are attached in Appendix D.

4.6. Existing Sewers and Water Mains

According to the Anglian Water Sewer Record attached in Appendix E, there are public storm water and foul water sewer system which are located on Winfrey Ave Road and Kings Road. However, there are no records of clogging or breaking the pipes and hence it is not considered likely that public sewer systems would create a risk of flooding at the proposed Site.

4.7. Risk to Adjacent Property

There is a mixture of residential and commercial developments around the Site. The classification of the proposed development is 'Water Compactable' Site, the proposed use of proposed development is for the outdoor sport. It is also assumed that the finished floor levels of all existing developments around the site are already above the maximum flood level. Moreover, the proposed drainage system from the development would be restricted with the controlled Greenfield Runoff rate and the flooding can be contained within the site. Therefore, there is no increased risk of flooding to adjacent properties.

5. Design considerations to mitigate residual flood risks

5.1. Residual Risks

Residual risks are those remaining after applying the sequential approach and taking mitigating actions. It is the responsibility of those planning development to fully assess flood risk, propose measures to mitigate it and demonstrate that any residual risks can be safely managed.

For Spalding Dental Surgery the residual risks are:

1. Breach of the Coronation Channel banks causing sudden and significant flooding of the site.
2. Failure/blockage of on-site drainage, resulting in localised flooding during storm events.
3. Failure of building services, causing internal flooding.

5.2. Managing Residual Flood Risk

Flood Resilient Structures

The proposed development consists of dugouts and seated stands for the football field facilities, and is classified as water compatible. In flood conditions it would be expected that the entire playing field would be unusable. Dugouts, being below ground structures should include facility to prevent entry and pump out after flooding. All of the structures proposed are by nature easily maintained and can be constructed to be resilient to flooding.

Flood-resilient buildings are designed to reduce the consequences of flooding and facilitate recovery from the effects of flooding sooner than conventional buildings. This may be achieved through the use of water-resistant materials for floors, walls and fixtures and the siting of electrical controls, cables and appliances at a higher than normal level.

Flood Warning and Evacuation Plan

As described previously, in the event of breach of the Coronation Channel banks, sudden and significant flooding can be expected. However, due to the distance from the Coronation Channel and very low likelihood of this scenario occurring, it is considered that there would be adequate time for alerts to be received and the ground evacuated and closed before flooding commenced.

It is recommended that a **Flood Warning and Evacuation Plan** should be developed to ensure that staff are aware of the risks and the procedure that should be adopted if a flood incident occurs. Advice on production of this plan is included in Appendix G.

Flood Warnings

The Environment Agency provides a Flood Warning Service which includes Flood Warning Codes and uses direct warning methods (such as email, text or phone) where the risks and impacts of flooding are high. Indirect warnings (via media broadcasts on local radio and television) are provided to all flood risk areas, even those at low risk of flooding.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Flood-line Service providing advice

6. Conclusion & Recommendations

The proposed development is within Flood Zone 3 (3a). The primary risk of flooding is Fluvial Flooding, which is considered to be a low risk for the proposed development.

In conclusion of all the information available, the proposed development at Spalding United Football Club is appropriate for its location in Flood Zone 3a, given its classification as "Water Compatible". The risks from fluvial flooding, the primary concern, are addressed through inclusion of flood resilient design and preparation of a Flood Evacuation Plan, closing the Site.

Appendix A- NPPF-TG Table 1 – Flood Zones

Flood Zone 1 – Low Probability
Definition This zone comprises land having less than 1 in 1000 annual probability of river or sea flooding (<0.1%). Appropriate Uses All uses of land are appropriate in this zone. Flood Risk Assessment requirements For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention. Policy Aims In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems.
Flood Zone 2 – Medium Probability
Definition This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year. Appropriate uses Essential infrastructure and water-compatible, less vulnerable uses, and more vulnerable uses as set out in Table 2 (NPPF-TG), are appropriate in this Zone if the Exception test is passed. The highly vulnerable uses are only appropriate in this zone if the Exception Test is passed. Flood risk assessment requirements All development proposals in this zone should be accompanied by a flood risk assessment. Policy aims In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage systems.
Flood Zone 3a – High Probability
Definition This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. Appropriate uses The water-compatible and less vulnerable uses of land set out in Table 2 (NPPF-TG) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone.

The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential Infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in time of flood.

Flood risk assessment requirements

All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims

In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;
- relocate existing development to land in zones with a lower probability of flooding; and
- create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage

Flood Zone 3b – Functional Floodplain

Definition

This zone comprises land where water has to flow or be stored in times of flood.

Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.

Appropriate uses

Only the water-compatible uses and the essential infrastructure listed in Table 2 (NPPF-TG) that has to be there should be permitted in this zone. It should be designed and constructed to:

- Remain operational and safe for users in times of flood;
- Result in no net loss of floodplain storage;
- Not impede water flows; and
- Not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test

Flood risk assessment requirements

All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims

In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;
- relocate existing development to land with a lower probability of flooding.

Appendix B – NPPF-TG Flood Risk Vulnerability Classification

Essential Infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations, and water treatment works that need to remain operational in times of flood • Wind turbines
Highly Vulnerable • Police stations; ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use¹ • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classed as “essential infrastructure”).
More Vulnerable • Hospitals • Residential institutions such as care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, <i>subject to a specific warning and evacuation plan.</i>²
Less Vulnerable • Police, ambulance and fire stations which are not required to be operational during a flood. • Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure. • Land and buildings used for agriculture and forestry • Water treatment works which do not need to remain operational during times of flood.

¹ NPPF-TG states that: For any proposal involving a change of use of land to a caravan, camping or chalet site, or to a mobile home site or park home site, the Sequential and Exception Tests should be applied.

² As Footnote 1

- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water Compatible

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

Appendix C – NPPF-TG Table 5: Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, off-shore wind speeds and wave heights

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak Rainfall intensity	+5%	+20%	+30%	+40%
Peak river flow	+10%	+30%		
Off-shore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

Appendix D – Borehole Record

Borehole Record 1 (Trial Pit 5)



British
Geological
Survey

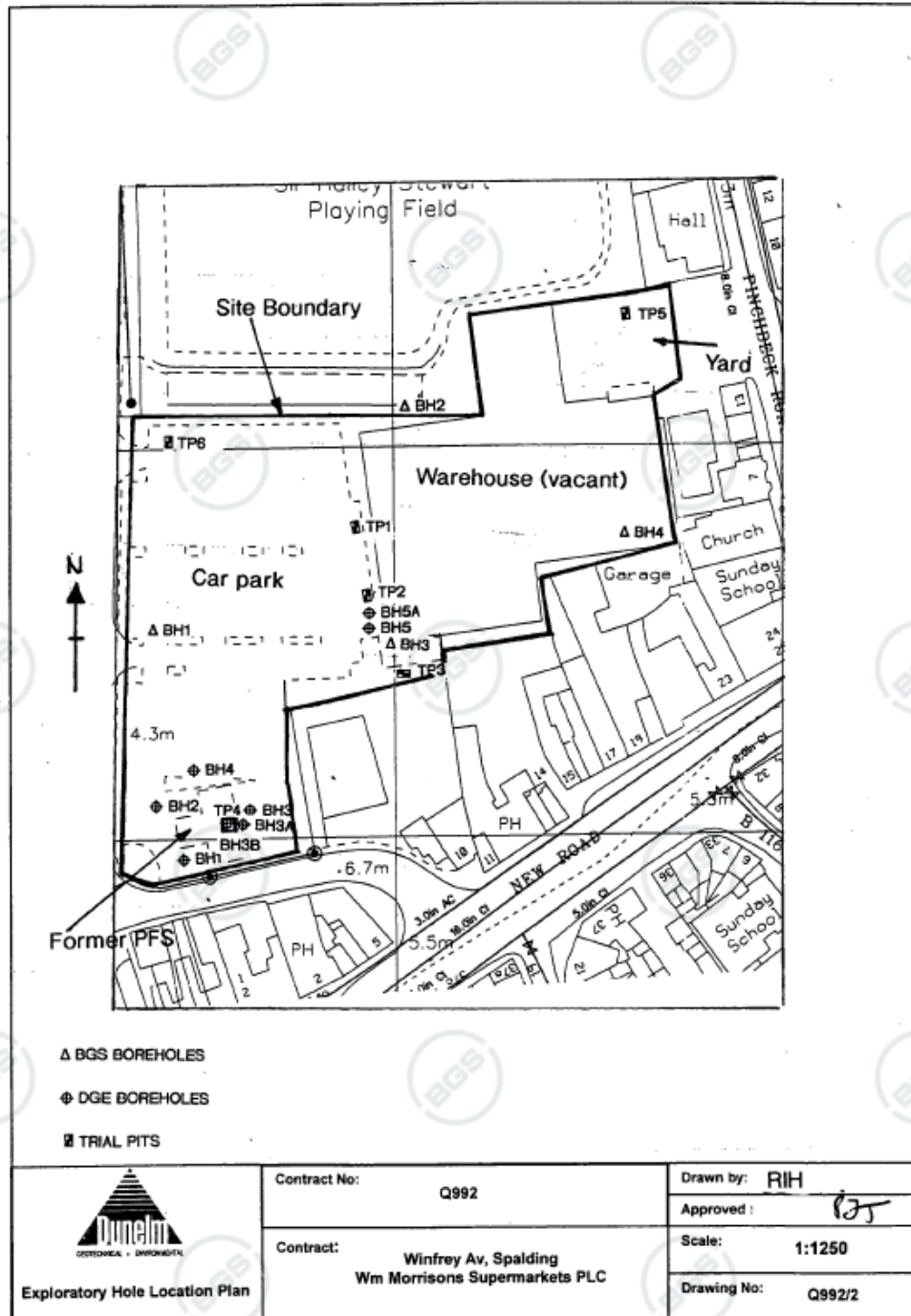
BGS ID: 20386081 : BGS Reference: TF22SW242
British National Grid (27700) : 524761,322934

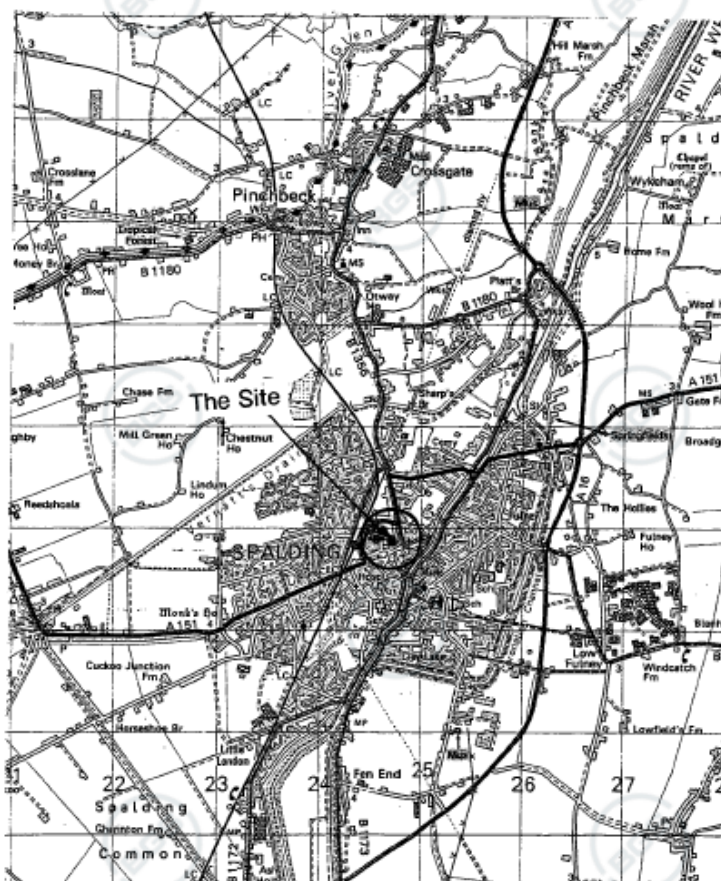
				TRIAL PIT RECORD		TP No. TP5 Sheet 1 of 1	
				Site Winfrey Avenue, Spalding		Contract No: Q992	
				Client Wm Morrison Supermarkets Plc.		Dates: 14/10/2002	
				Method JCB 3CX with a 0.6m wide toothed bucket.		Scale 1:25	
SAMPLE DETAILS				STRATA RECORD		Logged By: HC	
Type	Depth From - To (m)	Vane Results (kN/m²)	Ground-water	Description	Depth (m)	Legend	Well
D	0.30m - 0.40			MADE GROUND: Concrete.	0.20		
B	0.40m - 0.50			MADE GROUND: Light brown gravelly SAND. Gravel is fine to coarse subangular of limestone and brick. Occasional metal.	0.40		
				MADE GROUND: Dark brown silty very clayey SAND.			
B	1.00m - 1.20				1.20		
B	1.50m - 1.60	160 kN/m²		Stiff gray brown CLAY with partings of silt and occasional coal gravel.			
				Brown mottled black silty SAND.	1.70		
J	2.10m - 2.20						
				Brown silty SAND with occasional firm clay bands (<0.1m).	2.90		
J	3.10m - 3.20						
				End of Trial Pit at 3.70 m	3.70		
	3.60m - 3.70						

Remarks and Water Observations
 1. Slight seepage at 1.7m. Insufficient to sample.
 2. Trial pit unstable below 1.6m leading to trial pit collapse at 3.5m.
 3. Hydrocarbon contamination (odour) encountered between 1.7m to 3.2m.

Figure No.
TP5

Contact BGS: ngdc@bgs.ac.uk





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Dunelm Drilling Co Ltd,
Somerville House,
St John's Road,
Meadowfield
County Durham
DH7 8TZ
Licence No. AL 100016224



Site Location Plan

Contract No:

Q992

Drawn by: RIH

Approved: *PJS*

Contract:

Winfrey Avenue, Spalding

Scale:

1:50,000

Wm Morrison Supermarkets Plc

Drawing No:

Q992/1

Borehole Record 2 (Trial Pit 6)

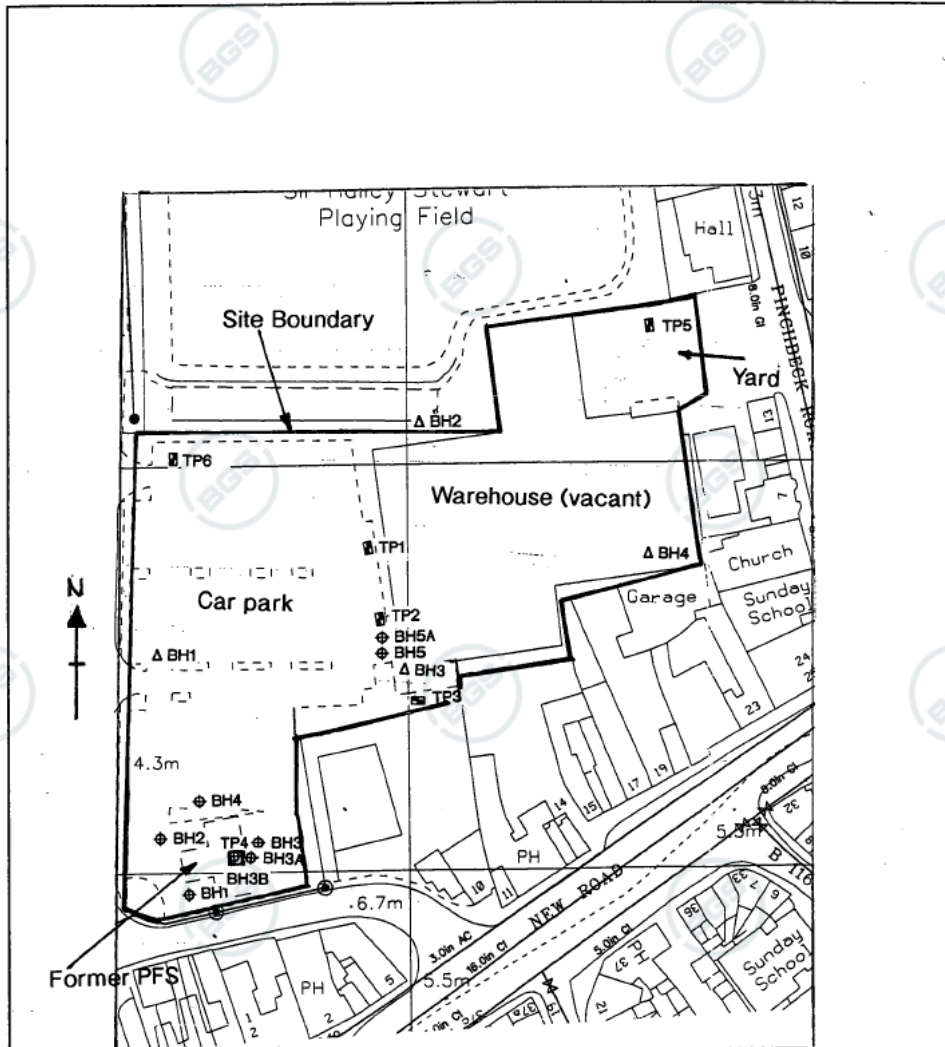


British
Geological
Survey

BGS ID: 20386082 : BGS Reference: TF22SW243
British National Grid (27700) : 524638,322902

				TRIAL PIT RECORD		TP No. TP6 Sheet 1 of 1	
				Site Winfrey Avenue, Spalding		Contract No: Q992	
				Client Wm Morrison Supermarkets Plc.		Dates: 14/10/2002	
				Method JCB 3CX with a 0.6m wide toothed bucket.		Scale 1:25	
SAMPLE DETAILS				STRATA RECORD		Logged By: HC	
Type	Depth From - To (m)	Vane Results (kN/m ²)	Ground -water	Description	Depth (m)	Legend	Well
				MADE GROUND: Tarmac hardstanding.	0.05		
				MADE GROUND: Light brown gravelly SAND. Gravel is fine to coarse subangular of limestone (sub-base).	0.40		
D	0.50m - 0.60			MADE GROUND: Dark brown silty slightly clayey SAND with occasional plant fragments.			
B	1.00m - 1.10						
B	1.20m - 1.30			Soft brown very sandy CLAY.	1.20		
	1.50	38kN/m ²					
B	2.00m - 2.10		▼	Brown silty SAND.	2.00		
B	3.50m - 3.60				3.80		
				End of Trial Pit at 3.80 m			
Remarks and Water Observations 1. Slight seepage at 2.0m. 2. Trial pit unstable below 2.0m leading to trial pit collapse at 3.8m.				Figure No. TP6			

Contact BGS: ngdc@bgs.ac.uk

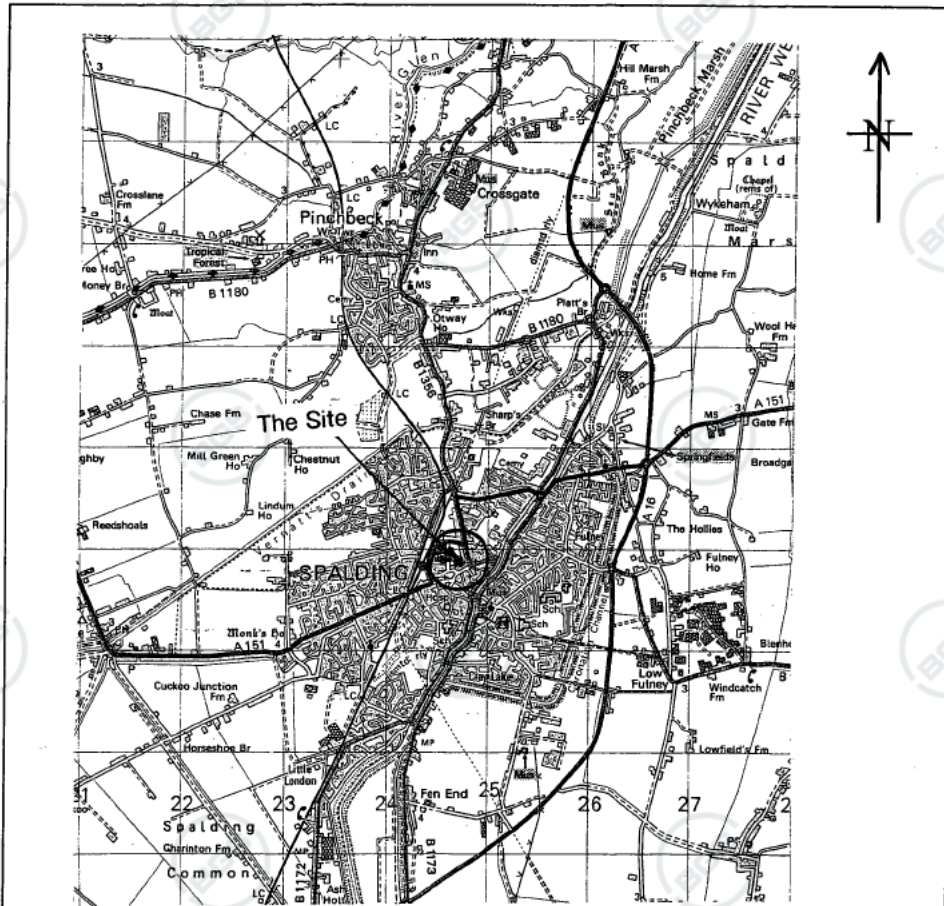


- △ BGS BOREHOLES
- ⊕ DGE BOREHOLES
- ▣ TRIAL PITS



Exploratory Hole Location Plan

Contract No:	Q992	Drawn by:	RIH
Contract:	Winfrey Av, Spalding Wm Morrisons Supermarkets PLC	Approved:	<i>[Signature]</i>
		Scale:	1:1250
		Drawing No:	Q992/2



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Site Location Plan

Contract No:

Q992

Drawn by: RIH

Approved:

PJS

Contract:

Winfrey Avenue, Spalding
Wm Morrison Supermarkets Plc

Scale:

1:50,000

Drawing No:

Q992/1

Contact BGS: ngdc@bgs.ac.uk

Appendix F – Greenfield Runoff Rate Estimation



Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Elena Phyu
Site name:	Spalding United FC
Site location:	Spalding

Site Details

Latitude:	52.78999° N
Longitude:	0.15252° W
Reference:	1553659580
Date:	Jan 08 2025 13:17

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	559	559
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default Edited

Q_{BAR} (l/s):	0.14	0.14
1 in 1 year (l/s):	0.12	0.12
1 in 30 years (l/s):	0.34	0.34
1 in 100 year (l/s):	0.5	0.5
1 in 200 years (l/s):	0.59	0.59

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix G – Warning and Evacuation Plan Guidance

The following guidance is provided to help organisations prepare a suitable **Warning and Evacuation Plan** for their site.

Key requirements

The **Warning and Evacuation Plan** for the site should consider the following key matters:

- | | |
|---|--|
| <i>How will a warning be received?</i> | It is recommended that organisations register with Flood Warnings Direct to receive early warnings and allow for preparations and managed evacuation of the premises in advance. |
| <i>What will happen when a warning is received?</i> | The Warning and Evacuation Plan should be implemented to make the premises safe and evacuate in advance of the flood conditions occurring. |

The plan should include as a minimum the following matters:

- Details of the site
- Visitor briefings on arrival and notices in the Retreats
- Alarm and communication system
- Evacuation methods and routes
- Staff training and responsibilities
- Attendance recording

Further guidance is provided below in relation to the considerations and operation of the Plan.

Receiving Early Warnings

It should be noted that the proximity of the site to the Coronation Channel / River Welland means that in the event that the flood defences are either over-topped or breached it is possible that flood waters may become fast flowing and deep in a very short period of time.

The EA operate a Flood Forecasting and Warning Service in areas at risk of flooding from rivers or the sea, which relies on direct measurements of rainfall, river levels, tide levels, inhouse predictive models, rainfall radar data and information from the Met Office. This service operates 24 hours a day, 365 days a year.

The Environment Agency (EA) and Met Office provide flood warnings up to five days in advance. These warnings should be coupled with specific on site systems to provide a useful system of escalation to specific actions.

Flood Warnings Direct (FWD)

Floodline Warnings Direct is a free service operated by the EA that provides flood warnings direct to you by telephone, mobile, email, SMS text message and fax. Sign up for Floodline Warnings Direct by calling Floodline on 0845 988 1188 or going online

If flooding is forecast, warnings are issued using a set of four easily recognisable codes, as follows:

Flood Warning Codes	What it means	When it's used	What to do
 Flood Alert	Flooding is possible. Be prepared.	Two hours to two days in advance of flooding.	• Be prepared to act on your flood plan. • Prepare a flood kit of essential items. • Monitor local water levels and the flood forecast on our website.
 Flood Warning	Flooding is expected. Immediate action required.	Half an hour to one day in advance of flooding.	• Move family, pets and valuables to a safe place. • Turn off gas, electricity and water supplies if safe to do so. • Put flood protection equipment in place.
 Severe Flood Warning	Severe flooding likely. Danger to life.	When flooding poses a significant threat to life.	• Stay in a safe place with a means of escape. • Be ready should you need to evacuate from your home. • Co-operate with the emergency services. • Call 999 if you are in immediate danger.
Warnings no longer in force	No further flooding is currently expected in your area.	When river or sea conditions begin to return to normal.	• Be careful. Flood water may still be around for several days. • If you've been flooded, ring your insurance company as soon as possible.

Raising the Alarm on Site

On the site, an alarm should be raised when a specific warning or trigger is received. This alarm should be obvious to those using the site and they should be clear on how to respond. Alarms should also take into account those with sensory or mobility impairment.

Devising Evacuation Procedures & Routes

Identify in advance of flooding which individuals can be sent home, if safe to do so. Allow time for this to occur before any routes become affected by the flooding. Evacuation procedures should be developed which identify when and how evacuation takes place, if necessary signed routes may be required, (including the maintenance of signs and keeping evacuation routes clear). Consideration should be given to the road network around the site, especially if these are more likely to flood first and therefore affect evacuation time.

The evacuation procedures should include options for the evacuation of ALL people on site, (including those with restricted mobility). It should be assumed that visitors will not have local knowledge and will need to be guided to a safe route / location. It is also worth keeping in mind the need to have evacuation plans for any pets and livestock.

Shelter & Welfare If an evacuation is necessary, consider the location to which the site will be evacuated. It can be assumed that it will be cold, raining and dark. The shelter and welfare of those evacuated from the site needs to be considered and it must be assumed that support from the emergency services will not be immediately forthcoming. For Commercial Businesses it is recommended that business is suspended in advance and wherever possible customers alerted to the fact that the premises is closed so that they do not unnecessarily enter areas at risk of flooding.

Fail Safe and Places of Safe Refuge

In the event that the Flood Defences are breached without Warning either being received or acted upon, consideration of the actions that should be taken to preserve life should be considered. Wherever possible, a 'Place of Safe Refuge' should be identified such that all occupants can take immediate action to keep themselves safe without relying on intervention from outside and consideration given to means of escape. These details should be recorded and be a part of the training for the **Warning and Evacuation Plan**.

If the decision is made that nominated individuals / critical workers are to remain safe on site, ensure risk assessments have been completed. Include details of how many people can be accommodated in this manner and the resources / equipment available to sustain them the necessary duration. Depending on the cause of flooding, people may need to stay for many hours. Consider their communications with management, emergency services and their families. - **Do not plan for or assume that the emergency services will rescue people from this location. The focus of any response from the emergency services will be to those who are immediately vulnerable and at most risk. It is probable that the emergency services will be stretched thin.**

Command and Control

Any staff on the site must be clear on their roles and responsibilities in response to flood warnings and flooding. There should be a single person in control of the site response to ensure all activities are coordinated. Any plans must be drawn up to work on a 24/7 basis.

If immediate flooding is forecast and the opportunity to safely evacuate is gone, preemptive flood protection tasks must be implemented (if time allows) and the formal instruction given to move to the area of safe refuge.

Site Re-occupation

It must be born in mind that before re-occupation occurs that the recovery of the area affected will be co-ordinated by the local authority supported by various agencies.

There may well be environmental hazards, loss of utilities and other such issues, which may have to be rectified before people are allowed back to premises.

Briefing/Training/Exercising

Whilst the risk of flooding is extremely low, it is through training that the right decisions and actions are taken to prevent unnecessary risks being taken. All personnel who work or are resident on site should be made aware of this plan and briefed / trained accordingly. Exercising of the plan and personnel is essential to avoid panic.

Health & Safety records should be kept listing which personnel have been trained and exercised.

The Plan will form part of the Health & Safety at Work Register maintained by the organisation.

Document Control

The Plan should be owned, maintained, and updated. All users should be reminded periodically to provide details of any changes that may materially affect the plan in any way.

Details of changes should be recorded and the documentation updated. This should be completed either through a re-issue of the plan or via an amendments record.

The plan should be reviewed at least every three years, or more regularly if required, for example, as a result of lessons identified after an activation event or exercise, following major changes of personnel or policy, or following any change to the flood risk or warning process.

Documentation control procedures should be in place to ensure that only the current version of the plan is in circulation.

Appendix H – Useful Sources of Information

Am I at Risk of Flooding?

Floodline Warnings Direct

<https://fwd.environment-agency.gov.uk/app/olr/register>

Prepare a Flood Plan for your Business

<http://www.environment-agency.gov.uk/business/topics/flooding/32362.aspx>

Business Flood Checklist

<http://www.environment-agency.gov.uk/business/topics/flooding/32358.aspx>

Make an Emergency Flood Plan for your Home

<http://publications.environment-agency.gov.uk/pdf/GEHO0709BQPU-e-e.pdf>

Preparing your home or business for flooding

<http://www.environment-agency.gov.uk/homeandleisure/floods/31644.aspx>

Improving the flood performance of new buildings: flood resilient construction.

<http://www.communities.gov.uk/publications/planningandbuilding/improvingflood>

Improving the flood resistance of your home - advice sheets

http://www.ciria.org.uk/flooding/advice_sheets.html

Flood Protection Association (Promote the interests of manufacturers and installers of flood protection equipment and requirements)

<http://www.floodprotectionassoc.co.uk/>

Direct Gov Preparing for emergencies

<http://www.direct.gov.uk/en/Governmentcitizensandrights/Dealingwithemergencies/Preparingforemergencies/index.htm>

UK Resilience

<http://www.cabinetoffice.gov.uk/ukresilience.aspx>