Flood Risk & Drainage Assessment Report

for the

Proposed Agricultural Building

on land at

Park Farm,

Jordans Cradge Bank Road

Spalding

Lincolnshire

PE11 3BJ

Prepared for

Lord Carrington.

Issue 01

February 2026

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Issue	:	01
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Date	:	14st February 2026

1.0 DEVELOPMENT SITE AND LOCATION

1.1 The development site is approximately 5.0km south west of Spalding, Lincolnshire. The site is located at Park Farm, Jordan's Cradge Bank Road, Spalding. The nearest Post Code is PE11 3BE.and the OS Grid Reference of the application site is TF 213 188.

1.2 The location is shown on the Flood Map for Planning contained in Appendix 1.

1.3 The site covers some 0.64 hectares of which 0.335ha is to be covered with impermeable surfaces. The site is currently used for arable farming.

1.4 The development adjoins the existing Park Farm development and would effectively extend the existing farm site. The site is bounded by arable farmland on the other three boundaries.

1.5 The field in which the development is proposed is generally flat with levels varying between 2.4 and 3.0m AOD.

1.6 There is an existing private drainage ditch commencing at the north west corner of the site.

1.7 The site is 2.5km west of the River Welland and the Cowbit-Crowland Washlands. The site is approximately 27.0km upstream of where the River Welland enters The Wash.

1.8 There are numerous drains in the vicinity, some IDB maintained providing drainage to the surrounding area of fenland.

1.9 The site is shown to be in Flood Zone 2 on the Flood Map for Planning

2.0 DEVELOPMENT PROPOSALS

2.1 The development comprises of a single 90m x 36.0m agricultural drain store with 3No attached 6.0 x6.0m fan house buildings. The proposed total roof area is 3348m2

2.2 An existing nominal 30m x 10m building is to be demolished.

2.3 Details of the proposed development are shown on Drawing 870-002 contained in Appendix 1.

2.4 In accordance with Table 2 of the National Planning Policy Framework (NPPF) the development would be classed as less vulnerable.

2.5 In accordance with Table 3 of the NPPF less vulnerable developments in Flood Zone 3 are acceptable.

2.6 The estimated lifetime for the proposed development is 50 years.

3.0 CLIMATE CHANGE

3.1 The NPPF web based guidance provides guidance on potential effects of climate change on flooding which is based on information published by the Environment Agency.

3.2 The Environment Agency published updated information on Climate Change in February 2016, which has been updated several times with the latest update published May 2022.

3.3 The Climate Change Allowances cover

a) Peak River flow

b) Peak Rainfall Intensity

c) Sea Level Rise

d) Offshore wind speed and extreme wave height.

3.4 For Peak River Flows for less vulnerable developments the central allowance should be used. For the Welland Management catchment the central allowance is an increase of 17%.

3.5 For Peak Rainfall Intensity, for developments with a lifetime between 2061 and 2100 the 2070's central allowance should be used to determine that the site safe from flooding and should not increase flooding elsewhere in the catchment for up to a 1 in 100 year event. In the Welland Management Catchment the 1 in 100 year central allowance is 25%,.but conservatively 40% has been used in this report.

3.6 The site is considered to be far enough in land not to be affected by the proposed sea level rises and offshore Peak Wind Speed and Extreme Wave Height Allowance.

3.7 The surface water drainage system serving the site will need to be designed such that potential additional flows due to climate change do not cause flooding on this development and do not to contribute to an increased risk of flooding elsewhere in the catchment.

4.0 SITE SPECIFIC FLOOD RISK

4.1 The site is located in Flood Zones 2.

4.2 The site is considered to be at risk of flooding from the following sources

a) Fluvial and Coastal Flooding

b) Flooding from Adjacent Drains and Surface Water

c) Flooding from Groundwater Sources.

d) Flooding from water mains or sewerage infrastructure.

e) Flooding from he surface water sewerage system serving the development.

4.3 The above potential risks are considered in more detail as follows:

Fluvial and Coastal Flooding

4.4 The site is located some 2.5km west of the River Welland and associated Cowbit Washlands. Floodwaters are contained within an earth embankment with crest levels around 6.0m AOD.

4.5 The River Welland is Tidal as far as Fulney Lock and Marsh Road Sluice on the north side of Spalding, some 7.0km north east of the site.

4.6 Additional Flood Information was requested from the Environment Agency. A copy of their response is contained in Appendix 1.

4.7 In their response the Environment Agency has stated that:

a) The Flood Map for Planning assumes there are no flood defences in place.

b) The Flood Map for Planning shows raised defences

c) The Environment Agency do not have any historic records of the site flooding.

d) There are no ongoing projects to sustain or reduce flood risk in the area

e) The site is considered at risk of fluvial flooding from 'Main Rivers' The existing raised defences which reduce the risk of flooding at the site consist of the Crowland – Cowbit washes and embankment. They are reported to be in a fair condition and offer a 1 in 100 year level of protection.

f) The modelled flood extents, taking into account existing defences do not impact the site.

g) The site is not covered by any Flood Hazard Mapping undertaken by the Environment Agency

h) The site is not considered to be at risk from Coastal Flooding.

4.8 Although, the Environment Agency has not undertaken any Flood Hazard Mapping for the site they suggest referring to the South East Lincolnshire Strategic Flood Risk Assessment which may contain some information on Flood Hazard Mapping.

4.9 The South East Lincolnshire Strategic Flood Risk Assessment contains various Hazard Mapping for a range of events.

4.10 The site is outside the more detailed maps of areas of high population. but shown on the South Holland 2115 (0.5% Tidal 1% Fluvial) Flood Depth Map. The Map shows that the site should not beat risk of flooding for a breach on this event. A screenshot of the section of the map around the site for this event is presented in Appendix 1

4.11 Overall it is concluded that the site is at a low risk of fluvial and coastal flooding

Flooding from Flooding from Adjacent Drains and Surface Water

4.12 The site is located at the head of a private drain. There are also a number of other drains both private and IDB maintained which provide drainage to the area.

4.13 Land drainage drains, ditches and dykes are normally cut deeper than they need to be for the hydraulic capacity to provide drainage for the adjacent fields. As such should they become blocked there is normally sufficient capacity in the ditch that levels will simply rise and flow over the obstruction. Even if levels should rise to the top of the bank, only a small depth of out of bank flow would be required to pass the flow and re-enter the ditch downstream of the obstruction.

4.14 When the outfalls from these drains become tide locked the IDB uses pump stations to discharge flows. The IDB systems are normally designed to provide 1 in 100 year protection to the drainage area served.

4.15 Overall the risk of flooding from the drains surrounding the site is low.

4.16 There is flooding across the site shown on the Surface Water Flood Map a copy of which is presented in Appendix 1.

4.17 The 1 in 1000 year Surface Water Flood Map shows some minor surface water flooding in the vicinity of the site. It is understood that this flooding is associated with isolated low spots which can only drain by infiltration through the sub-soil.

4.18 Following development, proposed building will be raised above ground level. Ground levels will graded away from the building and low spots will be filled in, reducing the risk of surface water flooding.

4.19 Overall the risk of surface water flooding is low.

Flooding from groundwater sources.

4.20 Groundwater levels at the site have been measured at around 1.2m below the surface and are likely to be similar to water levels in the surrounding ditches.

4.21 Given the topography of the surrounding land and setting the floor level of the building above the adjacent ground the risk of flooding will be minimal.

Flooding from water or sewerage infrastructure.

4.22 We are unaware of any large water mains or sewers in the area but given the topography of the land and setting the floor level of the building above the adjacent ground the risk of flooding will be minimal.

Flooding from site the surface water sewerage system.

4.23 The surface water system will be designed to attenuate flows for a range of storms up to the 1 in 100 year plus climate change event.

4.24 Flow paths for storm events in excess of the design criteria will be away from the building to the adjacent open fields minimising the risk of flooding

5.0 FLOOD RISK MITIGATION MEASURES

5.1 To mitigate the potential flood risks identified in the previous section it is proposed that the floor of the units are constructed at a minimum level of 3.5m AOD or a minimum of 150mm above the surrounding ground level.

6.0 SEQUENTIAL TEST

6.1 The Flood Risk vulnerability classification of the proposed development is less vulnerable which is considered appropriate Flood Zone 2.

6.2 The development is required to be located local to the existing farm business for operational reasons. The development utilises the existing farm buildings and access arrangements.

6.3 Within Section 4.0 of this report it is demonstrated that although the site is in Flood Zone 2, the development is located outside the area at risk of fluvial or coastal flooding, including when flood defences are breached or overtopped.

6.4 No other suitable sites in lower flood zones or sites with lower Flood Hazard Ratings have been identified within the local area

6.5 Taking into account the above points the site can be considered to have passed the Sequential Test.

7.0 OCCUPIERS & USERS OF THE DEVELOPMENT

7.1 The current proposals will see an increase in people using the land by up to 1-2 persons on an employment basis only. There will be no residential occupiers of the site.

7.2 The proposed development therefore can be considered safe for the lifetime of the development.

8.0 EXCEPTION TEST

8.1 Less Vulnerable developments in Flood Zone 2 are deemed appropriate and an Exception Test is not required.

9.0 SURFACE WATER MANAGEMENT

9.1 Sustainable Drainage Systems (SuDS) were been considered for this site.

9.2 Following the preferred hierarchy of drainage stated in Part H of the Building Regulations and The Suds Manual the following disposal routes were considered

a) Disposal via Infiltration

b) Disposal to a Watercourse

c) Disposal to Surface Water Sewer

9.3 A site investigation has been undertaken for the site. Copies of the borehole logs are presented in Appendix 1.

9.4 The logs show the site is overlain with clay based materials.

9.5 In addition a standpipe was installed in one of the boreholes. Groundwater levels approximately 1.2m below ground.

9.6 Given soil stratum and the high groundwater level, infiltration drainage systems have not been considered for this site.

9.7 Following the hierarchy of SuDS, a surface water drainage discharge to an open watercourse is the next preferred option. Therefore, it is proposed that the attenuated surface water run-off is discharged to private drain immediately to the west of the site, which eventually discharges to a drain managed by Welland And Deepings IDB.

9.8 A discharge consent will be required from the IDB.

9.9 This will provide a sustainable drainage system for the proposed development.

10.0 OUTLINE DESIGN OF THE PROPOSED SURFACE WATER DRAINAGE SYSTEM

10.1 The intention of this report is to demonstrate that it is practical to provide a surface water drainage system that meets the requirements of the NPPF. The detailed design of the system will need to be undertaken prior to construction and follow the principles contained in this report.

10.2 An illustration of the proposed Outline Design is shown on Drawing 870-002 contained in Appendix 1 and described in more detail in the following paragraphs.

10.3 The floor levels shown on the drawing are provided to illustrate a practical drainage solution. They are based on an assumed invert level of the ditch of 1.0m. This should be checked before commencing any construction. If the ditch level is higher then the proposed floor levels and drainage levels will need to be adjusted accordingly.

10.4 Should the floor levels be revised to suit cut and fill balances or similar, then the levels for the drainage system will need to be adjusted accordingly.

Roof Drainage and Piped Drainage System

10.5 The buildings have duo-pitched roofs. The number of rainwater outlets will be dependant on the guttering system used but for this report an outlet has been assumed for every 200m2 of roof.

10.6 This will require at least 4No rainwater outlets per side

10.7 For operational reasons a buried piped system is proposed to serve the buildings.

10.8 Pipe sizes and gradients have generally been selected so that they are not surcharged under the at the Building Regulations discharge of 0.014l/s/m2.

10.9 The longest pipe run was checked for levels at gradients of no slacker than one in the diameter of the pipe in mm.

10.10 With a selection of pipe sizes and gradients a practical level of the base of the attenuation basin is 1.0m AOD, which allows a 1 in 150 fall to the receiving drain..

10.11 The pipes were then checked for the 1 in 30 year and 1 in 100 year 15 minute storms which correspond to run-off rates of 0.021 and 0.028 l/s/m2 respectively.

10.12 The 1 in 1 year 15 minute storm was not checked as this is less onerous that the Building Regulations run-off rate.

10.13 Initially, there was some flooding on both the 1 in 30 and 1 in 100 year events but some pipe lengths were increased in diameter from 150mm to 225mm to prevent flooding.

10.14 The system shown on Drawing 870-002 does not flood for the 1 in 30 year event but has sone surcharging of the manholes. There is however some flooding for the 1 in 100 event. This will not result in any flooding of the buildings and exceedance flows will simply flow overland to the adjacent ditch. Exceedance flow routes are shown on the drawing.

10.15 The surcharge depths of all manholes are provided in the calculation spreadsheets contained in Appendix 1.

Urban Creep

10.16 As this is a commercial development in control of one owner an allowance for urban creep is not considered necessary.

Attenuated Discharge

10.17 The impermeable area of the site discharging to through the surface water drainage system is 0.34ha. The 1 in 1 year greenfield run-off for the site is only 1.2 l/s/hectare. The HR Wallingford Greenfield run-off Report is contained in Appendix 1.

10.18 Limiting the discharge to the 1 in 1 year run-off would result in a peak discharge of 0.41 l/s, which is impractical. The minimum practical size of discharge control device requires a clear opening of around 80mm.

10.19 There are devices available that restrict the flow rate to 3.5 l/s at 1.0m head and have a clear opening of 83mm and this is considered appropriate in this location. Details of a typical flow control device are presented in Appendix 1.

Attenuation Basin

10.20 The location of the proposed attenuation basin is shown on Drawing 870-002.

10.21 The ditch level used in this report, 1.0m, has been taken from a grid of LIDAR levels and the attenuation basin base level set at of 1.2m to allow fall to the drain.

10.22 The existing ground levels in the vicinity of the ditches 2.6m AOD meaning the basin would have an overall depth of 1.7m. This would provide a 1.0m attenuation depth with 0.3m of freeboard.

10.23 The proposed basin would have maximum 1 in 3 sides slopes for stability, ease of maintenance and safety of the public.

10.24 A rainfall run-off analysis, following the HR Wallingford Procedure, for storms up to and including the 48 hour 1 in 100 year plus 40% climate change rainfall, was undertaken. This was used to determine the size of the attenuation basin required and the critical storm using average discharge values.

10.25 For this development the critical storm was 6.0 hours and the attenuation volume required was 232.m3. The attenuation basin shown on Drawing 870-002 is slightly larger than this providing 261m3 of storage.

10.26 Simulations were then undertaken basin shown on Drawing 870-002 for the 6.0 hour 75% Winter and 50% Summer critical storms using the varying rain profiles, actual head/discharge curves and the actual storage to depth formula

10.27 For the 6.0 hour 1 in 100 year plus 40% Climate Change 75% Winter Storm the attenuation basin would fill to a depth of 0.945m.

10.28 For the 1.0 hour 1 in 100 year plus 40% Climate Event 50% Summer Storm the attenuation basin also would fill to a depth of 0.937m, although the filling profile is different to the winter storm.

10.29 This will provide a minimum freeboard of over 355mm for the most extreme event.

10.30 The simulation calculations are presented in Appendix 1.

Water Quality and Suds Treatment

10.31 The run-off entering the surface water drainage system will come from either the building roofs or the concrete hardstandings..

10.32 Commercial roofs have a low pollution hazard level and discharge via the infiltration basin should provide an adequate level of treatment..

Construction Phase

10.33 The Construction Phase has the potential to discharge silt laden water and reduce the capacity of the attenuation basin.

10.34 It is proposed that a temporary attenuation basin is constructed for the construction phase.

10.35 Construction of the final attenuation basin should not begin until the risk of contamination has passed

11.0 FUTURE MANAGEMENT & MAINTENANCE

11.1 The surface water drainage system will remain in private ownership who shall be responsible for ongoing maintenance. The existing farming business has the resources and equipment to carried out the maintenance tasks.

11.2 The system should require little maintenance. The grass will require cutting during the growing season to restrict the height to n more than 150mm. Litter picking should be carried out at the same time. The flow control device should be checked on an annual basis and if the basin drains slower than expected.

11.3 The yard channel drain and trap should be cleaned out on after each cleaning cycle of the Poultry Unit.

11.4 In addition to the above, the system should be maintained in accordance with the guidelines in the CIRIA Suds Manual which are as follows

Operational and Maintenance Requirements for Attenuation Basins		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris and trash	Monthly
	Cut – Grass landscaped areas and access routes	Monthly (during growing season) or as required
	Cut Grass- meadow grass in and around basin	Half yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start then as required.
	Inspect inlets outlets and overflows for blockages and clear as required.	Monthly
	Inspect bankside, structures, pipework etc. for evidence of physical damage.	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year) then annually or as required.
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required0
	Manage wetlands plants in outlet pool when provided	Annually (as set out in Chapter 23)
Occasional Maintenance	Reseed areas of poor vegetation growth	Annually or as required.
	Prune and trim trees and remove cuttings	Every two years or as required
	Remove sediment from inlets, outlets, forebay and main basin when required.	Every 5 years or as required
Remedial Actions	Repair erosion or other damage by reseeding or returfing	As required
	Re-align rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Re level uneven surfaces and reinstate design levels	As required

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12.0 OFF SITE IMPACTS

12.1 As the surface water discharge from the site will be collected, attenuated and discharged at a controlled rate there will be no adverse impact on flooding elsewhere in the catchment.

13.0 RESIDUAL RISKS

13.1 There are residual risks that more extreme events are experienced that those evaluated in this report. However, the consequences of more extreme events will not be significantly greater than those assessed in this report.

14.0 CONCLUSION

14.1 The proposed development is in Flood Zone 2 but this assessment has shown the site to be at a minimal risk of flooding.

14.2 This report demonstrates tat a practical surface water drainage, collection, attenuation and disposal system can be provided so that the proposed development will not cause flooding elsewhere in the catchment. The detailed design of the surface water system will need to undertaken following the principles of drainage contained in this report.

14.3 Taking into account the above points it is concluded that the proposed development can be considered appropriate in this location.

15.0 APPENDIX 1 SUPPORTING INFORMATION

a) Environment Agency Flood Map for Planning with Site Location added

b) Flood Information provided by the Environment Agency

c) Excerpt from South East Lincolnshire SFRA 2115 1% Fluvial 0.5% Tidal Breach Depth Map..

d) Surface Water Flood Map

e) HR Wallingford Greenfield Run-off Report

f) Excerpts From Site Investigation Report

g) Surface Water Drainage Areas

h) Pipe Sizing and Levels and Hydraulic Profiles

i) Critical Storm Calculations

j) Typical Flow Control Device

k) Attenuation Basin Simulation Analysis for Critical Storms

l) Drawing 870-001 – Existing Site, Contours and Key Drainage Features

m) Drawing 870-002 – Proposed Development and Outline Surface Water Design



Environment Agency

Flood map for planning

Your reference
870 Deeping St James

Location (easting/northing)
521376/318788

Scale
1:10,000

Created
26 Jan 2026 13:40

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 100 200 300m

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creating a better place
for people and wildlife

Environment Agency

George Shuttleworth
gsl_engineers@outlook.com

Our ref: EIR2026/03579

Date: 12 February 2026

Dear George,

Flood Risk Information for Jordans Cradge Bank Road, Spalding

The flood risk information for the above site is set out below and attached. It is important you read any contextual notes on the maps provided.

If you are preparing a Flood Risk Assessment (FRA) for this site, please note this information may not be sufficient by itself to produce an adequate FRA to demonstrate the development is safe over its lifetime. Additional information may be required to carry out an appropriate assessment of all risks, such as the consequences of a breach in the flood defences.

We aim to review our information on a regular basis, so if you are using this data more than twelve months from the date of this letter, please contact us again to check it is still valid.

Please read the letter in full as the information covered has been updated in **January 2026.**

1. Flood Map for Planning

The attached map includes the current Flood Map for Planning for your area. The map indicates the Area at Risk of Flooding (Flood Zone 3) and the Extreme Flood Outline (Flood Zone 2) **assuming no flood defences exist.**

The Area at Risk of Flooding shows the land that could be impacted from a flood with a 0.5% or greater chance of occurring in any year for flooding from the sea, or a 1% or greater chance of occurring in any year for fluvial (river) flooding.

The Extreme Flood Outline shows the land that could be impacted from a flood which has between a 1% and 0.1% chance of occurring in any year for fluvial (river) flooding, or between a 0.5% and 0.1% annual probability of sea flooding, or the highest recorded historic extent if greater.

In some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.

The Flood Map for Planning also shows the location of formal raised flood defences and flood storage reservoirs. It represents areas at risk of flooding for present day only and does not take account of climate change.

The Flood Map for Planning only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered flooding may occur from other sources such as surface water sewers, road drainage, etc.

2. Recorded Flood Outlines

With regards to the history of flooding I can advise we do not have any records of flooding in this area. It is possible recent flooding may have occurred which we are currently investigating, therefore this information may be subject to change.

It is possible other flooding may have occurred which other risk management authorities, such as the Lead Local Flood Authority (i.e. top tier council) or Internal Drainage Board (where they exist) have responsibility.

3. Schemes in the area

There are no ongoing capital projects to reduce or sustain the current flood risk to this area.

4. Fluvial Flood Risk Information

The site may be at risk from main rivers in the form of residual risk due to the failure of flood management infrastructure such as a breach of a raised flood defence. You may need to undertake further assessment of this residual risk using the data provided.

The site may also be at risk from local ordinary watercourses for which other risk management authorities, such as the Lead Local Flood Authority (i.e. top tier council) or Internal Drainage Board (where they exist) have responsibility.

4.1 Fluvial Defence Information

The existing fluvial defences reducing the risk of flooding to this site consist of Crowland-Cowbit Washes and embankment. They are in fair condition and provide protection against a flood event with a 1% chance of occurring in any year (1 in 100). We inspect these defences regularly to ensure that any potential defects are identified early.

Refer to paragraph 3 for details of any ongoing capital projects to reduce the flood risk to this site.

4.2 Fluvial Modelled Levels and Flows

Available modelled fluvial flood levels and flows for the model nodes shown on the attached map are set out in the data table attached. This data is taken from the model named on the data table, which is the most up-to-date model currently available.

Please note these levels are “in-channel” levels and therefore may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences.

Our models may not have the most up to date climate change allowances. In time we will update our models for the latest allowances. You should refer to 'Flood risk assessments: climate change allowances' to check if the allowances modelled are appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

4.3 Fluvial Modelled Flood Extents

Our modelled flood extents, which take into account flood defences, do not impact this site.

There may still be a residual risk of fluvial flooding to your site due to the failure of flood management infrastructure such as a breach of a raised flood defence. You may need to undertake further assessment of this residual risk using the data provided.

4.4 Fluvial Hazard Mapping

For certain locations we have carried out modelling to map the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from overtopping and / or breaching of defences at specific locations for a number of scenarios.

At present this information is available for fluvial flood risk in Northampton, Lincoln, Wainfleet and some isolated rural locations.

The number of locations we have this information for is expected to increase in time.

At present this site is not covered by any Environment Agency hazard mapping.

Detailed Hazard Mapping is available within the 2017 Update of South Holland Strategic Flood Risk Assessment. This can be downloaded via the following link: http://www.southeastlincslocalplan.org/water/

5. Tidal Flood Risk Information

This site is not considered to be at risk from tidal flooding.

6. Development Planning

If you would like local guidance on preparing a flood risk assessment for a planning application, please contact our Sustainable Places team at LNplanning@environment-agency.gov.uk. It will help if you mention this data request and attach your site location plan.

We provide free preliminary advice; additional/detailed advice, review of draft FRAs and meetings are chargeable at a rate set to cover our costs, currently £115 (plus VAT) per hour of staff time. Further details are available on our website at https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals.

General advice on flood risk assessment for planning applications can be found on GOV.UK at https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

We have provided information on risk of breach where it is available. If you are intending on using this information to prepare a Flood Risk Assessment you will need to check if the data meets your requirements. You may need to carry out further assessment (or modelling) for sites that are at residual risk (including from breach of defences), or additional locations or scenarios.

Climate change will increase flood risk due to overtopping of defences. Please note, unless specified otherwise, the climate change data included has an allowance for 20% increase in flow. Updated guidance on how climate change could affect flood risk to new development - 'Flood risk assessments: climate change allowances' was published on GOV.UK in **July 2021**. The appropriate updated climate change allowance should be applied in a Flood Risk Assessment.

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

7. Permitting Information

Under the Environmental Permitting (England and Wales) Regulations 2016, permission must be obtained from the Environment Agency for any proposed activities which will take place:

- in, over, under or within 8 metres of a main river (16 metres if tidal)
- on or within 8 metres of a flood defence structure or culvert (16 metres if tidal)
- on or within 16 metres of a sea defence
- within 16 metres of any main river, flood defence (including a remote defence) or culvert for quarrying or excavation

- in a flood plain more than 8 metres from the river bank, culvert or flood defence structure (16 metres if tidal) if planning permission has not already been granted for the works

For further guidance and advice please visit our website: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits or contact our local Partnerships and Strategic Overview team by email at psown@environment-agency.gov.uk. The team will be able to advise if an environmental permit or exemption registration is required and the fee applicable.

Please note that a permit is separate to and in addition to any planning permission granted. The applicant should not assume that such a permit will automatically be forthcoming once planning permission has been granted, and we would advise them to consult with us at the earliest opportunity.

8. Data Licence and Other Supporting Information

We respond to requests for recorded information we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

This information is provided in accordance with the Open Government Licence which can be found here: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Further information on flood risk can be found on the GOV.UK website at: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

Rights of appeal

If you are not satisfied with our decision, you can contact us within two calendar months to ask for the decision to be reviewed. We will then conduct an internal review of our response to your request and give you our decision in writing within 40 working days.

If you are not satisfied with the outcome of the internal review, you can then make an appeal to the Information Commissioner Office, the statutory regulator for EIR and the Freedom of Information Act 2002. The address is: Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire. SK9 5AF.

Tel: 0303 123 1113 (local rate) or 01625 545 745 (national rate) | Fax: 01625 524 510
Email: casework@ico.org.uk | Website: www.ico.org.uk

9. Other Flood Risk Management Authorities

The information provided with this letter relates to flood risk from main river or the sea. The Flood Map for Surface Water can be viewed at https://www.gov.uk/check-long-term-flood-risk

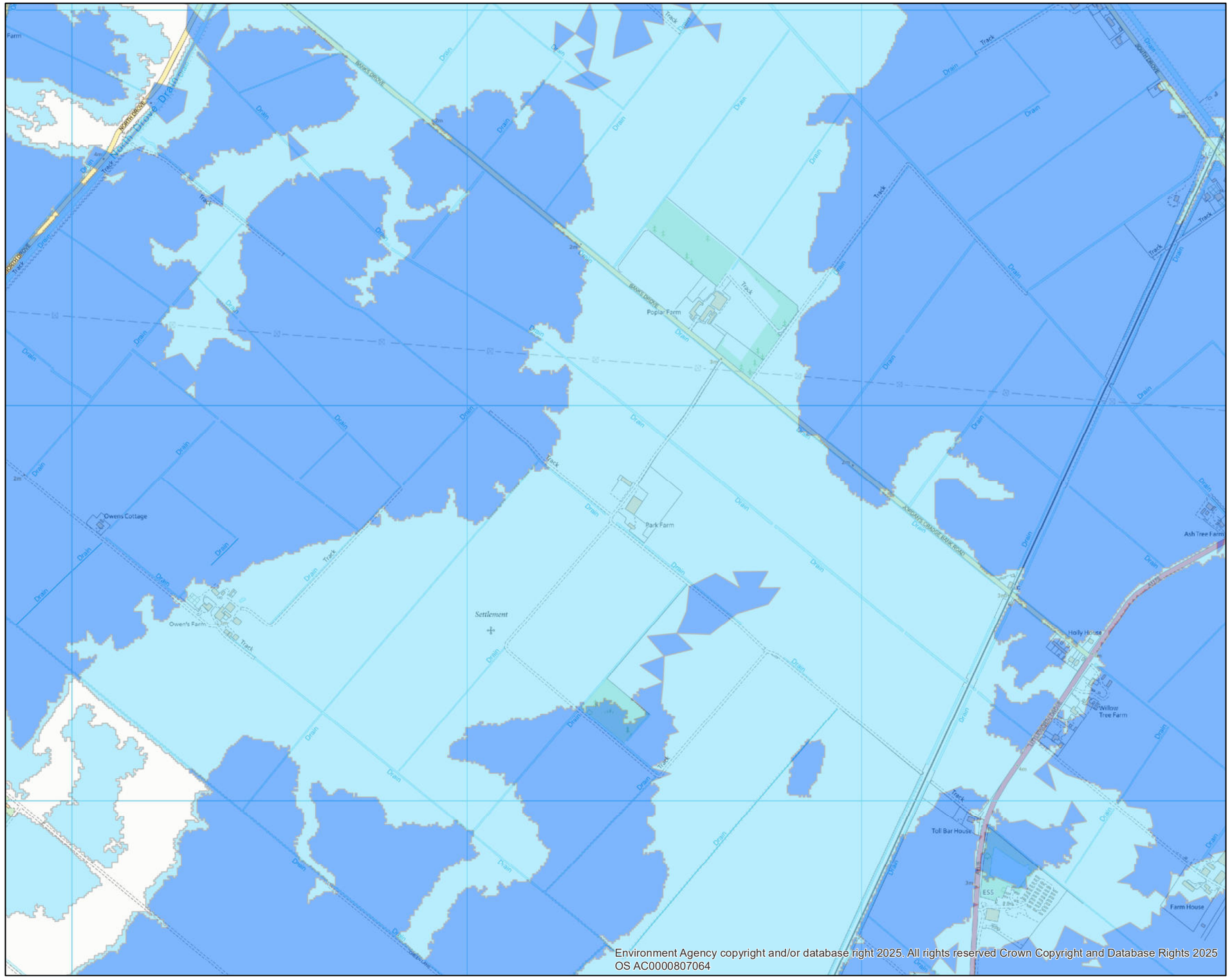
Additional information may be available from other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist).

I hope we have correctly interpreted your request. If you have any queries or would like to discuss the content of this letter further please contact Rachael Storey using the email address below and quoting our EIR reference number above.

Yours sincerely,
Rachael Storey
for John O'Neill
Welland and Nene Partnerships and Strategic Overview Team Leader
e-mail PSOWN@environment-agency.gov.uk

Enc.
Flood Map for Planning
Modelled Node Points Map
Modelled Fluvial Levels and Flows Data Sheet

Flood Map centred on TF 21376 18788 - created February 2026 [Ref: EIR2026/03579]



Environment Agency

Scale 1:10,000

N

Legend

- Main Rivers
- Raised Defences
- Flood Storage Areas

Flood Zones 2 and 3 Rivers and Sea Flood Zone

- Flood Zone 2
- Flood Zone 3

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This represents land that could be impacted by a flood which has a 1% (1 in 100) or greater chance of occurring in any year from rivers or 0.5% (1 in 200) or greater annual probability of flooding from the sea.

Light blue shows the extent of the Extreme Flood Outline. This represents land that could be impacted by a flood which has between a 1% and 0.1% (1 in 100 to 1 in 1000) chance of occurring in any year from rivers or between 0.5% and 0.1% (1 in 200 to 1 in 1000) annual probability of flooding from the sea, or the highest recorded historic extent if greater.

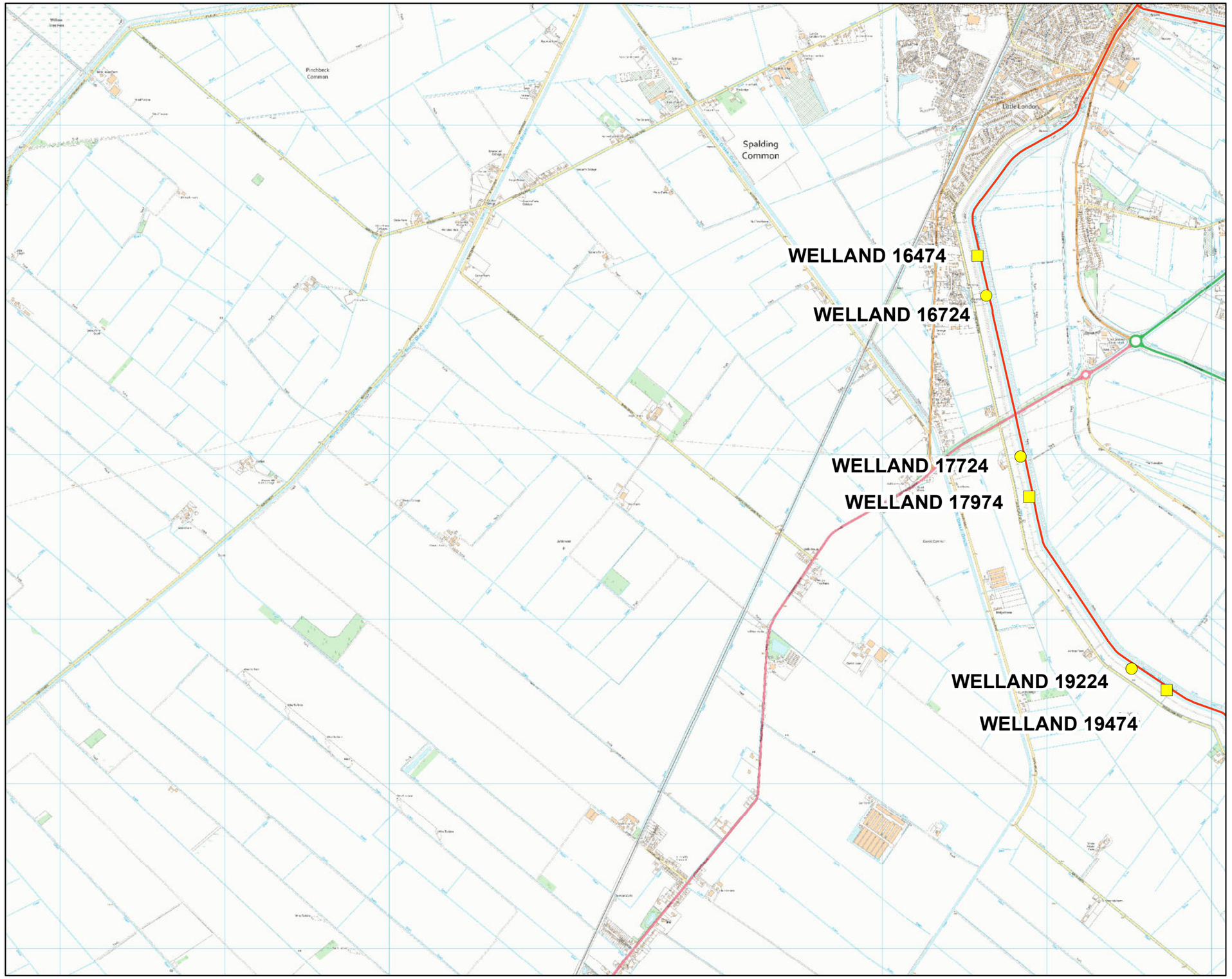
These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Created by the Partnerships and Strategic Overview Team, Kettering

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled Node Points Map centred on TF 21376 18788 - created February 2026 [Ref: EIR2026/03579]



Environment Agency

Scale 1:24,000

N

Legend

- Welland Glen Flows
- Welland Glen Levels
- Main Rivers

Created by the Partnerships and Strategic Overview Team, Kettering

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Fluvial Flood Levels (mODN)

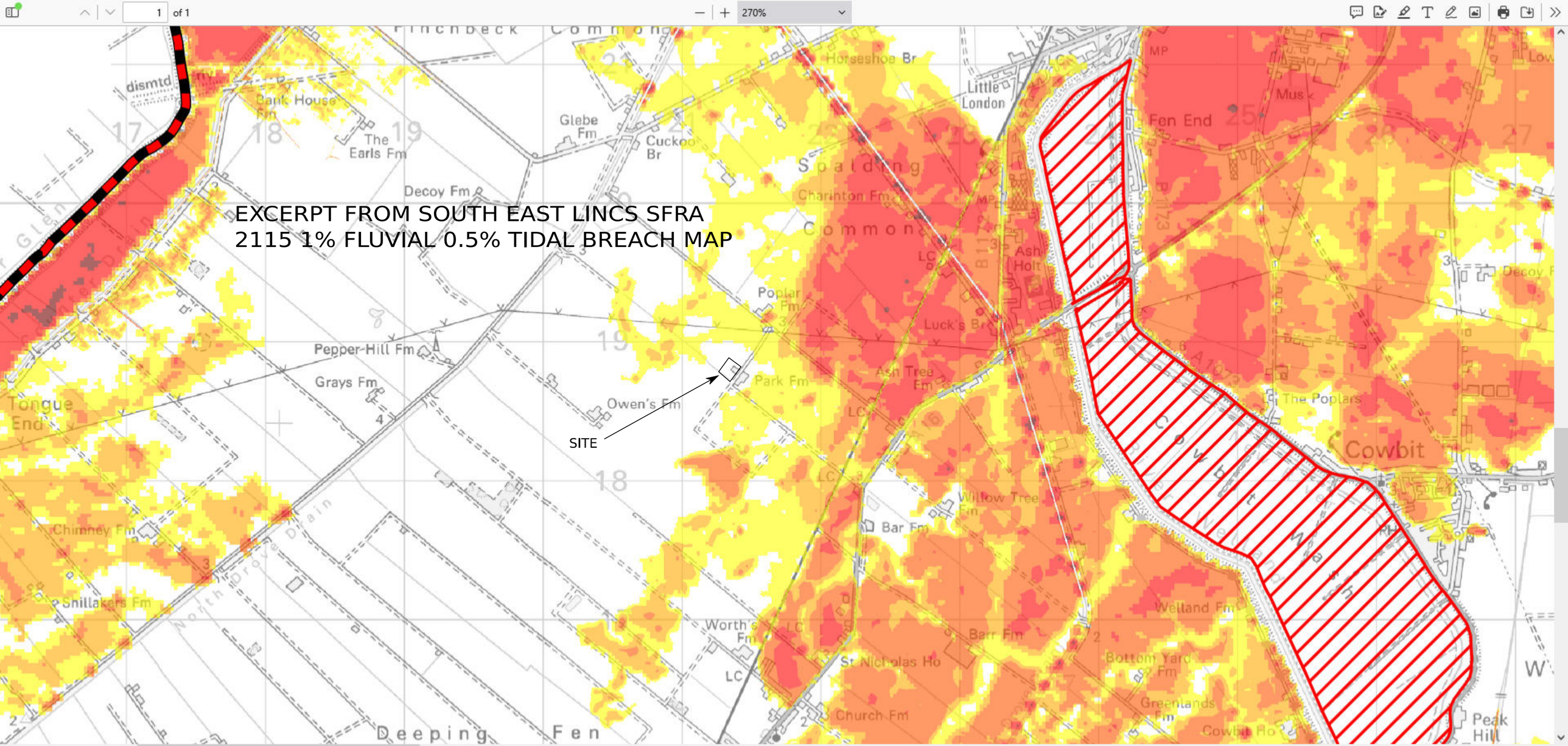
The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).

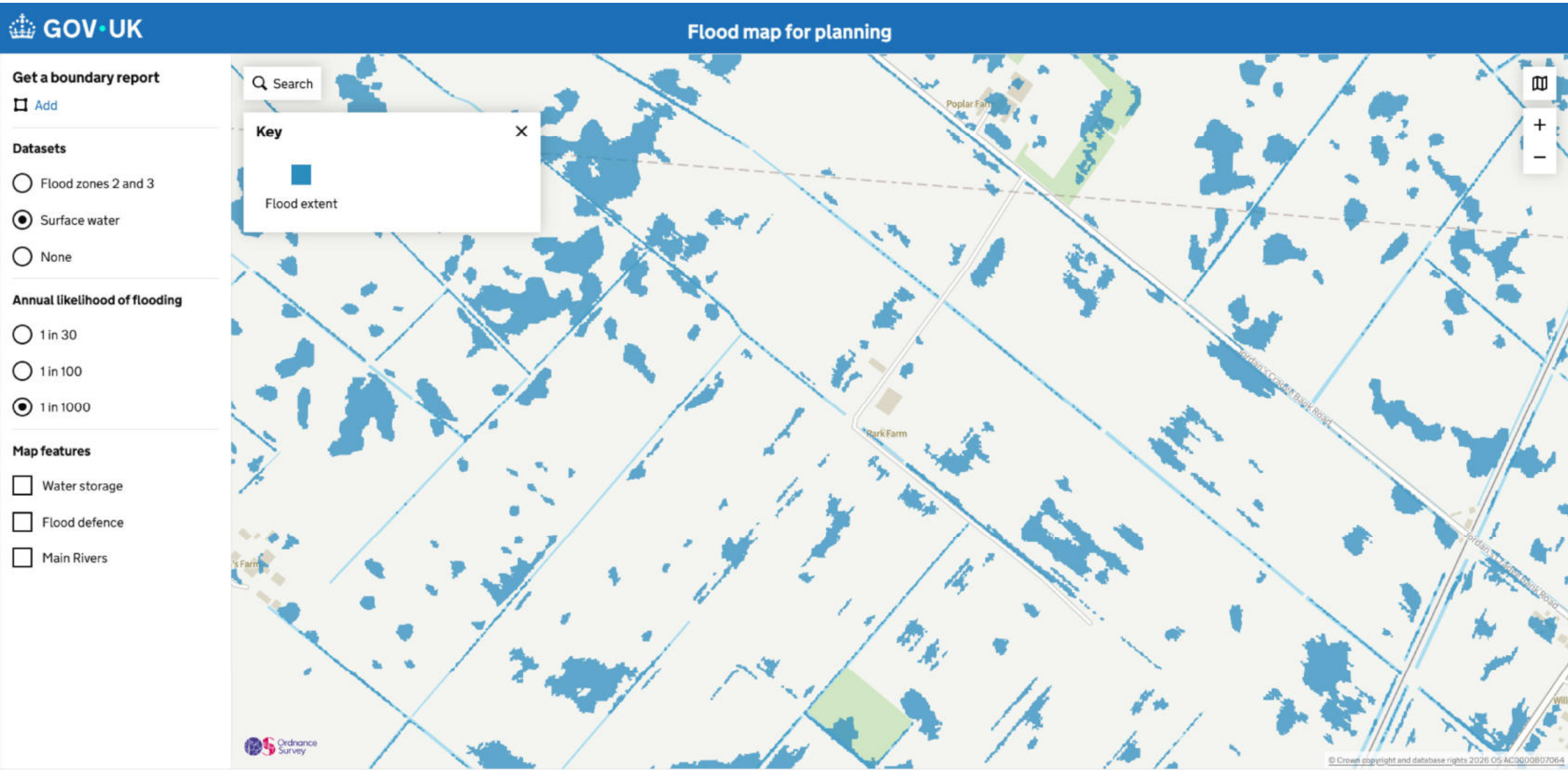
			Annual Exceedance Probability - Maximum Water Levels (mODN)											
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	3.33% (1in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	0.5% (1 in 200)	0.1% (1 in 1000)	1% (1 in 100) inc 20% Climate Change	0.1% (1 in 1000) inc 20% Climate Change
WELLAND 16724	523630	319964	3.70	3.99	4.19	4.44	4.51	4.53	4.53	4.54	4.54	4.55	4.66	4.66
WELLAND 17724	523840	318987	3.70	4.01	4.20	4.45	4.52	4.54	4.54	4.55	4.55	4.56	4.65	4.65
WELLAND 19224	524514	317698	3.72	4.01	4.23	4.47	4.53	4.55	4.56	4.56	4.57	4.57	4.65	4.65

Fluvial Flood Flows (m^3/s)

The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second (m^3/s).

			Annual Exceedance Probability - Maximum Flows (m^3/s)											
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	3.33% (1in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	0.5% (1 in 200)	0.1% (1 in 1000)	1% (1 in 100) inc 20% Climate Change	0.1% (1 in 1000) inc 20% Climate Change
WELLAND 16474	523577	320209	60.03	75.84	86.75	100.18	106.29	111.79	112.99	114.34	114.57	113.66	113.83	113.63
WELLAND 17974	523893	318743	57.96	73.76	84.47	98.12	106.41	111.67	112.88	114.26	115.46	113.65	114.22	113.62
WELLAND 19474	524728	317568	56.15	72.11	82.65	96.59	106.71	112.95	114.74	116.40	117.33	115.79	116.26	115.80


EXCERPT FROM SOUTH EAST LINCS SFRA
2115 1% FLUVIAL 0.5% TIDAL BREACH MAP
SITE
Horseshoe Br
Little London
Fen End
Bank House Fm
The Earls Fm
Glebe Fm
Cuckoo Br
Decoy Fm
Spalding Common
Charlton Fm
Ash Holt
Poplar Fm
Luck's Br
Pepper-Hill Fm
Grays Fm
Owen's Fm
Park Fm
Ash Tree Fm
Tongue End
The Poplars
Cowbit
Willow Tree Fm
Bar Fm
Chimney Fm
Shillakers Fm
Worth's Fm
St Nicholas Ho
Barr Fm
Welland Fm
Bottom Yard Fm
Greenlands Fm
Church Fm
Deeping Fen
Peak Hill


GOV·UK
Flood map for planning
Get a boundary report
Add
Datasets
Flood zones 2 and 3
Surface water
None
Annual likelihood of flooding
1 in 30
1 in 100
1 in 1000
Map features
Water storage
Flood defence
Main Rivers
Search
Key
Flood extent
Poplar Farm
Park Farm
Ordnance Survey
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Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

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.

Project details

Date	14/02/2026
Calculated by	
Reference	
Model version	2.2.2

Location

Site name	Park Farm
Site location	Spalding



Site easting (British National Grid)	521353
Site northing (British National Grid)	318756

Site details

Total site area (ha)	1 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	559 mm		559
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
QBar (IH124) (l/s)	1.4 l/s		

Growth curve factors

	My value		Map value
Hydrological region	5		5
1 year growth factor	0.87		
2 year growth factor	0.89		
10 year growth factor	1.65		
30 year growth factor	2.45		
100 year growth factor	3.56		
200 year growth factor	4.21		

Results

Method	IH124	
Flow rate 1 year (l/s)	1.2	l/s
Flow rate 2 year (l/s)	1.2	l/s
Flow rate 10 years (l/s)	2.3	l/s
Flow rate 30 years (l/s)	3.4	l/s
Flow rate 100 years (l/s)	5.0	l/s
Flow rate 200 years (l/s)	5.9	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at uksuds.com (https://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 uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate 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, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Legend	
	Sonic Borehole - BH10X
(S)	Standpipe Installation
	Hand Dug Pit - HP10X
/CBR	Lightweight Deflectometre CBR Test

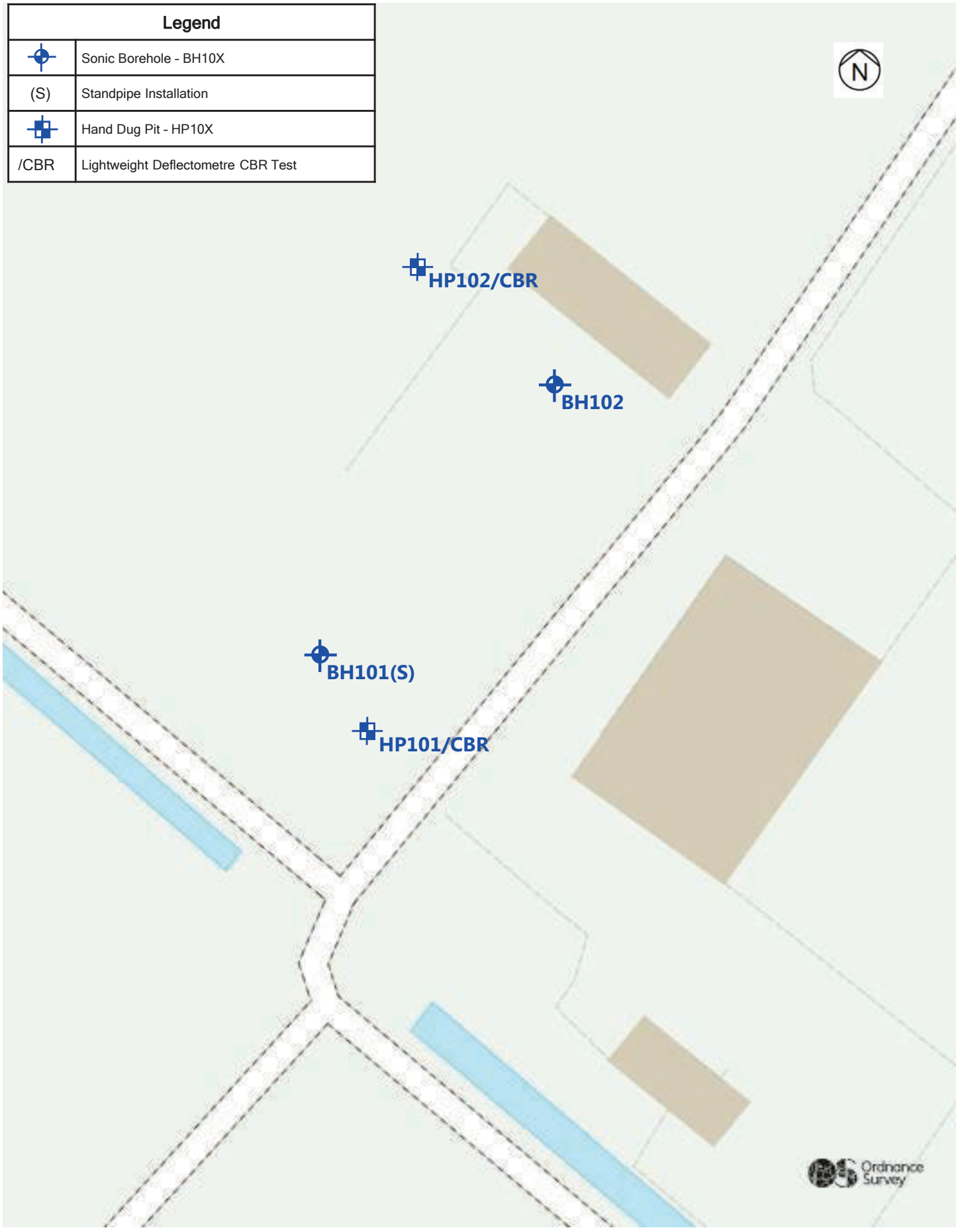


Figure No. and Title	Fig I - Approximate Intrusive Location Plan
Project Name	Park Farm, Banks Drove, Spalding
Client	Welvent Ltd on behalf of Lord Carrington
Service	Ground Investigation (GI)
Date of Issue	February 2026
Project number	EGE-25-11-22-01

evolve
GEO-ENVIRONMENTAL

Sonic Borehole Log

BH101
Sheet 1 of 2

Hole Type	Easting	Northing	Ground Level (m)	Scale
SB	521365.34	318757.05	2.72	1:50

Project Name	Project No.	Start Date	End Date
Park Farm, Banks Drove, Spalding	EGE-25-11-22-01	2026-01-12	2026-01-12

Client
Welvent Ltd on behalf of Lord Carrington

Consultant
JJR

Contractor

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.30)		TOPSOIL: Grass over soft dark brown sandy slightly gravelly CLAY with frequent fine rootlets. Sand is fine to coarse. Gravel is sub-angular to rounded fine to medium flint.
					2.42	0.30		
						(0.30)		Soft brown silty sandy CLAY. Sand is fine to medium. (TIDAL FLAT DEPOSITS)
					2.11	0.60		
		1.00	SPT	N=10 (2,1/2,2,3,3)				Medium dense becoming loose orangish brown very silty fine to medium SAND. (TIDAL FLAT DEPOSITS)
		1.00	D1					
						(2.40)		
		2.00	SPT	N=11 (1,2/3,2,3,3)				
		2.00	D2					
		3.00	SPT	N=12 (1,2/3,2,3,4)	-0.29	3.00		Medium dense orangish brown and dark bluish grey silty fine to medium SAND. (TIDAL FLAT DEPOSITS)
		3.50-4.00	B1					
		4.00	SPT	N=12 (2,2/2,3,4,3)		(2.00)		
		5.00	SPT	N=12 (1,2/3,2,3,4)	-2.29	5.00		Loose becoming medium dense brown silty fine to medium SAND. (TIDAL FLAT DEPOSITS)
		6.50	SPT	N=15 (2,2/3,4,4,4)				
						(5.80)		
		8.00	SPT	N=20 (2,3/4,5,5,6)				
		9.50	SPT	N=17 (2,3/4,4,4,5)				

Continued on next page

Remarks
1. Logged in general accordance with BS5930:2015+A1:2020;
2. Location cleared for underground utilities by Safe Dig Surveys Limited;
3. Hand dug inspection pit to 1.20 m bgl;
4. Groundwater strike unable to be accuratly reccorded due to the addition of water aiding drilling;
5. Borehole complete at 20.00 m bgl and installed with 50 mm internal diamiter standpipe.

Method, Plant, Stability, Dimensions
0.00 - 20.00m SB FRASTE SONIC

Logger
JJR

Checked By: PW **Approved By:** PH **Status:** FINAL

Created using Pebble Geo

Sonic Borehole Log

BH102
Sheet 1 of 2

Hole Type	Easting	Northing	Ground Level (m)	Scale
SB	521398.56	318797.88	2.84	1:50

Project Name	Project No.	Start Date	End Date
Park Farm, Banks Drove, Spalding	EGE-25-11-22-01	2026-01-13	2026-01-13

Client
Welvent Ltd on behalf of Lord Carrington

Consultant
JJR

Contractor

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
					2.64	(0.20) 0.20		MADE GROUND: Dark grey angular to sub-angular fine to medium granite gravel
						(0.50)		MADE GROUND: Soft dark grey gravelly clay. Gravel is angular to sub-angular fine to coarse granite and brick.
					2.14	0.70		
					1.94	(0.20) 0.90		Soft dark brown sandy slight silty CLAY. Sand is fine to medium. (TIDAL FLAT DEPOSITS)
		1.00 1.00	SPT D1	N=6 (2,1/1,2,1,2)		(0.60)		Loose orangish brown and brown very silty fine medium SAND. (TIDAL FLAT DEPOSITS)
					1.34	1.50		
						(0.50)		Soft orangish brown and brown sandy CLAY. Sand is fine to medium. (TIDAL FLAT DEPOSITS)
		2.00 2.00	SPT D2	N=7 (1,2/2,2,1,2)	0.84	2.00		Soft orangish brown and brown sandy SILT. Sand is fine to medium. (TIDAL FLAT DEPOSITS)
						(1.00)		
		3.00 3.00-3.50	SPT B1	N=9 (1,2/2,2,3,2)	-0.16	3.00		Loose dark bluish grey and brown very silty fine to medium SAND. (TIDAL FLAT DEPOSITS)
						(1.00)		
		4.00	SPT	N=10 (1,2/2,3,3,2)	-1.16	4.00		Loose becoming medium dense brown silty fine to medium SAND. (TIDAL FLAT DEPOSITS)
		5.00	SPT	N=13 (2,2/3,3,4,3)				
						(3.50)		
		6.00	SPT	N=14 (2,2/3,3,4,4)				
		7.50 7.50-9.00	SPT B2	N=16 (2,3/3,4,4,5)	-4.66	7.50		Medium dense brown silty slightly gravelly fine to medium SAND. Gravel is sub-rounded to rounded fine to medium flint and quartzite. (TIDAL FLAT DEPOSITS)
						(5.50)		
		9.00	SPT	N=17 (3,3/3,4,5,5)				

Continued on next page

Remarks
1. Logged in general accordance with BS5930:2015+A1:2020;
2. Location cleared for underground utilities by Safe Dig Surveys Limited;
3. Hand dug inspection pit to 1.20 m bgl;
4. Groundwater strike unable to be accuratly reccorded due to the addition of water aiding drilling;
5. Borehole complete at 20.00 m bgl and installed with 50 mm internal diamiter standpipe.

Method, Plant, Stability, Dimensions
0.00 - 20.00m SB FRASTE SONIC

Logger
JJR

Checked By: PW **Approved By:** PH **Status:** FINAL

Created using Pebble Geo

The ground conditions were found to most commonly comprise Topsoil (0.30 to 0.50 m bgl) or Made Ground (to 0.70 m bgl), underlain by superficial Tidal Flat Deposits to a maximum depth of 13.00 m bgl, underlain by the Abbey Sand and Gravel Member to a maximum proven depth of 15.20 m bgl, over Mid Pleistocene Till to a maximum proven depth of 19.30 m bgl. Finally, bedrock of the Oxford Clay Formation was encountered to a maximum proven depth of 20.00 m bgl.

The Topsoil was found to comprise 'Grass over soft dark brown sandy slightly gravelly CLAY with frequent fine rootlets. Sand is fine to coarse. Gravel is sub-angular to rounded fine to medium flint.', while made ground was found to most commonly comprise 'MADE GROUND: Soft dark grey gravelly clay. Gravel is angular to sub-angular fine to coarse granite and brick.'

The Tidal Flat Deposits were found to most commonly comprise sandy silty clays over, silty sands and occasional sandy silt.

The Abbey Sand and Gravel Member was found to comprise 'Medium dense brown and yellowish brown silty sandy sub-angular to rounded fine to coarse flint and quartzite GRAVEL. Sand is fine to medium.', while the Mid Pleistocene Till was encountered as 'Very stiff dark brown and creamish white slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to rounded fine to coarse flint, mudstone and chalk.'

Bedrock of the Oxford Clay Formation was found to comprise 'Very stiff dark grey silty sandy CLAY with frequent fossils throughout. Sand is fine to medium.'.

The encountered ground conditions are consistent with the mapped geology for the Site.

4.2 Visual and Olfactory Evidence of Contamination

No significant visual and olfactory evidence of contamination was identified during the soil sampling exercise.

4.3 Groundwater Strikes during Site Investigation

Groundwater was encountered during the ground investigation at the following depths:

Borehole	Strata	Depth (m bgl)	Comments
BH101	Topsoil	0.20	-
	Tidal Flat Deposits	2.30	
BH102	Made Ground	0.30	

4.4 Groundwater Levels during Monitoring

Groundwater levels were monitored on 20th January 2026. The results of which are summarised in the table below;

Exploratory Hole Location	Groundwater Level (m bgl)	Groundwater Level (m AOD)	Depth to Base (m bgl)	Comments	Geology
BH101	1.17	1.55	14.30	-	Tidal Flat Deposits

ARTIFICIAL SURFACES

Existing

Building to be Demolished	1	30	9.6	288

Proposed
From CAD Drawing

New Building	1	90	36	3240
Fan Housing	3	6	6	108
				3348

OUTLINE DESIGN OF PIPES AND LEVELS

Ditch Level Near Road to West		0.63	m	
Distance to Outfall		100	m	
Gradient 1 in		1000		
Re-Graded Level at site		0.73		
Outfall to Ditch	0.78		Distance To Ditch	10
Gradient 1 in	150		Outlet Level	1.200
Ex Ground Level	2.5		Outlet Depth	1.300

CONSIDER PIPEWORK RUNS LONGEST FIRST

Pipe	From	To	Connected Area	Flow at 0.014l/s/m2	Dia	Cap at Grade	D/S Ground Level	D/S invert Level	Cover	Distance	Grad 1 in	US Invert Level
1	O1	S1	3348	46.9	300	63.5	2.60	1.500	0.800	8	300	1.526
2	S1	S2	1620	22.7	225	32.6	2.60	1.601	0.774	15	225	1.668
3	S2	S3	1620	22.7	225	32.6	2.60	1.668	0.707	40	225	1.846
4	S3	S4	1620	22.7	225	32.6	3.00	1.846	0.929	36	225	2.006
5	S4	S5	810	11.3	150	15	3.00	2.081	0.769	46	150	2.387
	S5				150	15	3.00	2.387	0.463			
5	S1	S6	1323	18.5	225	32.6	2.60	1.601	0.774	25	225	1.712
6	S6	S7	882	12.3	150	15	2.60	1.787	0.663	19	150	1.914
	S7						2.60	2.064	0.536			

George Shuttleworth Ltd
Consulting Engineers
www.george shuttleworthltd.co.uk

Job No: 870
Project: Park Farm Spalding
Date: 13/02/2026
Engineer: GS

CHECK PIPE SURCHARGE FOR 15 MINUTE STORM
Calculate Start Level in Basin

Basin Base Level		1.200	
	1 in 1 yr	1 in 30 y	1 in 100 yr
Total Run Off Volume (m3)	26.4	64.3	83.1
Run Off at 15 mins (Peak Flow)	22.0	53.6	69.3
Basin Base Area	180.0	180.0	180.0
Discharge Rate (l/s)	3.5	3.5	3.5
Discharge in 15 mins	0.2	0.2	0.2
Depth in Basin (m)	0.12	0.30	0.38
Level in Basin (m,)	1.321	1.496	1.584
Top of Pipe	1.800	1.800	1.800
Start Level	1.800	1.800	1.800
Rainfall Intensity (mm/hr)	31.9	76.8	100
Equivalent Run off (l/s/m2)	0.009	0.021	0.028
Ks(mm)	0.600	Hazen Williams Equivalent	110

Hydraulic Profile 1 in [**30**] **year** **Equiv Run-off** **0.021 l/s/m2**

Pipe No	DS MH	Invert Level	DS Water Level	Connected Area	Flow	Pipe Dia	Length	Hyd Grad Req	US MH	US Water Level	US Soffit Level	Pipe Surcharge	Surcharge Depth	Cover Level	Freeboard	Flooding	Flooding Depth
1	O1	1.500	1.800	3348	71	300	8	0.0047	S1	1.837	1.826	Y	0.011	2.60	0.76	N	0.000
2	S1	1.601	1.837	1620	35	225	15	0.0050	S2	1.912	1.893	Y	0.019	2.60	0.69	N	0.000
3	S2	1.668	1.912	1620	35	225	40	0.0050	S3	2.110	2.071	Y	0.039	3.00	0.89	N	0.000
4	S3	1.846	2.110	1620	35	225	36	0.0050	S4	2.289	2.231	Y	0.058	3.00	0.71	N	0.000
5	S4	2.081	2.289	810	17	150	46	0.0099	S5	2.744	2.537	Y	0.207	3.00	0.26	N	0.000
4	S1	1.601	1.912	1323	28	225	25	0.0034	S6	1.997	1.937	Y	0.059	2.60	0.60	N	0.000
5	S6	1.787	1.997	882	19	150	19	0.0116	S7	2.217	2.064	Y	0.153	2.60	0.38	N	0.000

George Shuttleworth Ltd
Consulting Engineers
www.george shuttleworthltd.co.uk

Job No: 870
Project: Park Farm Spalding
Date: 13/02/2026
Engineer: GS

CHECK PIPE SURCHARGE FOR 15 MINUTE STORM
Calculate Start Level in Basin

Basin Base Level		1.200	
	1 in 1 yr	1 in 30 y	1 in 100 yr
Total Run Off Volume (m3)	26.4	64.3	83.1
Run Off at 15 mins (Peak Flow)	22.0	53.6	69.3
Basin Base Area	180.0	180.0	180.0
Discharge Rate (l/s)	3.5	3.5	3.5
Discharge in 15 mins	0.2	0.2	0.2
Depth in Basin (m)	0.12	0.30	0.38
Level in Basin (m,)	1.321	1.496	1.584
Top of Pipe	1.800	1.800	1.800
Start Level	1.800	1.800	1.800
Rainfall Intensity (mm/hr)	31.9	76.8	100
Equivalent Run off (l/s/m2)	0.009	0.021	0.028
Ks(mm)	0.600	Hazen Williams Equivalent	110

Hydraulic Profile 1 in 100 **year** **Equiv Run-off** **0.028 l/s/m2**

Pipe No	DS MH	Invert Level	DS Water Level	Connected Area	Flow	Pipe Dia	Length	Hyd Grad Req	US MH	US Water Level	US Soffit Level	Pipe Surcharge	Surcharge Depth	Cover Level	Freeboard	Flooding	Flooding Depth
1	O1	1.500	1.800	3348	93	300	8	0.0076	S1	1.861	1.826	Y	0.034	2.60	0.74	N	0.000
2	S1	1.601	1.861	1620	45	225	15	0.0081	S2	1.982	1.893	Y	0.089	2.60	0.62	N	0.000
3	S2	1.668	1.982	1620	45	225	40	0.0081	S3	2.306	2.071	Y	0.235	3.00	0.69	N	0.000
4	S3	1.846	2.306	1620	45	225	36	0.0081	S4	2.597	2.231	Y	0.366	3.00	0.40	N	0.000
5	S4	2.081	2.597	810	23	150	46	0.0161	S5	3.339	2.537	Y	0.802	3.00	-0.34	Y	0.339
4	S1	1.601	1.982	1323	37	225	25	0.0056	S6	2.121	1.937	Y	0.184	2.60	0.48	N	0.000
5	S6	1.787	2.121	882	25	150	19	0.0189	S7	2.480	2.064	Y	0.416	2.60	0.12	N	0.000

ATTENUATION & DISCHARGE TO WATERCOURSE

Calculation of Rain Profiles

M5-60	20							
r	0.4							
D (mins)	15	30	60	120	240	360	720	1440
Z1	0.64	0.81	1	1.21	1.4	1.62	1.8	2.2
M5-D	12.8	16.2	20.0	24.2	28.0	32.4	36.0	44.0
Z2(100)	1.94	1.99	2.03	2.02	2.01	1.95	1.92	1.86
Z2(30)	1.50	1.52	1.53	1.54	1.53	1.51	1.49	1.45
Z2(2)	0.80	0.80	0.81	0.82	0.83	0.83	0.84	0.85
Z2(1)	0.62	0.62	0.64	0.65	0.67	0.68	0.69	0.71
MT-D(100)	24.83	32.24	40.60	48.88	56.28	63.18	69.12	81.84
MT-D(30)	19.20	24.62	30.60	37.15	42.84	48.92	53.64	63.80
MT-D(2)	10.24	12.96	16.20	19.84	23.24	26.89	30.24	37.40
MT-D(1)	7.87	10.04	12.70	15.73	18.76	22.03	24.84	31.24
I(100)	99.33	64.48	40.60	24.44	14.07	10.53	5.76	3.41
I(30)	76.80	49.25	30.60	18.57	10.71	8.15	4.47	2.66
I(2)	40.96	25.92	16.20	9.92	5.81	4.48	2.52	1.56
I(1)	31.49	20.09	12.70	7.87	4.69	3.67	2.07	1.30

Calculation of Flows and Volumes

Contributing Impermeable Area = 3348 m2
Climate Change of 40%
Flows (l/s) = 2.78 x I x A(ha) x Global warming

Storm	15	30	60	120	240	360	720	1440
1 in 100 yr	129.43	84.01	52.90	31.85	18.33	13.72	7.51	4.44
1 in 30 yr	100.07	64.17	39.87	24.20	13.96	10.63	5.82	3.46
2 in 30 yr	53.37	33.77	21.11	12.93	7.57	5.84	3.28	2.03
1 in 1 yr	41.03	26.18	16.55	10.25	6.11	4.78	2.70	1.70

Volume (m3) = Cv x A(ha) x I x D/60 Cv= 1.00

Storm	15	30	60	120	240	360	720	1440
1 in 100 yr	116	151	190	229	264	296	324	384
1 in 30 yr	90	115	143	174	201	229	251	299
1 in 2 yr	48	61	76	93	109	126	142	175
1 in 1 yr	37	47	60	74	88	103	116	146

Initial Estimate of Balancing Volume Required

For Peak Discharge of 3.50 l/s Av Discharge Factor= 0.85 Av Qout = **2.98** l/s

Storm	15	30	60	120	240	360	720	1440
1 in 100 yr	114	146	180	208	221	232	195	127
1 in 30 yr	87	110	133	153	158	165	123	42
1 in 2 yr	45	55	65	72	66	62	13	0
1 in 1 yr	34	42	49	52	45	39	0	0

Storage required for Critical Storm = **232** m3

ACO QuAD-VFC

Q-Brake Design and Performance Report

Project Details
Project : New Min Standard
Chamber Number : 1
Chamber Name : New Chamber

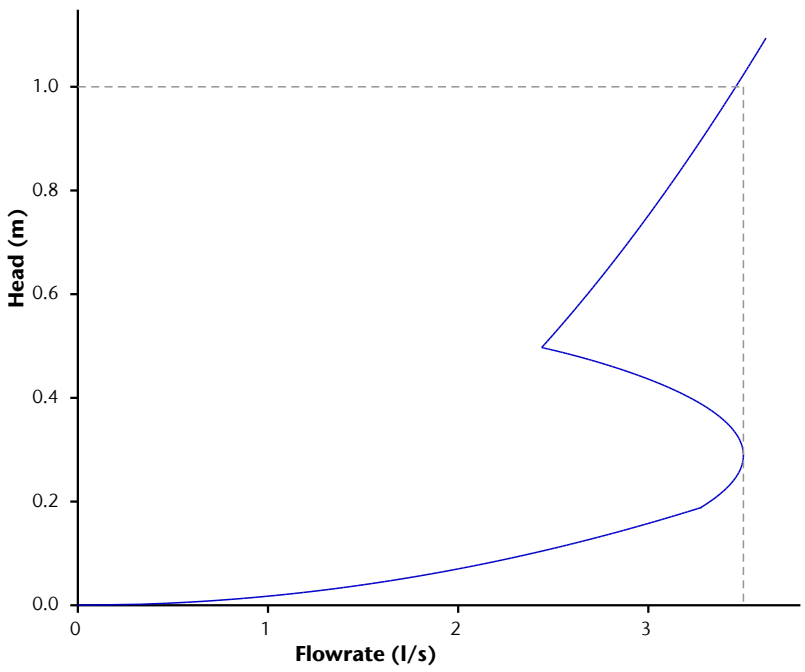
Reference
Design Reference : 00012500
Created by : George Shuttleworth
Date Produced : 29-10-2025

Design

Description	Size [m]
Design Head	1.000

Description	Rate [l/s]
Design Flow Rate	3.500

Description	Model
Design Style	Flat Back



Head [m]	Flow [l/s]
0.000	0.000
0.019	1.040
0.038	1.471
0.057	1.802
0.076	2.081
0.095	2.327
0.114	2.549
0.133	2.753
0.152	2.943
0.171	3.121
0.188	3.274
0.241	3.448
0.290	3.500
0.335	3.453
0.375	3.332
0.411	3.162
0.441	2.968
0.465	2.773
0.482	2.604
0.493	2.485
0.497	2.439
0.558	2.584
0.619	2.722
0.680	2.852
0.741	2.978
0.802	3.098
0.862	3.213
0.923	3.325
0.984	3.433
1.045	3.537
1.094	3.619

Specification

Description	Height [m]	Rate [l/s]
Flush Flow	0.208	3.35
Reattachment	0.497	2.44

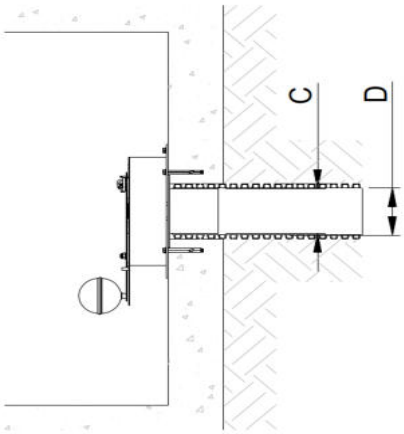
Description	Size [mm]
Minimum Outlet Pipe Diameter	100
Minimum Sump Depth	323
Minimum Chamber Diameter	1050

Disclaimer: This design only applies to ACO Q-Brake and ACO Q-Plate products and no other parties' products. It is the responsibility of the designer ('user') to verify that the design parameters have been entered correctly and that relevant industry standards and guidelines have been taken into consideration. ACO Q-Brake and Q-Plate are intended to be used with surface water only.

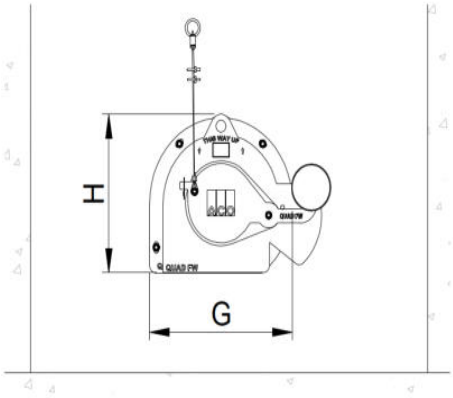
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Hitchin Road, Shefford, Bedfordshire. SG17 5TE Tel: +44(0)1462 816666

ACO Q-Brake Dimensions

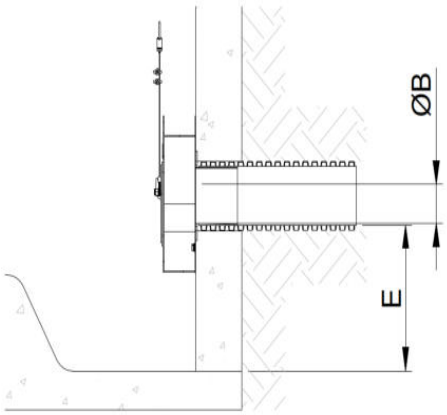
Model: QB350



Plan View



Front View



Side View

Flow Control Dimensions

Key	Description	Size [mm]
B	Orifice diameter	83
C	Outlet Spigot OD	95
G	Overall width	495
H	Overall height	379

Chamber/Pipework Dimensions

Key	Description	Min [mm]	Design [mm]
D	Outlet pipe DN	100	100
E	Sump depth	323	
F	Chamber diameter	1050	1050

* Design dimensions shown are as selected by the designer.

Disclaimer: This design only applies to ACO Q-Brake and ACO Q-Plate products and no other parties' products. It is the responsibility of the designer ('user') to verify that the design parameters have been entered correctly and that relevant industry standards and guidelines have been taken into consideration. ACO Q-Brake and Q-Plate are intended to be used with surface water only.

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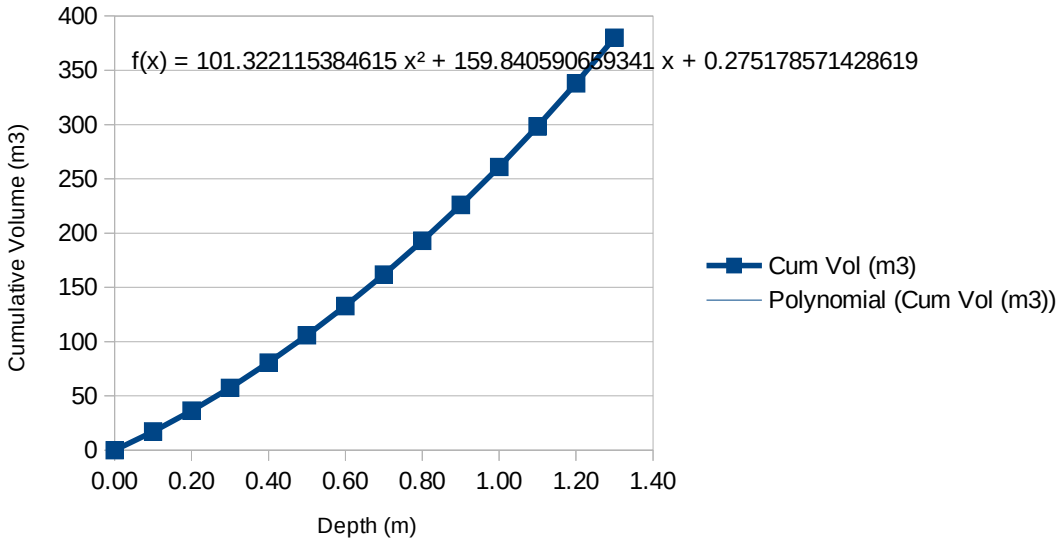
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Consulting Engineers
www.george shuttleworthltd.co.uk

Ref No: 870
Project: Park Farm, Spalding
Date: 13/02/2026
Engineer: GS

Open Attenuation Basin

Base Area	162	m2
Area at DWL	360	m2
Depth	1	m
Design Volume	261	m3
Area to Crest	433	m2

Depth (m)	(m2)	(m3)	Cum Vol
0.00	162		0
0.10	182	17.2	17
0.20	202	19.2	36
0.30	221	21.2	58
0.40	241	23.1	81
0.50	261	25.1	106
0.60	281	27.1	133
0.70	301	29.1	162
0.80	320	31.1	193
0.90	340	33.0	226
1.00	360	35.0	261
1.10	384	37.2	298
1.20	409	39.7	338
1.30	433	42.1	380

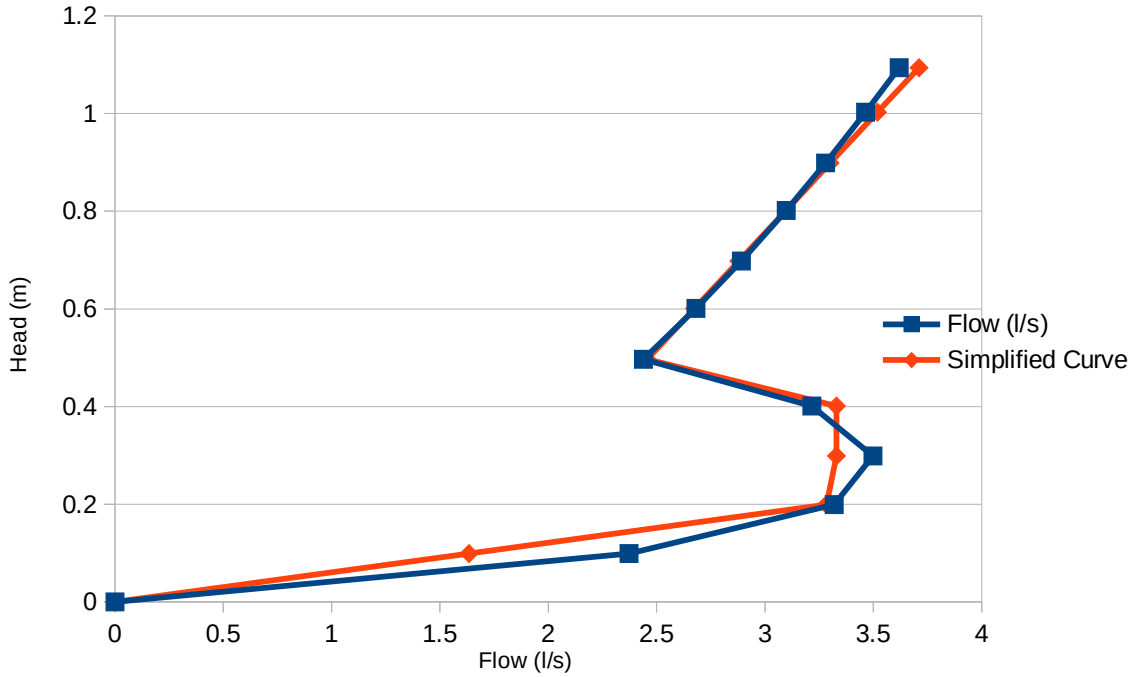


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Ref No: 870
Project: Park Farm, Spalding
Date: 13/02/2026
Engineer: GS

Discharge Control Device

Head (m)	Flow (l/s)	Simplified Curve Flow (l/s)
0	0	0
0.099	2.373	1.63
0.199	3.32	3.28
0.299	3.498	3.33
0.401	3.217	3.33
0.497	2.439	2.46
0.601	2.681	2.68
0.698	2.891	2.88
0.802	3.098	3.10
0.899	3.28	3.30
1.003	3.464	3.52
1.094	3.619	3.71



Simplified Formula

H up to 0.2	Q=H x 16.5
0.2<H<0.4	Q=3.33
0.4<H<0.5	Q= 3.33 -9.0(H-0.4)
Above 0.5	Q=2.46+2.1(H-0.5)

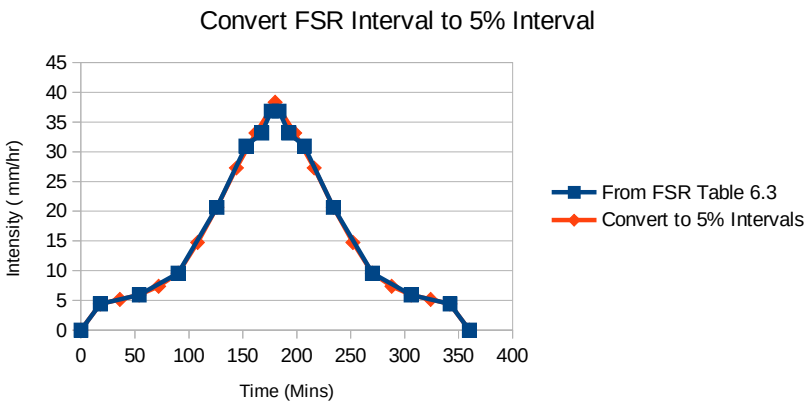
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Ref No: 870
Project: Park Farm, Spalding
Date: 13/02/2026
Engineer: GS

RAIN PROFILE 1 IN 100 YR 75% WINTER 6.0 HOUR

Critical Storm Duration	360	min
1 in 100 average Intensity	10.53	mm/hr
Cv	1.00	
Climate Change	1.40	
Connected Area	3348	

From FSR Table 6.3							Convert to 5% Intervals			
% Duration of Storm	Proportion of I	Mins from Centre	Time from Start Mins	Intensity mm/hr	Volume	Cumulative Volume	%	Time Mins	Proportion of I	Intensity (mm/hr)
0		180	0	0	0	0	0	0.0	0	0
5	0.3	162	18	4.42	2	2	5	18.0	0.3	4.42
15	0.4	126	54	5.90	10	13	10	36.0	0.35	5.16
25	0.65	90	90	9.58	16	28	15	54.0	0.4	5.90
35	1.4	54	126	20.64	30	58	20	72.0	0.5	7.37
42.5	2.1	27	153	30.96	39	97	25	90.0	0.65	9.58
46.5	2.25	12.6	167.4	33.17	26	123	30	108.0	1	14.74
49	2.5	3.6	176.4	36.86	18	141	35	126.0	1.4	20.64
51	2.5	-3.6	183.6	36.86	15	156	40	144.0	1.85	27.27
53.5	2.25	-12.6	192.6	33.17	18	173	45	162.0	2.25	33.17
57.5	2.1	-27	207	30.96	26	199	50	180.0	2.6	38.33
65	1.4	-54	234	20.64	39	238	55	198.0	2.25	33.17
75	0.65	-90	270	9.58	30	268	60	216.0	1.85	27.27
85	0.4	-126	306	5.90	16	284	65	234.0	1.4	20.64
95	0.3	-162	342	4.42	10	294	70	252.0	1	14.74
100		-180	360	0.00	2	296	75	270.0	0.65	9.58
							80	288.0	0.5	7.37
							85	306.0	0.4	5.90
							90	324.0	0.35	5.16
							95	342.0	0.3	4.42
							100	360.0	0	0.00



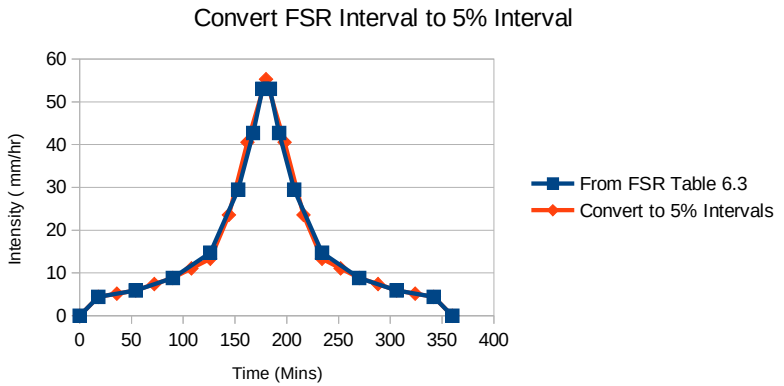
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Ref No: 870
Project: Park Farm, Spalding
Date: 13/02/2026
Engineer: GS

RAIN PROFILE 1 IN 100 YR 50% WINTER 6.0 HOUR

Critical Storm Duration	360	min
1 in 100 average Intensity	10.53	mm/hr
Cv	1.00	
Climate Change	1.40	
Connected Area	3348	

From FSR Table 6.3							Convert to 5% Intervals			
% Duration of Storm	Proportion of I	Mins from Centre	Time from Start Mins	Intensity mm/hr	Volume	Cumulative Volume	%	Time Mins	Proportion of I	Intensity (mm/hr)
0		180	0	0	0	0	0	0.0	0	0
5	0.30	162	18	4.42	2	2	5	18.0	0.3	4.42
15	0.40	126	54	5.90	10	13	10	36.0	0.35	5.16
25	0.60	90	90	8.85	15	27	15	54.0	0.4	5.90
35	1.00	54	126	14.74	24	51	20	72.0	0.5	7.37
42.5	2.00	27	153	29.48	33	84	25	90.0	0.6	8.85
46.5	2.90	12.6	167.4	42.75	29	113	30	108.0	0.75	11.06
49	3.60	3.6	176.4	53.07	24	137	35	126.0	0.9	13.27
51	3.60	-3.6	183.6	53.07	21	159	40	144.0	1.6	23.59
53.5	2.90	-12.6	192.6	42.75	24	183	45	162.0	2.75	40.54
57.5	2.00	-27	207	29.48	29	212	50	180.0	3.75	55.28
65	1.00	-54	234	14.74	33	245	55	198.0	2.75	40.54
75	0.60	-90	270	8.85	24	269	60	216.0	1.6	23.59
85	0.40	-126	306	5.90	15	284	65	234.0	0.9	13.27
95	0.30	-162	342	4.42	10	294	70	252.0	0.75	11.06
100		-180	360	0.00	2	296	75	270.0	0.6	8.85
							80	288.0	0.5	7.37
							85	306.0	0.4	5.90
							90	324.0	0.35	5.16
							95	342.0	0.3	4.42
							100	360.0	0	0.00



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Ref No: 870
Project: Park Farm, Spalding
Date: 13/02/2026
Engineer: GS

ATTENUATION FOR CRITICAL STORM DURATION OF 360.0 min
75% Winter Storm

Connected Area 3348 m2

Design Storage 261 m3

Open Storage
From Storage Sheet
Storage= 101.332 x2 + 159.84 X + 0.275

Discharge Control
From Discharge Control Sheet

H up to 0.2	Q=H x 16.5
0.2<H<0.4	Q=3.33
0.4<H<0.5	Q= 3.33 -9.0(H-0.4)
Above 0.5	Q=2.46+2.1(H-0.5)

Instructions Adjust head at DCV at each interval to give checksum=0 or close to 0

Time	Rainfall				DCV	Storage		Discharge Control				Check Sum	
	Rainfall	Av Rainfall mm/hr	Vol In m3	Cum In m3	Head h (mm)	Depth in Basin (m)	Vol m3	Out-flow l/s	Av Flow Out l/s	Vol Out m3	Cum Out m3	Inflow - Storage - Out = 0	% Design Storage
0.0	0.0	0.00	0.00	0.00	0.000	0.000	0.0	0.00	0.00	0.00	0.00	0.00	0
18.0	4.4	2.21	2.22	2.22	0.011	0.011	2.0	0.18	0.09	0.10	0.10	0.08	1
36.0	5.2	4.79	4.81	7.03	0.038	0.038	6.5	0.63	0.40	0.44	0.53	0.00	2
54.0	5.9	5.53	5.55	12.59	0.065	0.065	11.1	1.07	0.85	0.92	1.45	0.04	4
72.0	7.4	6.63	6.66	19.25	0.095	0.095	16.4	1.57	1.32	1.43	2.88	0.00	6
90.0	9.6	8.48	8.51	27.76	0.131	0.131	23.0	2.16	1.86	2.01	4.89	-0.08	9
108.0	14.7	12.16	12.22	39.98	0.180	0.180	32.3	2.97	2.57	2.77	7.66	-0.01	12
126.0	20.6	17.69	17.77	57.75	0.251	0.251	46.8	3.33	3.15	3.40	11.06	-0.10	18
144.0	27.3	23.96	24.06	81.81	0.344	0.344	67.3	3.33	3.33	3.60	14.66	-0.10	26
162.0	33.2	30.22	30.35	112.16	0.456	0.456	94.2	2.83	3.08	3.32	17.99	-0.06	36
180.0	38.3	35.75	35.91	148.07	0.580	0.580	127.1	2.63	2.73	2.95	20.93	0.07	49
198.0	33.2	35.75	35.91	183.98	0.694	0.694	160.0	2.87	2.75	2.97	23.90	0.07	61
216.0	27.3	30.22	30.35	214.33	0.782	0.782	187.2	3.05	2.96	3.20	27.09	0.00	72
234.0	20.6	23.96	24.06	238.39	0.846	0.846	208.0	3.19	3.12	3.37	30.46	-0.10	80
252.0	14.7	17.69	17.77	256.16	0.888	0.888	222.1	3.27	3.23	3.49	33.95	0.09	85
270.0	9.6	12.16	12.22	268.37	0.914	0.914	231.0	3.33	3.30	3.57	37.52	-0.17	89
288.0	7.4	8.48	8.51	276.89	0.928	0.928	235.9	3.36	3.34	3.61	41.13	-0.11	90
306.0	5.9	6.63	6.66	283.55	0.937	0.937	239.0	3.38	3.37	3.64	44.77	-0.23	92
324.0	5.2	5.53	5.55	289.10	0.942	0.942	240.8	3.39	3.38	3.65	48.42	-0.08	92
342.0	4.4	4.79	4.81	293.92	0.945	0.945	241.8	3.39	3.39	3.66	52.08	0.02	93
360.0	0.0	2.21	2.22	296.14	0.941	0.941	240.4	3.39	3.39	3.66	55.75	-0.02	92

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Ref No: 870
Project: Park Farm, Spalding
Date: 13/02/2026
Engineer: GS

ATTENUATION FOR CRITICAL STORM DURATION OF 360.0 min
50% Summer Storm

Connected Area 3348 m2

Design Storage 261 m3

Open Storage
From Storage Sheet
Storage= 101.332 x2 + 159.84 X + 0.275

Discharge Control
From Discharge Control Sheet

H up to 0.2	Q=H x 16.5
0.2<H<0.4	Q=3.33
0.4<H<0.5	Q= 3.33 -9.0(H-0.4)
Above 0.5	Q=2.46+2.1(H-0.5)

Instructions Adjust head at DCV at each interval to give checksum=0 or close to 0

Time	Rainfall				DCV	Storage		Discharge Control				Check Sum	
	Rainfall	Av Rainfall mm/hr	Vol In m3	Cum In m3	Head h (mm)	Depth in Basin (m)	Vol m3	Out-flow l/s	Av Flow Out l/s	Vol Out m3	Cum Out m3	Inflow - Storage - Out = 0	% Design Storage
0.0	0.0	0.00	0.00	0.00	0.000	0.000	0.0	0.00	0.00	0.00	0.00	0.00	0
18.0	4.4	2.21	2.22	2.22	0.011	0.011	2.0	0.18	0.09	0.10	0.10	0.08	1
36.0	5.2	4.79	4.81	7.03	0.038	0.038	6.5	0.63	0.40	0.44	0.53	0.00	2
54.0	5.9	5.53	5.55	12.59	0.065	0.065	11.1	1.07	0.85	0.92	1.45	0.04	4
72.0	7.4	6.63	6.66	19.25	0.095	0.095	16.4	1.57	1.32	1.43	2.88	0.00	6
90.0	8.8	8.11	8.14	27.39	0.129	0.129	22.6	2.13	1.85	2.00	4.87	-0.06	9
108.0	11.1	9.95	9.99	37.39	0.167	0.167	29.8	2.76	2.44	2.64	7.51	0.08	11
126.0	13.3	12.16	12.22	49.60	0.212	0.212	38.7	3.33	3.04	3.29	10.80	0.09	15
144.0	23.6	18.43	18.51	68.11	0.283	0.283	53.6	3.33	3.33	3.60	14.39	0.09	21
162.0	40.5	32.06	32.20	100.32	0.408	0.408	82.4	3.26	3.29	3.56	17.95	0.01	32
180.0	55.3	47.91	48.12	148.44	0.581	0.581	127.3	2.63	2.94	3.18	21.13	-0.04	49
198.0	40.5	47.91	48.12	196.56	0.735	0.735	172.5	2.95	2.79	3.02	24.15	-0.08	66
216.0	23.6	32.06	32.20	228.77	0.826	0.826	201.4	3.14	3.05	3.29	27.44	-0.11	77
234.0	13.3	18.43	18.51	247.27	0.871	0.871	216.4	3.24	3.19	3.45	30.89	0.02	83
252.0	11.1	12.16	12.22	259.49	0.897	0.897	225.2	3.29	3.27	3.53	34.41	-0.11	86
270.0	8.8	9.95	9.99	269.48	0.916	0.916	231.7	3.33	3.31	3.58	37.99	-0.22	89
288.0	7.4	8.11	8.14	277.63	0.928	0.928	235.9	3.36	3.35	3.61	41.61	0.15	90
306.0	5.9	6.63	6.66	284.29	0.937	0.937	239.0	3.38	3.37	3.64	45.24	0.04	92
324.0	0.0	2.95	2.96	287.25	0.935	0.935	238.3	3.37	3.38	3.65	48.89	0.05	91
342.0	0.0	0.00	0.00	287.25	0.925	0.925	234.8	3.35	3.36	3.63	52.52	-0.10	90
360.0	0.0	0.00	0.00	287.25	0.914	0.914	231.0	3.33	3.34	3.61	56.13	0.10	89



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REV	DESCRIPTION	AP	DATE

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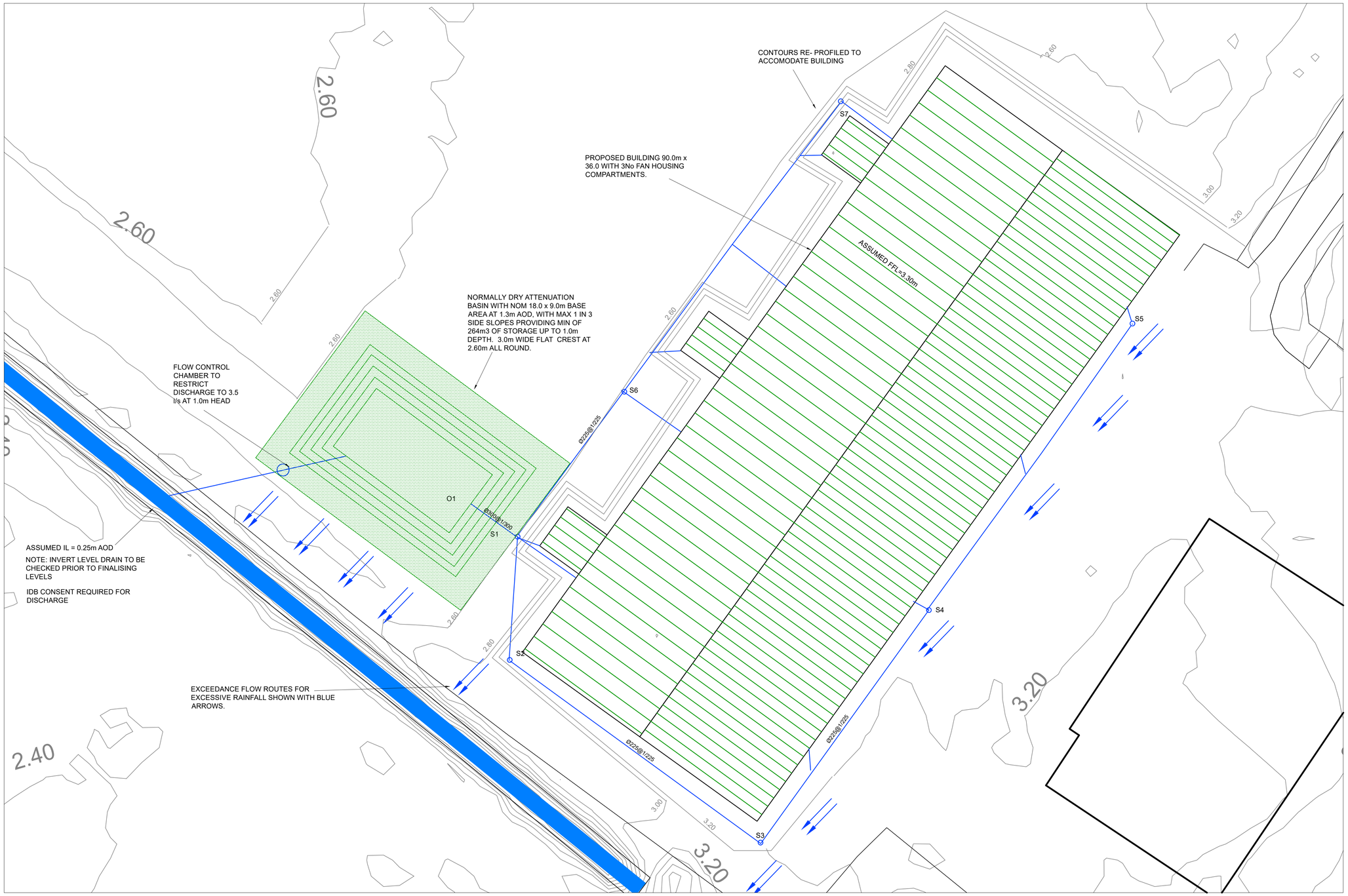
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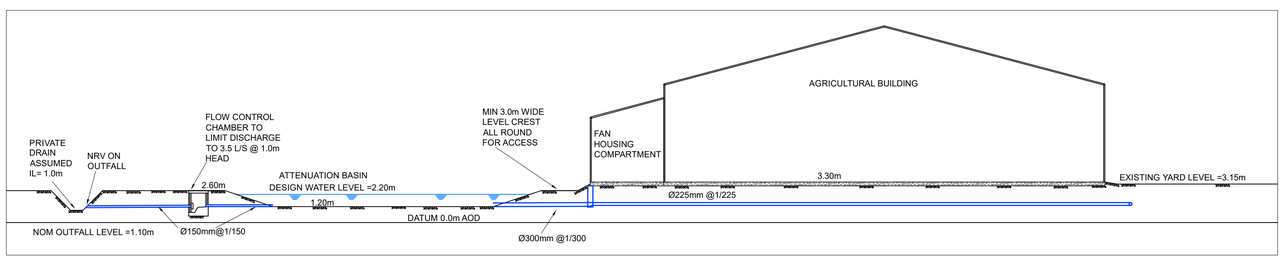
DRAWING TITLE: EXISTING SITE, CONTOURS AND KEY DRAINAGE FEATURES.

SCALE	APPROVED BY	DATE
1:1250	GS	FEB 26

DRG SIZE	DRAWING NO.	REV.
A1	870-001	-



SITE PLAN SCALE 1:250



ILLUSTRATIVE SECTION THROUGH ATTENUATION BASIN AND BUILDING SCALE 1:250

OUTLINE DESIGN NOTES

1. THE DETAILS SHOWN ON THIS DRAWING ARE TO DEMONSTRATE A WORKABLE DRAINAGE STRATEGY FOR PLANNING PURPOSES ONLY. FURTHER DESIGNS AND CHECKS ARE REQUIRED TO DEVELOP THIS DESIGN FOR CONSTRUCTION PURPOSES.
2. FLOOR LEVELS HAVE BEEN SET 150mm ABOVE THE ASSUMED LEVEL OF THE EXISTINGYARD OF 3.15m. IF A DIFFERENT CUT & FILL BALANCE IS REQUIRED THEN THE LEVELS AND SW DRAINAGE WILL NEED TO ADJUSTED ACCORDINGLY.
3. THE INVERT LEVEL OF THE DITCH SHOULD BE CHECKED PRIOR TO FINALISING LEVELS.
4. ALL SW PIPEWORK IS Ø150mm LAID AT 1 IN 150 UNLESS NOTED OTHERWISE ON THE DRAWING.
5. PIEWORK TO CONNECT SOFFIT TO SOFFIT.
6. PIPEWORK HAS BEEN SELECTED NOT TO SURCHARGE FOR THE BUILDING REGULATIONS RUN-OFF RATE OF 0.014l/s/m2 WHICH IS APPROPRIATE FOR THIS DEVELOPMENT.
7. TYPICAL MH INVERT LEVELS FOR THE OUTLINE SCHEME SHOWN ARE GIVEN IN THE FOLLOWING TABLE

MH No	IL
O1	1.500
S1	1.601
S2	1.668
S3	1.846
S6	1.787
S7	2.064

IMPERMEABLE AREA DISCHARGING TO SYSTEM
ROOF = 3348m2

THIS DRAWING HAS BEEN PRODUCED TO BE READ AT A1 SIZE. IF VIEWING A PDF, ZOOM TO 100% FOR BEST VIEW.

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CLIENT: LORD CARINGTON

PROJECT: NEW AGRICULTURAL DRYING BUILDING AT, PARK FARM, JORDAN'S CRADGE BANK, SPALDING, LINCOLNSHIRE.

DRAWING TITLE: PROPOSED DEVELOPMENT AND OUTLINE SURFACE WATER DRAINAGE DESIGN

SCALE	APPROVED BY	DATE
AS SHOWN	GS	FEB 26

DRG SIZE	DRAWING NO.	REV.
A1	870-002	