Land rear of Woodcock Close and rear of St Georges Way

Impington

Cambridgeshire

Flood Risk Assessment

June 2018

EAS

Document History

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Contents

1 Introduction

1.1 EAS has been commissioned to prepare a Flood Risk Assessment (FRA) for land rear of Woodcock Close and rear of St Georges Way, (Chivers Farm) Impington, Cambridgeshire. The purpose of this FRA is to highlight any flood risks on site and assess the feasibility for development. It is understood that a residential development is proposed at the site, although no plans are available at this stage. A location plan is contained in **Appendix A.** At this stage there is no fixed scheme.

1.2 The site falls entirely within Flood Zone 1 on the Environment Agency (EA) Floodmap for Planning which indicates a low risk of flooding (less than 1 in 1000 annual probability of flooding from rivers). Much of the site is in a 'Low' surface water risk area. All flood risk sources and potential means of draining the site have been considered in this FRA.

1.3 This report is based on the following data: South Cambridgeshire Strategic Flood Risk Assessment (2010), EA online mapping and British Geological Society geological information.

1.4 The contents of each section of this document are as follows:

Section 2 sets out the national, regional and local flood risk policies.

Section 3 described the site conditions.

Section 4 describes the potential sources of flooding.

Section 5 discusses the mitigation measures which could be included in the proposed development

Section 6 discusses some of the surface water drainage considerations required for a new development at the site.

Section 7 concludes the assessment.

2 Policy Framework

National Policy

2.1 The contents of this FRA are based on the advice set out in The National Planning Policy Framework (NPPF) published March 2012 and the Planning Practice Guidance (PPG), published March 2014.

2.2 The Planning Practice Guidance NPPF Table 1 (Paragraph 065) defines each Flood Zone along with appropriate land use and FRA requirements. The flood risk zones are defined as follows:

- Flood Zone 1 – This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river flooding (<0.1%).
- Flood Zone 2 – This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding.
- Flood Zone 3a – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), and for tidal flooding at least a 0.5% annual probability of flooding from tidal sources.
- Flood Zone 3b – This zone comprises land where water has to flow or be stored in times of flood.

2.3 A copy of the Environment Agency's Flood Map is included in **Appendix B**. The mapping shows the site to be entirely in Flood Zone 1 at 'Low' risk of fluvial flooding. This means that the probability of flooding each year is less than 1 in 1000 each year.

South Cambridgeshire Local Plan (Proposed Submission July 2013)

2.4 The South Cambridgeshire Local Plan replaces the South Cambridgeshire Local Development Framework. The Local Plan sets out a framework for new development and recognises the need for additional homes in the district.

2.5 Policy CC/9: Managing Flood Risk of the local plan states:

"In order to minimise flood risk, development will only be permitted where: A. The sequential test and exception tests established by the National Planning Policy Framework demonstrate the development is acceptable (where required). For undeveloped sites, floor levels are 300mm above the 1 in 100-year flood level plus an allowance for climate change where appropriate and/or 300mm above adjacent highway levels where appropriate;

B. Suitable flood protection / mitigation measures are incorporated as appropriate to the level and nature of flood risk, which can be satisfactorily implemented. Management and maintenance plans will be required, including arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime;

C. There would be no increase to flood risk elsewhere, and opportunities to reduce flood risk elsewhere

have been explored and taken, including limiting discharge of surface water (post development volume and peak rate) to natural greenfield rates or lower, and

D. The destination of the discharge obeys the following priority order: i. Firstly, to the ground via infiltration; ii. Then, to a water body; iii. Then, to a surface water sewer; iv. Discharge to a foul water or combined sewer is unacceptable.

2. Site specific Flood Risk Assessments (FRAs) appropriate to the scale and nature of the development and the risks involved, and which takes account of future climate change, will be required for the following:

e. Development proposals over 1ha in size;

f. Any other development proposals in flood zones 2 and 3;

g. Any other development proposals in flood zone 1 where evidence, in particular the Strategic Flood Risk Assessment or Surface Water Management Plans, indicates there are records of historic flooding or other sources of flooding, and/or a need for more detailed analysis".

2.6 Policy CC/9 has been considered in this report.

South Cambridgeshire Strategic Flood Risk Assessment (SFRA)

2.7 The South Cambridgeshire Strategic Flood Risk Assessment was published in September 2010, to inform the Local Development Framework. The document assesses all types of flood risk across the district, taking into account the projections of climate change. The SFRA notes the need for site specific flood risk assessments and provides information for developers, with particular reference to the design of sustainable drainage systems (SuDs). The site is not specifically mentioned as being at risk of flooding from any source.

2.8 An incident of pluvial (surface water) flooding was recorded in 2012 in Woodcock Close and the site itself is not specially mention to have experienced any historical flooding from any source. Table 4B located in Appendix B of the SFRA shows there are no recorded sewer flooding incidents at the site.

2.9 Figure B5 located in Appendix B shows that the site is located in an area which is at a 'less' of a risk of surface water flooding.

2.10 In Appendix B-SuDS Infiltration Feasibility Plan 1402-C-2, the site is shown to be located within an area with 'low potential' and 'uncertain potential' for infiltration.

2.11 The site is not located in an EA flood warning area.

3 Site Description

3.1 The site is located on land rear of Woodcock Close and rear of St Georges Way, (Chivers Farm) Impington, Cambridgeshire. The site location is shown in **Appendix A** and covers a total area of 2.9 hectares**.**

3.2 The existing site is undeveloped, comprising of a field bordered by hedges and trees. To the west of the site are existing residential dwellings, and to the east is agricultural land. North of the site is agricultural land, and immediately south of the site is residential and further agricultural land.

3.3 It is proposed that the site will provide a residential development. There are currently no plans or site layout available as this is a feasibility study only.

Proximity to Watercourses

3.4 There are numerous drainage ditches surrounding the site. Online mapping shows there to be a land drain/minor watercourse bisecting the two parcels of land prior to connecting into the other ditches/minor watercourses nearby. The new development is likely to be able to drain to these ditches.

3.5 There are no EA 'Main Rivers' located near the site.

Geology

3.6 The online British Geological Survey (BGS) mapping shows the site to be located in an area with a bedrock of Gault Formation - Mudstone. There are also superficial deposits of sand and gravel. The permeability for mudstone is typically variable. Further site investigations may be required to determine the infiltration abilities of the site.

Site Levels

3.7 Online mapping shows the northern field sits at around 13m AOD. In the southern field, there is a fall from west to east towards the ditch along the eastern perimeter from 12m AOD to 10m AOD. A topographical survey will be required at a later stage to provide accurate levels.

Sewers

3.8 Sewer records provided by Anglian Water are available in **Appendix C**. These show there are limited public surface water sewers in the local area. There is 150mm foul sewer located in St Georges Way and a 225mm surface water sewer, approximately 60m from the site.

Existing Drainage

3.9 The existing site is undeveloped and there are no formal drainage measures in place. It is assumed that

runoff would either infiltrate to the ground or follow the natural topography and flow towards the minor watercourse/ditch in the north western corner. The sewer maps suggest that runoff from some of the nearby houses is discharged to the minor watercourse crossing the site due to the absence of surface water sewers.

4 Potential Sources of Flooding

Fluvial/Tidal

4.1 The EA Floodmap for Planning shows that the site falls within Flood Zone 1. Flood Zone 1 indicates a 'low' risk area with less than 1 in 1000 annual probability of flooding from river or sea. An extract of the EA's Floodmap for Planning is included in **Appendix B**.

4.2 A land drain/minor watercourse bisects the two parcels of land prior to connecting into the other ditches/minor watercourses nearby. Although these small watercourses/ditches do not appear to be linked to a surface water risk, it is important that they do not become blocked or broken following development as this could cause a flood risk. These ditches are unlikely to have been included in the EA's flood modelling but from aerial mapping it appears to be a field drain/ditch rather than a fluvially influenced watercourse.

4.3 There are no EA 'Main Rivers' near the site and the minor watercourses/ditches are unlikely to pose a significant risk to the site. The risk of fluvial flooding is therefore considered to be low.

Surface Water Flooding (Pluvial)

4.4 Surface water flooding refers to flooding caused when the intensity of rainfall, particularly in urban areas, can create runoff which temporarily overwhelms the capacity of the local drainage systems or does not infiltrate into the ground. The water ponds on the ground and flows towards low-lying land. This source of flood risk is also known as 'pluvial'.

4.5 The EA surface water mapping is on the GOV.UK website and has been included at **Appendix D**. The site is predominantly at 'Very Low' risk of surface water flooding excluding minor sporadic areas.

4.6 Under a 'high risk' scenario, meaning each year this area has a chance of flooding greater than 3.3% (1 in 30), there is a minor path of surface water flooding along the south eastern boundary shown to be below 300mm. The remaining area of the site are shown to be unaffected.

4.7 Under a 'medium risk', meaning this area has an annual chance of flooding of between 1% and 3.3% (between 1 in 30 to 1 in 100) and a 'low risk' scenario meaning the area has an annual chance of flooding between 0.1% and 1% (between 1 in 100 and 1 in 1000), the same area along the south eastern boundary is affected by surface water flooding. The depths are shown to be below 300mm under each scenario. Two parallel paths of surface water flooding are shown in the northern area of the southern field , also shown to be below 300mm. This flooding is shown on the velocity maps, also located in **Appendix D**, to the flowing from the nearby residential area across the field and into the drainage ditch.

4.8 Under the low risk scenario, the land to the rear of St Georges Way is shown to experience surface water flooding below 300mm along the northern boundary of the site.

4.9 Under all other scenarios this area is shown to be unlikely to experience any surface water flowing.

4.10 Taking into consideration the routes of exceedance, it is likely surface water will continue to flow into the ditches. It is therefore important that the ditches remain clear and keep their structure and capacity throughout development construction. A reduction in the capacity of the ditches may increase surface water flood risk at the site.

4.11 It is likely that the surface water risk areas are in the lowest parts of the site, however in the absence of a site-specific topographic survey it is not possible to confirm this. To ensure the proposed development does not block the flowpaths and increase surface water risk to others, it will be necessary to include an effective surface water drainage system. This, along with some other mitigation measures, has been discussed in **Section 5**.

Groundwater

4.12 The site is not shown on the EA groundwater mapping, now accessed on the MAGIC map website (http://www.natureonthemap.naturalengland.org.uk/magicmap.aspx), to be within a Source Protection Zone.

4.13 The site is not shown to be located above an aquifer based on the bedrock of Mudstone. The site is however shown to be above a Secondary A Aquifer based on the superficial deposits of sand and gravel.

4.14 The groundwater vulnerability maps on the MAGIC map website show the site as being in a 'intermediate' vulnerability area. This means there is a low probability of any groundwater resources being polluted by contaminants, due to the unproductive strata underlying the site.

4.15 Appendix B of the South Cambridgeshire SFRA shows the site has not experienced any groundwater flooding previously.

4.16 The online British Geological Survey (BGS) mapping provides borehole records. Boreholes located to the west of the site (ID: TL46SW146) with a depth of 4.2 m below ground level did not strike water.

4.17 Given the local geology of mudstone, it is unlikely that there would be groundwater present in the local area. As such, the risk of flooding from groundwater is considered to be low.

Sewer Flooding

4.18 Anglian Water sewer records are included at **Appendix C**. These show there is a surface water sewer located in St Georges Way and a foul sewer also located in St Georges Way. There are no sewers located within the red line boundary of the site.

4.19 Table 4B located in Appendix B of the SFRA show that there are no recorded incidents of sewer flooding recorded at the site.

4.20 The risk of flooding from sewers is considered to be low.

Artificial Sources

4.21 The GOV.UK website does not show the site to be in a reservoir flood extent. There are no other nearby artificial sources.

4.22 The risk from artificial sources is therefore considered to be low.

5 Mitigation Measures

5.1 The assessment in Section 4 has identified that there is a risk of surface water flooding as a result of overland flow from the west to east across the site into a ditch located along the eastern perimeter. The capacity and structure of the ditch must not be impeded by any development.

Site Layout

5.2 There is no site layout currently available. Taking into consideration the site is located in Flood Zone 1 and that there are only minor patches of surface water flooding, it is recommended that no buildings impede this surface water flow path.

5.3 If possible, the main mitigation measure would be to locate houses away from this surface water risk area. It should be noted that the surface water risk is a 'worst case' scenario and typically is unlikely to occur, however, it is necessary to consider this risk.

5.4 A topographical survey would provide an accurate picture of the ideal locations for properties to be placed in the site, however the development layout should allow existing flow paths to remain.

Redirecting the Surface Water Flow Path

5.5 It may be possible to recontour the site and the surface water flow path, lowering the levels where the flow path is located and raising levels where properties would be located. This would allow the flow path to remain as well as maximising the developable area. Such a design would have to be undertaken at a later stage, but could include the use of conveyance swales in areas of public open space to provide these overland flow routes.

Finished Floor Levels

5.6 As a minimum, it is recommended that finished floor levels be set 150mm above the surrounding ground levels. This will help to keep surface water out of the ground floors of the properties.

Proposed Bridge

5.7 It is likely to be necessary to locate a new bridge over the ditch bisecting the two parts of the site, to connect the northern and southern land parcels, to allow pedestrian and/or vehicle movement across the sites. Although this ditch does not appear to be linked to the surface water risk, it is important that it does not become blocked or broken as a result of the development. A culvert is not recommended as Cambridge County Council have a strict culverting policy and try to avoid culverting channels where possible. A bridge is therefore likely to be more acceptable, and early discussions with Cambridge County Council and the Local Planning Authority are recommended. A maintenance plan would also need to be

in place to ensure any structure located across the ditch would be managed to prevent a debris build up and blockage.

5.8 The site may also be located within the local Internal Drainage Board (IDB) district, who would help manage the watercourses locally. The IDB have their own requirements when working on around or over a minor watercourse so it would also be necessary to determine these requirements at an early stage.

Surface Water Drainage

5.9 Any new development at the site will include a new surface water drainage strategy, which will manage the rainfall within the site boundary. Recommendations for the drainage strategy have been discussed in Section 6.

6 Surface Water Drainage Considerations

6.1 The existing site is undeveloped and comprises a field bordered by hedges and trees. Therefore, it will be necessary to achieve greenfield runoff rates when designing the proposed drainage system.

6.2 Sustainable drainage Systems (SUDS) should be used wherever possible in the design of the proposed drainage system. SUDS mimic the natural drainage system and provide a method of surface water drainage which can decrease the quantity of water discharged, and hence reduce the risk of flooding. In addition to reducing flood risk, these features can improve water quality and provide biodiversity and amenity benefits.

6.3 The SUDS management train incorporates a hierarchy of techniques and considers all three SUDS criteria of flood reduction, pollution reduction, and landscape and wildlife benefit. In decreasing order of preference, the preferred means of disposal of surface water runoff is:

- Discharge to ground.
- Discharge to a surface water body.
- Discharge to a surface water sewer.
- Discharge to a combined sewer.

6.4 The philosophy of SUDS is to replicate as closely as possible the natural drainage from a site pre-development and to treat runoff to remove pollutants, resulting in a reduced impact on the receiving watercourses. The benefits of this approach are as follows:

- Reducing runoff rates, thus reducing the flood risk downstream.
- Reducing pollutant concentrations, thus protecting the quality of the receiving water body.
- Groundwater recharge.
- Contributing to the enhanced amenity and aesthetic value of development areas.
- Providing habitats for wildlife in developed areas, and opportunity for biodiversity enhancement.

Site-Specific SUDS

6.5 The various SUDS methods need to be considered in relation to site-specific constraints. Several SUDS options are available to reduce or temporarily hold back the discharge of surface water runoff. Table 1 outlines the constraints and opportunities to each of the SUDS devices in accordance with the hierarchical approach outlined in The SUDS Manual CIRIA C753. It also indicates what could and could not be incorporated within the development, based upon site-specific criteria.

Device	Description	Constraints / Comments	Appropriate
Living roofs (source control)	Provide soft landscaping at roof level which reduces surface water runoff.	May not be suitable for proposed residential buildings due to pitch of roof and maintenance requirements.	No

Infiltration devices & Soakaways (source control)	Store runoff and allow water to percolate into the ground via natural infiltration.	Infiltration unlikely to be viable with mudstone geology. Infiltration tests could be undertaken to assess suitability.	No
Pervious surfaces (source control)	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate and/or slowly release to sewers.	Infiltration unlikely to be viable with geology of mudstone.	No
Rainwater harvesting (source control)	Reduces the annual average rate of runoff from the Site by reusing water for non-potable uses e.g. toilet flushing, recycling processes.	May be possible to include rainwater harvesting systems in residential dwellings to re-use roof runoff.	Possibly
Swales (permeable conveyance)	Broad shallow channels that convey / store runoff, and allow infiltration (ground conditions permitting).	Conveyance swales maybe possible, depending on site layout.	Possibly
Filter drains & perforated pipes (permeable conveyance)	Trenches filled with granular materials (which are designed to take flows from adjacent impermeable areas) that convey runoff while allowing infiltration.	Infiltration unlikely to be viable with geology of mudstone. Infiltration tests may be required.	No
Infiltration basins (end of pipe treatment)	Depressions in the surface designed to store runoff and allow infiltration.	Infiltration unlikely to be viable with geology of mudstone.	No
Wet ponds & constructed wetlands (end of pipe treatment)	Provide water quality treatment & temporary storage above the permanent water level.	Possibly – depends on site layout and spatial constraints.	Yes
Attenuation Underground (end of pipe treatment)	Oversized pipes or geo-cellular tanks designed to store water below ground level.	Attenuation underground may be required but this depends on the site layout.	Yes

Table 1: Site-Specific Sustainable Drainage Techniques

6.6 The geology of mudstone with deposits of sand and gravel suggests that the permeability of the site is likely to be variable. It is therefore recommended that surface water runoff from the new development should be attenuated in a pond or wetland feature, permeable paving or a swale. The existing surface water flow paths must be considered when locating a potential swale.

6.7 For the purpose of this report, the site was divided into two sections, the north field and south field. Using WINDES, the greenfield run off rates was calculated. As there are no development plans or site layout available, the impermeable area has been presumed to be 60% of the existing site area.

6.8 Greenfield runoff rates calculations have been carried out using the WinDes MicroDrainage software. The

ICP SUDS Mean Annual Flood method was used. Greenfield runoff rates at the site for QBAR, 1 year, 30 year and 100 year events are summarised in Table 2 per hectare, and for the total proposed impermeable area of 0.69 hectares (based on 60% impermeable area of the northern land parcel) and 1.09 hectares (based on 60% impermeable area of the southern land parcel):

Rainfall Event	Greenfield Runoff Rate (l/s/ha)	Greenfield Runoff Rate Northern Land Parcel (based on 60% impermeable area) (l/s)	Greenfield Runoff Rate Southern Land Parcel (based on 60% impermeable area) (l/s)
QBAR	3.3	2.3	3.6
1 in 100 year	11.8	8.2	12.9
1 in 30 year	8.0	5.5	8.72
1 in 1 year	2.9	2.0	3.2

6.9 The greenfield runoff rate output from WInDes MicroDrainage are included at **Appendix E.**

Northern Field

6.10 The Quick Storage Estimate feature in WinDes MicroDrainage was used to determine the likely attenuation volume required for each land parcel. This provides a maximum attenuation volume, but a more accurate analysis will be carried out once a fixed scheme is available.

6.11 The north field has a total area of 1.157 hectares, resulting in a total impermeable area of 0.69 hectares. Based on a greenfield runoff rate of 8.2 l/s, a Quick Storage Estimate showed a total storage volume between 338m^2-446 m^2 would be required to attenuate a 1 in 100 year (+40%CC) rainfall event to greenfield rates.

6.12 Based on the QBAR rate of 2.3 l/s, a quick storage estimate showed a total volume between 451m^2 and 582m^2 would be required.

Southern Field

6.13 The Southern field has a total area of 1.83 hectares, resulting in a total impermeable area of 1.09 hectares. Based on a greenfield runoff rate of 12.96 l/s, a Quick Storage Estimate showed a total storage volume between 531 m^3 and 702 m^3 would be required to attenuate a 1 in 100 year (+40%CC) rainfall event to greenfield rates. Based on the QBAR rate of 3.6 l/s, a quick storage estimate showed a total storage of 715m^3- 921 m^3.

6.14 The Quick Storage Estimate results and parameters are included at **Appendix F**. It is likely that this attenuation volume can be located throughout the site, and the most suitable attenuation features and locations will be determined at a later stage. It may be possible to provide the attenuation volume in a pond or wetland, lined permeable paving or a cellular storage system. It may also be possible to utilise a conveyance swale to direct runoff from the new development towards the pond, prior to discharge to the drain. The location of a swale and pond/wetland should be considered when setting out the new development.

7 Summary and Conclusions

7.1 The site is located at land rear of Woodcock Close and rear of St Georges Way, (Chivers Farm) Impington, Cambridgeshire. There are no detailed development plans available therefore this document provides an assessment of the feasibility for development on the site and has provided an overview of the flood risk on the site from various sources.

7.2 The EA Flood Map for Planning shows the site is located within Flood Zone 1, meaning the annual probability of flooding is less than 1 in 1000.

7.3 The site is not considered at significant risk of surface water flooding. There are sporadic areas of surface water flooding located in the southern field and surface water flooding only occurs in the northern field in a low risk scenario.

7.4 A potential surface water flow path has been identified flowing west from the nearby residential area to east across the site into the ditches located along the eastern boundary of the site. It is recommended that as not to increase surface water flood risk at the site the ditches remain clear with sufficient capacity. It is also recommended that any buildings should not be located in this surface water flow path as not to increase surface water flood risk off site.

7.5 It is recommended that finished floor levels be set 150mm above the surrounding levels. A topographic survey will need to be undertaken to clarify levels at the site.

7.6 To allow for vehicle and pedestrian access between the northern and southern fields, a bridge is proposed. A culvert is not recommended as Cambridge County Council have a strict culverting policy and try to avoid culverting channels where possible. It is recommended discussions commence with the Local Planning Authority and Cambridge County Council to guide the design of the crossing.

7.7 As no plan are available, quick storage estimates have been calculated using both the 1 in 100 year (+40%CC) greenfield run off rate and QBAR rate. For the northern field, based on the 1 in 100 year (+40%CC) greenfield run off rate, storage between 338m^3 and 446m^3 attenuation volume is required. Based on the QBAR rate, the total amount of storage is between 451 m^3 -582 m^3. For the southern field, based on the 1 in 100 year (+40%CC) greenfield run off rate, the total amount of storage required is estimated between 531m^3 -702m^3. Based on the QBAR, the estimated storage required is between 715 m^3 -921 m^3. This storage volume could be provided in a number of ways, such as in a pond/wetland, lined permeable paving or cellular storage crates. A conveyance swale could direct run off from the new development into the attenuation features prior to outfall to the drainage ditch. These details will be confirmed following receipt of a fixed scheme.

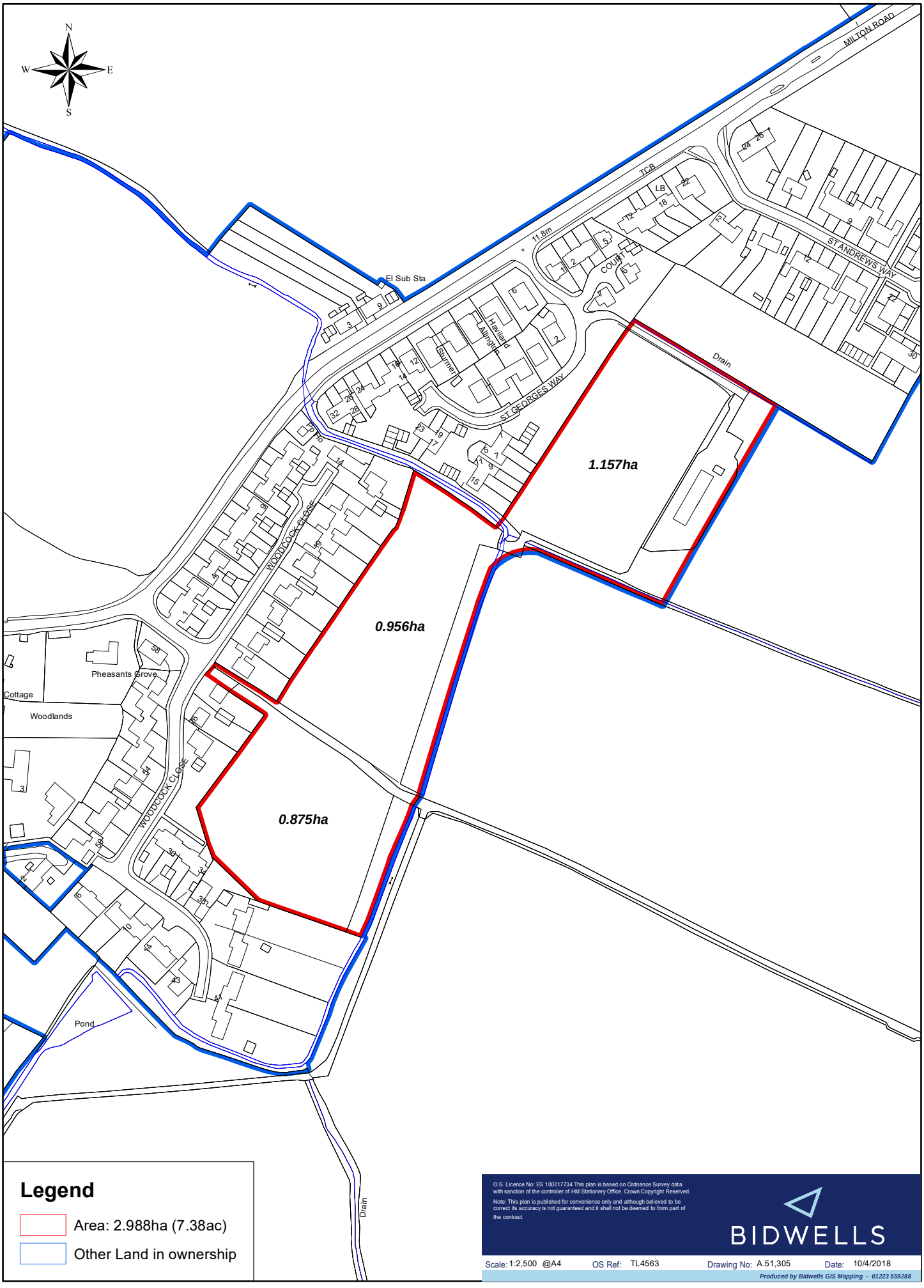
7.8 Maintenance of the drainage systems will be the responsibility of the owner or manager of the new development or an appointed management company and will not be offered for adoption.

8 Appendices

Appendix: A	Location Plan
Appendix: B	EA Flood Map for Planning
Appendix: C	Sewer Records
Appendix: D	Surface Water Flood Map
Appendix: E	WinDes Greenfield Runoff Rate
Appendix: F	Quick Storage Estimate Calculations

Appendix: A **LOCATION PLAN**

Chivers Farms Ltd -
Land rear of Woodcock Close and rear of St Georges Way, Impington



BIDWELLS

Scale: 1:2,500 @A4 OS Ref: TL4563 Drawing No: A.51,305 Date: 10/4/2018

Produced by Bidwells GIS Mapping - 01223 559288

Appendix: B EA FLOOD MAP FOR PLANNING

Flood map for planning

Your reference	Location (easting/northing)	Created
Impington	**545147/263376**	**17 May 2018 11:32**

Your selected location is in flood zone 1, an area with a low probability of flooding.

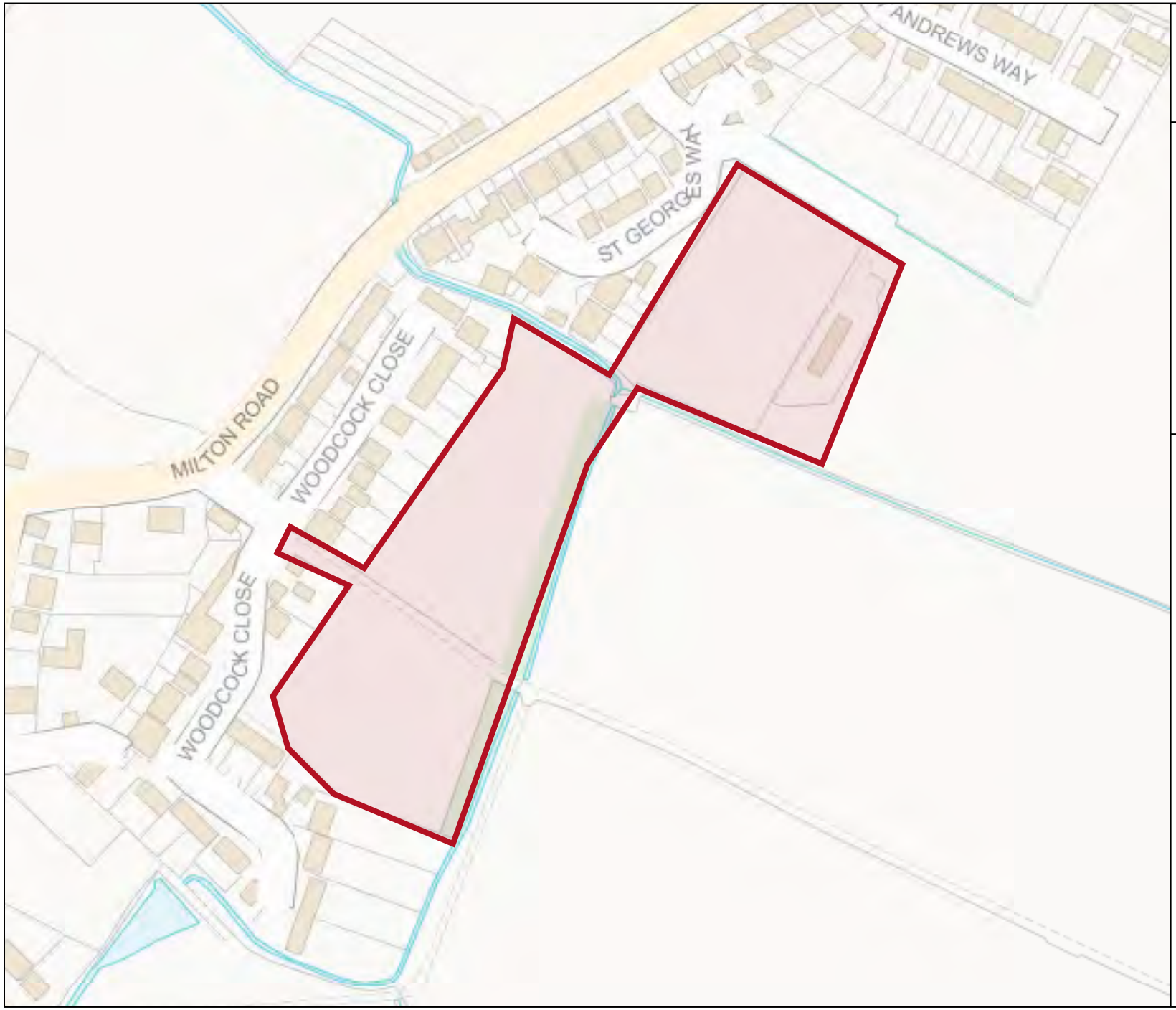
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn’t include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Impington

Location (easting/northing)
545147/263376

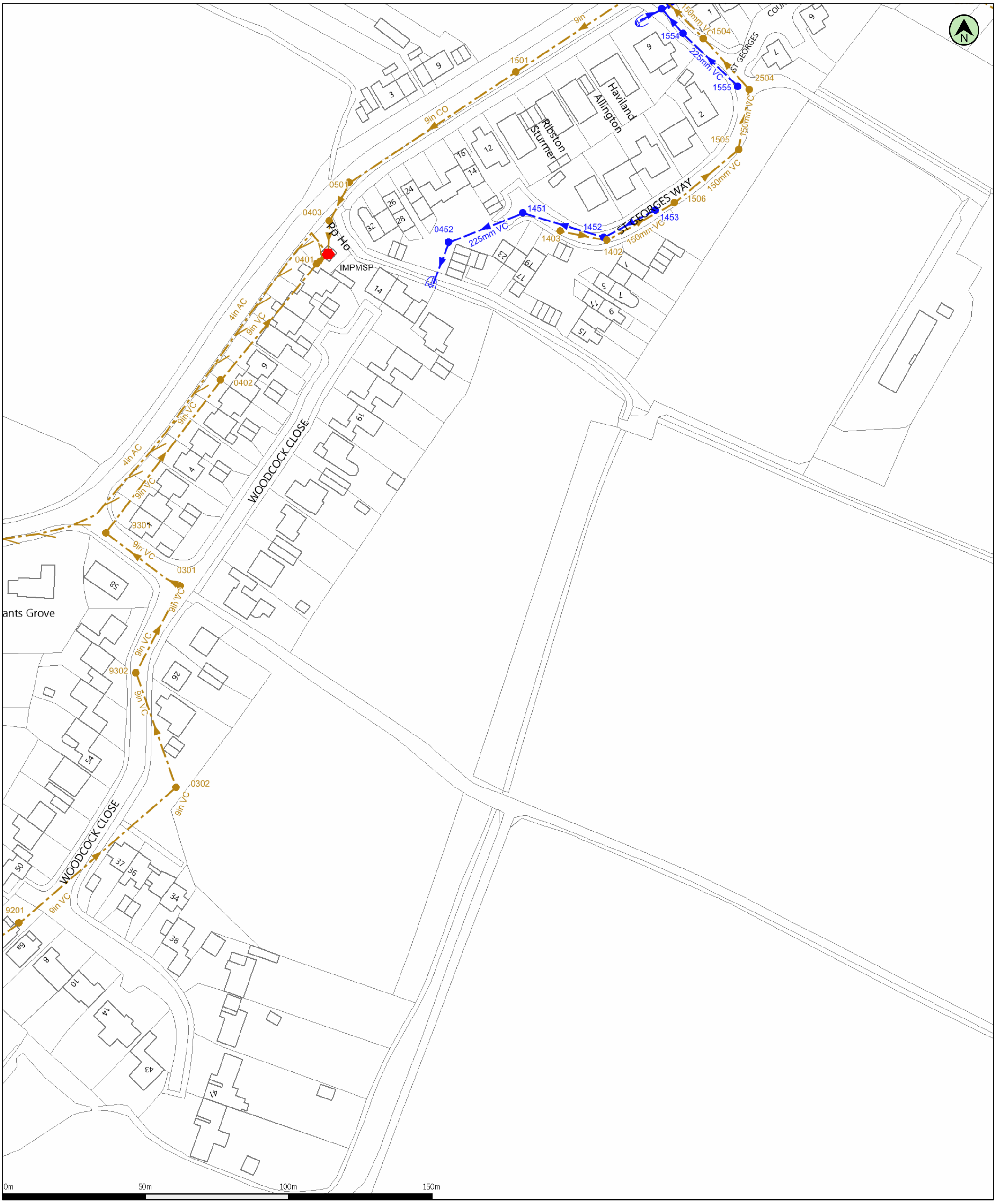
Scale
1:2500

Created
17 May 2018 11:33

- Selected area
- Flood zone 3
- Flood zone 3: areas bene tting from ood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Appendix: C SEWER RECORDS



(c) Crown copyright and database rights 2018 Ordnance Survey 100019209 | Scale: 1:1250 | Date: 17/05/18 | Wastewater Plan A3

Data updated: 04/04/18 | Map Centre: 545116,263362 | Our Ref: 264701 - 1 | Powered by digdat

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

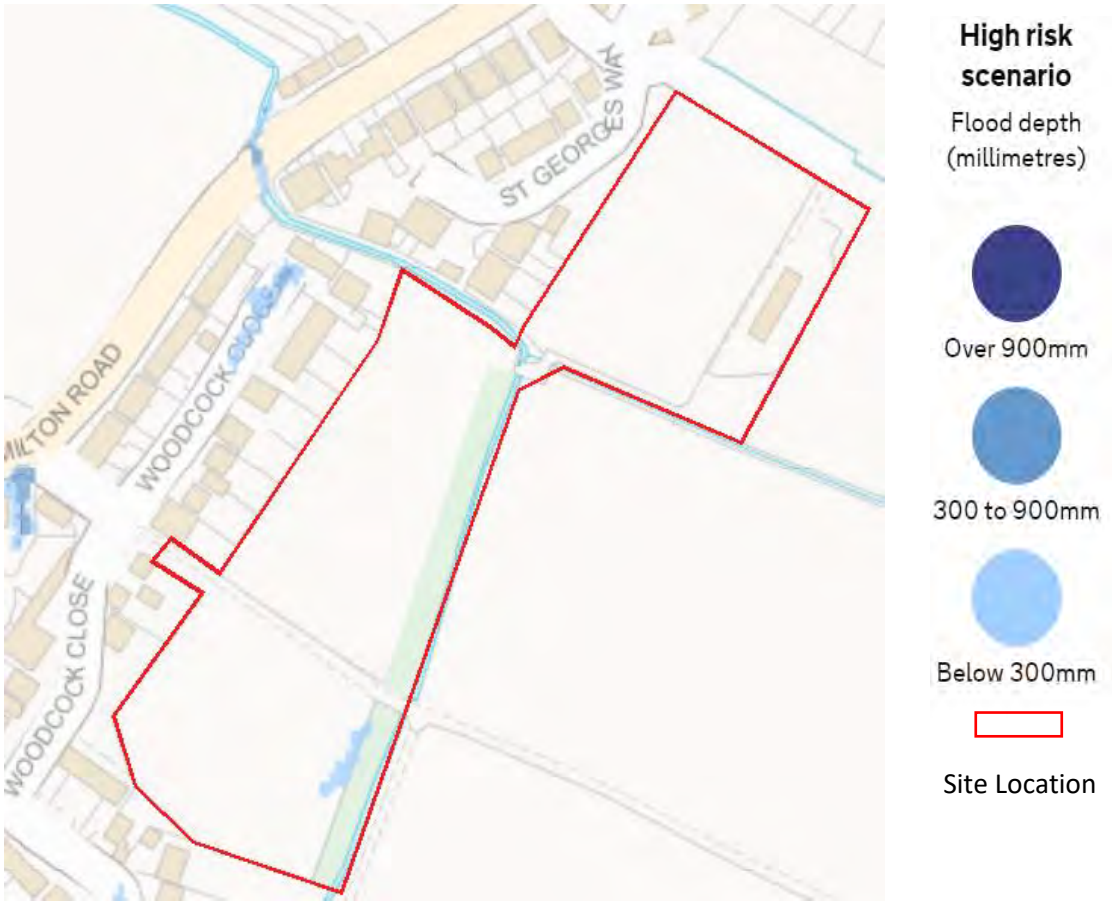
Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

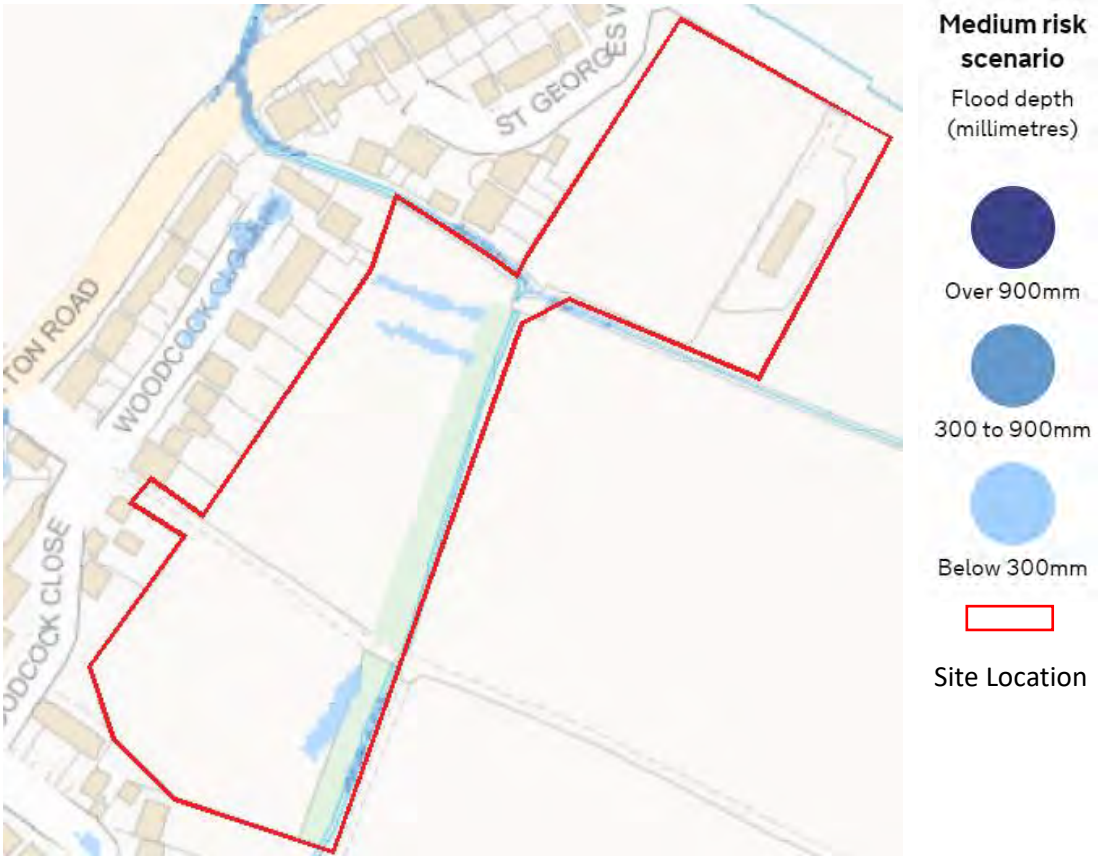
rose.cargill@eastp.co.uk
Impington1

love every drop anglianwater

Appendix: D SURFACE WATER FLOOD MAP



Extract from EA Flood Map for Planning- Surface Water Flood Risk
Contains public sector information licensed under the OpenGovernment Licence v3.0.



Extract from EA Flood Map for Planning- Surface Water Flood Risk
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Extract from EA Flood Map for Planning- Surface Water Flood Risk
Contains public sector information licensed under the OpenGovernment Licence v3.0.

Extract from EA Flood Map for Planning- Flood Velocity
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Appendix: E

WinDes Greenfield Runoff Rate

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	1.000	Urban	0.000
SAAR (mm)	550	Region Number	Region 5

Results l/s

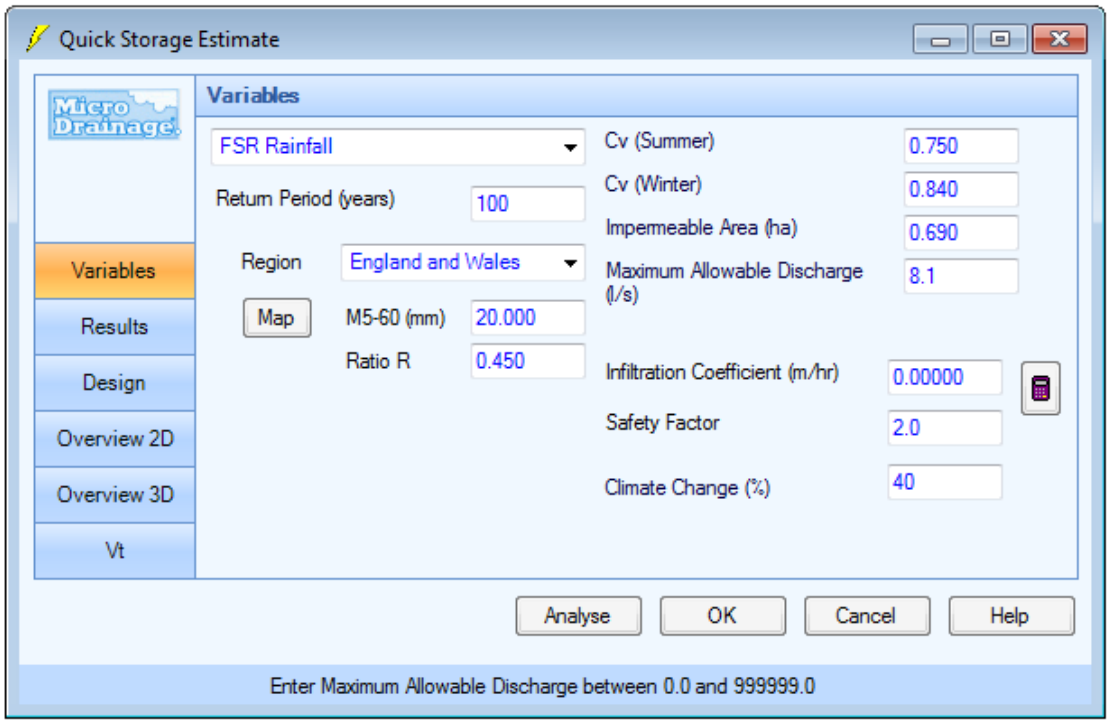
QBAR Rural	3.3
QBAR Urban	3.3
Q1 year	2.9
Q1 year	2.9
Q30 years	8.0
Q100 years	11.8

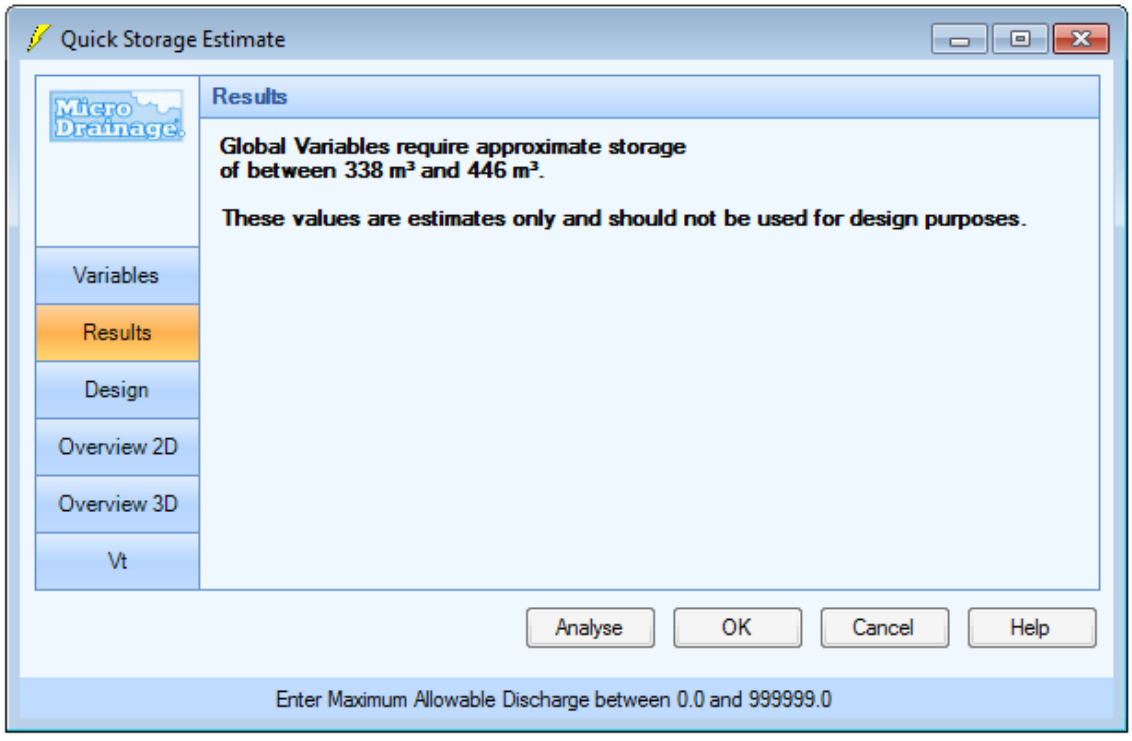
Appendix: F

QUICK STORAGE ESTIMATE CALCULATIONS

North Field

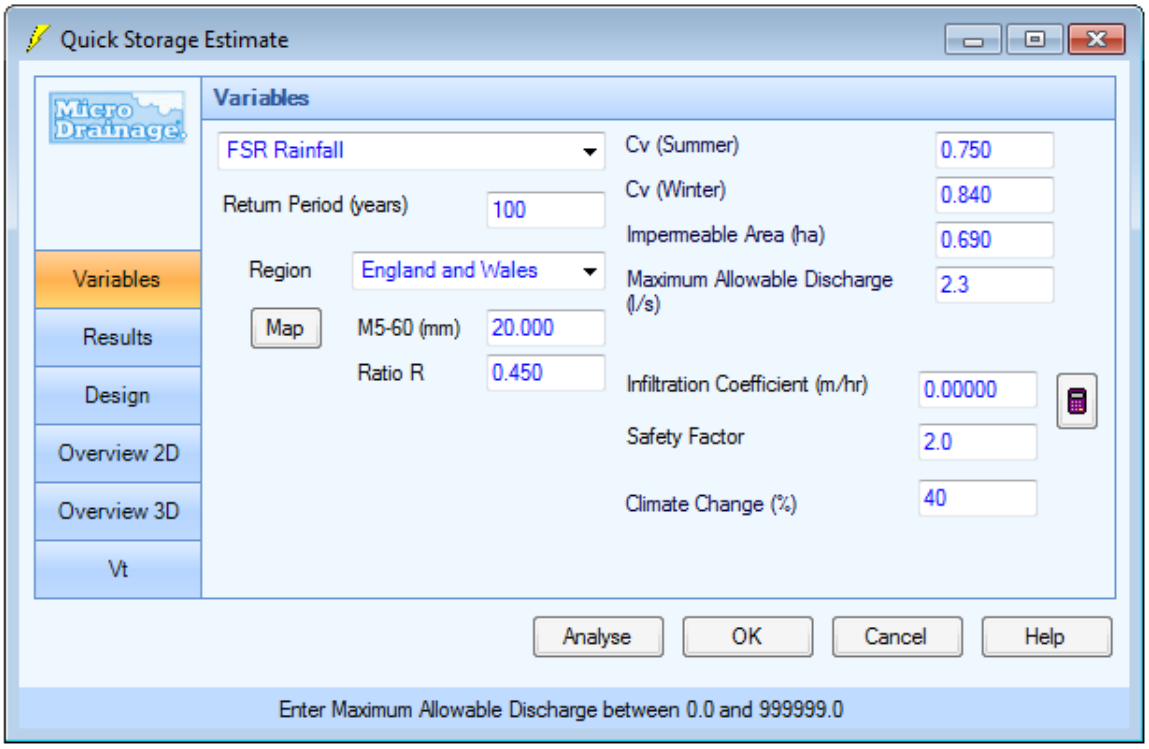
1 in 100 year +40% Climate Change

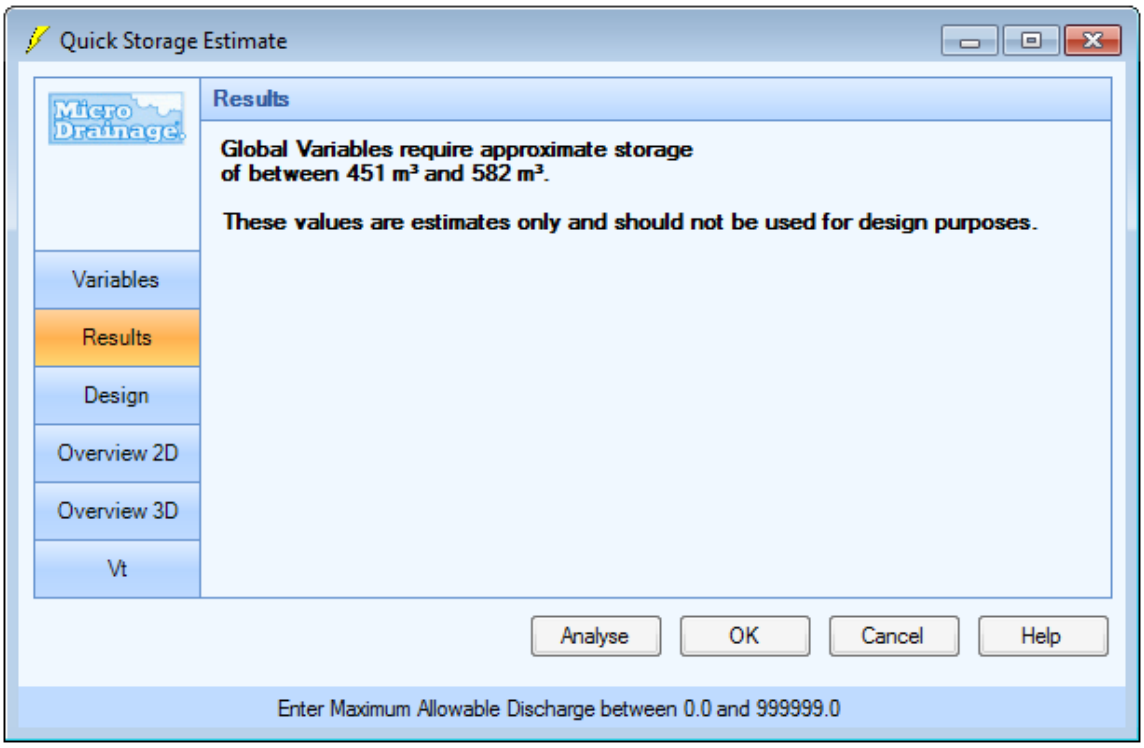




North Field

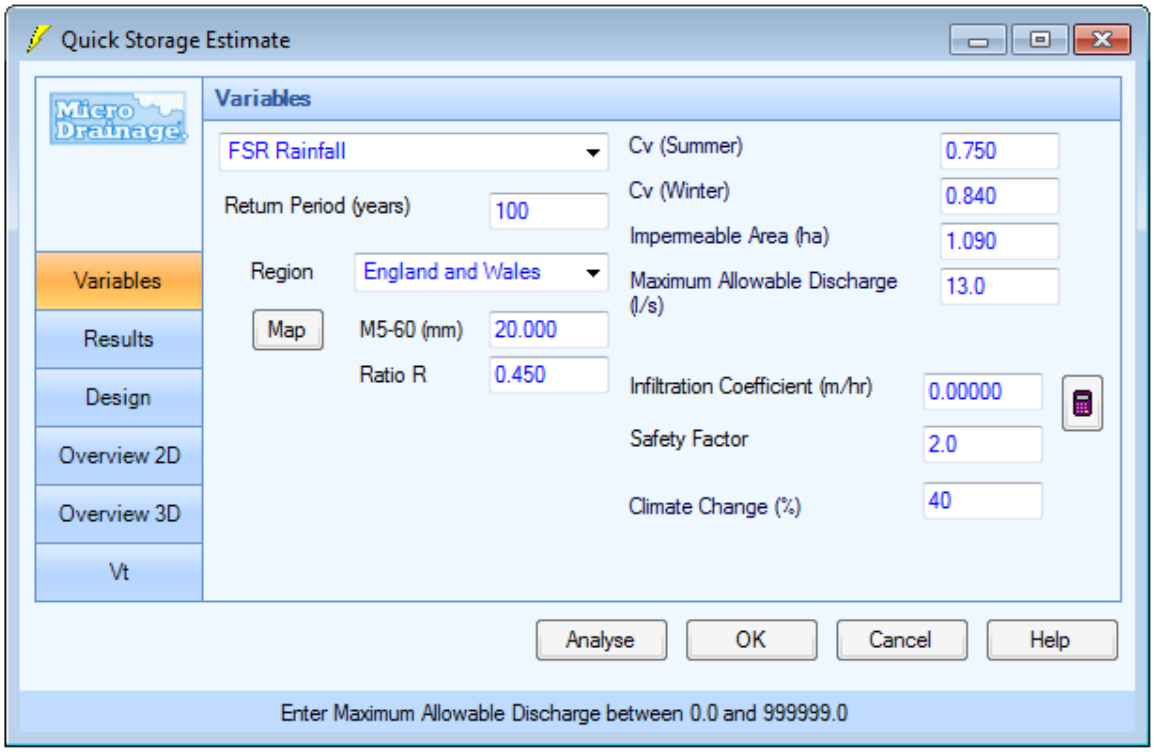
QBAR

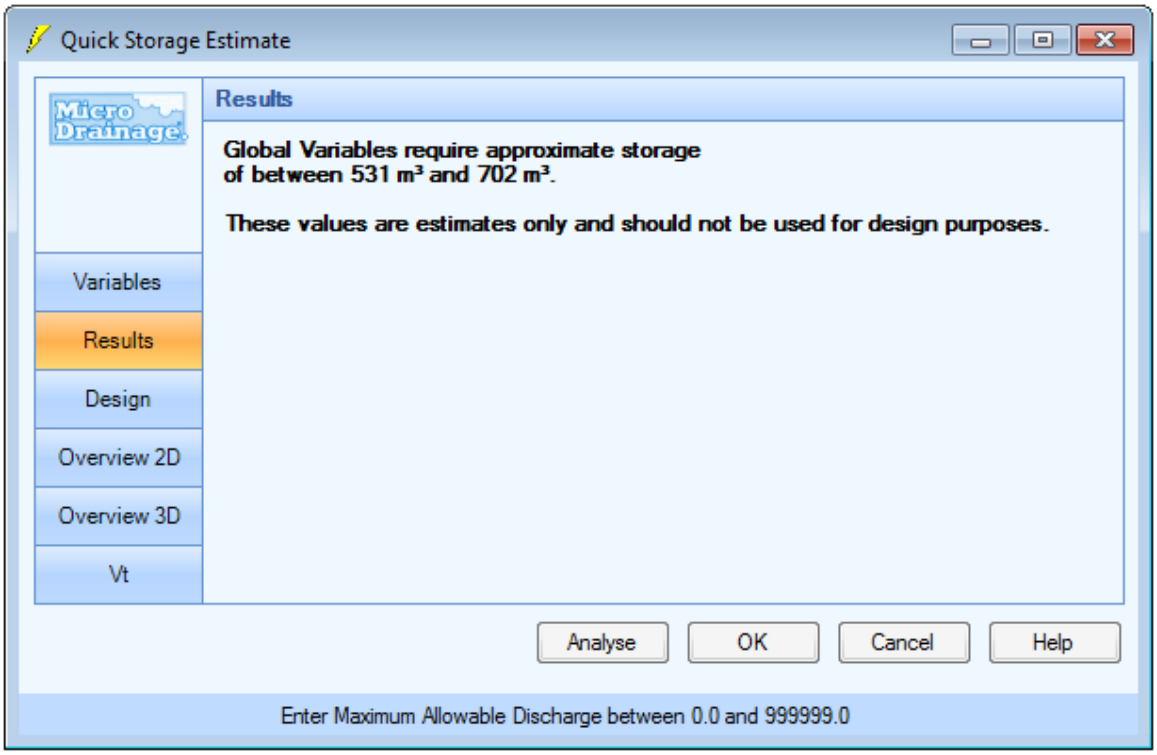




South Field

1 in 100 year +40% Climate Change





South Field QBAR