

Flood Risk & Drainage Assessment Report

for the

Proposed Free Range Egg

Production Unit

on land off

Delgate Bank,

Weston Hills, Spalding,

Lincolnshire

PE12 6BX.

Prepared for

W Dring and Sons Ltd.

Issue 01

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Issue : 01
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1.0 DEVELOPMENT SITE AND LOCATION

- 1.1 The development site is approximately 3.5km south east of Spalding and 20km north west of Wisbech, Lincolnshire. The site is located off Delgate Bank. The nearest Post Code is PE12 6BX and the OS Grid Reference of the application site is TF 287 207.
- 1.2 The location is shown on the Flood Map for Planning contained in Appendix 1.
- 1.3 The site covers some 15.8 hectares of which 0.365ha is to be covered with impermeable surfaces. The site is currently a greenfield site bounded by open farmland.
- 1.4 There are drainage ditches to both eastern and western boundaries but the western one is on the west side of the road, Delgate Bank.
- 1.5 The field in which the development is proposed is generally flat with levels varying between 3.0 and 2.6m AOD.
- 1.6 The site is shown to be in Flood Zone 3 on the Flood Map for Planning.
- 1.7 The site is 3.5km south east of the River Welland/Coronation Channel and 4.3km south east of Fulney Lock which is the tidal limit of the River Welland. The site is 18km west of the River Nene at Sutton Bridge and 19km north west of the River Nene at Wisbech.

2.0 DEVELOPMENT PROPOSALS

- 2.1 The development comprises of a single 110.5m x 24.5m poultry unit along a 24.0m x 12m egg packing building and a small link building. There is a concrete apron in front of the poultry unit and egg packing building.
- 2.2 The poultry unit has an impermeable roof area of 2707m², the Egg Packing Unit has a roof area of 292m² and the concrete apron is 651m².
- 2.3 There is an access track around the building which is to be constructed impermeable compacted stone linking to another stone area in front of the concrete apron.
- 2.4 The access road will not be positively drained but will either be of permeable construction or with a cross fall to the adjacent permeable ground.
- 2.5 It is understood that the Lincolnshire County Council Highways require the first 20m of the access road into the site to have a sealed surface. This will have a cross fall and drain to the adjacent land away from the highway...
- 2.6 Details of the proposed development are shown on Drawing 881-002 contained in Appendix 1.
- 2.7 In accordance with Table 2 of the National Planning Policy Framework (NPPF) the development would be classed as less vulnerable.
- 2.8 In accordance with Table 3 of the NPPF less vulnerable developments in Flood Zone 3 are acceptable.
- 2.9 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 Zone 3.
- 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 Additional Flood Information was requested from the Environment Agency. A copy of their response is contained in Appendix 1.

- 4.5 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) There are no ongoing or planned works to reduce or sustain flood risk
 - d) The Environment Agency do not have any historic records of the site flooding.
 - e) The site is not considered at risk of fluvial flooding from 'Main Rivers'
 - f) The site is not covered by any Flood Hazard Mapping undertaken by the Environment Agency
 - g) The site is considered to be at risk from Tidal Flooding.
 - h) The raised earth tidal flood defences provide a 1 in 150 year protection and the defences are regularly inspected.
 - i) Tidal Flood Levels were provided. The 1 in 200 year 50% confidence bound flood level at Fulney Lock is 5.98m and the 1 in 1 year Flood Level is 5.04m
 - j) The site is not covered by any Tidal Flood Hazard Mapping.
- 4.6 From Point (i) above the water level downstream of Fulney Lock is around 2.0m above the ground level at the site once per year and is likely to be above site levels daily. The site is protected from flooding by raised earth defences.
- 4.7 There is a risk of flooding if the defences are breached or overtopped.
- 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 site is covered by Flood Hazard Mapping provided in the South East Lincolnshire SFRA.
- 4.10 The 2115 1 in 100 year fluvial and 1 in 200 year coastal residual flood map shows that although flood flows approach the site, the site does not flood. An A4 copy of the full map along with a blown up excerpt is provided in Appendix 1. If the mapping provided is unclear, refer to the original map on the SE Lincolnshire web-site.
- 4.11 Taking into account the SFRA Hazard Mapping 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 bounded by drains on the eastern and western sides which are South Holland IDB maintained drains.
- 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 Overall the risk of flooding from the drains surrounding the site is low.
- 4.15 There is a minimal amount of flooding across the site shown on the Surface Water Flood Map a copy of which is presented in Appendix 1. The flooding would be associated with localised low spots.
- 4.16 Following development, the area surrounding the buildings will be raised above ground level and graded away from the buildings reducing the risk of surface water flooding. The remainder of the site provides ranging areas for the birds and the short duration flooding, until the rainwater percolates through the ground would not present a problem to the operation of the site.
- 4.17 Overall the risk of surface water flooding is low.

Flooding from groundwater sources.

- 4.18 Ground water levels at the site are likely to be similar to water levels in the surrounding ditches.
- 4.19 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.

- 4.20 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.

- 4.21 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.
- 4.22 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 No specific flood mitigation measures are required.

6.0 SEQUENTIAL TEST

- 6.1 The Flood Risk vulnerability classification of the proposed development is less vulnerable which is considered appropriate Flood Zone 3.
- 6.2 Poultry Units have a number of factors such as odour, noise, traffic landscape and visual impact etc., which need to be considered in addition to flood risk when selecting a location.
- 6.3 The proposed development site has been selected to minimise the impact on the above factors, including flood risk
- 6.4 Within Section 4.0 of this report it is demonstrated that although the site is in Flood Zone 3, the poultry unit is not to be considered at a risk of fluvial or coastal flooding, including when flood defences are breached or overtopped.
- 6.5 No other suitable sites in lower flood zones or sites with lower Flood Hazard Ratings have been identified within the local area
- 6.6 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 2 – 3 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 3 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 No site specific geotechnical data is available.
- 9.4 From the HR Wallingford Greenfield run-off Calculation Tool available on their web-site, the tool identifies the site as having Soil Type 2 on the Winter Rainfall Acceptance Potential (WRAP) Map. Soil Type 2 has relatively good drainage characteristics and can be suitable for infiltration drainage systems. A copy of the Greenfield Run-off Calculation Sheet is provided in Appendix 1. However, we are concerned that this is not an accurate reflection of the soil characteristics likely to be encountered. In addition, groundwater levels are likely to be similar to the water levels in the ditches.
- 9.5 Information on the BGS website indicates that site is underlain by clay based materials which are not practical for infiltration based drainage systems.
- 9.6 In the absence of site specific geotechnical investigation reports it is concluded that is unlikely that the site would be unsuitable for surface water disposal wholly reliant on infiltration systems for disposal.
- 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 Cross Drain, an IDB Drain flowing along the eastern boundary.
- 9.8 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 881-002 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 1.30m. 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 7 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 1.5m 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 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.
- 10.13 The system shown on Drawing 881-002 does not flood for the 1 in 30 year event but has some 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 drainage ditches. Exceedance flow routes are shown on the drawing.
- 10.14 The surcharge depths of all manholes are provided in the calculation spreadsheets contained in Appendix 1.

Drainage of the Concrete Apron

- 10.15 The concrete apron at the end will be set to provide a level threshold to the shed doors and will fall away from the doors to a linear channel drain.
- 10.16 The apron has a dual function of containing the wash out from the sheds and surface water drainage. When the sheds are being cleaned a locked valve on the pipework from the channel drains will direct the discharge to a buried sealed tank, which will be emptied by tanker.
- 10.17 Outside the cleaning operations the valve will be closed so that surface water run-off discharges by pipework to the attenuation basin.
- 10.18 The concrete apron covers some 651m², which at the Building Regulations peak run off rate of 0.014l/s/m², equates to a peak flow of 9.1 l/s, which should only require a 150mm outlet pipe at 1 in 150.

Provision of the Required Attenuation Volume

- 10.19 When considering the provision of attenuation storage the risk of avian flu has to be taken into account. Underground storage reduces the risk of avian flu but cost of providing cellular crates or similar can be prohibitively expensive.
- 10.20 With a normally dry attenuation basin water remains in the basin only for a short duration of time following rainfall. For a normal heavy rainfall event of 25mm of rain falling in an hour there will be water in the basin for around 8.0 hours after it stops raining. This reduces to around 3.0 hours if 25mm of rain falls over 6.0 hours.
- 10.21 With the above durations the risk of attracting migratory birds is low. In addition other preventative measures such as netting can be employed to reduce the risk further.
- 10.22 It is understood that the developer has taken the above points into consideration and concluded that a normally dry attenuation basin is acceptable for this development.

Attenuated Discharge

- 10.23 The impermeable area of the site discharging to through the surface water drainage system is 0.36ha. 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.
- 10.24 Limiting the discharge to the 1 in 1 year run-off would result in a peak discharge of 0.43 l/s, which is impractical. The minimum practical size of discharge control device requires a clear opening of around 80mm.
- 10.25 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

- 10.26 The location of the proposed attenuation basin is shown on Drawing 881-002.
- 10.27 The ditch level used in this report, 1.30m, has been taken from a grid of LIDAR levels and the attenuation basin base level set at of 1.50m to allow fall to the drain.
- 10.28 The existing ground levels in the vicinity of the ditches 2.8m AOD meaning the basin would have an overall depth of 1.3m. This would provide a 1.0m attenuation depth with 0.3m of freeboard.
- 10.29 The proposed basin would have maximum 1 in 3 sides slopes for stability, ease of maintenance and safety of the public.
- 10.30 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.
- 10.31 For this development the critical storm was 6.0 hours and the attenuation volume required was 259.m3. The attenuation basin shown on Drawing 881-002 is slightly smaller than this providing 311m3 of storage.
- 10.32 Simulations were then undertaken basin shown on Drawing 881-002 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
- 10.33 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 0.898m.
- 10.34 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 0.898m, although the filling profile is different to the winter storm.
- 10.35 This will provide a minimum freeboard of over 400mm for the most extreme event.
- 10.36 The simulation calculations are presented in Appendix 1.

Urban Creep

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

Water Quality and Suds Treatment

- 10.38 The run-off entering the surface water drainage system will come from either the building roofs or the concrete hardstandings..
- 10.39 Commercial roofs have a low pollution hazard level and discharge via the infiltration basin should provide an adequate level of treatment..
- 10.40 Trapped sumps on the channel drain should provide an adequate level of treatment for rainwater falling on the concrete apron to the end of the building.

Construction Phase

- 10.41 The Construction Phase has the potential to discharge silt laden water and reduce the capacity of the attenuation basin.
- 10.42 It is proposed that a temporary attenuation basin is constructed for the construction phase.
- 10.43 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 carry 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 no 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 required)
	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

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 than 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 FOUL DRAINAGE

- 14.1 The poultry site will be staffed by up to the equivalent of 2-4 full time workers.
- 14.2 There are two toilets and handwashing facilities proposed on site. The two toilets are not required for occupancy but for convenience for internal and external use.
- 14.3 There is no canteen on site and in accordance with the British Water loading rates the maximum of staff working on the day shift would be 200 litres and 10g of BOD. This is equivalent of two persons in a domestic setting..
- 14.4 The site is located over 1.0km from the nearest housing likely to be served by the public sewerage system. As the discharge is less than 2.0m³ per day an Environmental Permit would not be required and the General and Binding Rules would apply for both discharges to groundwater and surface water.

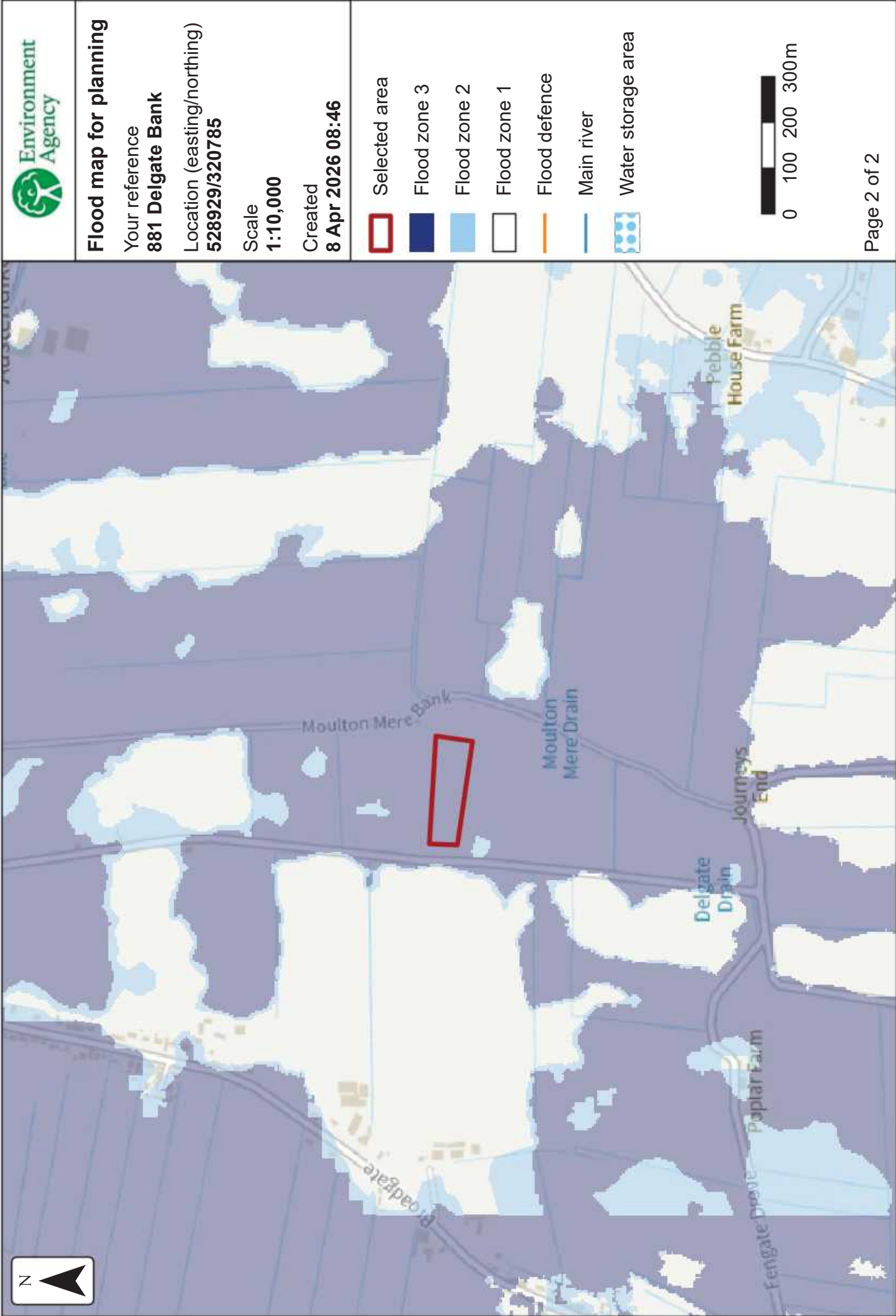
- 14.5 The General And Binding Rules do not apply if there is a public sewer closer than 30m x the equivalent no of domestic properties. The development is less than the equivalent of one domestic property and as there is no public sewer within 30m of the development, the General and Binding Rules apply.
- 14.6 An appropriately designed packaged treatment plant is proposed. Details of the Treatment Plants the Developer proposes to install are provided in Appendix 1. This treatment plant or similar will meet the requirements of Part H of the Building Regulations.
- 14.7 As a packaged treatment plant is proposed as oppose to a septic tank the effluent can be discharged to either to the watercourse or a suitably sized soakaway rather than a drainage field.
- 14.8 Before purchase of the treatment plant the loading, levels and treated effluent quality should be confirmed with a treatment plant supplier.
- 14.9 If a soakaway or drainage field is proposed suitable percolation testing should be undertaken to size the soakaway or drainage field.

15.0 CONCLUSION

- 15.1 The proposed development is in Flood Zone 3 but this assessment has shown the site to be at a minimal risk of flooding.
- 15.2 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.
- 15.3 A packaged treatment plant will be installed to treat foul flows.
- 15.4 Taking into account the above points it is concluded that the proposed development can be considered appropriate in this location.

16.0 APPENDIX 1 SUPPORTING INFORMATION

- a) Environment Agency Flood Map for Planning with Site Location added
- b) Flood Information provided by the Environment Agency
- c) South East Lincolnshire 2115 1% AEP Residual Risk Flood Plan.
- d) South East Lincolnshire 2115 1% AEP Residual Risk Flood Plan – Excerpt
- e) Surface Water Flood Map
- f) HR Wallingford Greenfield Run-off Report
- g) BGS Borehole Scans
- h) Surface Water Drainage Areas
- i) Pipe Sizing and Levels and Hydraulic Profiles
- j) Critical Storm Calculations
- k) Typical Flow Control Device
- l) Attenuation Basin Simulation Analysis for Critical Storms
- m) Drawing 881-001 – Existing Site, Contours and Key Drainage Features
- n) Drawing 881-002 – Proposed Development and Outline Surface Water Design



George Shuttleworth
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Our ref: EIR2026/17011
Date: 6 May 2026

Dear George,

Flood Risk Information for Delgate Bank, Weston Hills, South Holland

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

This site is not at risk of flooding from any main river. The site may 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.

5. Tidal Flood Risk Information

This site is considered to be at risk from tidal flooding.

5.1 Tidal Defence Information

The existing tidal defences protecting this site consist of earth embankments in combination with concrete crest and wave wall. They are in fair condition and reduce the risk of flooding (at the defence) to a 0.67% (1 in 150) chance of occurring in any year. We inspect these defences routinely to ensure potential defects are identified.

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

5.2 Tidal Flood Levels

The attached data sheets show our current best estimate for extreme tide levels.

Please read the information notes on the data sheets.

5.3 Tidal 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 along the full coastal / tidal floodplain, except the tidal Witham Haven in Boston (upstream of Hobhole) where only breaching and not overtopping has been modelled and the tidal River Welland upstream of Fosdyke Bridge where neither breaching nor overtopping are available.

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/>

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 Jo Henry using the email address below and quoting our EIR reference number above.

Yours sincerely,



Jo Henry
Engagement Officer
Partnerships and Strategic Overview Team

for John O'Neill

Welland and Nene Partnerships and Strategic Overview Team Leader

e-mail PSOWN@environment-agency.gov.uk

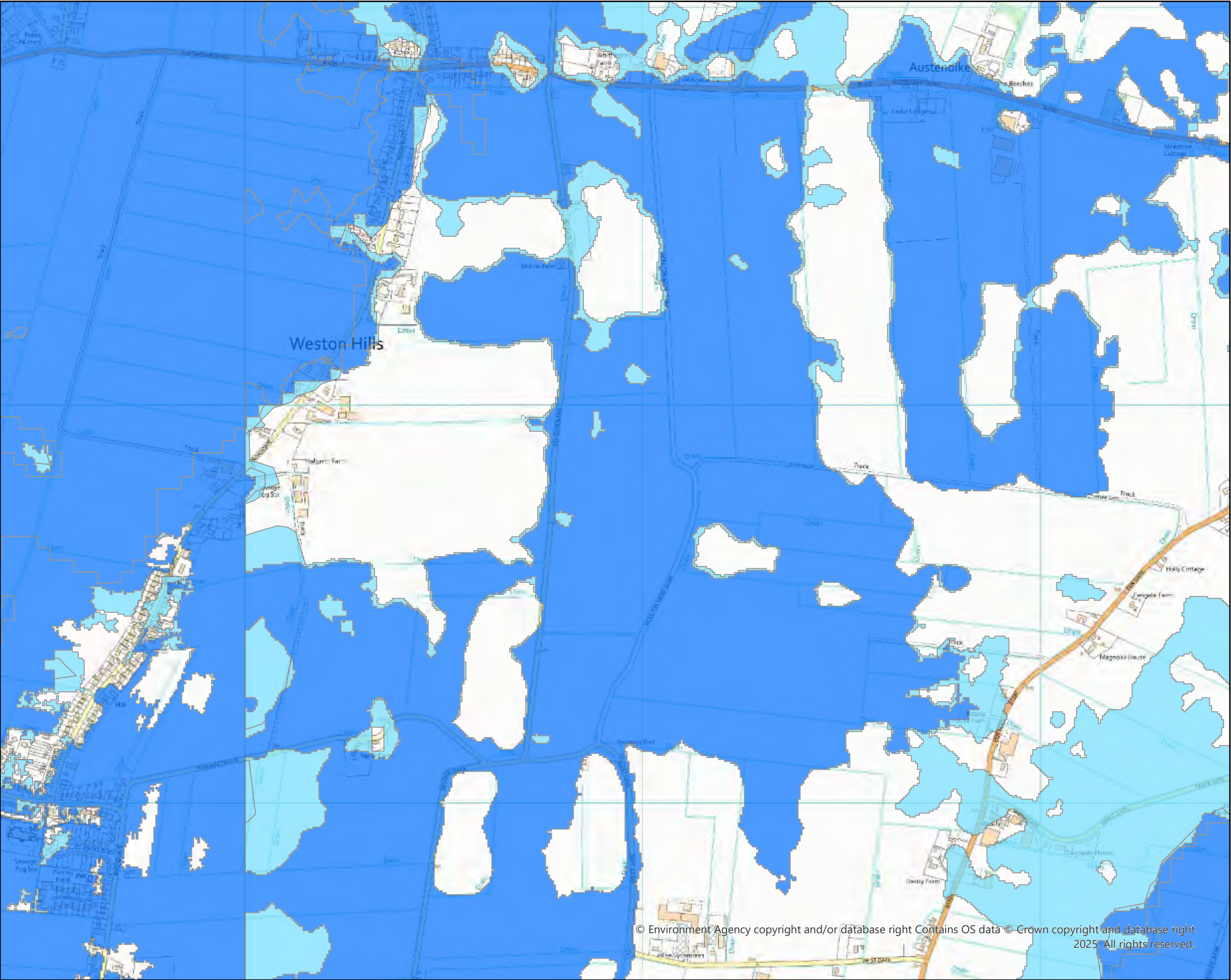
Enc.

Flood Map for Planning

Tidal Level Data Sheets - Map and Tables

Tidal Breach Points □ Locations Map

Flood Map centred on TF 28929 20785 - created May 2026 [Ref: EIR2026/17011]



Scale 1:10,000



Legend

- Raised Defences
- Flood Storage Areas

Flood Zones 2 and 3 Rivers and Sea

- 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 area could be flooded:

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.
- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue shows the extent of the Extreme Flood Outline, which represents the extent of a flood event with a 0.1% chance of occurring in any year, 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

East Coast and Wash - 2018 Coastal Flood Boundary [CFB] Dataset

Key Node Points



Scale 1:550,000



▲ East Coast and Wash

See separate data sheet for predicted flood levels

Created by the Partnerships and Strategic Overview Team, Lincoln

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

CFB REF	LOCATION	EASTING	NORTHING	ANNUAL CHANCE (1 IN X) OF TIDE LEVEL IN METRES ODN																						
				1			10			50			100			200			300			1000				
				Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound				
				2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%
3888	Immingham	520440	417625	4.16	4.17	4.19	4.50	4.53	4.62	4.73	4.80	5.00	4.83	4.93	5.19	4.93	5.06	5.41	4.98	5.14	5.55	5.15	5.38	6.01		
3890	Haborough Marsh	522100	416512	4.14	4.15	4.17	4.48	4.51	4.60	4.70	4.77	4.97	4.80	4.90	5.16	4.90	5.03	5.38	4.94	5.10	5.51	5.11	5.34	5.97		
3898	Grimsby	529295	413162	3.98	3.99	4.01	4.31	4.34	4.43	4.53	4.60	4.80	4.61	4.71	4.97	4.71	4.84	5.19	4.74	4.90	5.31	4.88	5.11	5.74		
3906	Buck Beck	534709	407369	3.87	3.88	3.90	4.19	4.23	4.31	4.41	4.50	4.68	4.50	4.61	4.86	4.61	4.75	5.10	4.64	4.82	5.22	4.80	5.05	5.66		
3910	Tetney	538035	405537	3.85	3.86	3.89	4.17	4.22	4.30	4.40	4.50	4.67	4.49	4.61	4.86	4.60	4.75	5.10	4.63	4.82	5.21	4.80	5.06	5.66		
3918	Donna Nook	544641	401997	3.82	3.83	3.86	4.14	4.19	4.27	4.38	4.48	4.65	4.47	4.60	4.85	4.58	4.74	5.10	4.63	4.82	5.22	4.81	5.08	5.68		
3928	Saltfleet	549131	393360	3.78	3.79	3.82	4.11	4.16	4.26	4.36	4.46	4.64	4.47	4.59	4.86	4.57	4.74	5.11	4.63	4.83	5.25	4.83	5.11	5.74		
3942	Boygrift	555131	380860	3.72	3.74	3.77	4.06	4.11	4.22	4.33	4.43	4.65	4.43	4.57	4.87	4.56	4.73	5.13	4.62	4.83	5.28	4.85	5.15	5.82		
3968	Gibraltar Point	557652	356181	4.16	4.17	4.20	4.51	4.56	4.67	4.76	4.85	5.08	4.85	4.97	5.27	4.94	5.10	5.49	4.99	5.18	5.63	5.14	5.41	6.09		
3992_14	Hobhole	535990	340116	4.96	4.97	5.01	5.40	5.44	5.56	5.66	5.76	5.98	5.78	5.90	6.20	5.88	6.04	6.44	5.92	6.11	6.57	6.03	6.31	6.99		
	Grand Sluice*	532366	344510	4.93	4.94	4.98	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
3992_9	Boston Barrier	532754	342852	4.93	4.94	4.98	5.41	5.45	5.57	5.73	5.83	6.05	5.85	5.97	6.27	5.93	6.09	6.49	5.94	6.13	6.59	5.98	6.26	6.94		
3992_5	Fosdyke Bridge	531886	332234	4.87	4.88	4.92	5.31	5.35	5.47	5.58	5.68	5.90	5.71	5.83	6.13	5.82	5.98	6.38	5.87	6.06	6.52	6.01	6.29	6.97		
4008	West Lighthouse	550094	329971	4.87	4.88	4.91	5.21	5.26	5.37	5.46	5.56	5.78	5.56	5.68	5.98	5.66	5.82	6.21	5.71	5.90	6.35	5.86	6.14	6.81		
-	Marsh Road	525988	324065	-	5.04	-	-	5.44	-	-	5.73	-	-	5.85	-	-	5.98	-	-	-	-	-	-	-		
-	Wisbech	546110	309940	-	4.83	-	-	5.25	-	-	5.53	-	-	5.66	-	-	5.78	-	-	-	-	-	-	-		
-	Dog-in-a-Doublet	527200	299287	-	3.67	-	-	4.00	-	-	4.22	-	-	4.32	-	-	4.42	-	-	-	-	-	-	-		

See next page for notes

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

NOTES:

The following notes apply to all CFB sites (ie all on table excluding Marsh Road, Wisbech, Dog-in-a-Doublet)

- The base date for the data is 2017.
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at <https://deframetadadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590>

The following notes apply to all Marsh Road, Wisbech, Dog-in-a-Doublet

- The base date for the data is 2006
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- These levels will be updated as their respective tidal river models are updated.

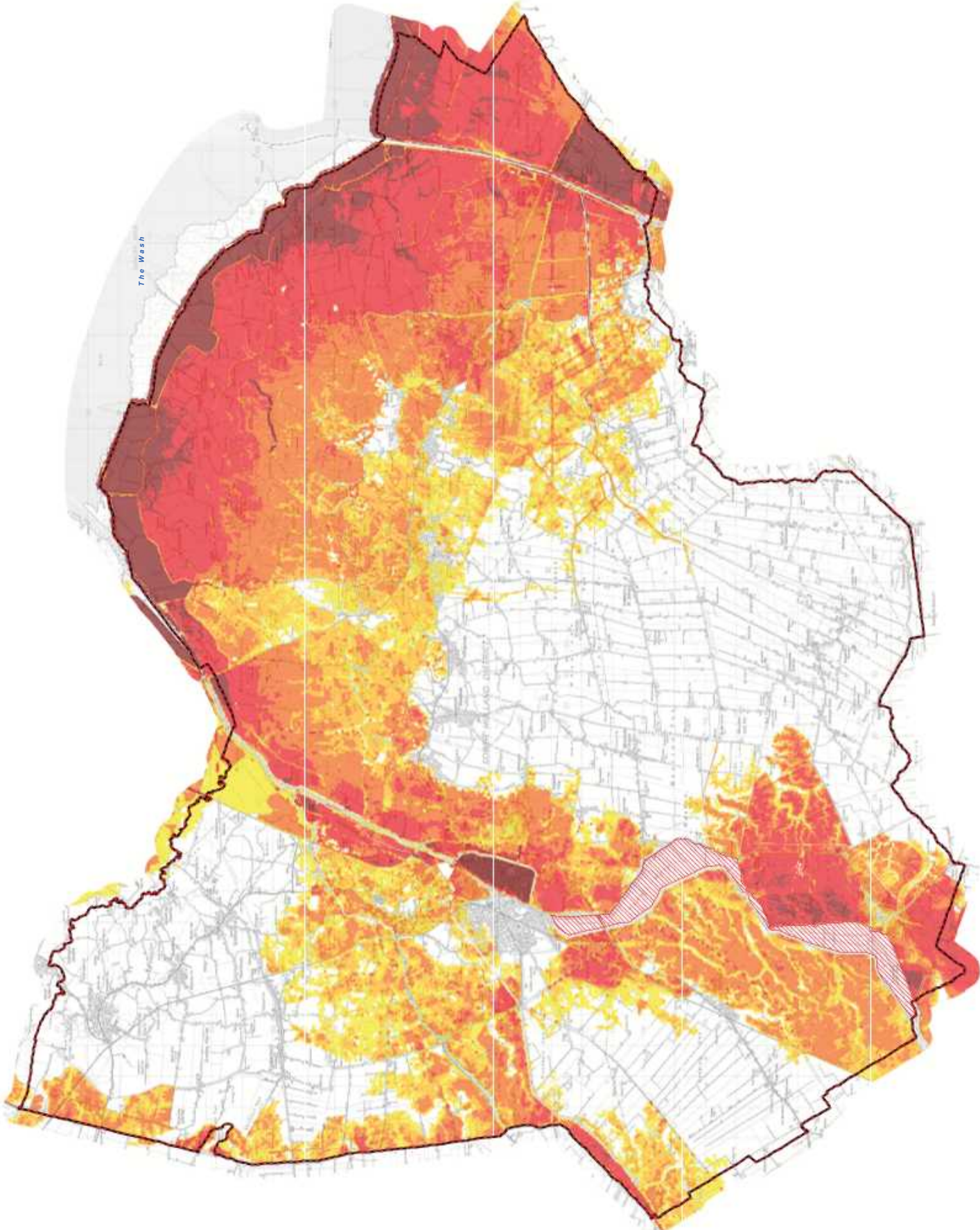
The following notes apply to Grand Sluice

- Grand Sluice remains the tidal limit for the River Witham.
- The data is based on CFB 2018 data for Boston Barrier site, capped at 5.3mAOD to reflect use of the barrier which raises for tides above this level.
- The base date for the data is 2017
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at <https://deframetadadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590>

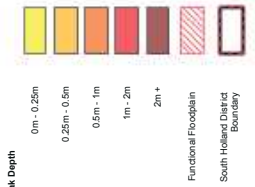


NOTES

- 1. The potential flooding consequences shown on this map primarily relate to flooding from the sea and main rivers taking into account the presence of current flood risk management measures such as flood defences.
- 2. This map is based on the 2015 Flood Risk Assessment for the Wash and (Fulwith) River Glen (Fulwith) and Tost Hazard mapping (River Weald, River Nene and the Wash sea defences). No new information from the Environment Agency or other sources has been used to update the Flood Risk Assessment or the map.
- 3. In addition to the potential flood extents shown on this map, there may be shallow flooding in low-lying rural areas.
- 4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.
- 5. Areas of potential flood extent are shown in the map, together with areas of low ground flood extent.
- 6. Land outside South Holland District is not considered.
- 7. This map shows the extent only of the flooding probability bands relevant to the map title.



Map Legend



REV	DATE	REMARKS
2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update

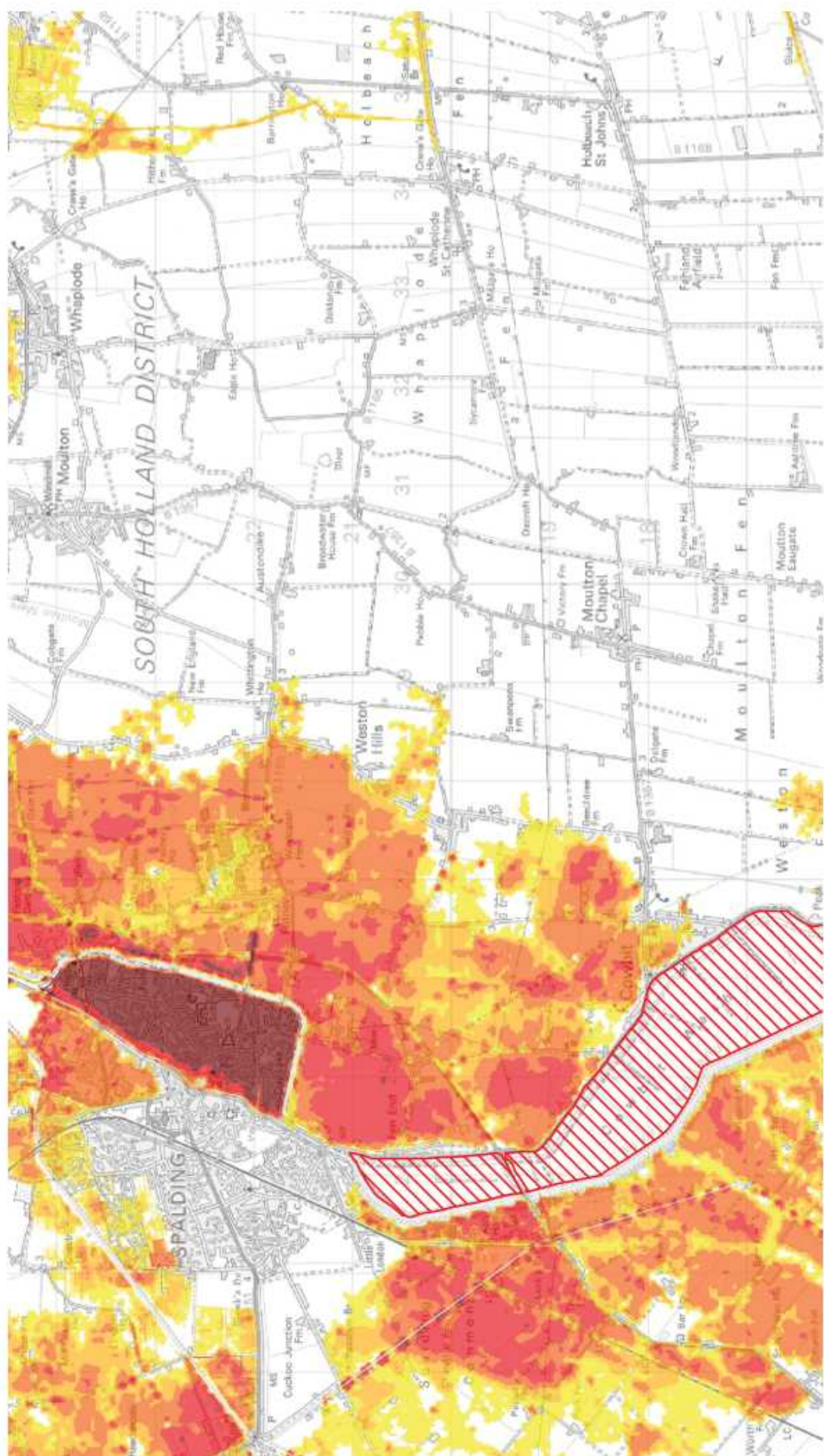
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SOUTH HOLLAND DISTRICT COUNCIL
COUNCIL OFFICES
PRIORITY ROAD
SOUTH HOLLAND
LINCOLNSHIRE
PE11 2XE

UPDATE OF STRATEGIC
FLOOD RISK ASSESSMENT
Residual Peak Depth
District - Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: Feb 2017	REV NO: 2
SCALE: 1 : 60,000 @ A1	MAP NO:



Flood map for planning

Get data for your location

Add or edit a location boundary

-
-
-
-
-

Datasets

Surface water

-
- ☐ Flood zones 2 and 3
- ☒ Surface water
- ☐ None

Annual likelihood of flooding

1 in 1000

-
- ☐ 1 in 30
- ☐ 1 in 100
- ☒ 1 in 1000

Map features

None selected

-

Search

Key

Click on the surface water areas for information



Get summary report

Ordnance Survey

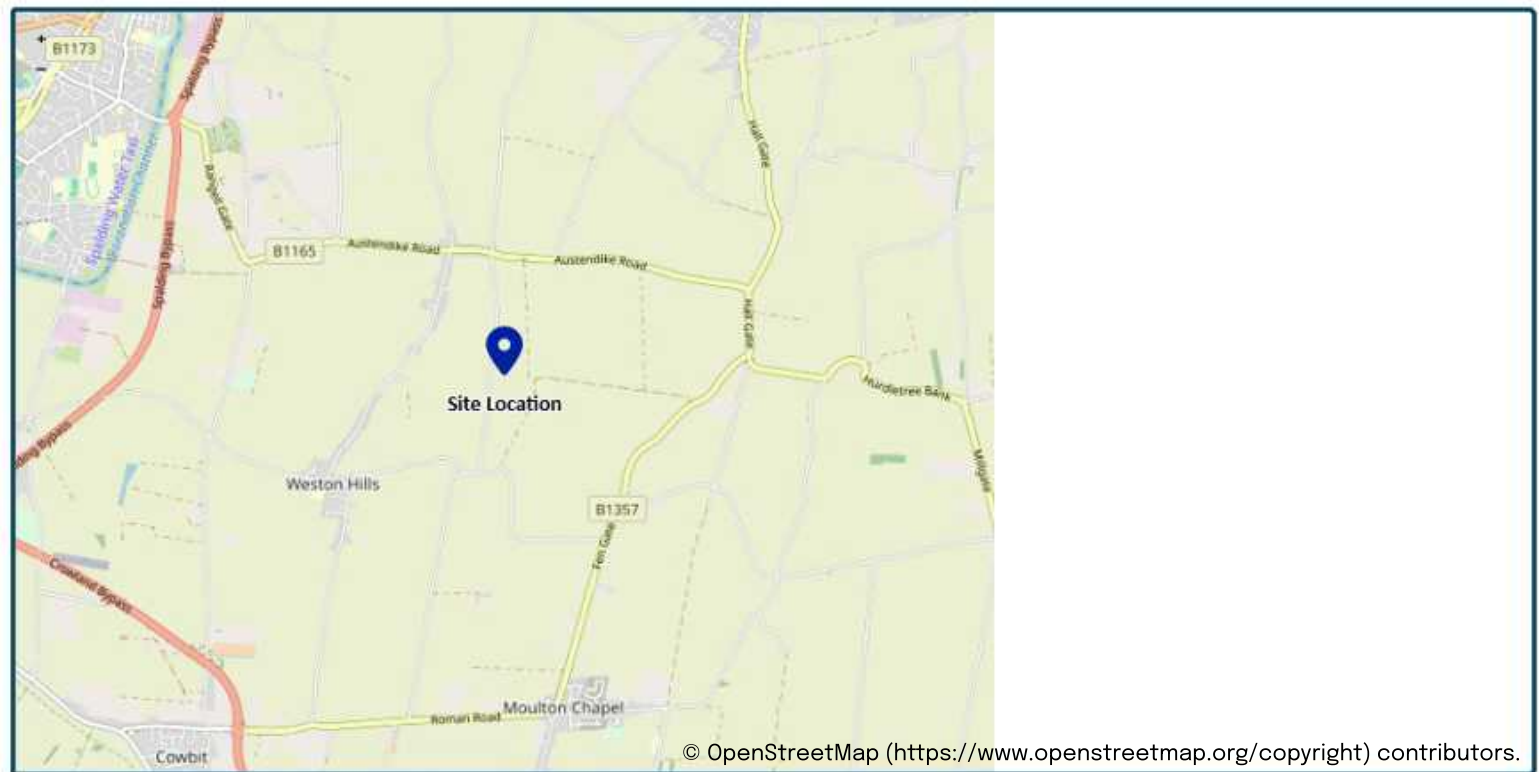
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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	22/05/2026
Calculated by	
Reference	
Model version	2.2.3

Location

Site name	881 Delgate Bank
Site location	



Site easting (British National Grid)	528896
Site northing (British National Grid)	320709

Site details

Total site area (ha)	1.0	ha
----------------------	----------------------------------	----

Greenfield runoff

Method

Method	IH124
--------	-------

IH124

	<u>My value</u>		<u>Map value</u>
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

	<u>My value</u>		<u>Map value</u>
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 (2.2.3) developed by HR Wallingford and available at [uksuds.com](https://www.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) (<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.



BGS ID: 473697 : BGS Reference: TF22SE6
British National Grid (27700) : 528010,320860

IGS 2A 2000 7/71

Institute of Geological Sciences
RECORD OF SHAFT OR BOREHOLE

6-in or 1:10 000 Map Registration No.

TF/22 SE/6

Name and Number of Shaft or Borehole

W2 Weston Hills

For whom made Spalding Rural District Council

Town or Village Weston Hills County Lincoln

Exact site (reference to a fixed point on 1-in or 1:50 000 Map:

National Grid Reference

2801 2086

1-in or 1:50 000
New Series Map No.

Enter 'C' if
Confidential

144

Purpose for which made Proving sequence

Ground level at ^{shaft}_{bore} relative to O.D. 2.5 m. If not ground level give O.D. of beginning of ^{shaft}_{bore} _____ m.

Made by Pre - Piling Surveys

Date of sinking 1971

Information from Report

Examined by _____

Specimen Numbers and Additional Notes

Contact BGS: ngdc@bgs.ac.uk



IGS 2A 2000 7/71

Institute of Geological Sciences
RECORD OF SHAFT OR BOREHOLE

6-in or 1:10 000 Map Registration No.

TF/22 SE/7

Name and Number of Shaft or Borehole

W3 Weston Hills

For whom made Spalding Rural District Council

Town or Village Weston Hills County Lincs

Exact site (reference to a fixed point on 1-in or 1:50 000 Map)

Purpose for which made Proving sequence

Ground level at ~~shaft~~ bore relative to O.D. 2.8 m. If not ground level give O.D. of beginning of shaft bore m.

Made by Pre-Piling Surveys

Date of sinking 1971

Information from Report

Examined by

National Grid Reference

2824 2118

1-in or 1:50 000
New Series Map No.

144

Enter 'C' if
Confidential

Specimen Numbers and Additional Notes

Geological Classification	Description of Strata	Thickness metres	Depth metres
+2.4	Topsoil	0.4	0.4
+1.6	Soft to firm brown and grey mottled silty sandy clay	0.8	1.2
	Dark grey slightly organic silty fine sand. Fine shell debris at 3.5 m.	5.8	7.0

ARTIFICIAL SURFACES

Proposed	Nr	(m)	(m)	(m2)
Poultry Unit	1	110.5	24.5	2707
Egg Packing Building	1	24	12	288
Link Building	1	2	2	4
Concrete Hardstanding	1	1	651	651
Total				3650

OUTLINE DESIGN OF PIPES AND LEVELS

Outfall to Ditch	1.4	Distance To Ditch	15
Gradient 1 in	150	Outlet Level	1.500
Crest Level	2.800	Outlet Depth	1.300

CONSIDER PIPEWORK RUNS LONGEST FIRST

Pipe	From	To	Conne cted 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	3650	51.1	300	63.5	2.80	1.500	1.000	63	300	1.710
2	S1	S2	2297	32.2	225	32.6	3.00	1.710	1.065	72	225	2.030
3	S2	S3	1620	22.7	225	32.6	3.00	2.030	0.745	34	225	2.181
	S3	S4	651	9.1	150	15	3.00	2.256	0.594	15	150	2.356
	S4			0.0	150	15	3.00	2.356	0.494			
4	S1	S5	1354	19.0	225	32.6	3.00	1.710	1.065	30	225	1.843
5	S5	S6	1354	19.0	225	32.6	3.00	1.843	0.932	57	225	2.097
	S6	S7	677	9.5	150	15	3.00	2.172	0.678	57	150	2.552
	S7				150	15	3.00	2.552	0.298			

CHECK PIPE SURCHARGE FOR 15 MINUTE STORM

Calculate Start Level in Basin

Basin Base Level	1.500		
	1 in 1 yr	1 in 30 y	1 in 100 yr
Total Run Off Volume (m3)	28.7	70.1	90.6
Run Off at 15 mins (Peak Flow)	23.9	58.4	75.5
Basin Base Area	372	372	372
Discharge Rate (l/s)	3.5	3.5	3.5
Discharge in 15 mins	0.3	0.3	0.3
Depth in Basin (m)	0.06	0.16	0.20
Level in Basin (m,)	1.563	1.656	1.702
Top of Pipe	1.800	1.800	1.800
Start Level	1.563	1.656	1.702
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 year Equiv Run-off 0.021 l/s/m2

Pipe No	DS MH	Invert Level	DS Water Level	Connect ed 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	1.702	3650	78	300	63	0.0055	S1	2.049	2.010	Y	0.039	3.00	0.95	N	0.000
2	S1	1.710	2.049	2297	49	225	72	0.0095	S2	2.730	2.255	Y	0.475	3.00	0.27	N	0.000
3	S2	2.030	2.730	1620	35	225	34	0.0050	S3	2.899	2.406	Y	0.493	3.00	0.10	N	0.000
7	S1	1.710	2.049	1354	29	225	30	0.0036	S5	2.155	2.068	Y	0.087	3.00	0.84	N	0.000
8	S5	1.843	2.155	1354	29	225	57	0.0036	S6	2.358	2.322	Y	0.036	3.00	0.64	N	0.000

CHECK PIPE SURCHARGE FOR 15 MINUTE STORM

Calculate Start Level in Basin

Basin Base Level	1.500		
	1 in 1 yr	1 in 30 y	1 in 100 yr
Total Run Off Volume (m3)	28.7	70.1	90.6
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Discharge Rate (l/s)	3.5	3.5	3.5
Discharge in 15 mins	0.3	0.3	0.3
Depth in Basin (m)	0.06	0.16	0.20
Level in Basin (m,)	1.563	1.656	1.702
Top of Pipe	1.800	1.800	1.800
Start Level	1.563	1.656	1.702
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 year Equiv Run-off 0.028 l/s/m2

Pipe No	DS MH	Invert Level	DS Water Level	Connect ed 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	1.702	3650	101	300	63	0.0090	S1	2.267	2.010	Y	0.257	3.00	0.73	N	0.000
2	S1	1.710	2.267	2297	64	225	72	0.0154	S2	3.379	2.255	Y	1.124	3.00	-0.38	Y	0.379
3	S2	2.030	3.379	1620	45	225	34	0.0081	S3	3.653	2.406	Y	1.247	3.00	-0.65	Y	0.653
7	S1	1.710	2.267	1354	38	225	30	0.0058	S5	2.441	2.068	Y	0.373	3.00	0.56	N	0.000
8	S5	1.843	2.441	1354	38	225	57	0.0058	S6	2.772	2.322	Y	0.450	3.00	0.23	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 = 3650 m2

Climate Change of 40%

Flows (l/s) = $2.78 \times I \times A(\text{ha}) \times \text{Global warming}$

Storm	15	30	60	120	240	360	720	1440
1 in 100 yr	141.11	91.60	57.68	34.72	19.99	14.96	8.18	4.84
1 in 30 yr	109.11	69.97	43.47	26.39	15.22	11.58	6.35	3.78
2 in 30 yr	58.19	36.82	23.01	14.10	8.25	6.37	3.58	2.21
1 in 1 yr	44.73	28.54	18.04	11.17	6.66	5.22	2.94	1.85

Volume (m3) = $C_v \times A(\text{ha}) \times I \times D/60$ $C_v = 1.00$

Storm	15	30	60	120	240	360	720	1440
1 in 100 yr	127	165	207	250	288	323	353	418
1 in 30 yr	98	126	156	190	219	250	274	326
1 in 2 yr	52	66	83	101	119	137	155	191
1 in 1 yr	40	51	65	80	96	113	127	160

Initial Estimate of Balancing Volume Required

For Peak Discharge of 3.50 l/s $Av \text{ Discharge Factor} = 0.85$ $Av \text{ Qout} = 2.98 \text{ l/s}$

Storm	15	30	60	120	240	360	720	1440
1 in 100 yr	124	159	197	228	245	259	225	161
1 in 30 yr	95	120	146	168	176	186	146	69
1 in 2 yr	50	61	72	80	76	73	26	0
1 in 1 yr	38	46	54	59	53	48	0	0

Storage required for Critical Storm = 259 m3

Q-Brake Design and Performance Report

Project Details

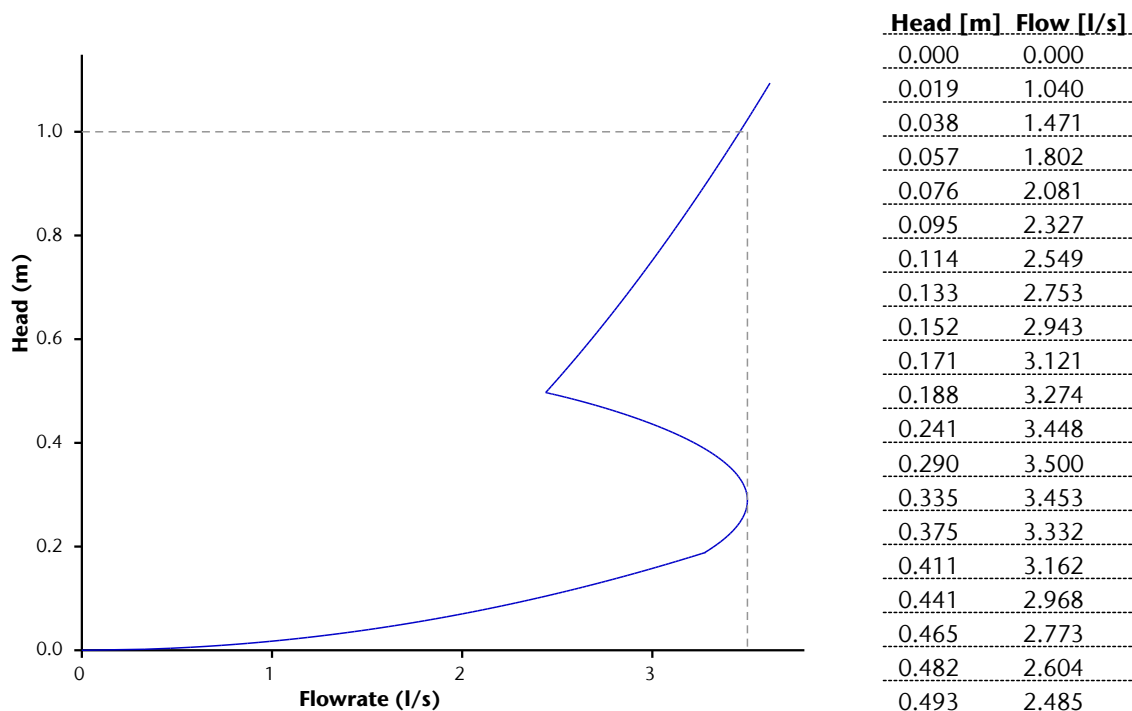
Project : New Min Standard
 Chamber Number : 1
 Chamber Name : New Chamber

Reference

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

Design

Description	Size [m]	Description	Rate [l/s]	Description	Model
Design Head	1.000	Design Flow Rate	3.500	Design Style	Flat Back



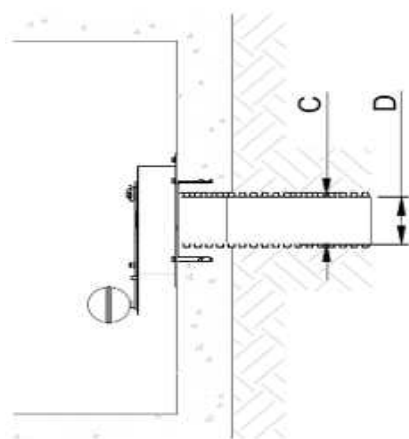
Specification

Description	Height [m]	Rate [l/s]	Description	Size [mm]
Flush Flow	0.208	3.35	Minimum Outlet Pipe Diameter	100
Reattachment	0.497	2.44	Minimum Sump Depth	323
			Minimum Chamber Diameter	1050

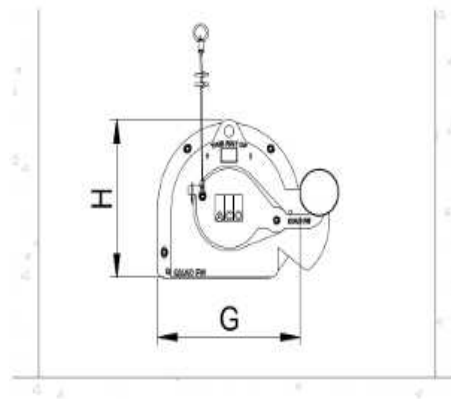
Disclaimer: This design only applies to ACO Q-Brake and ACO Q-Plate products and no other parties' products. It is the responsibility of the designer ('user') to verify that the design parameters have been entered correctly and that relevant industry standards and guidelines have been taken into consideration.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

ACO Q-Brake Dimensions

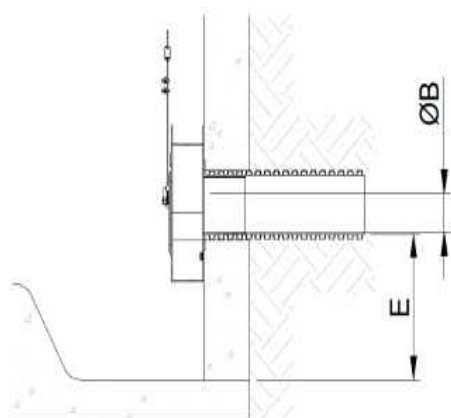
Model: QB350



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

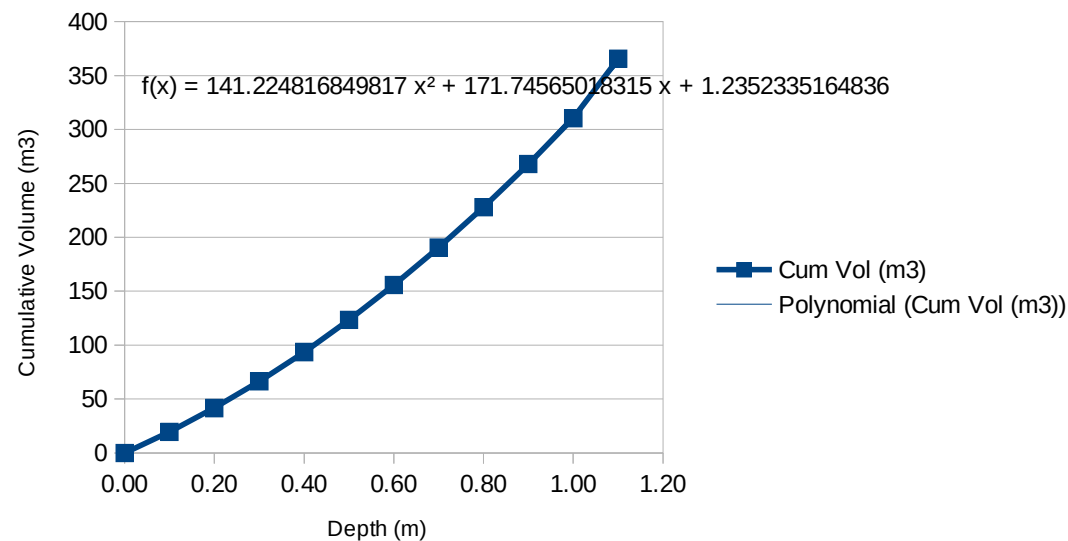
* Design dimensions shown are as selected by the designer.

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.

Open Attenuation Basin

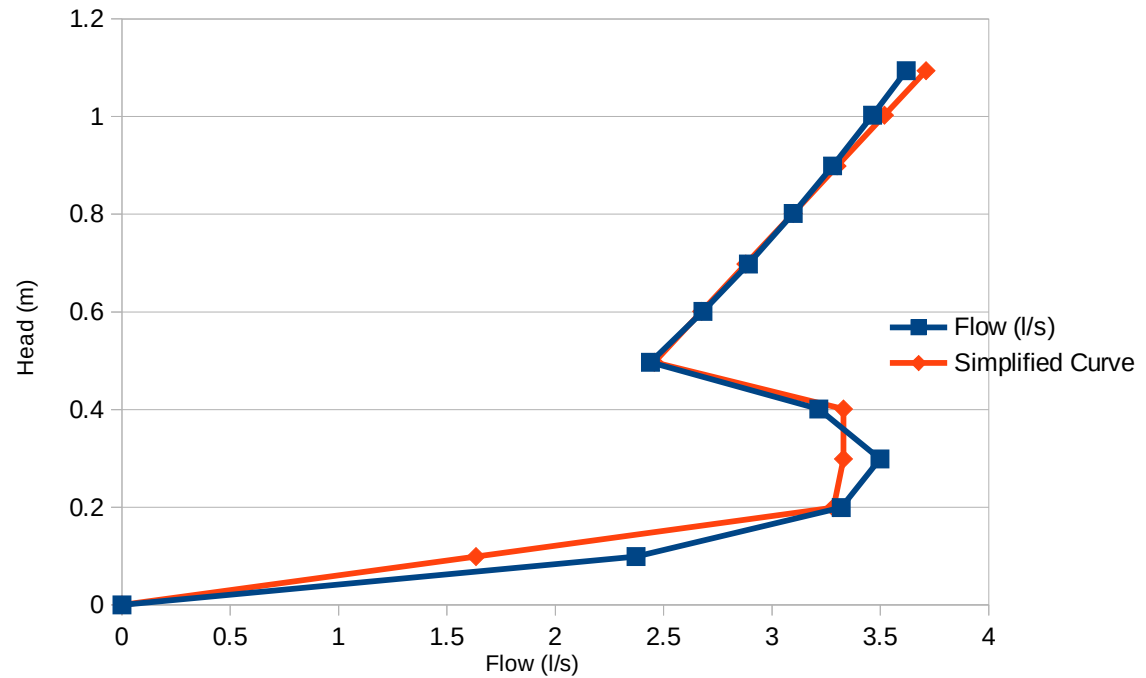
Base Area 183 m2
 Area at DWL 438 m2
 Depth 1 m
 Design Volume 311 m3
 Area at Crest 1114 m2

Depth (m)	(m2)	(m3)	Cum Vol
0.00	183		0
0.10	209	19.6	20
0.20	234	22.1	42
0.30	260	24.7	66
0.40	285	27.2	94
0.50	311	29.8	123
0.60	336	32.3	156
0.70	362	34.9	191
0.80	387	37.4	228
0.90	413	40.0	268
1.00	438	42.5	311
1.10	663	55.1	366
1.20	889	77.6	443
1.30	1114	100.1	543



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



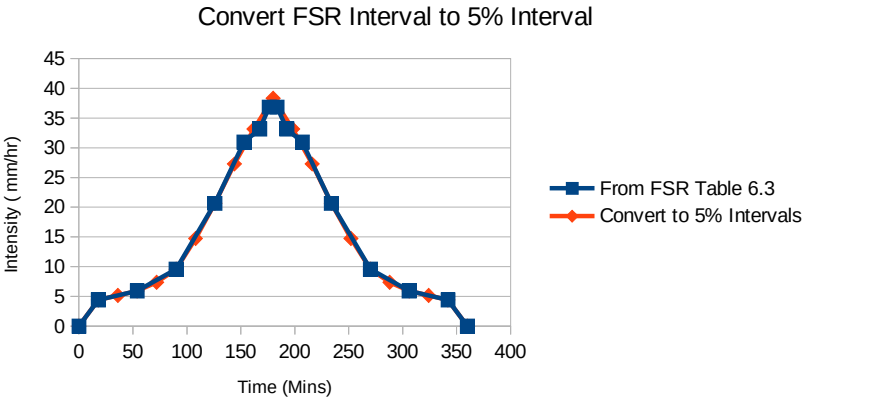
Simplified Formula

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

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 3650

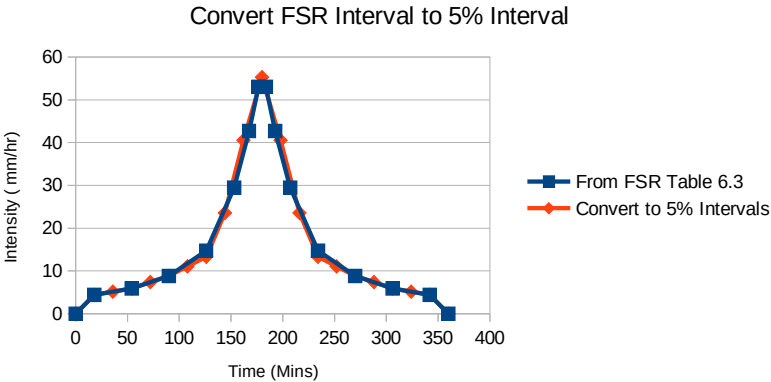
From FSR Table 6.3							Convert to 5% Intervals			
% Duration of Storm	Proportion of I	Mins from Centre	Time from Start Mins	Intensity mm/hr	Volume	Cumulative Volume	%	Time Mins	Proportion of I	Intensity (mm/hr)
0		180	0	0	0	0	0	0.0	0	0
5	0.3	162	18	4.42	2	2	5	18.0	0.3	4.42
15	0.4	126	54	5.90	11	14	10	36.0	0.35	5.16
25	0.65	90	90	9.58	17	31	15	54.0	0.4	5.90
35	1.4	54	126	20.64	33	64	20	72.0	0.5	7.37
42.5	2.1	27	153	30.96	42	106	25	90.0	0.65	9.58
46.5	2.25	12.6	167.4	33.17	28	134	30	108.0	1	14.74
49	2.5	3.6	176.4	36.86	19	153	35	126.0	1.4	20.64
51	2.5	-3.6	183.6	36.86	16	170	40	144.0	1.85	27.27
53.5	2.25	-12.6	192.6	33.17	19	189	45	162.0	2.25	33.17
57.5	2.1	-27	207	30.96	28	217	50	180.0	2.6	38.33
65	1.4	-54	234	20.64	42	259	55	198.0	2.25	33.17
75	0.65	-90	270	9.58	33	292	60	216.0	1.85	27.27
85	0.4	-126	306	5.90	17	309	65	234.0	1.4	20.64
95	0.3	-162	342	4.42	11	321	70	252.0	1	14.74
100		-180	360	0.00	2	323	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



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 3650

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	11	14	10	36.0	0.35	5.16
25	0.60	90	90	8.85	16	30	15	54.0	0.4	5.90
35	1.00	54	126	14.74	26	56	20	72.0	0.5	7.37
42.5	2.00	27	153	29.48	36	92	25	90.0	0.6	8.85
46.5	2.90	12.6	167.4	42.75	32	124	30	108.0	0.75	11.06
49	3.60	3.6	176.4	53.07	26	150	35	126.0	0.9	13.27
51	3.60	-3.6	183.6	53.07	23	173	40	144.0	1.6	23.59
53.5	2.90	-12.6	192.6	42.75	26	199	45	162.0	2.75	40.54
57.5	2.00	-27	207	29.48	32	231	50	180.0	3.75	55.28
65	1.00	-54	234	14.74	36	267	55	198.0	2.75	40.54
75	0.60	-90	270	8.85	26	293	60	216.0	1.6	23.59
85	0.40	-126	306	5.90	16	309	65	234.0	0.9	13.27
95	0.30	-162	342	4.42	11	321	70	252.0	0.75	11.06
100		-180	360	0.00	2	323	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



ATTENUATION FOR CRITICAL STORM DURATION OF

360.0 min

75% Winter Storm

Connected Area

3650 m2

Design Storage

311 m3

Open Storage

From Storage Sheet

Storage= 141.22 x2 +

171.745 x +

1.235

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	% Design Storage
	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	
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	2.42	2.42	0.006	0.006	2.3	0.10	0.05	0.05	0.05	0.10	1
36.0	5.2	4.79	5.25	7.67	0.034	0.034	7.2	0.56	0.33	0.36	0.41	0.02	2
54.0	5.9	5.53	6.05	13.72	0.062	0.062	12.4	1.02	0.79	0.86	1.27	0.03	4
72.0	7.4	6.63	7.26	20.99	0.093	0.093	18.4	1.53	1.28	1.38	2.65	-0.09	6
90.0	9.6	8.48	9.28	30.27	0.128	0.128	25.5	2.11	1.82	1.97	4.62	0.12	8
108.0	14.7	12.16	13.32	43.58	0.178	0.178	36.3	2.94	2.52	2.73	7.34	-0.04	12
126.0	20.6	17.69	19.37	62.96	0.246	0.246	52.0	3.33	3.13	3.38	10.73	0.20	17
144.0	27.3	23.96	26.23	89.19	0.335	0.335	74.6	3.33	3.33	3.60	14.32	0.25	24
162.0	33.2	30.22	33.09	122.28	0.440	0.440	104.1	2.97	3.15	3.40	17.72	0.41	34
180.0	38.3	35.75	39.15	161.42	0.556	0.556	140.2	2.58	2.77	3.00	20.72	0.49	45
198.0	33.2	35.75	39.15	200.57	0.660	0.660	176.1	2.80	2.69	2.90	23.62	0.85	57
216.0	27.3	30.22	33.09	233.66	0.743	0.743	206.8	2.97	2.88	3.11	26.73	0.13	67
234.0	20.6	23.96	26.23	259.89	0.802	0.802	229.8	3.09	3.03	3.27	30.01	0.08	74
252.0	14.7	17.69	19.37	279.27	0.842	0.842	246.0	3.18	3.14	3.39	33.40	-0.10	79
270.0	9.6	12.16	13.32	292.58	0.865	0.865	255.5	3.23	3.20	3.46	36.86	0.27	82
288.0	7.4	8.48	9.28	301.86	0.880	0.880	261.7	3.26	3.24	3.50	40.36	-0.22	84
306.0	5.9	6.63	7.26	309.13	0.890	0.890	265.9	3.28	3.27	3.53	43.89	-0.71	86
324.0	5.2	5.53	6.05	315.18	0.895	0.895	268.1	3.29	3.28	3.55	47.43	-0.32	86
342.0	4.4	4.79	5.25	320.43	0.898	0.898	269.3	3.30	3.29	3.56	50.99	0.10	87
360.0	0.0	2.21	2.42	322.85	0.896	0.896	268.5	3.29	3.29	3.56	54.55	-0.19	86

ATTENUATION FOR CRITICAL STORM DURATION OF

360.0 min

50% Summer Storm

Connected Area

3650 m2

Design Storage

311 m3

Open Storage

From Storage Sheet

Storage= 141.22 x2 +

171.745 X +

1.235

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)

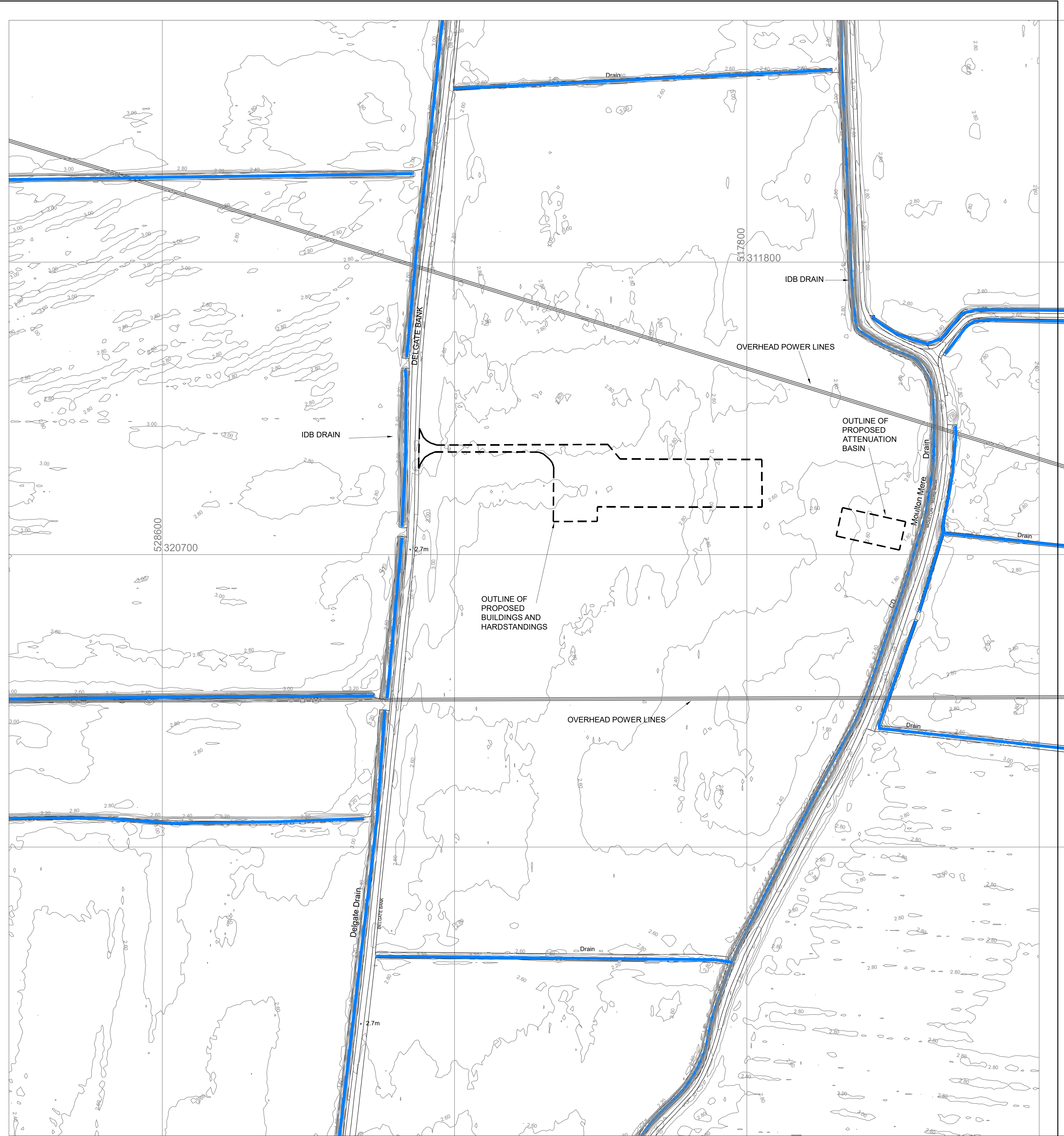
Above 0.5

Q=2.46+2.1(H-0.5)

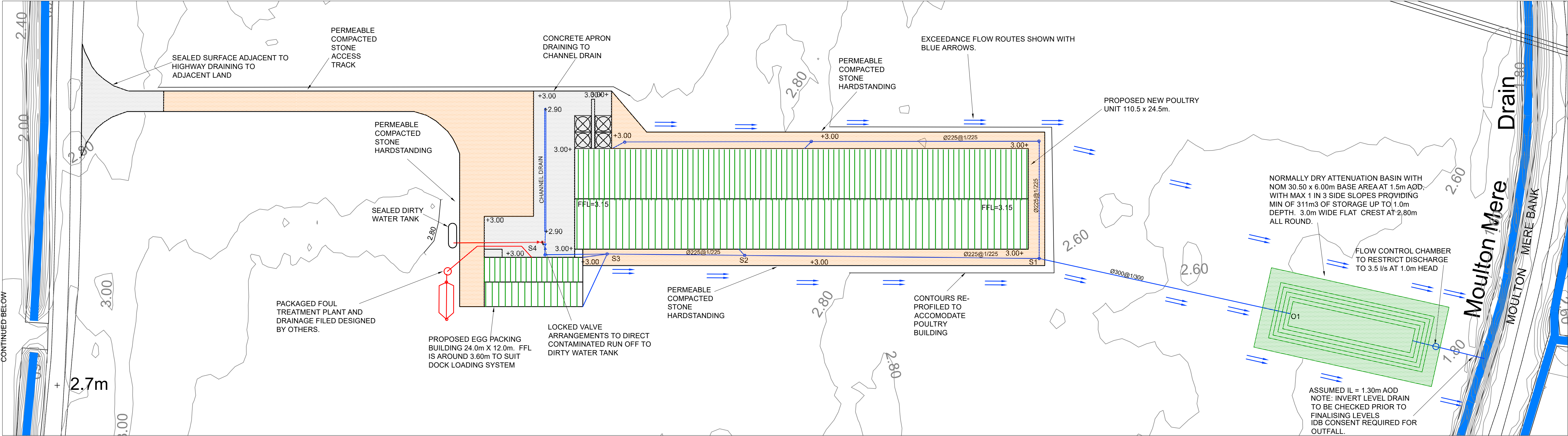
Instructions

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

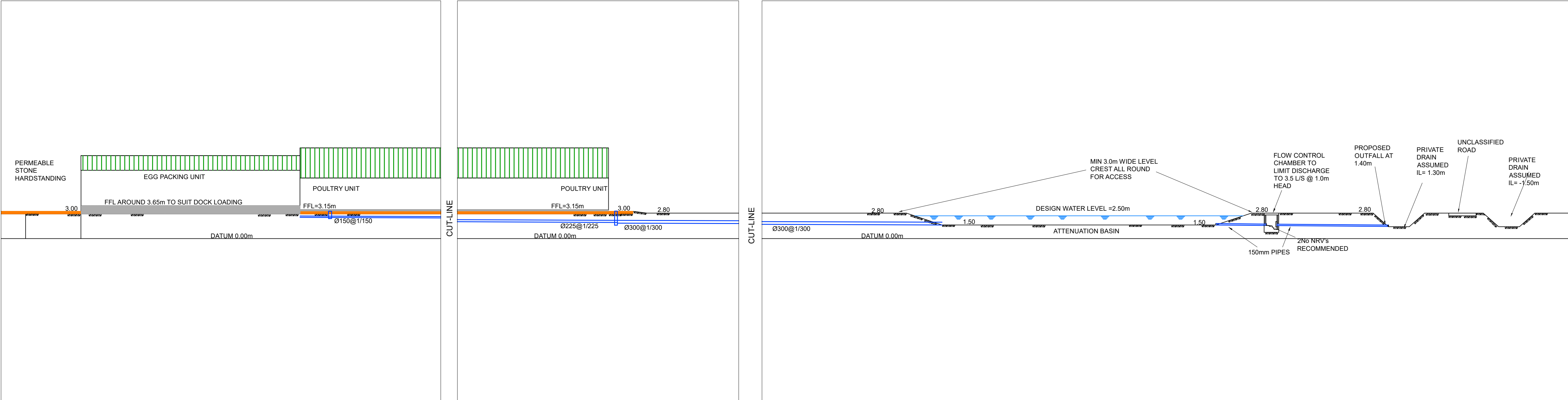
Time	Rainfall				DCV	Storage		Discharge Control				Check Sum	% Design Storage
	Rainfall	Av Rainfall mm/hr	Vol In m3	Cum In m3	Head h (mm)	Depth in Basin (m)	Vol m3	Out-flow l/s	Av Flow Out l/s	Vol Out m3	Cum Out m3	Inflow - Storage - Out = 0	
0.0	0.0	0.00	0.00	0.00	0.000	0.000	0.0	0.00	0.00	0.00	0.00	0.00	0
18.0	4.4	2.21	2.42	2.42	0.006	0.006	2.3	0.10	0.05	0.05	0.05	0.10	1
36.0	5.2	4.79	5.25	7.67	0.034	0.034	7.2	0.56	0.33	0.36	0.41	0.02	2
54.0	5.9	5.53	6.05	13.72	0.062	0.062	12.4	1.02	0.79	0.86	1.27	0.03	4
72.0	7.4	6.63	7.26	20.99	0.093	0.093	18.4	1.53	1.28	1.38	2.65	-0.09	6
90.0	8.8	8.11	8.88	29.86	0.128	0.128	25.5	2.11	1.82	1.97	4.62	-0.28	8
108.0	11.1	9.95	10.90	40.76	0.165	0.165	33.4	2.72	2.42	2.61	7.23	0.12	11
126.0	13.3	12.16	13.32	54.08	0.210	0.210	43.5	3.33	3.03	3.27	10.49	0.05	14
144.0	23.6	18.43	20.18	74.26	0.280	0.280	60.4	3.33	3.33	3.60	14.09	-0.23	19
162.0	40.5	32.06	35.11	109.37	0.397	0.397	91.7	3.33	3.33	3.60	17.69	0.00	30
180.0	55.3	47.91	52.46	161.83	0.557	0.557	140.7	2.58	2.95	3.19	20.88	0.24	45
198.0	40.5	47.91	52.46	214.29	0.700	0.700	190.7	2.88	2.73	2.95	23.83	-0.19	61
216.0	23.6	32.06	35.11	249.40	0.784	0.784	222.7	3.06	2.97	3.21	27.03	-0.32	72
234.0	13.3	18.43	20.18	269.58	0.826	0.826	239.4	3.14	3.10	3.35	30.38	-0.25	77
252.0	11.1	12.16	13.32	282.90	0.849	0.849	248.8	3.19	3.17	3.42	33.80	0.26	80
270.0	8.8	9.95	10.90	293.79	0.868	0.868	256.7	3.23	3.21	3.47	37.27	-0.19	83
288.0	7.4	8.11	8.88	302.67	0.880	0.880	261.7	3.26	3.25	3.51	40.78	0.16	84
306.0	5.9	6.63	7.26	309.94	0.890	0.890	265.9	3.28	3.27	3.53	44.31	-0.32	86
324.0	5.2	5.53	6.05	315.99	0.895	0.895	268.1	3.29	3.28	3.55	47.85	0.07	86
342.0	4.4	4.79	5.25	321.24	0.899	0.899	269.8	3.30	3.29	3.56	51.41	0.06	87
360.0	0.0	2.21	2.42	323.66	0.897	0.897	268.9	3.29	3.30	3.56	54.97	-0.23	87



CROWN COPYRIGHT. ALL RIGHTS RESERVED. LICENCE NO. 100040210.				George Shuttleworth Ltd Consulting Engineers gs1_engineers@outlook.com 1 Fulmar Court, Fulmar Rd, Lincoln, LN6 3NE Tel 07940 927285				CLIENT W DRING AND SONS LTD		DRAWING TITLE EXISTING SITE, CONTOURS AND KEY DRAINAGE FEATURES.		
NOTES 1. DO NOT SCALE FROM THIS DRAWING 2. CONTOURS SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM LIDAR LEVELS DOWNLOADED FROM THE DEFRA WEB-SITE				This drawing is the copyright of George Shuttleworth Ltd and shall not be copied or amended without the written permission of George Shuttleworth Ltd				PROJECT NEW POULTRY UNIT ON LAND OF DELGATE BANK, WESTON HILLS, LINCOLNSHIRE, PE12 6BX.		SCALE 1:1250	APPROVED BY GS	DATE MAY 25
REV DESCRIPTION				AP DATE				DRG SIZE A1		DRAWING NO. 881-001		REV. -



PLAN ON POULTRY UNITSCALE 1:500



ILLUSTRATIVE SECTION THROUGH ATTENUATION BASIN AND POULTRY UNIT SCALE 1:200

NOTES

- DO NOT SCALE FROM THIS DRAWING
- CONTOURS SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM LIDAR LEVELS DOWNLOADED FROM THE DEFRA WEB-SITE

OUTLINE DESIGN NOTES

- 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.
- FLOOR LEVELS HAVE BEEN SET TO MINIMISE FLOOD RISK AND SUIT THE EXISTING CONTOURS. IF A DIFFERENT CUT & FILL BALANCE IS REQUIRED THEN THE LEVELS AND SW DRAINAGE WILL NEED TO ADJUSTED ACCORDINGLY.
- THE INVERT LEVEL OF THE DITCH SHOULD BE CHECKED PRIOR TO FINALISING LEVELS.
- ALL SW PIPEWORK IS Ø150mm LAID AT 1 IN 150 UNLESS NOTED OTHERWISE ON THE DRAWING.
- PIPEWORK TO CONNECT SOFFIT TO SOFFIT.
- ALL PIPEWORK TO BE INSTALLED IN ACCORDANCE WITH BUILDING REGULATIONS PART H.
- TYPICAL MH INVERT LEVELS FOR THE OUTLINE SCHEME SHOWN ARE GIVEN IN THE FOLLOWING TABLE

MH No	IL
O1	1.500
S1	1.710
S2	2.030
S3	2.256
S5	1.843
S6	2.172
S7	2.552

IMPERMEABLE AREA DISCHARGING TO SYSTEM
ROOFS = 3000m²
CONCRETE HARDSTANDING = 650m²

REV DESCRIPTION AP DATE

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CLIENT W DRING AND SONS LTD

PROJECT NEW POULTRY UNIT ON LAND OF DELGATE BANK, WESTON HILLS, LINCOLNSHIRE, PE12 6BX.

DRAWING TITLE
**PROPOSED DEVELOPMENT AND
OUTLINE SURFACE WATER
DRAINAGE DESIGN**

SCALE AS SHOWN APPROVED BY GS DATE MAY 26

DRG SIZE A1 DRAWING NO. 881-002 REV.

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THIS DRAWING HAS BEEN
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FOR BEST VIEW.