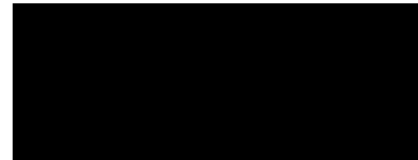




The Civil Engineering Practice
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Flood Risk Assessment

Proposed New Production Unit and Associated Works at

Sefter Farm, Pagham, West Sussex

On behalf of

Barfoots of Botley Ltd

July 2016

Document History and Status

Project Reference: 22536

Date	Version	Prepared By	Reviewed By	Approved By
07/07/16	1.0	Bava Sathan CEng MICE FIHE	Gerry Waller CEng MICE MCIWEM MAE	Gerry Waller CEng MICE MCIWEM MAE

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1 Non Technical Summary

- 1.1 This Flood Risk Assessment has been undertaken in accordance with the National Planning Policy Framework on behalf of Barfoots of Botley Ltd in support of a Planning Application for the construction of a new processing, preparation, packaging and distribution unit for fresh foods together with accommodation associated with the existing horticultural business and the revision of internal access road, car parking and hard standing areas and landscaping on land at Sefter Farm, West Sussex.
- 1.2 This Assessment is to be read in conjunction with all planning, architectural and other reports that accompany the Planning Application for the proposed development.
- 1.3 The site is partially shown on the Environment Agency flood modelling data to be within Flood Zone 3. This Assessment confirms that the site is protected by existing flood defence and is not at risk of flooding from tidal or fluvial sources, overland flows or at an unacceptable risk from groundwater.
- 1.4 Surface water from the new building, loading yard area and service road will be collected and stored in the existing storage reservoir with existing restricted discharge to the Main River Pagham Rife to the west of the site.
- 1.5 Foul drainage will be discharged to the existing private foul drainage system at Sefter Farm.
- 1.6 This report concludes that the proposed development is suitable at this location and there are no significant flooding or drainage risks.

2 Planning Policy Context

2.1 National Planning Policy Framework

2.1.1 National Planning Policy Framework aims to reduce flood risk through development opportunities. The policy framework aims to ensure flood risks and the predicted effects of climate change have been taken into account and appropriate measures put in place to ensure that:

- The development is safe
- Where possible the flood risk overall is reduced
- Increased flood risk does not occur elsewhere
- Appropriate mitigation measures are employed to deal with these effects and risks.

2.1.2 The National Planning Policy Framework requires Planning Authorities to apply a sequential approach to planning and flood risk by placing development in areas of low flood risk before allocating sites in areas of higher risk sequentially and by exception following the processes of the Sequential and Exception Tests.

2.2 Arun District Council Emerging Local Plan 2011 – 2031

2.2.1 The Arun Local Plan 2011 – 2031 (Publication Version) is the most recent version of the emerging Local Plan.

2.2.2 The Arun District Local Plan 2011-2031 and supporting documents were submitted on 30th January 2015 for independent examination to the Secretary of State for Communities and Local Government via the Planning Inspectorate.

2.2.3 On 5 March 2015 the Inspector issued preliminary questions which were responded to by Arun District Council on 17 March 2015.

2.2.1 A procedural meeting was held on 16th July 2015 to discuss the implications of the Council's revised position on the 'objectively assessed needs for market and affordable housing'.

2.2.2 On 2nd February 2016 the Inspector provided his conclusions on Objectively Assessed Needs. The Inspector has suspended the Examination until completion of Arun District Council's agreed work plan.

2.2.3 Until the Local Plan is adopted by the District Council the statutory development policies currently consists of:

- The saved policies within the Arun District Local Plan (2003)
- The Arun District Proposals Map
- The saved policies within the West Sussex Minerals Local Plan (2003)

2.3 Arun District Council Local Plan (2003)

2.3.1 The Arun District Council Local Plan 2003 saved policies will remain effective until replaced by the new Arun Local Plan.

2.3.2 The policies of the currently adopted Local Plan which are relevant to this development are as follows:

2.3.3 **POLICY GEN9** Foul and Surface Water Drainage states that *'planning permission for development which will materially increase foul and/or surface water discharges will be refused unless the Local Planning Authority is satisfied that either adequate drainage capacity exists or appropriate drainage capacity can be provided as part of the development. Consideration should also be given to the use of Sustainable Urban Drainage Systems (SUDS) as alternatives to conventional drainage where appropriate.'*

2.3.4 **POLICY GEN10** Tidal Flooding and Coastal Defence states that *'planning permission will be refused for development which would be at an unacceptable risk of tidal flooding and/or where proposals are detrimental to the integrity of tidal defences or the ability to maintain or improve them.'*

2.3.5 It continues *'within the built-up areas, planning permission will only be granted where the local planning authority is satisfied that appropriate flood and coastal defence and mitigation measures have been provided so that the development will not itself be at unacceptable risk and furthermore does not pose an unacceptable risk to existing development in the area.'*

2.3.6 **POLICY GEN11** Inland Flooding states that *'permission for development which would be at risk from flooding and/or materially decrease the capacity of a floodplain to store or pass flows of floodwater, will be refused unless the Local Planning Authority is satisfied that compensatory flood storage/waterway areas can be provided as part of the development and the function and effectiveness of existing watercourses, or their replacements, are not adversely affected.'*

2.4 Strategic Flood Risk Assessment

2.4.1 Capita Symonds produced a Strategic Flood Risk Assessment on behalf of Arun District Council in February 2008.

2.4.2 The SFRA has been reviewed and is referenced within this Assessment.

2.5 Lead Local Flood Authority

2.5.1 West Sussex County Council became a Lead Local Flood Authority under the Flood and Water Management Act 2010 and was given a series of new responsibilities to coordinate the management of local flood risk.

2.5.2 As part of their role the County Council have produced a Preliminary Flood Risk Assessment which is referenced within this Assessment.

3 Existing Site

3.1 Site Location

- 3.1.1 The development site is located on open farmland at Sefter Farm, Pagham, West Sussex. The nearest postcode is PO21 3PX, Ordnance Survey reference SZ 893 995.
- 3.1.2 The site is bounded on its northeast side by the access road to the farm from Pagham Road, on its east side by Pagham Road, on its west side by a drainage ditch, reservoirs and silos within Sefter Farm and on its south side by a short section of land draining to a stream which in turn discharges to the Pagham Rife 200m to the west.
- 3.1.3 A copy of the site location plan is located in Appendix 1 at the rear of this Assessment.

3.2 Site Description

- 3.2.1 The development site is approximately 2.33 hectares in area and currently comprises undeveloped agricultural land, access ways, parking areas and a number of outbuildings.
- 3.2.2 Vehicular and pedestrian access to the site is available from the private access road to Sefter Farm at the northern site boundary which forms an uncontrolled T Junction with Pagham Road.
- 3.2.3 The site is at a level of between 5.7 and 3.7m AOD and slopes gently towards the centre of the proposed area to be developed.
- 3.2.4 A copy of the existing site layout plan is located in Appendix 2 at the rear of this Assessment.

3.3 Geology and Groundwater

- 3.3.1 Borehole records hosted by the British Geological Survey confirm the geology in the vicinity of the site.
- 3.3.2 A borehole immediately east of the site sunk in 1890 identified 2.4m of gravel over clay layers with chalk approximately 142m below ground level. No groundwater was struck.
- 3.3.3 More recent boreholes undertaken in September 1981 located approximately 780m to the north of the site identified clayey gravels over clay with a water strike 2.8m below ground level in one location and no groundwater to a depth of at least 4m in another.
- 3.3.4 A copy of the borehole records is located in Appendix 3 at the rear of this report.

3.4 Drainage

- 3.4.1 The site currently benefits from existing land drainage systems and positive surface water drainage infrastructure to drain the land and hard standing within the site boundary.
- 3.4.2 The existing hard surfaces discharge in an unrestricted manner through existing petrol interceptors and into the Pagham Rife.
- 3.4.3 The greenfield runoff from the site has been determined using the IH124 method with a mean annual runoff (QBar) value of 4.68l/s.
- 3.4.4 Foul discharge from the existing buildings is connected to the public foul sewer through a private pumped system which crosses the wider site.
- 3.4.5 A copy of the Greenfield runoff calculation is located in Appendix 4 at the rear of this Assessment.

4 Flood Zone and Flood History

4.1 Flood Zone

4.1.1 The Environment Agency's online mapping shows the site is located in Flood Zone 3. The extent of the flood map does not take account of any topographical features or other flood defence.

4.1.2 Environment Agency has noted that new modelling information would become available but the information was not provided at the time of writing this report.

4.1.3 Environment Agency has further indicated that the new flood outline is similar to modelling information referred to in this report.

4.2 Flood History

4.2.1 Environment Agency

4.2.1.1 The Environment Agency has confirmed that they hold no data related to flooding of the site.

4.2.2 West Sussex County Council

4.2.2.1 The Preliminary Flood Risk Assessment prepared by West Sussex County Council in May 2011 does not identify any specific flood incidents at the proposed development site.

4.2.2.2 West Sussex County Council has confirmed one historic record for the area dating back to 1998 which was linked to the ditch network around 'Sefter Bottom' and resulted in 75mm of water across the highway.

4.2.2.3 West Sussex County Council also noted that the updated flood maps for surface water (uFMfSW) show the site to be at 'low risk' for 1 in 30 and 1 in 100 year rainfall events.

4.2.2.4 West Sussex County Council have confirmed that the area has limited positive highway drainage with much of the highway draining over the edge to the highway verges.

4.2.2.5 West Sussex County Council has also confirmed that based on the current ESI Groundwater Flood Risk Maps the site is at 'High risk' of groundwater flooding and the area has a 'High susceptibility' to groundwater flooding.

4.2.3 Arun District Council

4.2.3.1 The Strategic Flood Risk Assessment includes a map of historic flood incidents in the District.

- 4.2.3.2 The SFRA identifies an incident related to surface water flooding to the south of the site.
 - 4.2.3.3 The date, cause, severity and nature of this event are not recorded but it is believed that it is the same event identified by West Sussex County Council which occurred in 1998.
 - 4.2.3.4 Arun District Council have verbally confirmed that there are highway drainage issues on the east side of Pagham Road in the locality of the Sefter Farm access where highway drainage discharges to a pond which drains slowly by infiltration.
 - 4.2.3.5 There is also a low spot on Sefter Road which is known to flood and that Pagham Rife backs up into the local watercourses during periods of heavy rainfall.
 - 4.2.3.6 Arun District Council was approached for pre-application advice and noted that the development was likely to be accepted when supported by an adequate site specific flood risk assessment report.
- 4.2.4 Southern Water
- 4.2.4.1 Southern Water have confirmed that their closest sewer system is located on Hook Lane approximately 600m to the south of the site and that they hold no record of flooding in the locality.
- 4.2.5 Copies of the Environment Agency Flood Maps are located in Appendix 5 at the rear of this report and correspondence received from The Environment Agency, West Sussex County Council, Arun District Council and Southern Water is located in Appendix 6.

5 Flooding Potential

5.1 Tidal and Fluvial Flooding

- 5.1.1 The site is shown to be partially within the Flood Zone 3 flood envelope from the Pagham Rife.
- 5.1.2 On the south western corner of the site there is an existing earth bund with top of bund levels ranging from 5.03m up to 5.70m AOD.
- 5.1.3 The raised reservoir to the western boundary of the site has a top of bund level set at 4.90m AOD, which is lower than the southern boundary bund.
- 5.1.4 The reservoir is not shown to be within the flood extent as the raised bund acts as a flood barrier.
- 5.1.5 Similarly the existing earth bund at the southern boundary would act as flood defence and protect the site from any flooding.
- 5.1.6 There is an existing anaerobic digestion plant unit immediately south of the proposed development area. The unit along with associated flood defence measures were implemented circa 2009/10 under Planning Permission P/92/08/.
- 5.1.7 A copy of the existing topographical information showing the existing earth bund and raised reservoir is shown in Appendix 7 at the rear of this report.

5.2 Groundwater Flooding

- 5.2.1 As previously noted West Sussex County Council has confirmed that the site is within an area classified with a 'High susceptibility' to groundwater flooding.
- 5.2.2 No records of groundwater flooding affecting this site in the past have been identified though consultations and groundwater monitoring may be required to confirm groundwater depths which are anticipated to rise seasonally to approximately 800mm below ground level.
- 5.2.3 The main building floor level will be set above existing ground level and the risk from groundwater flooding is not considered significant.

5.3 Overland Flow

- 5.3.1 The Environment Agency have produced a surface water flood map which is included in Appendix 5 at the rear of this report.
- 5.3.2 The map shows a small area at the western site boundary as potentially at low risk of surface water flooding with the remainder at negligible risk.

- 5.3.3 The areas identified will affect the completed building and given that the local area is generally flat the risk of surface water runoff entering the site from the surroundings is negligible.
- 5.4 Flooding from Sewers and Drains
- 5.4.1 There are no public sewers in the immediate vicinity of the site, the closest being Southern Water's foul sewer located beneath Hook Lane approximately 600m to the south of the site
- 5.4.2 Localised flooding of highway drains in the vicinity has been identified by Chichester District Council and verbally confirmed by Arun District Council but is not anticipated to be a significant risk to the development site.
- 5.5 Flooding from Reservoirs
- 5.5.1 The Environment Agency have produced a map which identifies the risk of flooding from reservoirs which is included in Appendix 5 at the rear of this report.
- 5.5.2 The reservoirs to the west of the site are clearly marked and no flood risk to the site or the downstream catchment is identified.
- 5.6 Flood Routing
- 5.6.1 The natural route for flood waters to dissipate should any ever occur on the site is towards the existing drainage channel along the western site boundary and the watercourse to the south both of which discharge via the Pagham Rife to the sea at Pagham Harbour.

6 Development Proposals

6.1 Description

- 6.1.1 The development proposal is for the construction of a new processing, preparation, packaging and distribution unit for fresh foods together with accommodation associated with the existing horticultural business and the revision of internal access road, car parking and hard standing areas and landscaping.
- 6.1.2 As part of the proposed works the existing staff car park will be relocated eastwards and the existing temporary buildings and associated hard surface will be removed.
- 6.1.3 The roof area of the new building will be approximately 7,300m² and the external hard standing areas will cover approximately 11,475m² comprising a service road, loading yard area including approximately 1,830m² of existing hard standing.
- 6.1.4 As part of the proposed development approximately 1,520m² of existing outbuildings and associated paved areas will be removed.
- 6.1.5 A copy of the proposed site layout plan is located in Appendix 8 at the rear of this report.

6.2 Drainage Strategy

- 6.2.1 Surface water collected from the loading yard together with surface water from the access road will be passed through a suitable petrol interceptor and will be discharged into the existing reservoir north west of the proposed new building.
- 6.2.2 Surface water from the roof of the new building will be discharged directly into the same reservoir.
- 6.2.3 The total new impermeable surface area, taking account of the existing hard standing and removal of outbuildings, is 15,440m². The additional volume of runoff generated is thus approximately 1,220m³.
- 6.2.4 This additional volume will be discharged into the reservoir to the north west of the proposed new building. The surface area of the reservoir at its maximum capacity is approximately 10,000m². The additional surface water runoff volume generated by the new impermeable surface will result in less than 125mm increase in water level.
- 6.2.5 The reservoir is an artificial water body supplying part of the water requirements for the farm operational and irrigation activities. The reservoir is fed by abstracting water from the Pagham Rife.

- 6.2.6 The level of water within the reservoir is artificially maintained to allow a minimum freeboard of 500mm.
- 6.2.7 The proposed new development will not change the operation of the reservoir and will not result in a reduction of the operational freeboard level.
- 6.2.8 Foul drainage will be discharged to the existing private foul drainage system at Sefter Farm.
- 6.2.9 The full extent of the drainage infrastructure will be confirmed during detailed design and may also include other suitable sustainable drainage techniques.
- 6.2.10 Layouts showing the existing and new impermeable areas (drawings 6 and 7) together with preliminary storage volume calculations and a preliminary drainage strategy plan (drawing 8) are located in Appendix 9 at the rear of this report.

7 The Sequential and Exception Tests

7.1 Sequential Test

7.1.1 Referring to Paragraph 66 of the National Planning Practice Guidance (NPPG) under 'Table 2: Flood Risk Vulnerability Classification' the development is classified as 'Less Vulnerable'.

7.1.2 Under Paragraph 67 of the NPPG 'Table 3: Flood Risk Vulnerability and Flood Zone 'Compatibility'' confirms that 'Less Vulnerable' development is appropriate in Flood Zones 1, 2 and 3a.

7.1.3 The Sequential Test is passed as the proposed development is classified as 'Less Vulnerable' and considered compatible for the Flood Zone Classification.

7.2 Exception Test

7.2.1 The Exception Test is only required when the proposal does not meet the requirements of the Sequential Test. The Exception Test does not apply in this case.

8 Conclusions

- 8.1 The site is partially in Flood Zone 3, the proposed development is considered Less Vulnerable, compatible for the flood zone and the Sequential Test is passed.
- 8.2 The site benefits from local flood defence in the form of an earth bund on the south western corner of the site and is unlikely to be affected by flooding.
- 8.3 The Environment Agency have confirmed they hold no record of flooding having affected the site.
- 8.4 West Sussex County Council has confirmed one historic record for the area dating back to 1998 which was linked to the ditch network around 'Sefter Bottom' and resulted in 75mm of water across the public highway.
- 8.5 Arun District Council have verbally confirmed that there are highway drainage issues on the east side of Pagham Road and on Sefter Road.
- 8.6 There are however no records of flooding effecting the site within Arun District Council's Strategic Flood Risk Assessment.
- 8.7 This site is not at risk of flooding from the sea or overland flows. The highest flood risk to the site is from groundwater or from a failure of the onsite drainage system and reservoirs. Both these risks will be mitigated within the design.
- 8.8 The finished floor level of the building will be set above existing ground levels and will not be affected by groundwater.
- 8.9 The proposed onsite surface water drainage system will attenuate long return period storms and ensure there is no increase in surface water runoff from the land due to the development.
- 8.10 Foul drainage will be discharged to the existing private foul drainage system at Sefter Farm.
- 8.11 In terms of flood risk planning the proposed development is safe and suitable at this location and is considered appropriate.

9 List of Appendices

Appendix 1	Site Location Plan
Appendix 2	Existing Site Layout Plan
Appendix 3	Borehole Records
Appendix 4	Greenfield Runoff Calculation
Appendix 5	Environment Agency Flood Maps
Appendix 6	Correspondence received from The Environment Agency, West Sussex County Council, Arun District Council and Southern Water
Appendix 7	Topographical Information
Appendix 8	Proposed Site Layout Plan
Appendix 9	Impermeable Area Layouts, Preliminary Calculations and Drainage Strategy Plan

Appendix 1

Site Location Plan



SITE LOCATION

Rose Green

Aldwick

Nyetimber

Pagham

-100m 0 100 200 300 400 500m
Scale 1:12500

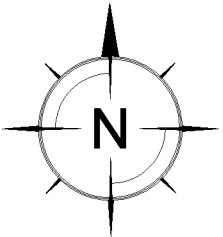
TITLE
Site Location Plan
Postcode: PO21 3PX
Grid Ref: SZ 893 995
SCALE
1:12500 @ A3
DRG. No.
1

Appendix 2

Existing Site Layout Plan



the
Civil
Engineering
Practice



Key:
Site Area
Extent of Sefter Farm

-20m 0 20m 40m 60m 80m

Scale 1:2000

TITLE
Existing Site Layout
SCALE
1:2000 @ A3
DRG. No.
2

Appendix 3

Borehole Records



British
Geological Survey
NATIONAL GOVERNMENT RESEARCH COUNCIL

Geology of Britain viewer



More GB33 map viewers

Full Screen
Geology

2D
Borehole

Borehole
Scans

Geology
Transparency

Borehole Scans

Click on a borehole to view
scans.

Borehole depth

- 0 - 10m
- 10 - 30m
- 30m+
- Unknown
- Confidential or Restricted

[More on boreholes](#)

Go to
Location

Switch
Basemap

100% 0%

Geology Transparency

Grid Ref: 496652, 95630

Rose
Green

esri

332/19 SZ89(2)
332/19

PAGHAM.

73 NE

Seftr School

From samples communicated by Duke & Okender, who sank the well.

W. 55x. I, p. 72.

332/19. Pagham, Seftr School. See W.S.
Ex. I, p. 72. We should be glad of any
details, ? deepening of shaft.

From Duke & Okender 23/9/01

- No watery hole abandoned.

		Thickness (Feet)	Depth
Drift 18 ft.	Loamy gravel	8	8
	Gravel	10	18
	Hard blue clay, not so less sandy	6	24
	Buff and brown sand	8	32
	Buff sand	14	46
	Blue clay and shells	11	57
	Brownish and blue clay	11	68
	Blue clay, not sandy	23	91
	Blue clay, more sandy	9	100
London Clay 57 ft.	Blue clay, with pyrites and fragments of large oyster	9	109
	Blue and brownish clay	34	143
	Blue and brownish clay, more sandy	13	156
Shaft is located here This shaft is now Pagham Village Hall and the lady living in the house adjoining says the well has been filled in now on meadow water.	Blue and brownish clay, still more sandy	11	167
	Black sandy loam	5	172
	Brown sandy loam	3	175
Reading 1882-10-57 Beds 104 ft.	Mottled red and brown clay and sand	7	182
	Grey loam	7	189
	Blackish loam	3	192
	Mottled clays	87	279
Upper Chalk	Chalk and flints (no water)	188	467
Heavy changes of dip in the chalk, to increase the yield of water, but without result, and the well has been abandoned.			
Sited on 6" Inclinometer 73 NE/W OD 18. Still in use Visited P. Okender 19.2.91			
Information from F.W. Okender records, at Basingstoke, May 1941: 6/1890 School Committee. Depth 467 ft. 19.2.91			

332/19 The Village Hall, Pagham (formerly Sefter School). (Filled in)

W.S.Sx. I. p. 72.

Surface +18.

Shaft.

Ck -261.

Shots fired.

Yield small.

Dando, June 1890.

British Geological Survey

British Geological Survey

SZ8912

Drift

18

Loamy gravel ...

...

8

8

Shrave ...

...

10

18

Hard blue clay, more or less

sandy ...

...

6

24

Buff and brown sand ...

...

8

32

Buff sand ...

...

14

46

Blue clay and shells ...

...

11

57

Brownish and blue clay ...

...

11

68

Blue clay, not sandy ...

...

23

91

Blue clay, more soapy ...

...

9

100

LC

157

Blue clay, with pyrites and

fragments of large oyster

...

9

109

Blue and brownish clay ...

...

34

143

Blue and brownish clay, more

sandy ...

...

13

156

Blue and brownish clay, still

more sandy ...

...

11

167

Black sandy loam ...

...

5

172

Brown sandy loam ...

...

3

175

Mottled red and brown clay and

sand ...

...

7

182

Grey loam ...

...

7

189

Blackish loam ...

...

3

192

Mottled clays ...

...

87

279

UCk

188

Chalk and flints (no water)

188

467

SZ 8947 9952.



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 429957 : BGS Reference: SU80SE56

British National Grid (27700) : 488830,100260

[Report an issue with this borehole](#)

<<

< Prev

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Next >

>>

SU 80 SE 56

8883 0026

Banwell Farm, South Mundham

Block 2

Surface level +3.3 m

Water not struck

September 1981

British Geological Survey

British Geological Survey

3.0 m

Bedrock

1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Head	Soil on yellow brown silty clay	2.1	2.1
Raised Beach Deposits (younger)	'Very clayey' gravel Gravel: fine with coarse, angular to rounded; flint Sand: coarse with medium and fine, angular; flint Fines: grey to brown clay	0.9	3.0
London Clay	Clay, brown, grading downwards into grey mudstone	1.0+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	Percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-4	+4 -1	+1 -1	+1 -4	+4 -16	+16 -64	+64 mm
29	27	44	2.1-3.0	28	8	8	11	33	11	0



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 429962 : BGS Reference: SU80SE61

British National Grid (27700) : 489740,100320

[Report an issue with this borehole](#)

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< Prev

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Next >

>>

SU 80 SE 61

48974 00320

Copyhold Farm, Pagham

Block E

Surface level +7.4 m

Water struck at +4.6 m

September 1981

British Geological Survey

Overburden 2.8 m
Mineral 1.4 m
Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Brickearth	Soil on brown silt with flints, lignite fragments and chalk nodules	2.0	2.0
	Silt, grey, with some flints	0.8	2.8
Raised Beach Deposits (younger)	Sandy gravel Gravel: coarse and fine, angular and rounded; flint Sand: fine with medium and coarse, angular to subrounded; quartz Fines: clay	1.4	4.2
London Clay	Mudstone, grey, clayey, weathered brown at top	0.8+	5.0

GRADING

Mean for deposit percentages			Depth below surface (m)	Percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-4	+4 -4	+4 -1	+1 -4	+4 -16	+16 -64	+64 mm
7	50	43	2.8-4.2	7	30	12	8	19	24	0

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

Appendix 4

Greenfield Runoff Calculation

Greenfield runoff estimation for sites

Site name: **Sefton Farm**

Site location: **Pagham**

Site coordinates

Latitude: **50.78869° N**

Longitude: **0.73733° W**

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Reference: **gcp2zjz1dfnb / 2.33**

Date: **1 Jul 2016**

Site characteristics

Total site area	2.33	ha
Significant public open space	0.7	ha
Area positively drained	1.63	ha

Methodology

Greenfield runoff method	IH124
Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type
SOIL type	3
HOST class	N/A
SPR	0.37

Hydrological characteristics

	Default	Edited	
SAAR	700	700	mm
M5-60 Rainfall Depth	17	17	mm
'r' Ratio M5-60/M5-2 day	0.4	0.4	
FEH/FSR conversion factor	0.84	0.84	
Hydrological region	7	7	
Growth curve factor: 1 year	0.85	0.85	
Growth curve factor: 10 year	1.62	1.62	
Growth curve factor: 30 year	2.3	2.3	
Growth curve factor: 100 year	3.19	3.19	

Greenfield runoff rates

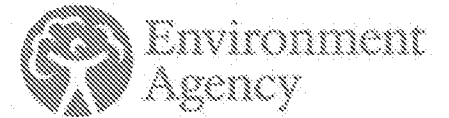
	Default	Edited	
Qbar	4.68	4.68	l/s
1 in 1 year	3.98	3.98	l/s
1 in 30 years	10.77	10.77	l/s
1 in 100 years	14.94	14.94	l/s

Please note that a minimum flow of 5 l/s applies to any site

Appendix 5

Environment Agency Flood Maps

Modelled Flood Outputs Centered on Barfoots Farm, Pagham - Created 14/05/2015 [Ref: SSD/6353]



Legend

- Main River
- Flood Zone 3
- Flood Zone 2

Flood Map for Planning (assuming no defences)

Flood Zone 3

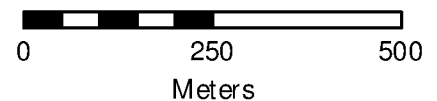
Shows the area that could be affected by flooding:
- from the sea with an 1 in 200 or greater chance of happening each year.
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2

Shows the extent of an extreme flood from rivers of the sea with up to a 1 in 1000 chance of occurring each year.

1:10,000 *

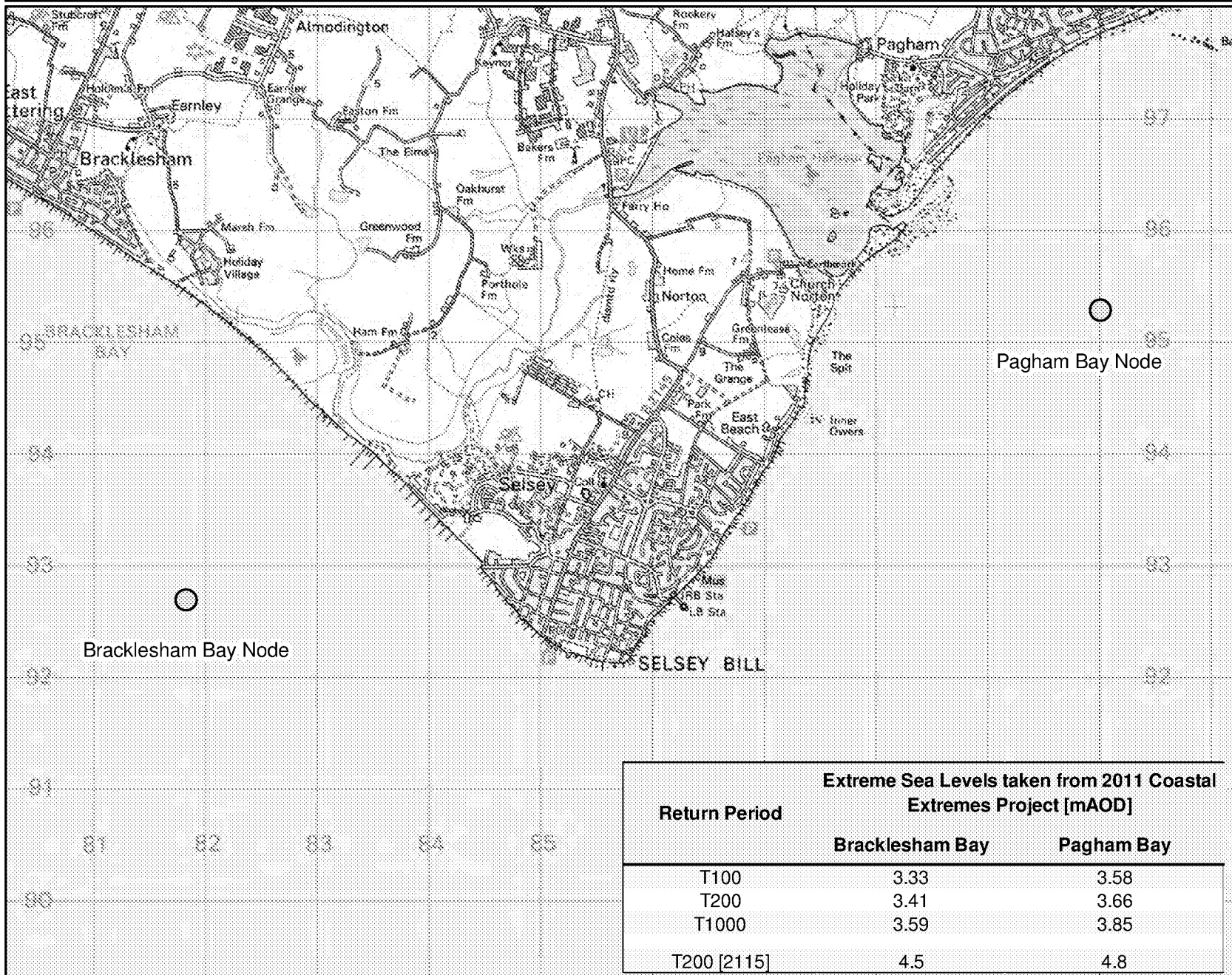
*when printed at A4.



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Extreme Sea Levels taken from 2011 Coastal Extremes Project



Environment
Agency

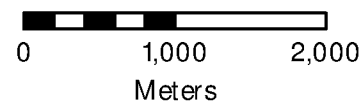
Pagham Bay Node

Bracklesham Bay Node

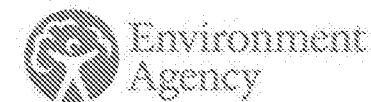
Extreme Sea Levels taken from 2011 Coastal Extremes Project [mAOD]		
Return Period	Bracklesham Bay	Pagham Bay
T100	3.33	3.58
T200	3.41	3.66
T1000	3.59	3.85
T200 [2115]	4.5	4.8

1:50,000 *

*when printed at A4.



Risk of flooding from Surface Water



Scale 1:10,000



Likelihood of flooding from Surface Water

- High
- Medium
- Low
- Very Low

Likelihood of flooding from Surface Water

- High: Greater than or equal to 1 in 30 (3.3%) chance in any given year
- Medium: Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year
- Low: Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year
- Very Low: Less than 1 in 1,000 (0.1%) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on our website.

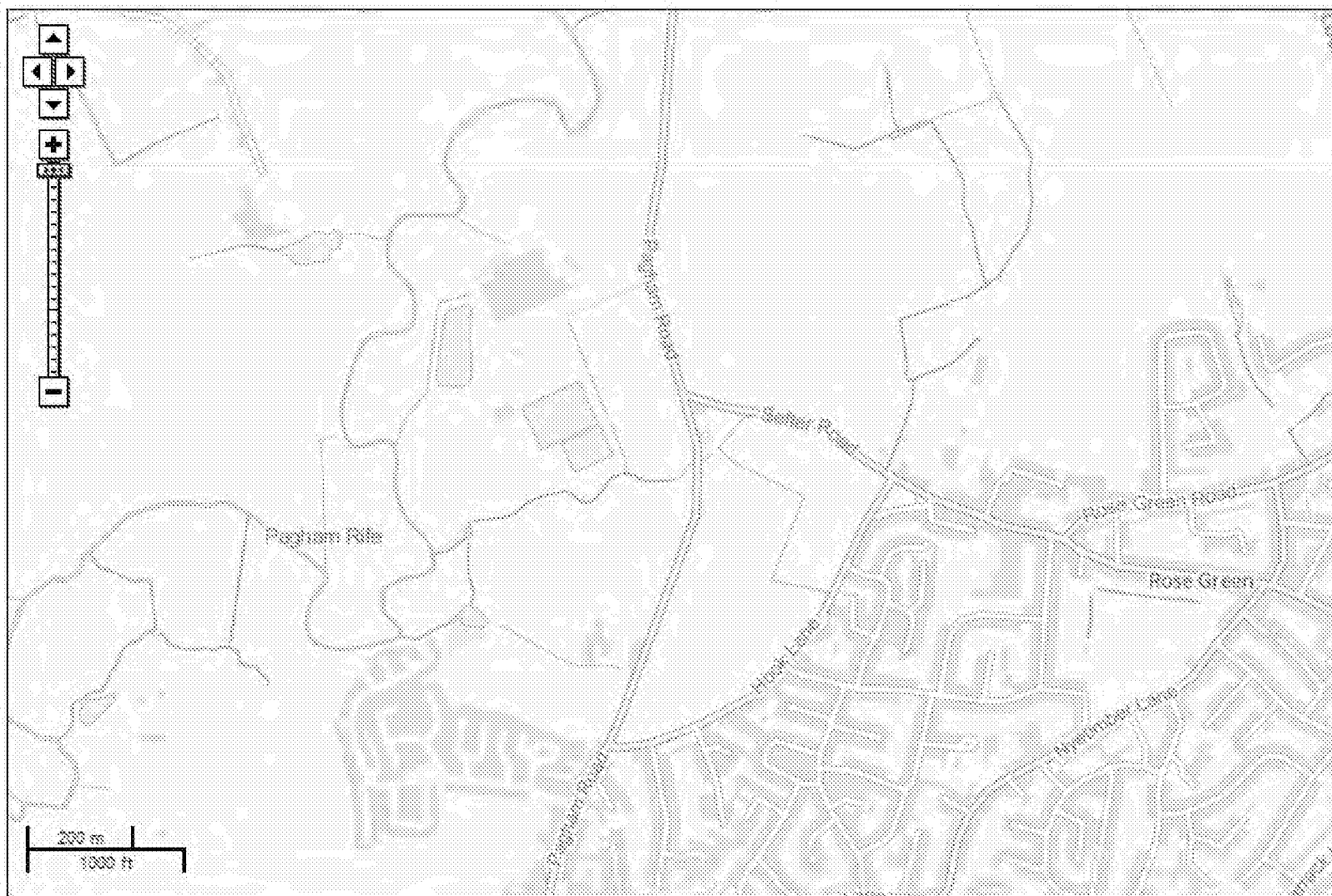
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Risk of Flooding from Reservoirs

Map of X: 489,433; Y: 99,427

Maximum extent of flooding



Customers in Wales - From 1 April 2013 Natural Resources Wales (NRFV) will take over the responsibilities of the Environment Agency in Wales.
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