MA11242 FRA/DS-R04

Sunnydale Close
Surfleet

Flood Risk Assessment

17 September 2020

Millward
consulting engineers

REVISION

Reference	Revision	Author	Date
MA11242 FRA/DS-R01	Initial Issue	CMN	Feb 2020
MA11242-FRA/DS-R02	Update of site layout and mitigation measures	JMcK	July 2020
MA11242-FRA/DS-R03	Update of site layout	JMcK	17 Aug 2020
MA11242-FRA/DS-R04	Update of SWS drainage strategy	JMcK	14 Sept 2020

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- South Holland SFRA Depth Mapping
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1. INTRODUCTION

1.2 Millward have been appointed to undertake a Flood Risk Assessment (FRA) and Drainage Strategy (DS) for a proposed residential development for 75 plots on land off Sunnydale Close, Surfleet.

1.2 This FRA is undertaken in accordance with the National Planning Policy Framework and associated Technical Guidance 'Flood Risk and Coastal Change March 2014' (NPPF).

1.3 This FRA discusses and provides both a qualitative assessment and quantitative assessment for the residential development in terms of flood risk and future flood risk over the anticipated lifetime of the development.

1.4 This FRA has been written with the most recent SFRA for South-East Lincolnshire which uses data provided by the South Holland District SFRA.

1.5 The South East Lincolnshire Council have allocated this site in the local plan.

2 THE SITE

2.1 This proposed residential development is located to the north-east of Sunnydale Close Surfleet Lincolnshire, totalling 2.82 Hectares (28200m^2) in area. The site is located on the southern extent of Surfleet approximately 4.99Km to the north-east of Spalding town centre and approximately 11.25Km to the north-west of the centre of Holbeach. The site location is shown on drawing MA11242/001 contained within Appendix A.

2.2 Vehicular access to the development will be via Sunnydale Close as per the architects drawing contained within Appendix A. This will require a road over the Welland and Deepings IDB Drain (Woods Lane Drain) subject to a formal application to Welland and Deeping IDB.

2.3 The site is not currently developed nor has been previously developed therefore the site is classified as Greenfield.

2.4 There is no evidence that the site is or has been formally drained previously and is currently used for agriculture.

2.5 Site levels within the development area vary from circa 3.52mAOD to the south-eastern corner, 4.75mAOD to the north-eastern corner, 4.36mAOD to the north-western corner 3.40mAOD to the south-western corner.

2.6 The site is currently 100% Greenfield and therefore the site surface water run-off has been calculated by the IH124 SUDS method using the Wallingford Greenfield Run-off rate estimation for sites (www.uksuds.com), which confirms a Q-Bar (Mean annual flood flow) Greenfield run-off rate of 3.96l/s. The greenfield calculations are contained within Appendix C. This calculated Greenfield Run-off Rate is equivalent to 1.4l/s/ha.

3 CONSULTATIONS

3.1 Environment Agency (EA)

3.1.1 The EA national flood risk maps available on their web site have been interrogated firstly to define in terms of planning what flood zone the site is contained within.

3.1.2 The development site is located within Flood Zone 3a which in accordance with Table 1 of the NPPF Technical Guidance document, is defined as High Probability having a 1 in 100 or greater annual probability of flooding from rivers (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year (National Planning Policy Framework Technical Guidance, March 2012).

3.1.3 The site and surrounding area benefit from significant tidal flood defences which protects the site up to the 1:100yr flood levels.

3.1.4 Therefore, further information has been obtained from the LLFA relating to this site in the form of Hazard Mapping from the South Holland SFRA which is contained within Appendix B.

3.1.5 The information shows modelled breach locations and mapping showing anticipated depths, water velocities and maximum hazard ratings (FD 2320) for a range of events.

3.1.6 The range of events are 1 in 100 year event (Scenario years 2017 and 2115) and the 1 in 1000 year event (Scenario years 2017 and 2115).

3.1.7 The assessment of this data is undertaken in Section 7.1.

3.2 Anglian Water (AW)

3.2.1 As part of this assessment AW sewer maps have been obtained to determine the location of sewers in the vicinity of the site.

3.2.2 There is a rising main owned by Anglian Water within the western boundary of the site. There is also a pump station to the south of the site but not within the site boundary.

3.2.3 There are no public surface water sewers within the vicinity of the site however there is a watercourse maintained by the IDB running along the western boundary connected via a culvert to the IDB drain at the southern boundary. Infiltration and discharge into the watercourse will be considered as an initial way of treating and disposing of the surface water drainage.

3.2.4 An AW developer enquiry has been made and the response is that a foul gravity connection to MH 2801 is viable. Upon Any foul connections to any existing adoptable sewers are subject to a S106 sewer connection agreement which would be undertaken as part of the detailed design of the drainage for the development.

4 SEQUENTIAL AND EXCEPTION TESTS

4.1 Sequential Test

4.1.1 The site has been assessed in line with the NPPF technical guidance. The site is confirmed to be wholly within Flood Zone 3a (High probability) as defined in Table 1 (Flood zones) of the technical guidance document for the NPPF.

4.1.2 Table 2, (Flood risk vulnerability classification) of the same document confirms that residential development (buildings used for dwelling houses) is classified as 'More Vulnerable' development.

4.1.3 Table 3, (Flood risk vulnerability and flood zone 'compatibility') confirms that development classified as 'More vulnerable' development in Flood Zone 3a requires the exception test to be carried out.

4.1.4 In terms of Sequential Test, the site sits wholly within flood zone 3 which is the case for the vast majority of this borough.

4.1.5 The SFRA states that the EA flood zones will continue to be used by the Borough Council as the basis on which the Sequential Test is applied. The majority of the South Holland District is within Flood Zone 3a and Surfleet has land in the Danger to Most category and a high probability of flooding.

4.1.6 The adopted local plan (in appendix B) has identified that 11,681 houses at 467 per annum is required within South Holland District. As mention in section 1.4.1 the site has been identified in the local plan (Sur006) as having potential for allocating residential units.

4.1.7 As the site is allocated in the adopted local plan the Sequential Test has been undertaken s part of the local plan process and is therefore deemed passed.

4.2 Exception Test

4.2.1 It has been identified in the South-East Lincolnshire Adopted Local Plan that this site is designated for residential development. The local plan explains the need and requirement for housing in this area in order to sustain growth for the district.

4.2.2 The mitigation measures discussed in section 8 of this report outlines how the development will be designed to reduce the risk of flooding to residents by the raising of floor levels from the existing levels in accordance with the Environment Agency Standard advice.

4.2.3 The prevention of overflowing into adjacent land will also be mitigated through the design of a land perimeter drain to the northern boundary of the site. This will reduce the risk of increasing the flood risk to adjacent existing properties.

4.2.4 The surface water drainage system will be design to the 1:100yr+40% c.c plus 6% urban creep to ensure that there is no flooding on site.

4.2.5 Therefore, taken into account the above assessment, we consider that the Exception Test is passed.

5 PROPOSED DEVELOPMENT

5.1 The proposed development proposals consist of circa 75 no dwellings in total with POS, associated driveways and garages (off road) and garden areas to the rear of the proposed dwellings. The site is to be accessed off Sunnydale Close in line with the current master plan for the site contained within Appendix A.

5.2 The impermeable areas of the proposed site have been calculated from the site layout in appendix A as 1.48ha (53% impermeable). This is an increase in impermeable area on the site, which therefore will require mitigation measures in terms of surface water drainage to reduce the surface water run off to equivalent Greenfield rate of 3.96 l/s.

5.3 The site is served by an access road which will be drained by roadside filter drains that convey water to the outfall into the IDB drain to the western boundary.

6 PROPOSED DRAINAGE STRATEGY

6.1 The site topography varies with a general fall from the north-east to the south-west at levels 4.75mAOD to 3.40mAOD.

6.2 The preliminary drainage strategy shown on drawing MA11242/200C is based upon the current master plan for the site and assumes that private driveways and shared drives will utilise permeable paving as part of the strategy.

6.3 Roadside filter drains will take the surface water run-off from the proposed carriageways before a restricted outfall into and adopted surface water pump station where the flows is pumped to a proposed manhole in the western part of the site then ultimate outfall into the IDB maintained ditch at restricted discharge rates. An attenuation tank will be provided offline for storage purposes within the site.

6.4 The cumulative discharge rate for surface water from the pump is designed not to exceed the 1 in 1 year Greenfield run off rate of 3.96 l/s for the whole development site or other agreed rate with the Welland and Deepings IDB (Agree as part of the detailed design process).

6.5 The total impermeable area to be drained from the site is 1.481ha based upon site layout 1280-003 B.

6.6 The surface water drainage system to be designed for the site will ensure that there is no flooding from the site in the 1 in 100 year event including a 40% allowance for climate change whilst maintaining the agreed maximum cumulative discharge rate for the development site.

6.7 The volume of attenuation which is estimated to be required to accommodate the above criteria is 1,191m^3. This has been calculated using WinDES source control quick storage estimate. However further detailed hydraulic modelling suggests that a storage volume of circa 1,313m^3 within the system is required (provided by pipes, manholes, cellular storage and permeable pavements).

6.8 The attenuation accommodates the storage required in the 1:100 year+40% c.c and 6% urban creep without the calculation of additional storage from the permeable paving and under drained filter drains; actual final attenuation requirements will be confirmed as part of the detailed design.

6.9 As the site is to be raised above adjacent ground levels, consideration of inclusion of perimeter land drains to the northern boundary may be necessary. The southern and western boundaries are protected from overland flows by the location of the IDB watercourse. Both the IDB and perimeter drain would intercept any water from the gardens of the proposed dwellings and prevent it entering the existing gardens. (Currently, there is no such facility to protect the existing gardens in the north).

6.10 The surface water drainage strategy provides the required minimum 1 treatment train for roof areas and two treatment trains for the roads / driveways. (All areas flow through 2 treatment trains in line with CIRIA C697.

6.11 The attenuation tank will be adopted and maintained by a private management company which will be funded through the residents of the development which this funding requirement secured through their deeds. This will ensure that the private management company is suitable funded throughout the lifetime of the development.

6.12 The filter strips will be adopted by LCC whereas the carrier drains under the filter strips (filter drains), flow control and outfall headwall will be adopted by AW.

6.13 The existing IDB maintained drains to the western and southern boundaries have an existing 9m easement to each bank for maintenance purposes as shown on drawing MA11242/200C contained within Appendix A.

6.14 Analysis of the closest recorded borehole (trial pit) in proximity of the site (data taken from the British Geological Survey records online). The logs confirms that between 0.4m to 1.5m below ground level the material is predominantly silty sandy clay. This material sits on chalky boulder clay.

6.15 A Phase 1 and 2 Geo-Environmental Assessment will be undertaken to confirm this. Infiltration tests should also be conducted as part of the Geo-Environmental assessment to confirm low rates of infiltration.

6.16 It is therefore presumed based on the BGS data that soakaways are not recommended as solution to surface water drainage of the site.

6.17 Therefore, surface water is proposed to drain to the existing IDB maintained drains at the 1 in 1 year Greenfield run off rate of 3.96 l/s or another rate agreed with the IDB. This is subject to a formal discharge application to Welland and Deepings IDB.

6.18 In terms of foul drainage, it is proposed to have a gravity foul system within the site to convey flows towards the existing AW MH 2801 subject to a S106 agreement with AW. This manhole has an existing connecting into an AW pump station; therefore, permission would be required to confirm that this pump station has the capacity to accept the flow from this site. The developer enquiry carried out should confirm this manhole as an acceptable FW outfall for this site.

7 FLOOD RISK

7.1 Flooding From Fluvial and Tidal Sources

7.1.1 The residential development area is shown within Flood Zone 3a as having a 1 in 100 or greater annual probability of flooding from rivers (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. (National Planning Policy Framework Technical Guidance, March 2012)

7.1.2 The South-East Lincolnshire Strategic Flood Risk Assessment (March 2017) provides district wide assessment of the flood risk including flood defence breach scenarios which have been assessed. It is recommended that the Year 2115, 1% Fluvial, 0.5% Tidal Event Probability mapping should be used for the purpose of this assessment.

7.1.3 The study area in the South-East Lincolnshire SFRA shows the whole site to be in flood zone 3 with a flood hazard of Danger to Most.

7.1.4 The site has an IDB watercourse running adjacent to the western and southern boundary of the site known as Woods Lane Drain. The IDB drain is culverted to connect the western drain and southern drain which flows towards the south-east of the site boundary.

7.1.5 Surfleet is defended by significant tidal flood defences to the southern bank of the River Glen and whilst the Flood Zone is 3a this does not take into account the presence of flood defences.

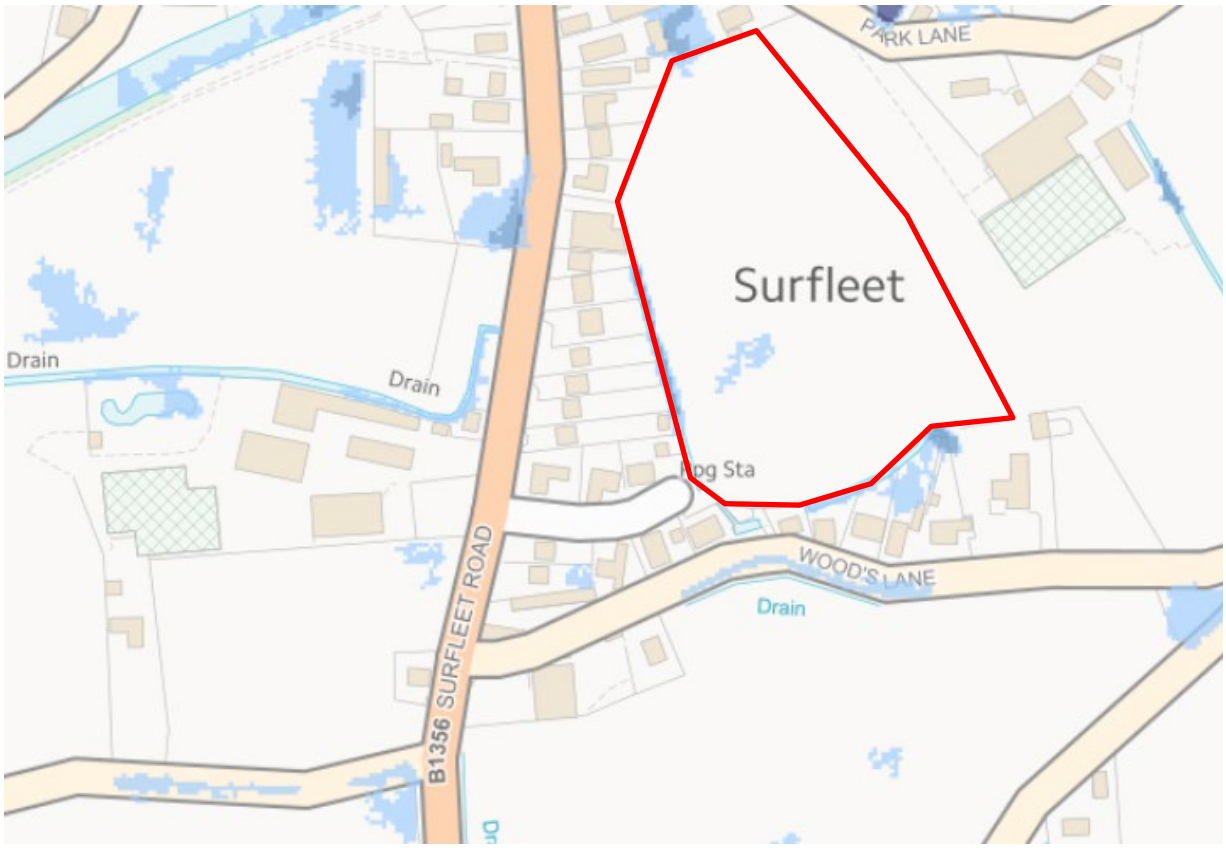
7.1.6 The use of the Relative Probability of Flooding maps in the South-East Lincolnshire SFRA shows that the site is at a high probability of flooding suggesting that these flood defences do not defend the site up to the 1:100yr fluvial and 1:200yr tidal events.

7.1.7 As the risk of flooding is high with the flood defences taken into account (Flood Zone 3a) the risk of flooding from this source is **HIGH**.

7.1.8 Upon further interrogation of the maximum depth hazard mapping there is a large variation in terms of anticipated depth, ranging from 0m to 0.5m. Looking at the level differences on the topographical survey between the south-east and north-west extents of the site there is a circa 1.37m fall in the south-eastly direction. It can be assumed that this flood depth range is correct and the worst case of depths of 0.25m-0.5m will be used for deciding the mitigation measures necessary.

7.1.9 Therefore, mitigation measures are required to counteract this which involves raised floor levels by 0.5m from existing ground level in line with the mitigation advice stated in the South East Lincolnshire SFRA by the EA. The mitigation measures proposed are discussed further in Section 8.

7.2 Flooding From Land / Adjacent Development



7.2.1 The EA mapping for surface water flooding risk has been obtained to determine the risk of flooding from this source. It can be seen that there is minimal or low probability of flooding from this source. A small patch in the south-west shows a low risk but relates to a low spot shown on the topography and is therefore localised. There is also some risk to the western and southern boundary, but this is thought to be due to the location of the IDB drain adjacent to the site boundary.

7.2.2 Any overland flow from adjacent development site is likely to be minimal. There is a low point within the site which would create a localised depression in the ground which would be at risk of ponding / pooling water from this source however this will be design out as part of the detailed design of levels for this site.

7.2.3 Overall, the risk of flooding from this source is considered to be **LOW.**

7.2.4 Therefore, there are mitigation measures proposed as part of the development layout and levels to mitigate this residual risk which are discussed in Section 8.

7.3 Flooding From Infrastructure Failure

7.3.1 The site is not within an area deemed to be at risk of flooding from reservoirs (according to the data on the EA website).

7.3.2 As the site is outside the limits of any deemed flood extents from a reservoir failure, the risk of flooding to the site is considered **LOW**.

7.4 Flooding From Groundwater

7.4.1 There are no confirmed records of groundwater flooding in the vicinity of the site in the SFRA.

7.4.2 As mentioned in section 6.14 borehole scans have been examined to determine the geology of the land in Surfleet. These borehole logs did not show presence of groundwater. As part of the phase I and II ground investigation report the risk of groundwater should be confirmed.

7.4.3 Overall, the risk of flooding from this source is considered to be **LOW**. As there should not be any dwellings in localised low points within the site it is not considered further assessment is required to assess flooding from this source.

7.4.4 However, mitigation measures are proposed as part of measures to counteract other sources of flooding which will essentially further reduce any likelihood of flooding from this source.

7.5 Flooding From Sewers

7.5.1 Anglian Water sewer maps show the existing FWS network as being within proximity of the site. The existing AW MH 2801 has a cover level of 3.66mAOD which is lower than the site levels. There is also a rising main adjacent to the IDB drain on the western boundary where levels are also lower than the site.

7.5.2 The cover levels of the FWS in Surfleet Road vary between 4.11-4.38mAOD where site levels are between 3.40-4.75mAOD there is potential for the southern area of the site to be at risk of flooding from this source. Flow velocities and depths are expected to be relatively slow and shallow respectively towards the site and likely to be constrained within the carriageways initially then directed into the IDB maintained drains realistically.

7.5.3 Overall taking into account the proximity of the sewers and topography of the area, the risk of flooding from this source is considered to be **LOW**.

7.5.4 However, mitigation measures are proposed as part of measures to counteract other sources of flooding which will essentially reduce any likelihood of flooding of properties on the site from this source.

7.6 Off-Site Flood Risks

7.6.1 The site proposals along with the proposed drainage strategy outlined in Section 6.1 will intercept drainage run off from the development in filter drains, potential perimeter land drains and attenuation tanks which will be designed to accommodate the 1 in 100 year event scenario (including 40% allowance for climate change) without flooding.

7.6.2 Consideration at the detailed design stage will be given to either a land drain / land drains to intercept any surface water flow from the site at the northern boundary which will outfall into the IDB drain at the western boundary. This would be reviewed at detailed design stage once final proposed floor levels, layout and finished level contours are produced to confirm any flow routes.

7.6.3 With regard to risk to areas off site, the residual risk is considered to be **LOW** as the onsite drainage system will be designed to accommodate the extreme events without flooding and there will be an overflow system in place to ensure any exceedance water does not flow into other land.

7.6.4 Existing dwelling gardens would be protected if required by a land drain to intercept any water that may approach the site boundaries adjacent to these properties. The final site layout would be designed with this potential requirement in mind.

7.7 Flooding from Climate Change

7.7.1 The NPPF Technical Guidance Document confirms in Table 5 that peak rainfall intensity is estimated to increase potentially up to 40% over the lifetime of this development (100 years) and peak river flows by 20%.

7.7.2 NPPF technical guidance also requires climate change to be considered to fluvial sources. The site lies within the Humber River Basin where the vulnerability class is more vulnerable therefore the High Central and Upper End allowances should be considered when modelling the fluvial flows. The mapping provided as part of the SFRA is modelled as the 2115 in the 1:100yr fluvial and 1:200 year tidal event. The properties will be raised by 0.5m from existing ground level. This is the mitigation measure advised in the SFRA.

7.7.3 Overall, the risk of flooding from this source is considered to be **HIGH** and Section 7 discusses the mitigation measures that we would consider need to be applied to manage this risk and ensure the development is safe for its lifetime which would reduce the risk of flooding.

8 MITIGATION MEASURES

8.1 Essential Mitigation Measures

8.1.1 The assessment of flood risk in Section 7 of this assessment confirms a **HIGH** risk of flooding from Fluvial / Tidal and climate change. There is a **LOW** risk of flooding from all other sources including infrastructure failure, groundwater and sewers.

8.1.2 Therefore, there are several essential mitigation measures to be applied as part of the development.

8.1.3 Flood depths due a breach scenario are anticipated to be between 0.25m up to 0.5m based upon the Hazard maps provided by the Environment Agency (EA) and the justification in Section 7.1. Therefore, in line with the EA comments on the South East Lincolnshire Local for depths between 0.25m and 0.5m finished floor levels are to be raised 0.5m above existing ground levels with a minimum of 300mm flood resilient construction. However, where levels are raised above 800mm then the flood resilient measures are not required.

8.1.4 Surface water drainage for the site must be designed to accommodate the 1 in 100 year event storm scenarios including a 40% allowance for climate change without any flood waters leaving the development site and no flood waters leave the site boundary.

8.2 Recommended Mitigation Measures

8.2.1 All dwellings should have concrete ground floors with damp proof membranes as they are regarded as the most flood resilient floor types with effective connections between the dpc and dpm and shall be constructed to a height of 150mm above the predicted flood level. The dpm should be between the surface screed and the concrete slab as this enables the concrete floor to dry out quickly and would also protect against any rising groundwater should flood risk from this source increase over the lifetime of the development.

8.2.2 Permeable paving to private driveways and parking areas should be utilised even if infiltration SUDS are not viable as permeable paving can be designed into a sealed system before outfall into the drainage ditch to the east of the site. This would form part of a SUDS treatment train in line with CIRIA C753, subject to SAB approvals.

8.2.3 It is recommended that FFL to properties should be above any adjacent roads levels where possible.

8.2.4 Where external gradients are flat or towards the dwelling entrances, provision of linear drainage should be provided to the level threshold access points only.

8.2.5 Plaster work at ground floor to be laid with the boarding horizontal which allows for easy replacement at the lower level without excessive breaking out or cutting of plasterboard.

9 CONCLUSIONS

9.1 This Flood Risk Assessment serves to review, assess and quantify (where applicable) the sources, or any potential flooding, the pathways of this flooding and potential receptors within the vicinity of the site.

9.2 Due to the mitigation measures put in place the assessment of flood risk in Section 7 of this assessment confirms a **MODERATE** risk of flooding from Fluvial / Tidal, adjacent land and climate change. There is a **LOW** risk of flooding from infrastructure failure, sewers and groundwater.

9.3 The mitigation measures will provide further protection to the development and reduce any residual risk (however low) as far as practicable. It is recommended that compliance with the recommendations of this FRA are conditioned as part of any planning permission.

9.4 This assessment concludes that the site is suitable for development for residential use without unacceptable risk of flooding from all sources to the site itself and elsewhere for the lifetime of the development.

Appendix A – Drawings

Site Location Plan: MA11242-001

Proposed Site Layout: 118-SL-01

Proposed Drainage Strategy: MA11242-200 C



ASSOCIATED DRAWINGS	
No.	TITLE

NOTES

REV	DATE	BY	DETAILS	CHK'D

AMENDMENTS

CLIENT
Ashwood Homes

PROJECT
Sunnydale Close
Surfleet

TITLE
Site Location Plan

DRAWING No:	DRAWING STATUS
MA11242-001	19.02.2020

SCALE	DRAWN	ENGINEER
NTS	CMN	CMN
DATE	**CHECKED**	**APPROVED BY**
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Different through Design

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A3



KEY:

SITE BOUNDARY:

1800mm Facing Brick wall: (brick to match adjacent property)

Bin Collection Areas:

Affordable housing locations:

SCHEDULE:

	Unit	Beds	Storey	SqFt	Parking	No
Market						
	Dee	2	2	732	ps	8
	Clyde	3	2	783	sg	12
	Aire	3	2	870	sg	6
	Avon	3	2	910	sg	8
	Coronation	3	2	932	sg	2
	Nene	3	2	1,077	sg	9
	Lock	3	2	1,079	sg	5
	Mere	3	2	1,079	sg	8
	Ribble	4	2	1,283	dg	2
	Severn	4	2	1,229	sig	4
	Balmoral	4	2	1,460	sig	2
	Tay	4	2	1,770	dg	3
					Sub-Tot	**69**
Affordable Housing	*					
	A732	2	2	732	ps	3
	A902	3	2	902	ps	3
					Sub-Tot	**6**
					Total	**75**

REVISIONS:

Rev A: Electric cable easement added. 26.2.20
Rev B: Updated to Planners comments, numbers reduced to 77. 29.6.20
Rev C: Electricity Sub station added. 24.7.20
Rev D: Affordable provision amended. 6.8.20
Rev E: Plot 47 position adjusted. 7.8.20

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PRELIMINARY

PROJECT: SUNNYDALE CLOSE, SURFLEET

TITLE: PRELIMINARY PLANNING LAYOUT

CLIENT: ASHWOOD HOMES
1, GOODISON ROAD, LINCS GATEWAY BUSINESS PARK
SPALDING, LINCOLNSHIRE
PE12 6 FY 01406 490590

SCALE	DATE	DRAWN
1:500 @ A1	FEBRUARY 2020	NKW

DRAWING NUMBER: 1280-003

REVISION: E

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Key

- Existing Adopted FWS
- Existing Adopted Rising Main
- Proposed Adopted SWS
- Proposed Adopted FWS
- Proposed Highway Drain
- Proposed AW 3m Easement
- Proposed Adopted Pre-Cast Headwall
- Proposed Private Land Drain
- Proposed Private SW Drain
- Proposed Private FW Drain
- Proposed Private SW Rodding Eye
- Proposed Private Permeable Tarmac Storage Required
- Proposed Private Attenuation Tank Aquacell

N

Private SW Attenuation 26.0m35.0x1.2m Deep Provides 1037.4m³ of storage up to 1:100yr+40% c.c Min CL 4.570 IL 2.770 (600Ø in/out)

PUBLIC OPEN SPACE

SWS PUMP @3000Ø CL 4.100 IL 1.204in IL@0.200base

Drainage Easement

IDB Drainage Easement

15m easement Pump Stn

Route of Diverted Public Footpath

Ex Pipe IL 2.000 (based upon IDB records - TBC on Site)

Ex Pipe IL 1.950 based upon IDB records - TBC on Site)

Ex Pipe IL 1.970 (based upon IDB records - TBC on Site)

Refuse/recycling Collection area Plots 10, 11, 12, 13 & 14

Refuse/recycling Collection area Plots 18, 19, 20, 21 & 22

Refuse/recycling Collection area Plots 69, 70, 71 & 72

Refuse/recycling Collection area Plots 73 & Pad 1

Electric cable easment

Sub Stations

Sample Point

Trial Pit

Hedge

Fence

Drain

Ditch

Kerb

Stone

Concrete

Topsoil

Glasshouse

Footway

Sub Station

Rising Main outfall to be agreed with the IDB

REV	DATE	BY	DETAILS	CHK'D
C	14.09.20	JMcK	Site sws strategy updated fft's revised	JMcK
B	17.08.20	JMcK	Site layout updated to 118-SL-01 Layout	JMcK
A	17.07.20	JMcK	Site layout updated to 77 dwellings	JMcK

A0 AMENDMENTS

NOTES

TITLE: S104 Drainage Layout

PROJECT: Sunnydale Close Surfleet

CLIENT: ASHWOOD HOMES

DATE	CHECKED	APPROVED BY	SCALE	DRAWN	ENGINEER	DRAWING No:	DRAWING STATUS
31/03/20	JMcK	JMcK	1:250@A0	CMN	CMN	MA11242-200 C	PRELIMINARY

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Different through Design

Appendix B – Consultations

South Holland SFRA Hazard Mapping

South Holland SFRA Depth Mapping

South Holland SFRA Extents Mapping

South-East Lincolnshire Adopted Local Plan Designation-Surfleet

Welland and Deepings IDB Drain Location

Anglian Water Pre-Development Enquiry Response

Anglian Water Sewer Map

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 update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.

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. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.

6. Land outside South Holland District is not considered.

7. This map shows the extents only of the flooding probability bands relevant to the map Title

Map Legend

Max Hazard
(Flood Risk to People : FD2320)

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.0 (Danger for Most)
- Greater than 2.0 (Danger for All)
- Functional Floodplain
- South Holland District Boundary

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

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UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Residual Flood Hazard
Surfleet- Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: Feb 2017 **REV NO:** 2

SCALE: 1 : 7500 @ A1

MAP NO:

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 update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.

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. The potential flooding consequences relate to flood probability bandings as follows:

Probability Band	Annual probability of Flooding	
	from a river (fluvial)	from the sea (tidal)
Low	<0.1%	<0.1%
Medium	1%-0.1%	0.5%-0.1%
High	>1%	>0.5%

6. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.

7. Land outside South Holland District is not considered.

8. This map shows the extents only of the flooding probability bands relevant to the map Title

Map Legend

Flooding Probability bands :

- High
- Low or medium, but reliant on protection by flood defences for this standard
- Functional Floodplain
- South Holland District Boundary

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

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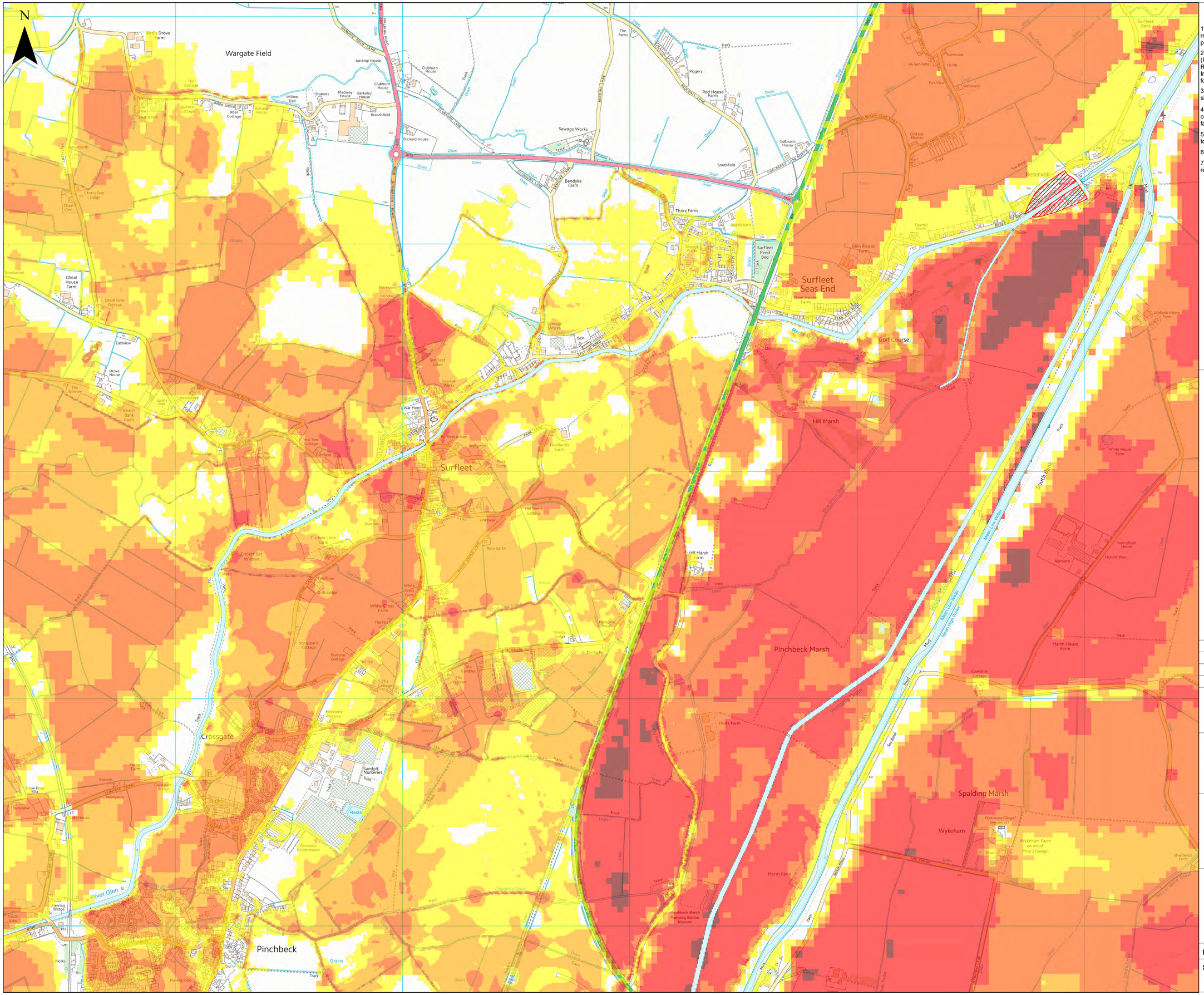
UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Residual Risk Extent
Surfleet - Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: Feb 2017 **REV NO:** 2

SCALE: 1 : 15,000 @ A1

MAP NO:



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 update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.
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. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.
6. Land outside South Holland District is not considered.
7. This map shows the extents only of the flooding probability bands relevant to the map Title

Map Legend

Peak Depth

- 0m - 0.25m
- 0.25m - 0.5m
- 0.5m - 1m
- 1m - 2m
- 2m +
- Functional Floodplain
- South Holland District Boundary

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

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UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Residual Peak Depth
Surfleet- Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: Feb 2017 **REV NO:** 2

SCALE: 1 : 7500 @ A1

MAP NO:

South East Lincolnshire
Local Plan 2011-2036

Adopted March 2019

Policies Map Inset Map No 23

Surfleet

Minor Service Centre
Scale 1:11,000 @A3

N

South East Lincolnshire
Joint Strategic Planning Committee

Sur018
Sur016
Sur003
Sur006
SR001
SR002

Surfleet
Surfleet Seas End
Surfleet Reed Bed
Surfleet Lows
Thary Farm
Bendyke Farm
Sewage Works
Orchard House
Brandsfield
Clubhurn House
Aorangi House
Medway House
Berkeley House
Red House Farm
Piggery
The Ferns
Gas Gov
Coney Garth House
Sunnyside
Ali-San-Ama
Hylite
Fair View
Westview
Surfleet Bank
Colbeach House
Cottage Homes
Smithfield
Glen Rowan Farm
Flaxmill House
Reservoir
Sea Bank
Sluice
Vernatt's Bridge
Slipway
Glen House
Glen House
Club House
Golf Course
River Glen
Hill Marsh
Hill Marsh Farm
Newlands Farm
Park Farm
Surfleet Bridge
Brynawyn
War Memi
Old Tom's Cottage
The Brambles
Limsway
Rose Garth
Mill House
Lincote
Surfleet Lows
Crowtree Farm
White Cross Farm
The Firs
Pearstree Cottage
Tor Ivo
Windy Lodge
Herdgate House
The Lodge
The Gambles
Pinchbeck Marsh
Blue Gowt Drain
South Bank
River Welland
Main Low Water
Mean High Water
Mud
Welland House Farm
White House Farm
Sunnyfield House
Herons Way
Nursery
Marsh House Farm
Cowhirne Cottage
Wickmere
South Lincolnshire Crematorium
Old Sea Drain
Old Pinchbeck Drain
Roman Bank
Drains
Track
Path
Slipway
Sluice
Bridge
Sch
Cemy
FB
PH
TCB
TH
PW
MP
NTL

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Park Lane
Surfleet Road
Woods Lane
B1356
White Cross Lane
(1 of 2)
DrainID 92
DrainName Woods Lane Drain
CatchID 5
CatchName Pinchbeck
SCatchID 5
Length 1,275
CenX 525,554
Zoom to
Esri UK, Esri, HERE, Garmin, INCREMENT P, Intermap, ...
esri

Pre-Planning
Assessment Report
SUNNYDALE CLOSE 156330/903166510/1/0078645

Report published 25/02/2020

Section 1: Proposed development

Thank you for submitting a pre-planning enquiry. This has been produced for Ashley King (Developments)Ltd DART. Your reference number is **156330/903166510/1/0078645**. If you have any questions upon receipt of this report, please contact the Pre-Development team on 03456 066087 or email planningliaison@anglianwater.co.uk.

The response within this report has been based on the following information which was submitted as part of your application:

List of planned developments	
Type of development	**No. Of units**
Dwellings	78

The anticipated residential build rate is:

Year	Y1	Y2
Build rate	50	28

Site grid reference no.

TF2525927961

Development type

Greenfield

Planning application status

Unknown

The comments contained within this report relate to the public water mains and sewers indicated on our records. Your attention is drawn to the disclaimer in the useful information section of this report.

Section 2: Assets affected

Our records indicate that there are no public water mains/public sewers or other assets owned by Anglian Water within the boundary of your development site. However, it is highly recommended that you carry out a thorough investigation of your proposed working area to establish whether any unmapped public or private sewers and lateral drains are in existence.

Pumping Station

The development site is within 15 metres of a sewage pumping station. This asset requires access for maintenance and will have sewerage infrastructure leading to it.For practical reasons therefore it cannot be easily relocated.Anglian Water consider that dwellings located within 15 metres of the pumping station would place them at risk of nuisance in the form of noise, odour or the general disruption from maintenance work caused by the normal operation of the pumping station.The site layout should take this into account and accommodate this infrastructure type through a necessary cordon sanitaire, through public space or highway infrastructure to ensure that no development within 15 metres from the boundary of a sewage pumping station if the development is potentially sensitive to noise or other disturbance or to ensure future amenity issues are not created.

Due to the private sewer transfer in October 2011 many newly adopted public used water assets and their history are not indicated on our records. You also need to be aware that your development site may contain private water mains, drains or other assets not shown on our records. These are private assets and not the responsibility of Anglian Water but that of the landowner.

Section 3: Water supply

In examining the available capacity for your development site we assess the capacity and costs for two categories of water main. These are:

Strategic:

These are the offsite potable water mains which deliver water within an area to a large number of development sites often across a number of towns. The strategic provision of these water mains enables us to provide of the cheapest solution across a large geographical area.

Local reinforcement:

These are localised reinforcement mains to enable us to provide water to your development site.

On most sites we also have two categories of water mains the Spine Mains and Housing Estate Mains (HEMS). To support your budgeting arrangements we have also examined the estimated cost for delivering the onsite water mains needed for a site of your size.

Water supply network

The water supply to the proposed development site can be provided from the existing mains. Anglian Water cannot reserve capacity and therefore you are recommended to formally apply for a connection at your earliest convenience. Please note that available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

Connection point(s)

Connection Point
CP-2330

Address
Sunnydale Close

National Grid Reference (NGR)
TF2517427838

Water Infrastructure & Costs

As a result of the recent charging rules published by Ofwat, our charging regime has changed. Your development site will be required to pay a Zonal charge for each new property connecting to our water supply network that benefits from Full planning permission.

Payment of the Zonal charge must be made before premises are connected to our water supply network. More information on the Zonal charge can be found at http://www.anglianwater.co.uk/developers/charges

The Zonal charge consists of two elements. The first is called the 'Fixed Element' which is the same in nature to the Infrastructure charge applied prior to April 2018. The second is called the 'Variable Element' which may vary each financial year.

The elements are combined together to create the 2018/19 Zonal charge for Water:

Fixed Element	£ 370
Variable Element	£ 88.50

In most circumstances zonal charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage). However, if the new connection is to non-household premises, the fixed element is calculated according to the number and type of water fittings in the premises.This is called the "relevant multiplier" method of calculating the charge. Details of the relevant multiplier for each fitting can be found at our web-page: http://www.anglianwater.co.uk/developers/charges/

The total Zonal charge payable for your site for Water is:

Zonal charge per new connection - Water	No. Of Units	Total amount payable
£ 458.50	78	£ 35,763.00

The estimated* Onsite Water Mains cost for your site is:

Estimated Onsite Water Mains	
Onsite water mains costs	£ 5,616.00

*A detailed cost breakdown will be provided on receipt of a formal application for a new water main.

In addition, you also have the ability to construct the onsite water mains under a self-lay agreement. In such cases, an Asset Payment is made by Anglian Water following commissioning and adoption of the assets. The Asset Payment is calculated as required in the Water Act 2003. For more information on the self-lay of water mains please see http://www.anglianwater.co.uk/developers/self-lay.

You will also need to budget for connection costs.Please note that we offer alternative types of connections depending on your needs and these costs are available in our annual charges booklet, which can be downloaded from http://www.anglianwater.co.uk/developers/charges

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Section 4: Water recycling services

In examining the used water system we assess the ability for your site to connect to the public sewerage network without causing a detriment to the operation of the system. We also assess the receiving water recycling centre and determine whether the water recycling centre can cope with the increased flow and influent quality arising from your development.

Water recycling centre

The foul drainage from the proposed development is in the catchment of Surfleet Water Recycling Centre, which currently has capacity to treat the flows from your development site. Anglian Water cannot reserve capacity and the available capacity at the water recycling centre can be reduced at any time due to growth, environmental and regulation driven changes.

Used water network

Our assessment has been based on development flows connecting to the nearest foul water sewer of the same size or greater pipe diameter to that required to drain the site. The infrastructure to convey foul water flows to the receiving sewerage network is assumed to be the responsibility of the developer. Conveyance to the connection point is considered as Onsite Work and includes all work carried out upstream from of the point of connection, including making the connection to our existing network. This connection point has been determined in reference to the calculated discharge flow and on this basis, a 150mm internal diameter pipe is required to drain the development site. The nearest practicable connection is to the 150mm diameter sewer at manhole 2801 at National Grid Reference NGR TF 25222 27834 or at any point downstream to suit the development's layout via construction of a new manhole. The cover level is 3.66m and the invert level is 0.77m. Anglian water has assessed the impact of gravity flows from the planned development to the public foul sewerage network. We can confirm that this is acceptable as the foul sewerage system, at present, has available capacity for your site. Please note that Anglian Water will request a suitably worded condition at planning application stage to ensure this strategy is implemented to mitigate the risk of flooding.

It is assumed that the developer will provide the necessary infrastructure to convey flows from the site to the network. Consequently, this report does not include any costs for the conveyance of flows.

Surface water disposal

You indicated on the Pre-Planning Application form that a connection to the public surface water sewer network is not required as infiltration and a connection to a watercourse is to be utilised. A new surface water sewer can be used as a mechanism to discharge surface water to a watercourse or as part of a Suds scheme where appropriate. Subject to the sewer being designed in accordance with the current version of Sewers For Adoption, the sewer can be put forward for adoption by Anglian Water under Section 104 of the Water Industry Act 1991. If the outfall is to a watercourse, the applicant will be required to obtain consent to discharge via the appropriate body. Therefore a capacity assessment has not been made on the public surface water network. However, should this situation change and you wish to have a surface water connection assessment on the local network, then we will provide this free of charge if requested within 12 months of this report and you are able to provide the relevant evidence that your original strategy was unviable.

As you may be aware, Anglian Water will consider the adoption of SuDs provided that they meet the criteria outline in our SuDs adoption manual. This can be found on our website at http://www.anglianwater.co.uk/developers/suds.aspx. We will adopt features located in public open space that are designed and constructed, in conjunction with the Local Authority and Lead Local Flood Authority (LLFA), to the criteria within our SuDs adoption manual. Specifically, developers must be able to demonstrate:

1. Effective upstream source control,
2. Effective exceedance design, and
3. Effective maintenance schedule demonstrating than the assets can be maintained both now and in the future with adequate access.

If you wish to look at the adoption of any SuDs then an expression of interest form can be found on our website at: http://www.anglianwater.co.uk/developers/suds.aspx

The proposed method of surface water disposal is not relevant to Anglian Water; we suggest that you contact the relevant Local Authority, Lead Local Flood Authority, the Environment Agency or the Internal Drainage Board, as appropriate.

Trade Effluent

We note that you do not have any trade effluent requirements. Should this be required in the future you will need our written formal consent. This is in accordance with Section 118 of the Water Industry Act (1991).

Used Water Budget Costs

As a result of the recent charging rules published by Ofwat, our charging regime has changed. Your development site will be required to pay a Zonal charge for each new property connecting to the public sewer that benefits from Full planning permission.

Payment of the Zonal charge must be made before premises are connected to the public sewer. More information on the Zonal charge can be found at http://www.anglianwater.co.uk/developers/charges

The Zonal charge consists of two elements. The first is called the 'Fixed Element' which is the same in nature to the Infrastructure charge applied prior to April 2018. The second is called the 'Variable Element' which may vary each financial year.

The elements are combined together to create the 2018/19 Zonal charge for Sewerage:

Fixed Element	£ 370
Variable Element	£ 101

In most circumstances zonal charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage). However, if the new connection is to non-household premises, the fixed element is calculated according to the number and type of water fittings in the premises.This is called the "relevant multiplier" method of calculating the charge. Details of the relevant multiplier for each fitting can be found at our web-page: http://www.anglianwater.co.uk/developers/charges/

The total Zonal charge payable for your site for Sewerage is:

Zonal charge per new connection - Sewerage	No. Of Units	Total amount payable
£ 471	78	£ 36,738.00

It has been assumed that the onsite used water network will be provided under a section 104 Water Industry Act application.

It is recommended that you also budget for connection costs. Please note that we offer alternative types of connections depending on your needs and these costs are available at our website.

Section 5: Map of Proposed Connection Points



Figure 1:Showing your water point of connection



Figure 2:Showing your used water point of connection

Section 6: Useful Information

Water

Water Industry Act – Key Water Sections:

Section 41:

This provides you with the right to requisition a new water main for domestic purposes to connect your site to the public water network.

Section 45:

This provides you with the right to have a connection for domestic purposes from a building or part of a building to the public water main.

Section 51A - E

This provides you with the right to provide the water main or service connection yourself and for us to vest them into our company.

Section 55:

This applies where you request a supply of water for non domestic purposes.

Section 185:

This provides you with the right to make a reasonable request to have a public water main, sewer or public lateral drain removed or altered, at your expense. Details on how to make an application and the s185 form is available on our website at http://www.anglianwater.co.uk/developers or via our Development Services team on 03456 066087.

Details on how you can make a formal application for a new water main, new connection or diversion are available on from our Development Services team on 03456 066087 or via our website at http://www.anglianwater.co.uk/developers

If you have any other queries on the rights to requisition or connect your housing to the public water and sewerage infrastructure then please contact our Development Services team at: Developer Services, Anglian Water, PO Box 495, Huntingdon, PE29 6YY or Telephone: 0345 60 66 087 or Email: developerservices@anglianwater.co.uk

Water pressure and flow rate: The water pressure and consistency that we must meet for your site is laid out in the Water Industry Act(1991). This states that we must supply a flow rate of 9 litres per minute at a pressure of 10 metres of head to the external stop tap. If yourwater pressure requirements exceed this then you will need to provide and maintain any booster requirements to the development site.

Self Lay of Water Mains: A list of accredited Self Lay Organisations can be found at https://www.lr.org/en/utilities/water-industry-registration-scheme-wirs-wirsae/search/

Used water

Water Industry Act – Key Used Water Sections:

Section 98:

This provides you with the right to requisition a new public sewer. The new public sewer can be constructed by Anglian Water on your behalf. Alternatively, you can construct the sewer yourself under section 30 of the Anglian Water Authority Act 1977.

Section 102:

This provides you with the right to have an existing sewerage asset vested by us. It is your responsibility to bring the infrastructure to an adoptable condition ahead of the asset being vested.

Section 104:

This provides you with the right to have a design technically vetted and an agreement reached that will see us adopt your assets following their satisfactory construction and connection to the public sewer.

Section 106:

This provides you with the right to have your constructed sewer connected to the public sewer.

Section 185:

This provides you with the right to have a public sewerage asset diverted.

Details on how to make a formal application for a new sewer, new connection or diversion are available on our website at http://www.anglianwater.co.uk/developers or via our Development Services team on 03456 066087.

Sustainable drainage systems:

Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not resilient to climate change in the long term. Therefore our preferred method of surface water disposal is through the use of Sustainable Drainage Systems (SuDS). SuDS are a range of techniques that aim to mimic the way surface water drains in natural systems within urban areas. For more information on SuDS, please visit our website at http://www.anglianwater.co.uk/developers/suds.aspx . We also recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for the area to discuss your application.

Private sewer transfers:

Sewers and lateral drains connected to the public sewer on the 1 July 2011 transferred into Water Company ownership on the 1 October 2011. This follows the implementation of the Floods and Water Management Act (FWMA). This included sewers and lateral drains that were subject to an existing Section 104 Adoption Agreement and those that were not. There were exemptions and the main non-transferable assets were as follows:

- Surface water sewers and lateral drains that did not discharge to the public sewer, e.g. those that discharged to a watercourse.
- Foul sewers and lateral drains that discharged to a privately owned sewage treatment/collection facility.
- Pumping stations and rising mains will transfer between 1 October 2011 and 1 October 2016.

The implementation of Section 42 of the FWMA will ensure that future private sewers will not be created. It is anticipated that all new sewer applications will need to have an approved section 104 application ahead of a section 106 connection.

Encroachment:

Anglian Water operates a risk based approach to development encroaching close to our used water infrastructure. We assess the issue of encroachment if you are planning to build within 400 metres of a water recycling centre or, within 15 metres to 100 metres of a pumping station. We have more information available on our website at http://anglianwater.co.uk/developers/encroachment.aspx

Locating our assets:

Maps detailing the location of our water and used water infrastructure including both underground assets and above ground assets such as pumping stations and recycling centres are available from . All requests from members of the public or non-statutory bodies for maps showing the location of our assets will be subject to an appropriate administrative charge. We have more information on our website at: http://www.anglianwater.co.uk/developers/our-assets/

Summary of charges:

A summary of this year's water and used water connection and infrastructure charges can be found at http://www.anglianwater.co.uk/developers/charges

Disclaimer:

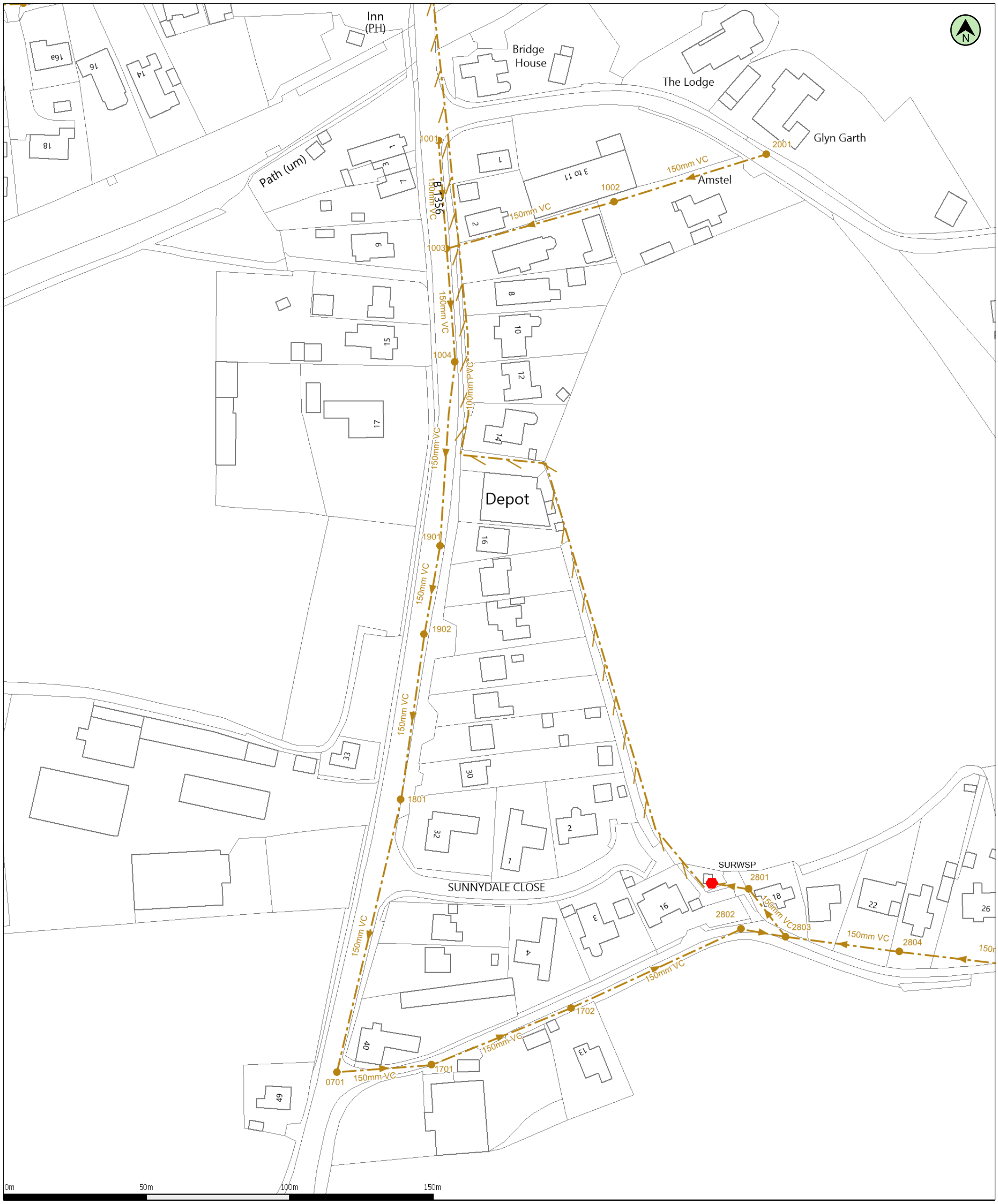
The information provided in this report is based on data currently held by Anglian Water Services Limited ('Anglian Water') or provided by a third party. Accordingly, the information in this report is provided with no guarantee of accuracy, timeliness, completeness and is without indemnity or warranty of any kind (express or implied).

This report should not be considered in isolation and does not nullify the need for the enquirer to make additional appropriate searches, inspections and enquiries. Anglian Water supports the plan led approach to sustainable development that is set out in the National Planning Policy Framework ('NPPF') and any infrastructure needs identified in this report must be considered in the context of current, adopted and/or emerging local plans. Where local plans are absent, silent or have expired these needs should be considered against the definition of sustainability holistically as set out in the NPPF.

Whilst the information in this report is based on the presumption that proposed development obtains planning permission, nothing in this report confirms that planning permission will be granted or that Anglian Water will be bound to carry out the works/proposals contained within this report.

No liability whatsoever, including liability for negligence is accepted by Anglian Water, or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content. Furthermore in no event will any of those parties be liable to the applicant or any third party for any decision made or action taken as a result of reliance on this report.

This report is valid for the date printed and the enquirer is advised to resubmit their request for an up to date report should there be a delay in submitting any subsequent application for water supply/sewer connection(s).



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Data updated: 03/01/20 | Map Centre: 525135,327934 | Our Ref: 370837 - 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)

jason@millward.co.uk

Sunnydale Close

love every drop anglianwater

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2020 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0701	F	4.38	1.68	2.7
1001	F	5.222	3.415	1.807
1002	F	4.22	3.326	0.894
1003	F	4.71	3.015	1.695
1004	F	4.151	2.835	1.316
1701	F	3.5	1.5	2
1702	F	3.33	1.27	2.06
1801	F	4.11	2.16	1.95
1901	F	4.15	2.62	1.53
1902	F	-	-	-
2001	F	4.457	3.684	0.773
2801	F	3.66	0.77	2.89
2802	F	3.35	0.95	2.4
2803	F	3.3	0.87	2.43
2804	F	3.02	1.19	1.83
9102	F	4.406	2.626	1.78

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix C – Calculations

SUDS Greenfield Run Off Calculations

Flood Depth Overlay

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Christina Noakes
Site name:	Sunnydale Close
Site location:	Surfleet

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.

Site Details

Latitude:	52.83456° N
Longitude:	0.14239° W
Reference:	2696140003
Date:	Feb 19 2020 16:47

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 2.82

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	560	560
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

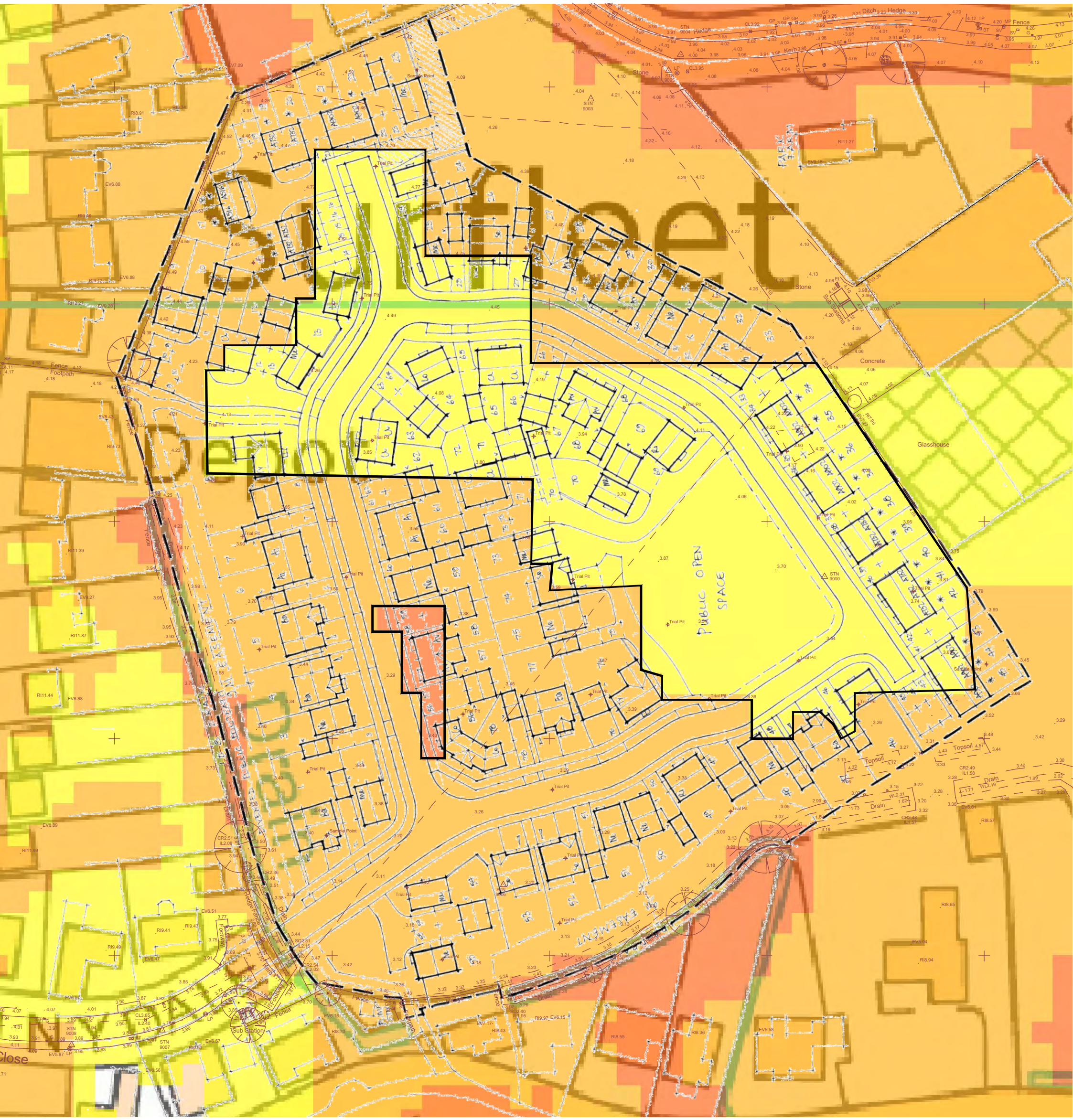
(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	3.96	3.96
1 in 1 year (l/s):	3.44	3.44
1 in 30 years (l/s):	9.7	9.7
1 in 100 year (l/s):	14.09	14.09
1 in 200 years (l/s):	16.66	16.66

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at 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 www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of 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, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.


Ditch
Hedge
Fence
Hedge
Kerb
Stone
Stone
Concrete
Glasshouse
PUBLIC OPEN SPACE
EASEMENT
EASEMENT
Fence
Footpath
Fence
Fence
Fence
Hedge
Fence
Sub Station
Drain
Drain
Drain
Topsoil
Topsoil
Trial Pit
Sample Point
STN 9003
STN 9004
STN 9005
STN 9006
STN 9007
STN 9008
STN 9000
LP
Close