FLOOD RISK ASSESSMENT
FOR PROPOSED
HORTICULTURAL DEVELOPMENT AT
NEW RIVER GATE,
HOLBEACH ST. JOHNS, LINCS.

FINAL REPORT

GEOFF BEEL CONSULTANCY

APRIL 2018

GCB/ANGLIA BUILDING CONSULTANTS

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1.0 INTRODUCTION

1.1 A full planning application is to be submitted by Anglia Building Consultants Ltd on behalf of Blofield Nurseries Ltd for proposed horticultural development at New River Gate, Holbeach St. Johns, Lincs.

1.2 A Flood Risk Assessment is required to accompany the planning application and meet the requirements and general principles contained in the Planning Practice Guidance to the National Planning Policy Framework (NPPF).

The site, as situated, is located within Flood Zone 3 of the Environment Agency's Flood Map for Planning. The latest Agency Flood Maps have been created as a tool to raise awareness of flood risk with the public and our partner organisations, such as Local Authorities, Emergency Services and Drainage Authorities. The Maps do not take into account any flood defences.

The site however is also shown in Flood Zone 1 and outside of any Hazard Zone of the South Holland District Council's Updated Strategic Flood Risk Assessment Maps (2016).

The site is also located in the South Holland IDB drainage district.

1.3 Geoff Beel Consultancy was appointed on 8th March 2018 to undertake a Flood Risk Assessment.

2.0 LOCATION

2.1 The development site is located at New River Gate, Holbeach St. Johns. The National Grid Reference of the central point of the development is TF34501720.

2.2 The position and extent of the site is shown on Fig 1 – Location Plan at the end of the document.

2.3 The site, located within the South Holland Internal Drainage Board district is shown within Flood Zone 3 as detailed on the Environment Agency Flood Map for Planning and in Flood Zone 1 of the Council's Updated Strategic Flood Risk Assessment Maps (2016) as defended by the Agency's tidal defences and the Internal Drainage Board system.

3.0 THE SITE AND SEQUENTIAL TEST

3.1 The site is currently agricultural land.

3.2 The area of development is approximately 3.00 hectares.

3.2 The proposed site layout consists the construction of a new glasshouse development with land levels at 2.00m aOD with storage reservoir and access off New River Gate. Existing New River Gate carriageway level is generally at 2.87m aOD.

3.4 The Sequential Test is met as the site is located in Flood Zone 1 of the Council's Updated Strategic Flood Risk Assessment Maps (2016) and protected against both the 1 in 100 year fluvial event and the 1 in 200 year tidal event.

4.0 EXISTING FLOOD ALLEVIATION MEASURES

4.1 The site is within a defended floodplain, as defined in Appendix 1 of the Environment Agency's 'Policy for the Protection of Floodplains' and is considered to be passive until such time as a flood greater than that for which the defences were designed occurs. The likelihood of flooding due to overtopping or failure of a flood defence embankment is considered to be small.

The development site within the South Holland Internal Drainage Board is protected by the Wash tidal defences to the Holbeach Marsh frontage with embankment levels of a minimum of 7.00m aOD.

4.2 The site and the surrounding land drains by gravity to the IDB main drain the northern boundary of the site and hence the Peartree Hill Pumping Station to discharge into the South Holland Main Drain and hence the tidal River Nene.

4.3 The existing standard of drainage for the South Holland Internal Drainage Board is 1 in 50 years return period, compatible with the Department of the Environment, Food and Rural Affairs target level of service for rural drainage and flood defence works. Freeboard of 900mm is provided to the lowest land levels.

4.4 Current maintenance standards within the South Holland Internal Drainage Board and of the Environment Agency defences are generally very good.

During the operation and maintenance of its pumping stations, associated structures and channel systems, particularly those that could affect property, the Board seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought. However, bank slips, blocked culverts etc may occur from time to time and these matters are usually dealt with promptly.

5.0 POTENTIAL SOURCES OF FLOODING

5.1 Four potential sources of flooding have been identified as a result of this assessment:

a) local blockages to IDB main drain system.
b) storm return period of 1 in 50 years being exceeded
c) failure of Peartree Hill Pumping Station
d) overtopping and breaching of defences of the River Nene tidal defences

5.2 The probability of flooding from source a) is low due to the maintenance standards already achieved and managed by the IDB.

The probability of flooding from b) is also low due to the South Holland IDB main drain design standard incorporating a minimum 900mm freeboard to the lowest land level which provides adequate storage in events greater than 1 in 50 years.

Sustainable drainage system from the development will be via rainfall capture off the glasshouse to the proposed storage reservoir for subsequent plant watering purposes.

Previous historic rainfall events of 1968 and 1978, estimated to be greater than 1 in 100 year events, caused no flooding to any residential properties at the time and the Boards policy is to provide a standard of drainage which satisfies NPPF requirements of a 1 in 100 year return period for fluvial protection inclusive of the effects of climate change and developments to the arterial system enables a flexible approach to be adopted and meet the criteria for "sustainable urban drainage".

5.3 Failure of Peartree Hill Pumping Station may occur due to long term mechanical breakdown or power supply being disrupted. However, in these circumstances, if conditions were such to put properties and land at risk of flooding, the Internal Drainage Board would take emergency action to maintain the drainage level of service by utilising temporary pumping equipment. The probability of such an occurrence is also considered to be low.

5.4 The flood embankments to the River Nene tidal defences provide a 1 in 200 year return period level of protection. The 1 in 200 year tidal event to the River Nene frontage inclusive of climate change to 2115 is estimated to be 7.20m aOD as against existing embankment levels of a minimum of 7.00m aOD.

There is a low risk during such an event for wave and wind action to cause overtopping and/or breaching of the first line defences. However, the site is further protected by second line defences with embankment levels of 6.00m aOD. Any overtopping/breaching would therefore not reach the development site.

5.5 The Environment Agency has recently published The Wash Shoreline Management Plan 2 from Gibraltar Point to Old Hunstanton. The summary of the plan between Gibraltar Point and Wolferton Creek is as follows:-

The intent of management for this Policy Development Zone (PDZ) is to sustain flood defence for the communities and their hinterland on the low-lying areas around The Wash. This includes an increase of management as needed to sustain the current level of flood risk in the face of climate change.

6.0 EXTENT OF KNOWN FLOODING

6.1 During the preparation of this assessment, no evidence was discovered of the site being flooded or of any adjoining properties.

7.0 PROBABILITIES AND TRENDS OF FLOODING

7.1 The probability of this development flooding from localised drainage systems is very low.

7.2 The probability of the site flooding with water from any South Holland IDB main drain is less than 1% because of the standards of the existing flood defence systems, storage within existing drainage channels and the location of the site.

7.3 The probability of the site flooding with tidal waters from any main river system is less than 1% because of the standards of the existing flood defences and the location of the site.

7.4 If under very extreme events, levels of floodwater from the South Holland IDB main drains or arterial systems rose to such an extent that the site was affected, the situation would not be sudden. It is very probable that sufficient time would be available to take precautionary actions to limit the extent and potential impact of flooding.

7.5 The water levels in the drainage channels will tend to rise as a result of the impacts of climate change. However the existing systems and defences together with the proposed floor levels of the glasshouse extension will be appropriate for the design life of the development (i.e. 60 years).

8.0 IMPACTS OF FLOODING

8.1 No significant impacts of flooding are anticipated.

8.2 Floor level of the development will be 150mm above ground levels which together with the proposed sustainable drainage system will offer additional protection against impacts arising from any extreme short duration, localised events.

8.3 The general location of the site within the catchment is such that if flooding occurred from any of the South Holland IDB main drain systems, then probably 2 to 3 days warning time would be available.

8.4 No displacement of water from the site will affect any adjoining properties as a proposed sustainable drainage system will be implemented by way of the storage reservoir being constructed for collection of rainwater to be recycled for plant watering purposes.

8.5 The developer should ensure that the eventual occupiers of the horticultural premises are sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency provides a Flood Warning Service, which includes Flood Warning Codes and uses direct warning methods where the risks and impacts of flooding are high. Indirect warnings are provided to all flood risk areas, even those at low risk of flooding. The main method is media broadcasts via local radio and also by television.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding, contact tel no: 0345 988 1188.

9.0 RESIDUAL RISK – EXTREME EVENTS

9.1 The residual risk from extreme events is very low on this site, because of its location, within the South Holland IDB area and its location 10.00kms from the River Nene tidal defences with secondary defences between the river frontage and the site.

9.2 The site is within fluvial Flood Zone 1 according to NPPF classification and has a very low risk of flooding due to the current standards of drainage and flood defence and land levels. The site is not located within a Functional Flood Plain of any 'main river' or 'main drain'. The Environment Agency Flood Map for Planning has been produced irrespective of existing flood defences and standards of protection.

9.3 South Holland District Council in conjunction with the Environment Agency and the local IDB's within the Council area have carried out an Updated Strategic Flood Risk Assessment (2016) of the whole District by appointed Consulting Engineers.

The Updated Strategic Flood Risk Assessment (2016) has produced more definitive Flood Risk Maps similar to those published by the Environment Agency and at the same time has analysed flood return periods of all tidal and fluvial defences to account for the effects of climate change.

Breach scenarios of embankments failing and/or being overtopped have also been carried out to establish Flood Risk Zones. As a result of the Updated Strategic Flood Risk Assessment (2016) the site is outside any Hazard Zone and defended by tidal defences and tidal doors.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 As a result of the assessment, the following conclusions have been reached:-

- The proposed development is in a Defended Floodplain. It is located in the Passive Floodplain of the tidal River Nene and South Holland IDB protected by defences to a 1 in 200 year return period, (1.0%)

- The site is in Flood Zone 1 with the actual risk of flooding from any Environment Agency river system being very low (less than 0.5%).

- Although the site is located within an Internal Drainage District with a minimum standard of drainage of 1 in 50 years, this accords with Defra guidelines for rural development. Freeboard to design water level of 900mm to lowest land level is available for events greater than 1 in 50 years providing further storage within the drainage channels.

- On site surface water run-off from the development will be discharged to a storage reservoir to be recycled for plant watering purposes.

- Land Drainage Byelaw Consent will be required from the South Holland IDB for any development within 9.00m of the Board's main drain on the northern boundary of the site.

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No	Date	Revision
Issue:	For Clients Approval	

Site: New River Gate, Holbeach St John, Spalding, Lincolnshire, PE12 0RY

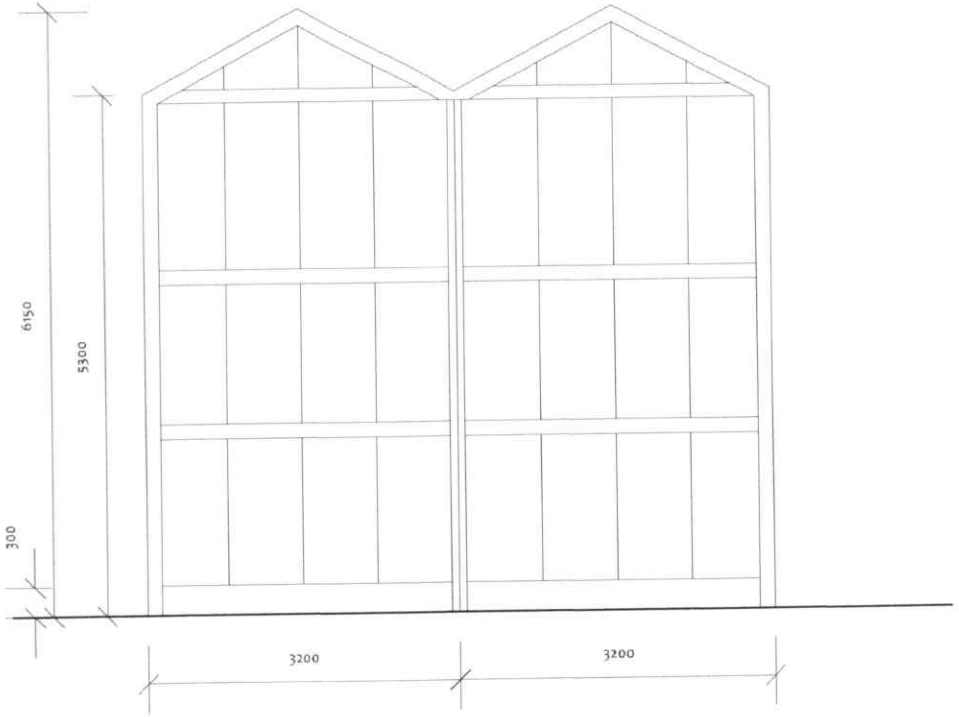
Project: Proposed Nursery

Drawing Title: Location Plan

Client: Blofield Nurseries Ltd

Date: January 2018
Scale: 1:1250 At: A1
Drawing Number: 17-1708-1

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No	Date	Revision
Issue:		For Clients Approval

Site: New River Gate, Holbeach St John, Spalding, Lincolnshire, PE12 0RY

Project: Proposed Nursery

Drawing Title: Proposed Glasshouse Elevation

Client: Blofield Nurseries Ltd

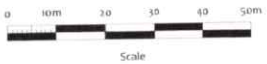
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Issue:	For Clients Approval	

Site: New River Gate, Holbeach St John, Spalding, Lincolnshire, PE12 0RY

Project: Proposed Nursery

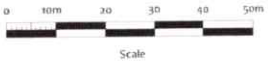
Drawing Title: Existing Site Plan

Client: Blofield Nurseries Ltd

Date: January 2018
Scale: 1:500 At: A1
Drawing Number: 17-1708-21

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Glass house

Shed

Reservoir

Vehicle turning and parking area

Access

New Rivergate Farm

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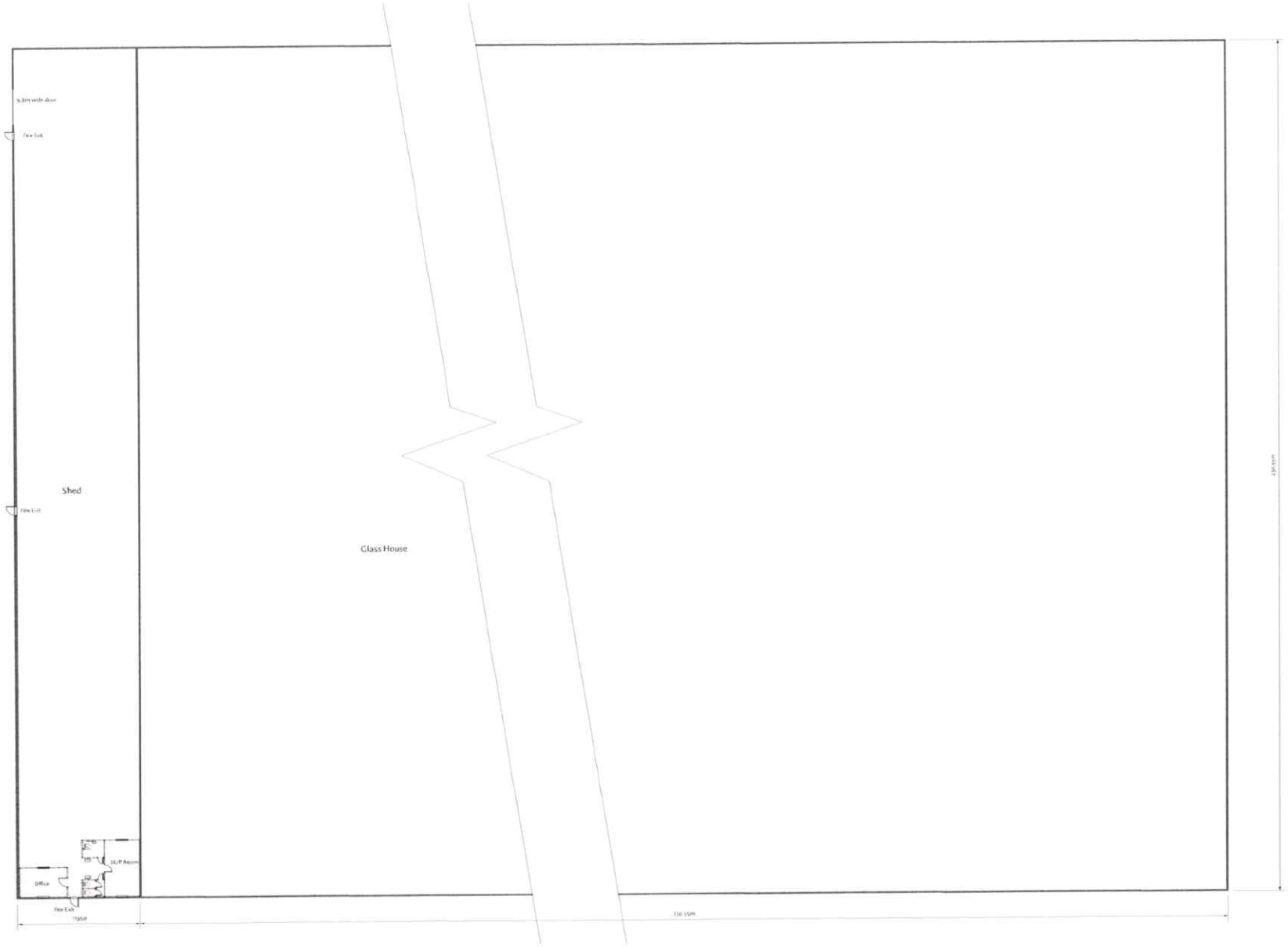
Project: Proposed Nursery

Drawing Title: Proposed Site Plan

Client: Blofield Nurseries Ltd

Date: January 2018
Scale: 1:500 At: A1
Drawing Number: 17-1708-22

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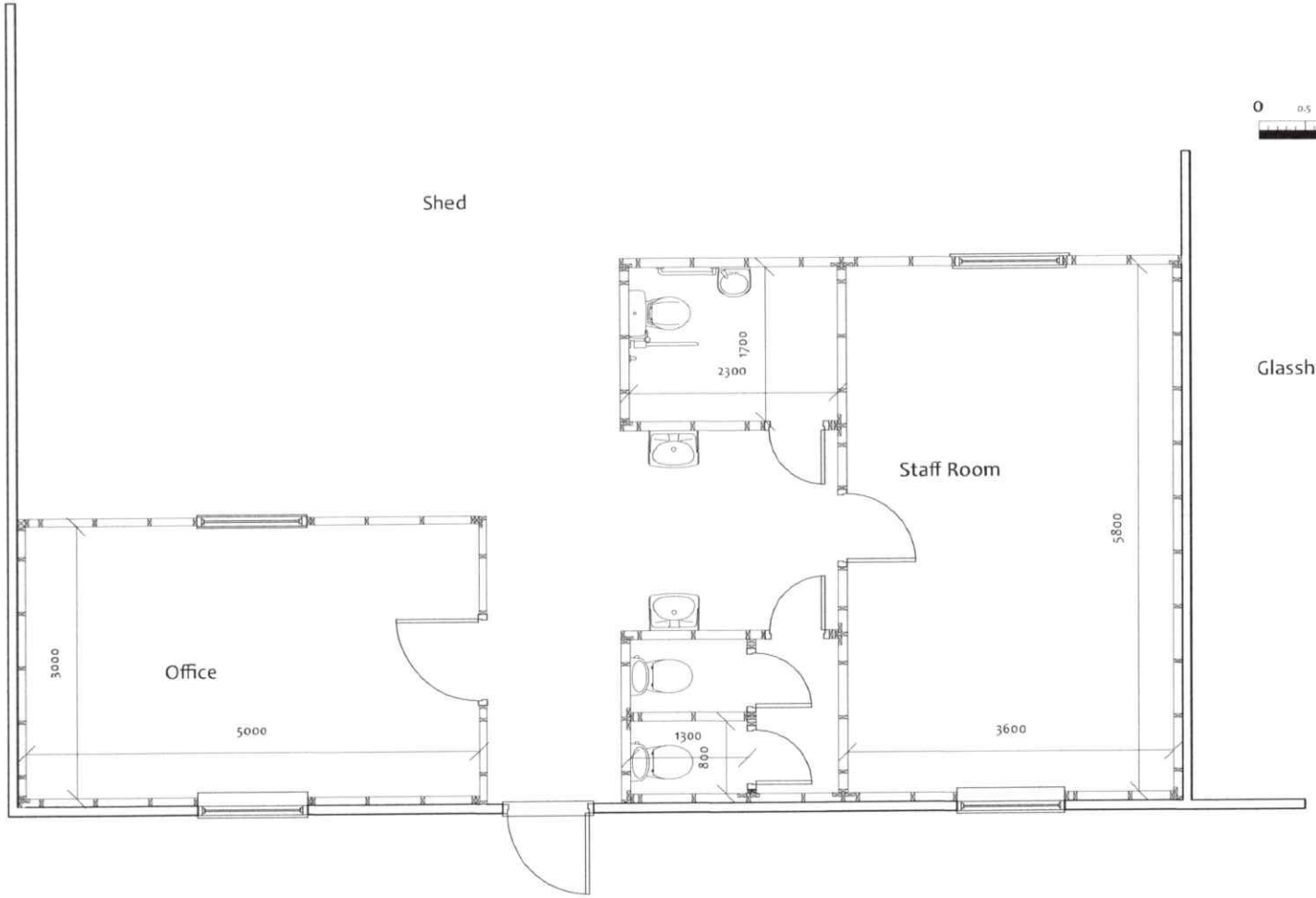
Project: Proposed Nursery

Drawing Title: Proposed Floor Plan

Client: Blofield Nurseries Ltd

Date: February 2018
Scale: 1:200 At: A1
Drawing Number: 17-1708-23

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No	Date	Revision
Issue:		For Clients Approval

Site: New River Gate, Holbeach St John, Spalding, Lincolnshire, PE12 0RY

Project: Proposed Nursery

Drawing Title: Proposed Staff Facilities Floor Plan

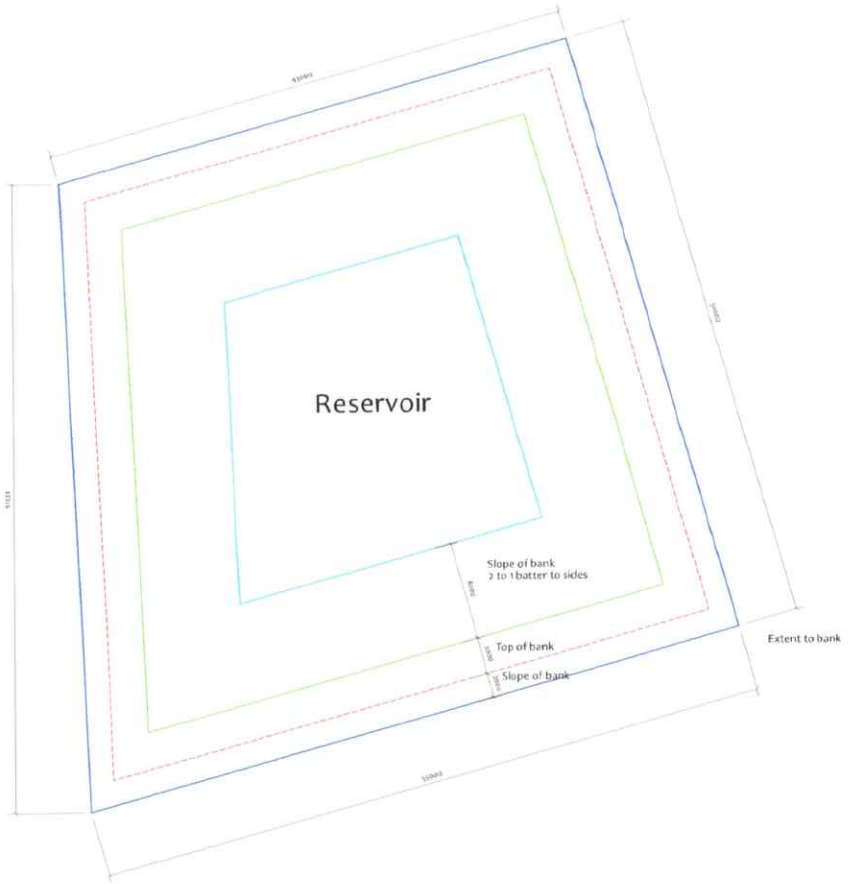
Client: Blofield Nurseries Ltd

Date: February 2018
Scale: 1:50 At: A3
Drawing Number: 17-1708-24

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No Date Revision
Issue: For Clients Approval

Site: New River Gate, Holbeach St John, Spalding, Lincolnshire, PE12 0RY

Project: Proposed Nursery

Drawing Title: Reservoir Plan

Client: Blofield Nurseries Ltd

Date: February 2018
Scale: 1:200 At: A1
Drawing Number: 17-1708-25

sage per m2

h	Minutes of water per month	Litres of water used per month	mm of Rainfall per month	1 in 100 year storm	m3 of rain of rain collected from building	litres of rain collected from building	Plus/minus per month	Plus/minus - runing total	Assuming reservoir empty at November running total
	20	271,600	0.051		1,098.29	1,098,285	826,685	826,685	161,130
	20	271,600	0.035	0.085	1,830.51	1,830,510	1,558,910	2,385,595	1,720,040
	60	814,800	0.042		904.47	904,470	89,670	2,475,265	1,809,710
	90	1,222,200	0.043		926.01	926,005	- 296,195	2,179,070	1,513,515
	90	1,222,200	0.053		1,141.36	1,141,355	- 80,845	2,098,225	1,432,670
	160	2,172,800	0.053		1,141.36	1,141,355	- 1,031,445	1,066,780	401,225
	160	2,172,800	0.05		1,076.75	1,076,750	- 1,096,050	- 29,270	-694,825
	160	2,172,800	0.06		1,292.10	1,292,100	- 880,700	- 909,970	-1,575,525
	120	1,629,600	0.055		1,184.43	1,184,425	- 445,175	- 1,355,145	-2,020,700
	90	1,222,200	0.062		1,335.17	1,335,170	112,970	- 1,242,175	-1,907,730
	40	543,200	0.055		1,184.43	1,184,425	641,225	- 600,950	-1,266,505
	20	271,600	0.048		1,033.68	1,033,680	762,080	161,130	-504,425
	1030	13,987,400	0.61		14,148.53	14,148,530			

Allowing for a 1 in 100 year storm
Stored water will be at its height of capacity
in February where 2,501,265 litres storage is required

Reservoir capacity assuming 4m of water = approx 4000m3

Watering worked out on blue spreader nozzles at 200 litres /per hour = 3.33 litres per min
Nozzles spaced at 1.5m apart along sprayline, spraylines 3.2m apart
1 nozzle per 5m2
20390m2 divided by 5m2 = 4078nozzles
4078 nozzles x 3.33 litres = 13580 litres per min

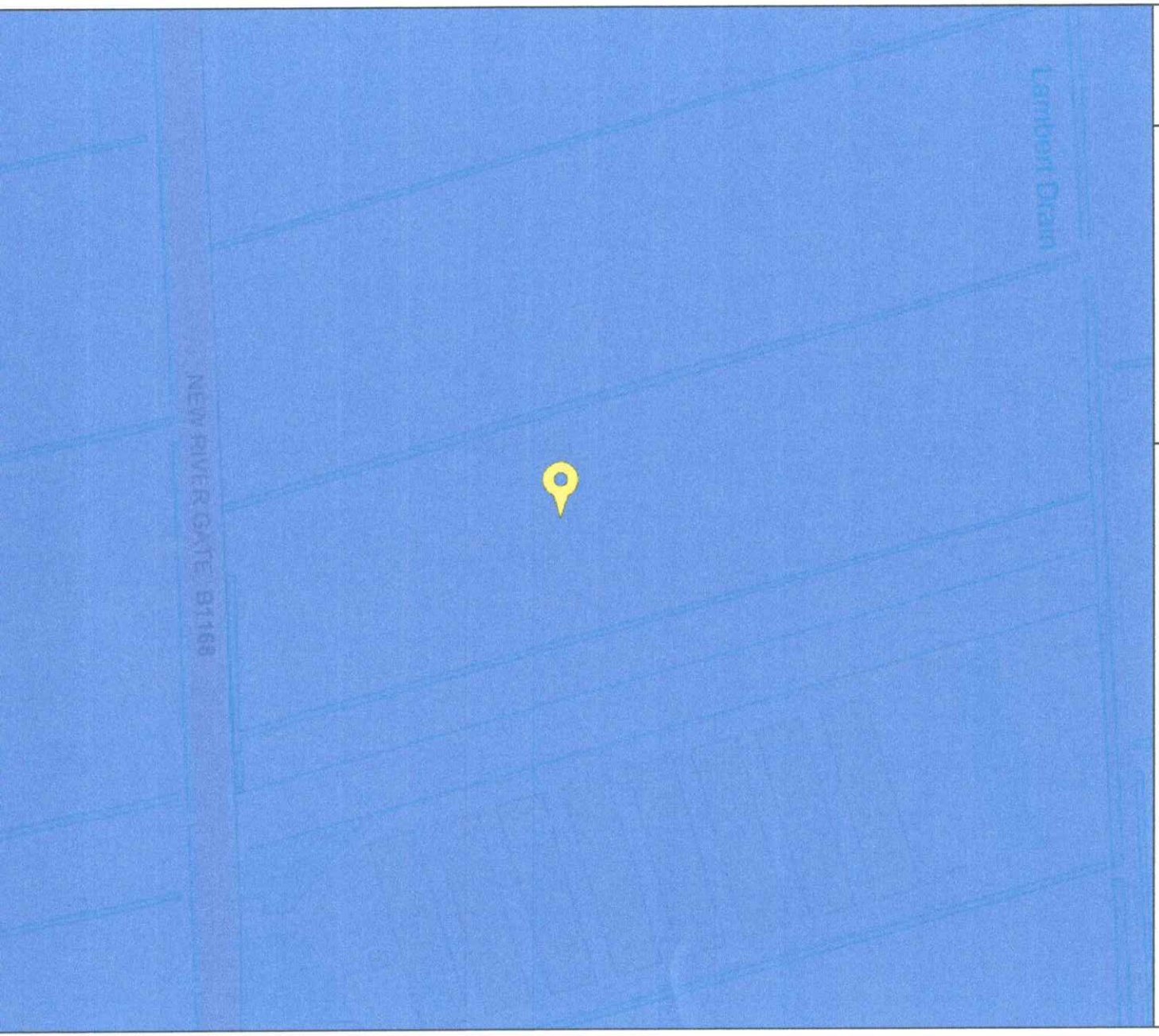
h	Minutes of water per month	Litres of water used per month	mm of Rainfall per month	1 in 100 year storm + 30%	m3 of rain of rain collected from building	litres of rain collected from building	Plus/minus per month	Plus/minus - runing total	Assuming reservoir empty at November running total
	20	271,600	0.051		1,098.29	1,098,285	826,685	826,685	710,272
	20	271,600	0.035	0.1105	2,379.65	2,379,653	2,108,053	2,934,738	2,818,325
	60	814,800	0.042		904.47	904,470	89,670	3,024,408	2,907,995
	90	1,222,200	0.043		926.01	926,005	- 296,195	2,728,213	2,611,800
	90	1,222,200	0.053		1,141.36	1,141,355	- 80,845	2,647,368	2,530,955
	160	2,172,800	0.053		1,141.36	1,141,355	- 1,031,445	1,615,923	1,499,510
	160	2,172,800	0.05		1,076.75	1,076,750	- 1,096,050	519,872	403,460
	160	2,172,800	0.06		1,292.10	1,292,100	- 880,700	- 360,828	-477,240
	120	1,629,600	0.055		1,184.43	1,184,425	- 445,175	- 806,003	-922,415
	90	1,222,200	0.062		1,335.17	1,335,170	112,970	- 693,033	-809,445
	40	543,200	0.055		1,184.43	1,184,425	641,225	- 51,808	-168,220
	20	271,600	0.048		1,033.68	1,033,680	762,080	710,272	593,860
	1030	13,987,400	0.61		14,697.67	14,697,673			

Allowing for a 1 in 100 year storm + 30%
Stored water will be at its height of capacity
in February where 2,410,595 litres storage is required
Building size = 240 x 88m = 21120m2
Glass House size = 227.2 x 88m = 20000m2

erate by 1 in 100 year storm from building = 0.1105 x 21535 = 2380m3
ng on reservoir 1 in 100 year storm =0.1105 x 1555m2 = 172m3
uilding and reservoir = 2552m3
rvoir has capacity of over 4000m3 well in excess of rainwater from the 1 in a 100 year storm

city assuming 3m of water = approx 3000m3

a taken from Met office website https://www.metoffice.gov.uk/public/weather/climate/u12h2kdgz



Environment Agency

Flood map for planning

Your reference
PE12 0RY

Location (easting/northing)
534487/317234

Scale
1:2500

Created
2 Apr 2018 11:44

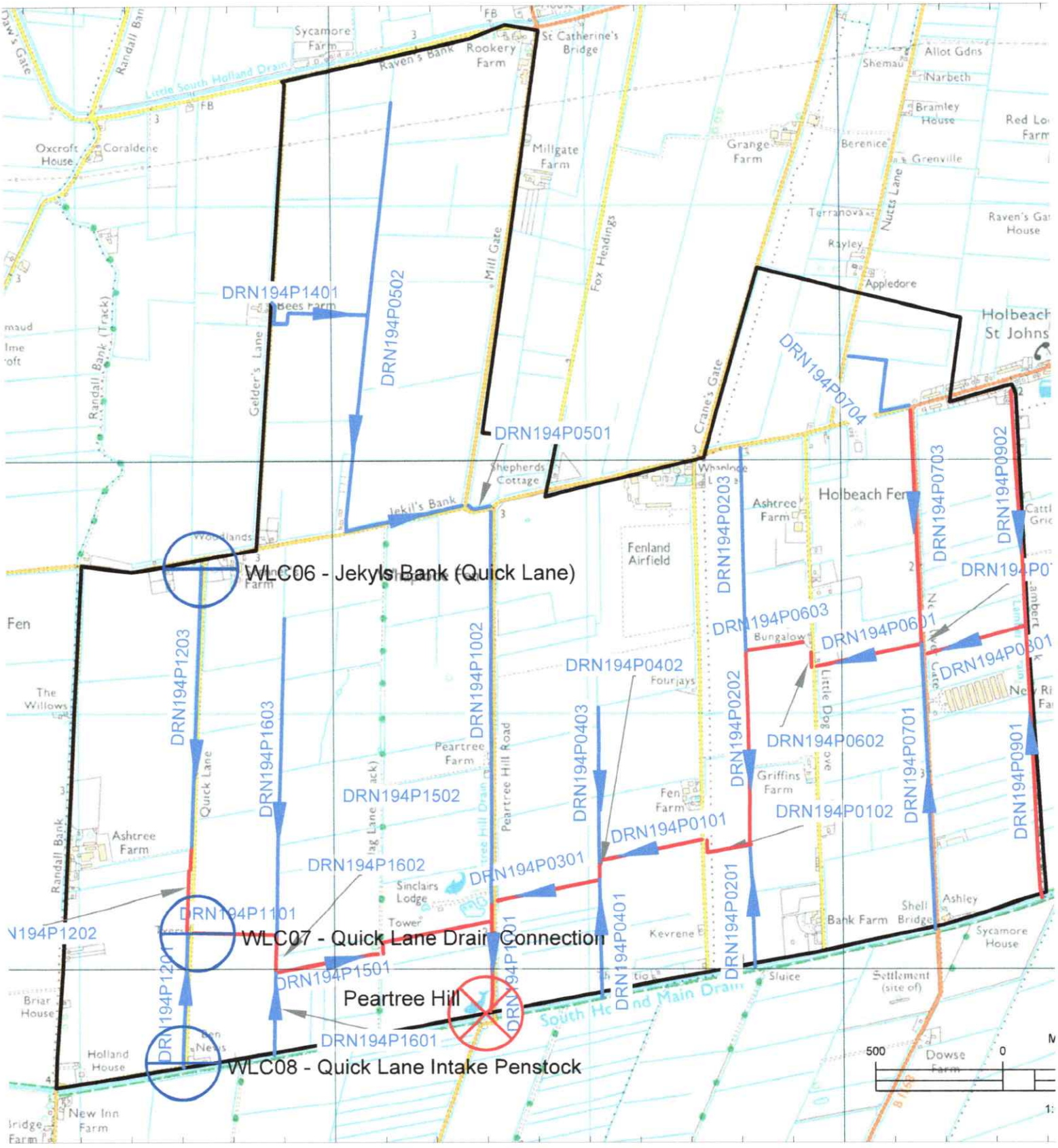
- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

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2116

Holbeach Fen
Whaplode Fen
Holbeach St Johns
Whaplode St Catherine
Clark's Hill
Sycamore Fm
Crane's Gate
Saturday Br
Sluice
Cuthpits Br
Holbeach Fm
Manor Fm
Cross
Cole Ho
Sandygate Fm
Bell's Br
Leedsgate Br
Hallgate Fm
Coy Br
Shell Br
Dowse Fm
B1168
Feinland Airfield
Fen Fm
Milgate Ho
Milgate Fm
Sycamore Fm
B1165
PH
MP


DRN194P1401
DRN194P0502
DRN194P0501
DRN194P0704
DRN194P0902
DRN194P0703
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DRN194P0202
DRN194P0602
DRN194P0701
DRN194P0901
DRN194P1502
DRN194P0102
DRN194P0101
DRN194P1602
DRN194P0301
DRN194P1101
DRN194P1202
DRN194P1201
DRN194P1501
DRN194P0401
DRN194P0201
DRN194P1601
WLC06 - Jekyls Bank (Quick Lane)
WLC07 - Quick Lane Drain Connection
WLC08 - Quick Lane Intake Penstock
Peartree Hill
Little South Holland Drain
Raven's Bank
Rookery Farm
St Catherine's Bridge
Millgate Farm
Mill Gate
Fox Headings
Crane's Gate
Nutts Lane
Randall Bank (Track)
Gelder's Lane
Jekill's Bank
Shepherds Cottage
Fenland Airfield
Ashtree Farm
Holbeach Fen
Holbeach St Johns
Peartree Hill Road
Quick Lane
Griffins Farm
Sinclairs Lodge
Bank Farm
Shell Bridge
Ashley
Sycamore House
Settlement (site of)
Dowse Farm
Holland House
New Inn Farm
Briar House
Oxcroft House
Coraldene
Grange Farm
Bramley House
Red Lodge Farm
Raven's Gate House
Appledore
Bungalow
Fourjays
Fen Farm
Kevrene
Sluice
500
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