

SECTION 2.2 Site Investigation Reports

2.2.1 Flood Risk Assessment



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SITE SPECIFIC FLOOD RISK & SUDS ASSESSMENT

Gateway 14, Stowmarket, Suffolk - Plot 4000

Gateway 14 Ltd

June 2022

Project no: 61445

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Title: SITE SPECIFIC FLOOD RISK ASSESSMENT
Project: Gateway 14, Stowmarket, Suffolk - Plot 4000
Client: Gateway 14 Ltd
Project No.: 61445

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1. Introduction

- 1.1. Richard Jackson Ltd has been appointed by Gateway 14 Ltd to undertake a Flood Risk & Strategic SuDS Assessment in support of a reserved matters planning application, for a new commercial development proposal at Gateway 14, Stowmarket, Suffolk. The proposal is for a Commercial building on the area known as Plot 4000.
- 1.2. Gateway 14 gained planning consent in 2021 and the main site infrastructure highways and drainage is under construction and will be completed in 2022.
- 1.3. This assessment will follow the checklist published as part of the National Planning Practice Guidance (NPPG) website and the Lead Local Flood Authority SuDS guidance.

2. Development Site and Location

- 2.1. The Gateway 14 planning consent allows the construction of the main site surface and foul water infrastructure. A surface water sewer serving the south of Gateway 14 and outfalling to an existing watercourse to the east of the plot 4000 site, will be constructed before these proposals commence on site. A new foul sewer system outfalling to the west in Gun Cotton Way will also be provided before these proposals commence. Both systems will be adopted by Anglian Water in due course.
- 2.2. The Site is bound by Gateway Boulevard carriageway (under construction) to the north, a public right of way (under construction), watercourse, bund and strategic detention basins to the east, the Ipswich to Cambridge railway line to the south and the A1120 and Stowmarket to the west.
- 2.3. Adjacent to and beyond the Site, there are a range of land uses including:
 - To the north – the remainder of the wider G14 site and the A14 dual carriageway, beyond which lie Creeting Lakes fishery, open agricultural fields, the settlement of Creeting St Peter.
 - To the east - open agricultural fields and the River Gipping and its floodplain.
 - To the south – the London to Norwich railway line, Muntons Malting works and the B1113 Stowmarket Road.
 - To the west – the A1120 and commercial (Climax Molybdenum and Tesco)/residential properties on the eastern edge of Stowmarket.
- 2.4. The flood map for planning provided in Appendix B shows the whole of plot 4000 site to be located in Flood Zone 1 for river and sea flooding.
- 2.5. The site generally has a steady gradient which falls south in direction, with an approximate range in elevation from 43m AOD to 25m AOD. See the topographic survey in Appendix C.

- 2.6. At outline application stage Plot 4000 was envisaged to be constructed on two development platforms with multiple connections to the main drainage infrastructure. For each of these surface water connections, an assumed impermeable area and outflow rate restricted to greenfield runoff was used. When added together these give an impermeable area of 18.99ha and an outflow at Qbar rate of 46.4l/s. (2.44l/s/ha).

3. Development Proposals

- 3.1. The proposed development of Plot 4000 is for a single unit of some 108,899m² GIA under use class B8 (106,112m² with 2,787m² ancillary office class E(g)). It is understood at this stage that the site will be occupied by The Range Home and Leisure Ltd (The Range) as a distribution centre. The site location is shown on Figure 1 and with the proposed site layout included in Appendix D. This development is defined by the NPPG as being less vulnerable to flood risk. A design lifetime of 50 years has been assumed for the purposes of this assessment.
- 3.2. The impermeable area of these proposals is 18.62 Ha and the proposed outfall at Qbar rate using the criteria set out above is 42.9/s. (2.30 l/s/ha).

4. Climate Change

- 4.1. The NPPG defines climate change allowances that should be considered for various development proposals across the nation. The mapping shows that 40% should be considered for the upper end allowance for post 2070 design life.

5. Site Specific Flood Risk

Groundwater Flood Risk

- 5.1. The bedrock geology of the site is split, the majority of the site is underlain by Crag Group Sand, with the southern area of the site underlain by Newhaven Chalk Formation. The entire site is overlain by Lowestoft Formation. This site has been the subject of full ground investigations undertaken by Richard Jackson in 2020, for further details of the ground conditions see Appendix F.
- 5.2. The ground investigations comprised the formation of 10 light cable percussive (LCP) boreholes, 20 windowless sampler (WLS) boreholes, 58 trial pits and 51 dynamic cone penetrometer (DCP) tests, in various locations across the site. Groundwater was struck at 10 locations, with 7 of these the strikes being more than 10m below ground level (bgl). In BH05 groundwater was encountered at 2.9m bgl. In WS53 and WS54 groundwater was struck at 1.9m and 1m bgl respectively, these are likely to be perched water atop the Lowestoft formation, nearby BH08 shows a ground water level of 19.5m bgl.
- 5.3. Based on the information above, generally the ground water flood risk is deemed to be low.

Surface Water Flood Risk (Appendix E1)

- 5.4. The High Risk (0.33%) 1 in 30 year return period mapping shows that there are isolated patches of flooding to the south/west of the site with depths below 300mm. The velocity mapping indicates that this is a no clear flow route. This area of flooding is associated with the rail line which is maintained by Network Rail.
- 5.5. In the Medium Risk (0.1%) 100 year return period the mapping shows a slight worsening of that described in the high risk scenario. There is a low route that originates within the plot 4000 area. This is associated with a low spot in the topography. The velocity mapping shows a similar pattern to the high risk event described above.
- 5.6. In the Low Risk (0.1%) 1000 year event the mapping shows the flooding seen previously forming a flow path originating from the centre of the plot 4000 site. The flood depth is generally shown to be below 300mm with small areas showing depths between 300-900mm on the network rail boundary. The velocity mapping shows flow routes within the network rail area bifurcating to the south of the site. Flows within the network rail area reach the River Gipping to the east and west.
- 5.7. This mapping shows that currently the site is not at significant risk from surface water flooding. See Appendix E1.

Fluvial Flood Risk (Appendix E2)

- 5.8. The Gov.uk mapping shows the plot 4000 site to be located in Flood Zone 1 for river and sea flooding.
- 5.9. The River Gipping floodplain lies to the east of the site beyond the boundary.

Reservoir and Artificial Flooding (Appendix E3)

- 5.10. The Gov.uk flood mapping shows that flooding from a reservoir failure does not reach the plot 4000 site boundary even when the River Gipping is in flood at the same time.
- 5.11. The closest sewers and water supplies are within Gateway Boulevard and within the main G14 infrastructure beyond the site boundary. A failure of this infrastructure may result in localised flooding. This is a low risk.

6. Surface Water Management

Detailed Application Surface Water Strategy

- 6.1. When developing a strategy to manage surface water flows the SuDS hierarchy dictates that draining the site via infiltration methods (where suitable ground conditions allow and ability to provide the necessary pollution treatment), before exploring other options.

- 6.2. The use of infiltration SuDS for the site is not considered appropriate due to the nature of the soil in the area, also the soakage testing to BRE 365 standards has previously been undertaken provided negative results, see Appendix F. It is proposed to discharge the surface water from plot 4000 site in line with the G14 surface water strategy approved at outline stage.
- 6.3. The plot 4000 site will be levelled by an earthworks cut and fill operation. This will provide a level platform for the buildings and yards at a higher level than the car parks. The surface water flood mapping shows that water currently flows off the site to the network rail land in the larger rainfall events. The new arrangements will allow the surface water drainage system to collect and attenuate this water flow. This new system will reduce flood risk off site as a result.
- 6.4. The plot 4000 site includes a number of open Suds. These include swales on the Network Rail boundary and detention basins to the east of the site. The car park will be constructed in permeable paving. The yard areas will be constructed in concrete and served by channel drains. Where open Suds cannot be provided, proprietary pollution control measures will treat the yard areas before they pass on to the remainder of the Suds train.
- 6.5. The final outfall from the Suds train will be to the main site surface water drainage system at a rate that is set to match the greenfield runoff rate for the 1in1 year Qbar rate for the impermeable area of the site 18.6HA at 42.9 L/s.
- 6.6. The detailed surface water strategy can be seen on the drawings in Appendix G.

Surface Water Quality

- 6.7. The commercial roof, which is defined by table 26.2 of the SuDS manual as being low pollution hazard, requiring treatment indices of:

TSS:	0.30
Metals:	0.20
Hydrocarbons:	0.05
- 6.8. The car park which will have more than 300 movements per day and is defined by table 26.2 of the SuDS manual as being medium pollution hazard, requiring treatment indices of:

TSS:	0.70
Metals:	0.60
Hydrocarbons:	0.70
- 6.9. The HGV yard, which is defined by table 26.2 of the SuDS manual as being high pollution hazard, requiring treatment indices of:

TSS:	0.8
Metals:	0.80
Hydrocarbons:	0.90

- 6.10. Total SuDS mitigation index = mitigation index₁ + 0.5(mitigation index₂)

The mitigation indices for permeable paving are 0.5 TSS, Metals 0.6, and 0.7 Hydrocarbons. The mitigation indices for a detention basin are 0.5 TSS, 0.5 Metals and 0.6 hydrocarbons.

The roof will pass through the detention basin.

TSS:	0.5
Metals:	0.5
Hydrocarbons:	0.60

- 6.11. This level of treatment is sufficient for low pollution hazard uses.

- 6.12. The car park will pass through its own sub-base and then the detention basin.

TSS:	0.5+0.25=0.75
Metals:	0.6+0.25=0.85
Hydrocarbons:	0.7+0.3=1.0

- 6.13. This is sufficient treatment for a medium pollution risk.

- 6.14. The HGV yard will drain to the swale on the south side of the site via a gravel filter strip and finally the detention basin. The mitigation indices a filter strip are 0.4 TSS, Metals 0.4 and Hydrocarbons. The mitigation indices for a swale are 0.5 TSS, 0.6 metals and 0.6 Hydrocarbons. Using these indices and a minimum Suds train of PD, basin the SuDS train is calculated as :

TSS:	0.40 +0.25+0.25 =0.90
Metals:	0.40 +0.30+0.25 =0.95
Hydrocarbons:	0.50 +0.30+0.30 =1.10

- 6.15. Elsewhere a proprietary treatment device will be used as swale cannot be accommodated. The mitigation indices for the proposed proprietary device are 0.8 TSS, Metals 0.8 and Hydrocarbons 0.7. The mitigation indices for a swale are 0.5 TSS, 0.6 metals and 0.6 Hydrocarbons. Using these indices and a minimum Suds train of PD, basin the SuDS train is calculated as :

TSS:	0.80 +0.25 = 1.05
Metals:	0.80 +0.25 = 0.05
Hydrocarbons:	0.70 +0.30 = 1.00

- 6.16. When compared against Table 26.2 of the SuDS Manual, the proposed treatment of SuDS features would achieve the required pollution control before the water enters the existing watercourse, thus satisfying the criteria as set out in the SUDS Manual.

Surface Water Hydraulics

- 6.17. The proposed strategy is to maintain the use of the approved discharge points to the watercourse at GFR, controlled by flow control devices located throughout the site. Rainwater Harvesting will be provided. It is envisaged that this will serve the office area and the tanks and associated plant will be provided internal to the building.
- 6.18. The proposed outline drainage strategy can be seen in drawing in Appendix G.
- 6.19. The 1 in 100 event plus 40% climate change the FLOW calculations do not show any potential flooding with the exception of one minor area of flooding on the HGV access road (which will flow downhill to the yard area). Also, the low areas of the dock levelers will be wet during a design event. Therefore, in all events up to the 1 in 100 year event there will be no overland flooding on or off site from the SuDS features. The calculations can be seen in Appendix G.
- 6.20. All of the open Suds will be lined with impermeable geomembranes. This will restrict infiltration to the recompacted materials below.
- 6.21. The design of surface water systems to accord with local and national guidance needs to consider the LLFA guidance which is published by SCC.
- 6.22. During extreme events excess surface water from the site will run-off in a southerly and easterly direction and will be collected by the existing watercourses which drain to the south/east.
- 6.23. No urban creep has been applied to this strategy as any increase in impermeable area would need a further planning consent. In addition, there is limited space within the site available that is not dedicated to Landscaping to comply with the G14 design guidelines.

Foul Water Strategy

- 6.24. Foul flows will be collected on site by a private drainage system designed to accord with Part H of building regulations. The strategic foul sewer system outfall is located at the Junction of Gateway Boulevard and Gateway Drive. As this outfall is some distance higher than the finished floor level of the building a system of private pump stations will be provided. 24 hour storage will be provided as required by Part H of regulations.

Management and Maintenance Plan

- 6.25. The maintenance regime will be such that the work to maintain the attenuation features and adoptable system, regular checks and maintenance will be undertaken as indicated in Appendix N, with further details of maintenance contained within the SuDS Manual (2015). The maintenance of the drainage and Suds train within the plot 4000 site will be the responsibility of the Range management team on site.

SuDS Risk Assessment

- 6.26. A SuDS risk assessment has been undertaken, this can be found in Appendix L.

7. Exception Test

- 7.1. The exception test is not relevant to these proposals for less vulnerable development in flood zone 1.
- 7.2. The proposed site is for a commercial development on land designated such in the local plan. This SSFRA has shown that the on-site and off-site flood risks to the proposed development and the local area can be reduced and managed appropriately. Existing surface water flow paths from the site to the adjacent rail line area will be removed and flood risk is therefore reduced on and off site.
- 7.3. These proposals reduce flood risk on and off site by providing a surface water system that manages flows in events up to and including the 1 in 100 year event with climate change.

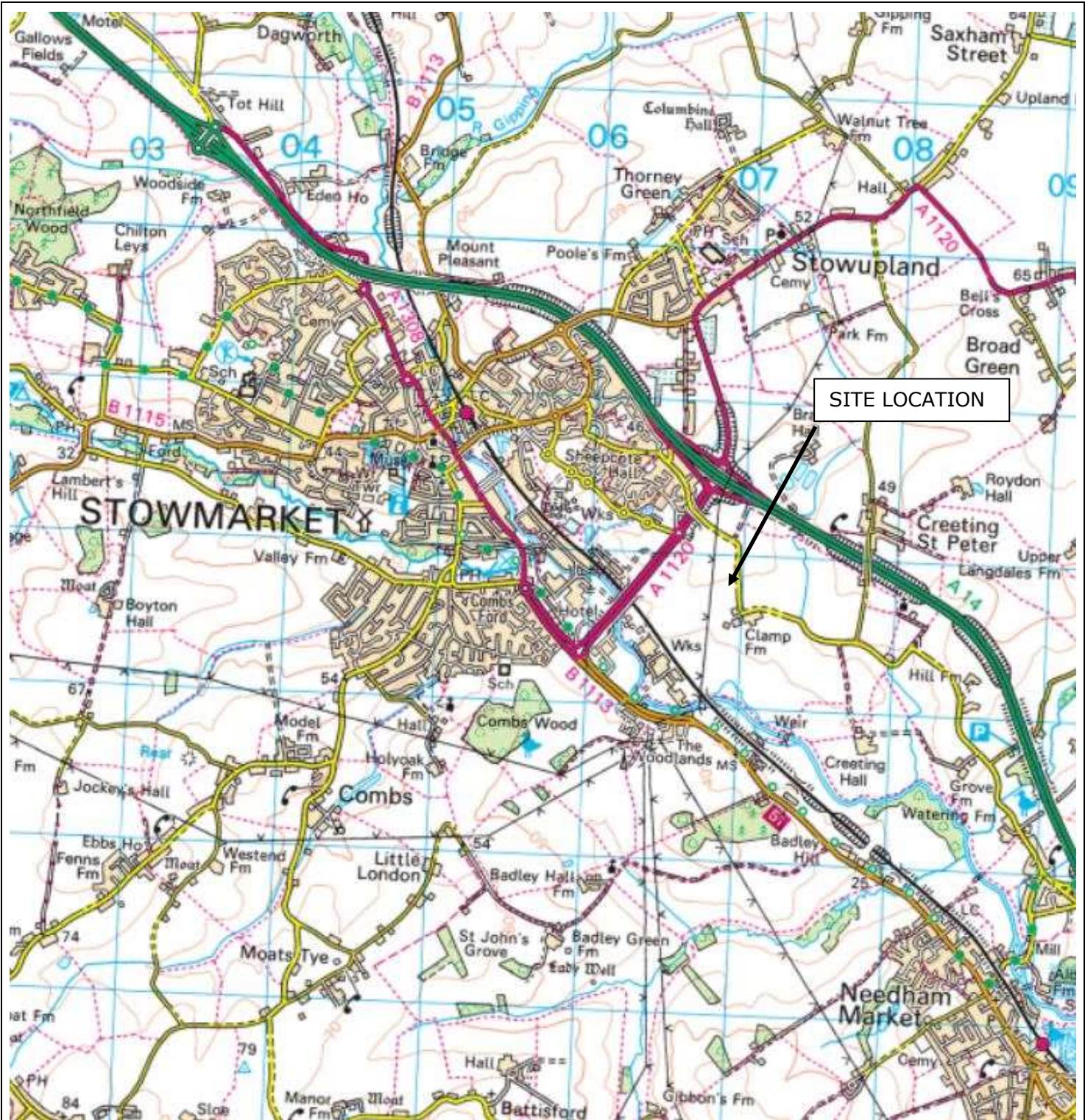
8. Residual Risks

- 8.1. The residual risk is usually taken to refer to the portion of overall risk that remains once risk mitigation measures have been implemented.
- 8.2. A surface water flood greater than the 1.0% Annual Probability event could occur, which may exceed the capacity of the SUDs system and cause flooding to the site. Extreme flow routes are shown on the drawings.
- 8.3. Flooding during an extreme event could occur during the construction phase of the development, in order to minimise the impact of this and mitigate the risk, a Construction Surface Water Management Plan will be developed.

Appendices

Appendix A

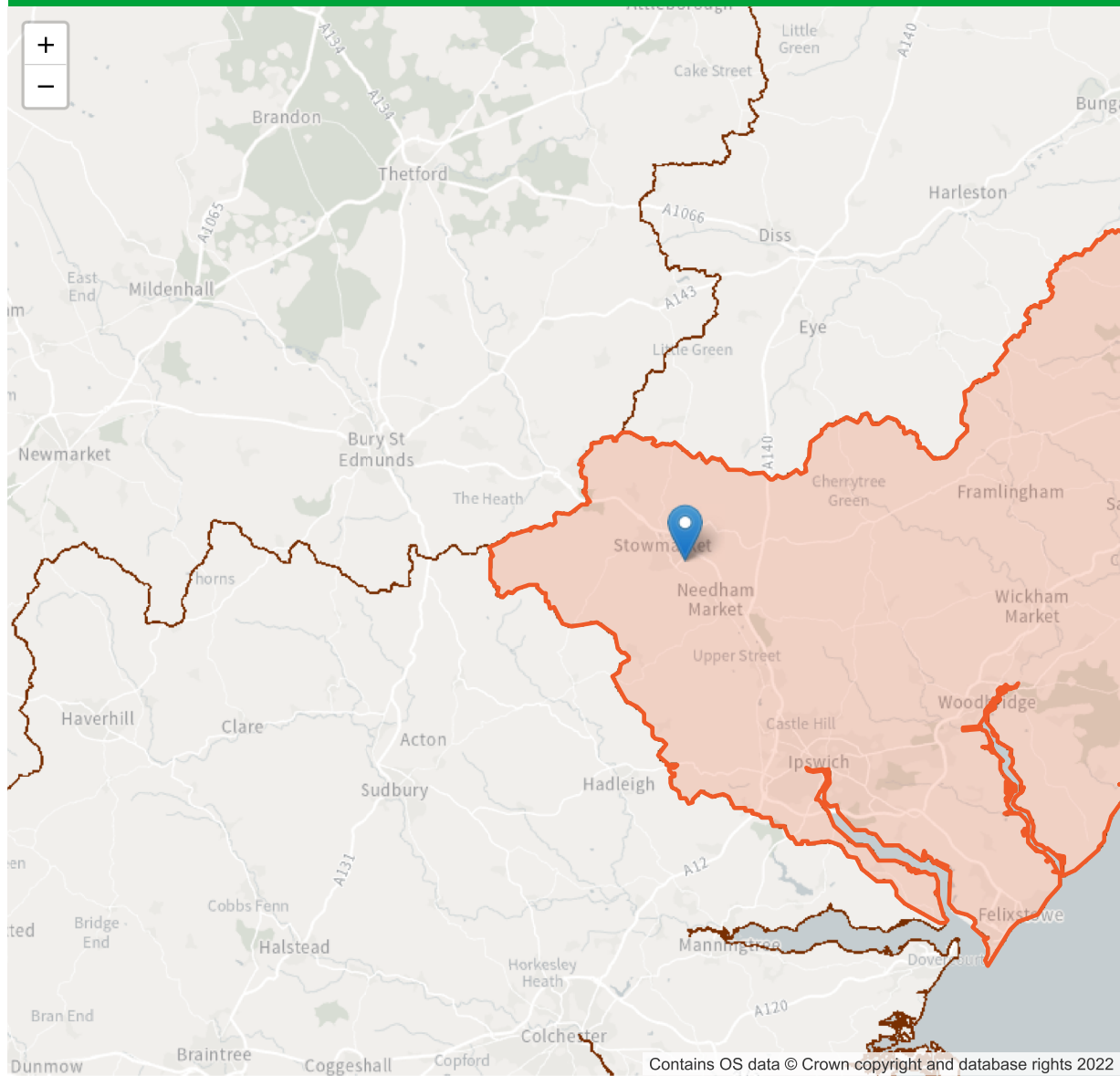
Site Location Plan



REPRODUCED FROM ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE, © CROWN COPYRIGHT RICHARD JACKSON LTD – ACC No. 100002572

Appendix B

Flood Map for Planning and Climate Change allowance



East Suffolk Management Catchment peak rainfall allowances

3.3% annual exceedance rainfall event

Epoch		
	Central allowance	Upper end allowance
2050s	20%	40%
2070s	20%	40%

1% annual exceedance rainfall event

Epoch		
	Central allowance	Upper end allowance
2050s	20%	45%
2070s	20%	40%

*Use '2050s' for development with a lifetime up to 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

This map contains information generated by Met Office Hadley Centre (2019): UKCP Local Projections on a 5km grid over the UK for 1980-2080. Centre for Environmental Data Analysis, 2022

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Flood map for planning

Your reference
G14 plot 4000

Location (easting/northing)
606596/257712

Created
30 Jun 2022 17:07

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

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

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.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

G14 plot 4000

Location (easting/northing)

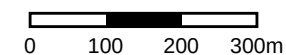
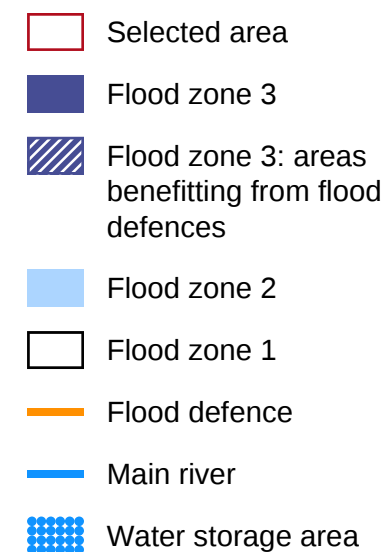
606596/257712

Scale

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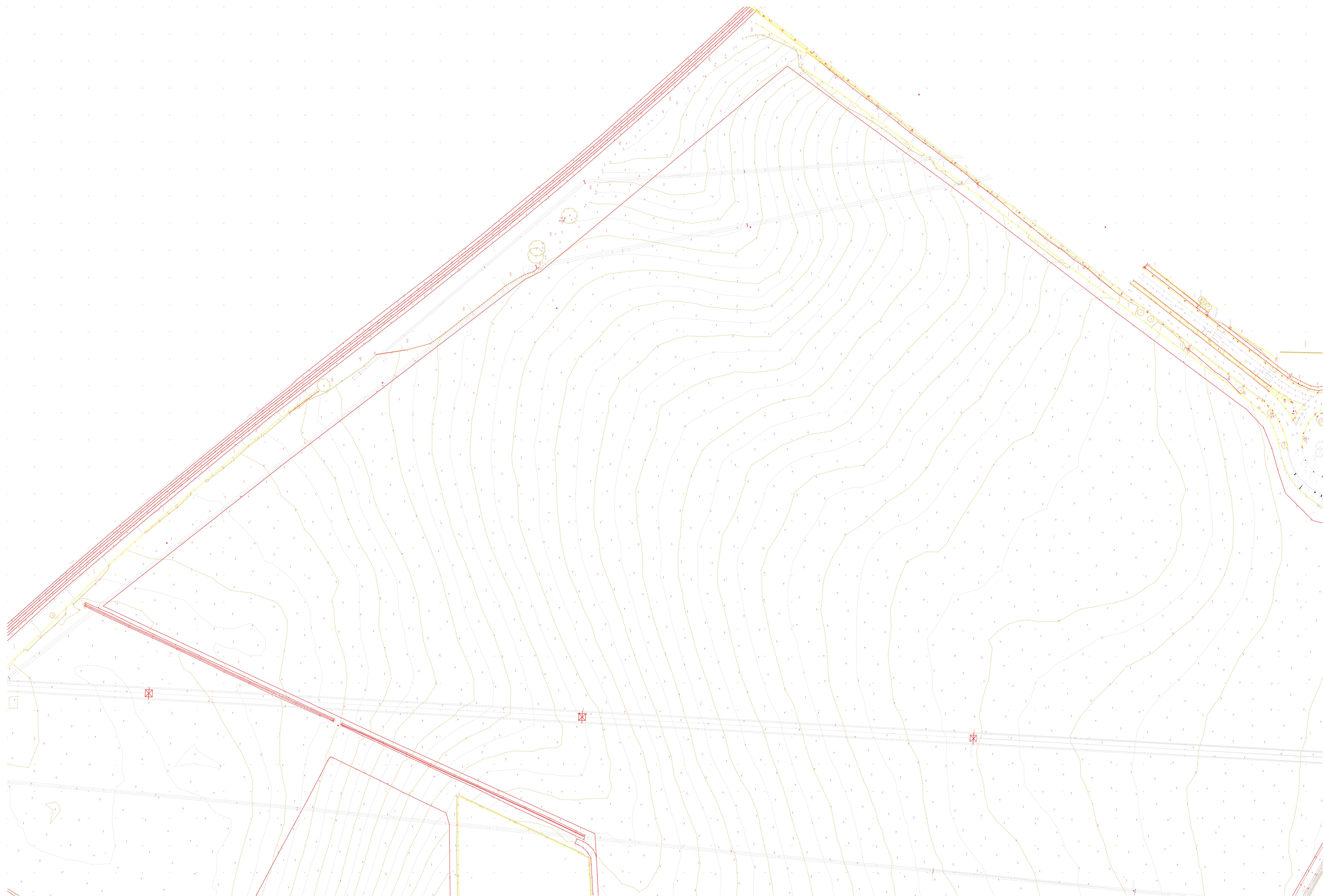
Created

30 Jun 2022 17:07



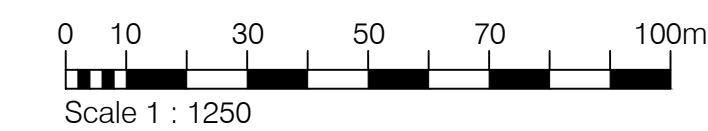
Appendix C

Topographical Survey



Appendix D

Proposed Site Plan



Building Areas (GIA)

Parking

Goods Doors

Plot Areas

P10	AREA NOTES UPDATED	05/07/22	MJB
P9	PERKINS UPDATED TO SUIT M&E REQUEST	05/07/22	MJB
P8	UPDATED TO COMMENTS	04/07/22	MJB
P07	OFFICE ENTRANCE LOCATED. GENERAL	29/06/22	MJB
	REVISIONS TO SUIT COMMENTS.		
P06	ISSUED FOR REVIEW AND COMMENT	21/06/22	MJB
P05	ISSUED FOR REVIEW AND COMMENT	20/06/22	MJB
P04	SUITS LAYOUT UPDATED TO SUIT CLIENT COMMENTS.	16/06/22	MJB
P03	GENERAL UPDATES	06/06/22	CAP
P02	GENERAL UPDATES	11/05/22	MJB
P01	ACCESS TO STAIRS AND LAYOUT UPDATED TO ENGINEERS LATEST DRAWING. BUS STOP MOVED AWAY FROM SUBSTATION.	28/04/22	MJB

PLOT 4000

GATEWAY14
STOWMARKET

Drawing
SITE PLAN

Client _____



FRANK

SHAW

ASSOCIATES

**ASSOCIATED
LIMITS**

LIMITED

ARCHITECTS

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Scale	Drawn/Checked
1 : 1250@A1	CAP

Job No	Date
21067	28/02/22

Drawing Number	Rev
21067-FSA-00-XX-DB-A-0101	P10

Appendix E1

Surface Water Flood Risk

Learn more about flood risk

Select the type of flood risk information you're interested in. The map will then update.

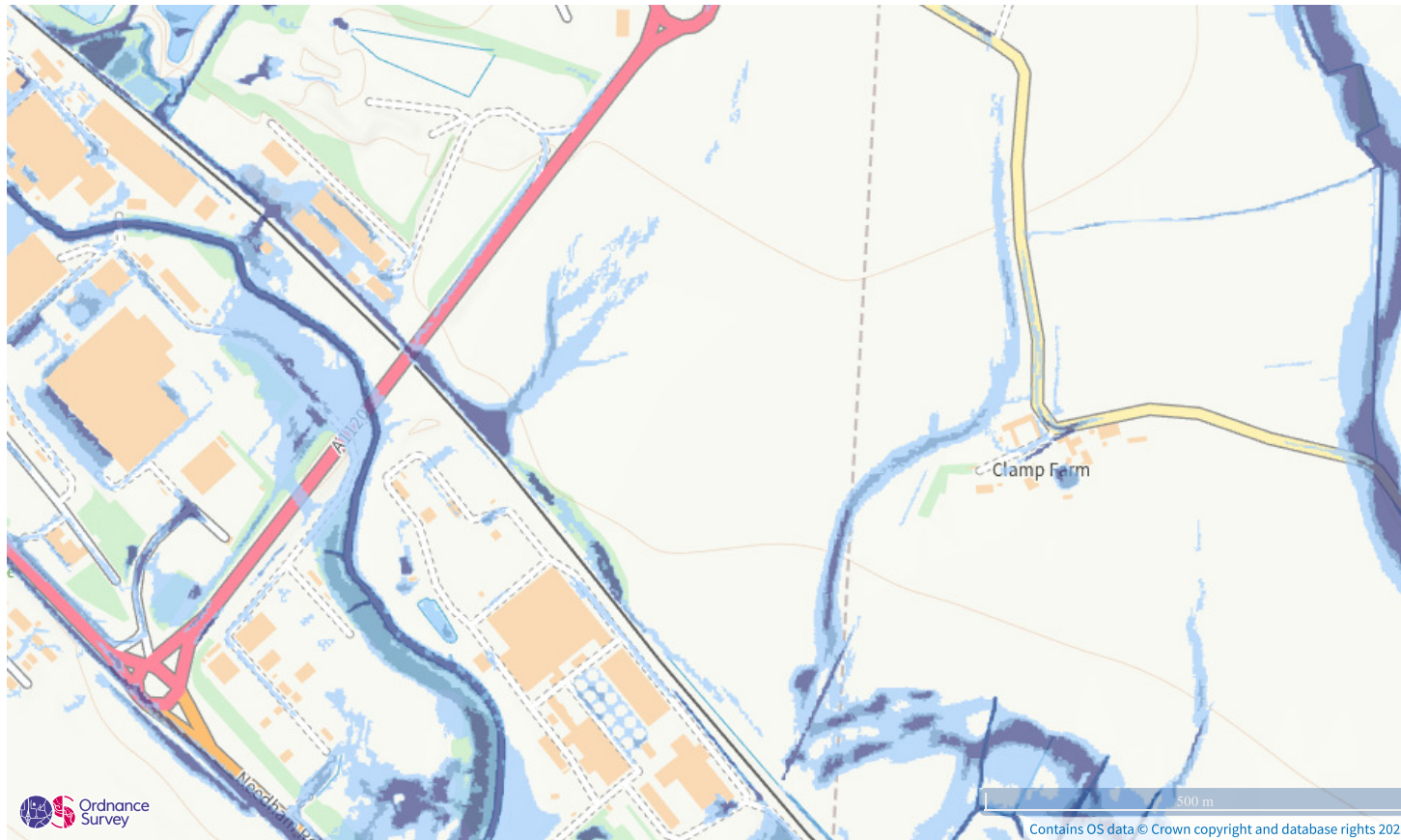
Flood risk

Extent of flooding



Location

Gateway 14 Plot 4000



Extent of flooding from surface water

● [High](#) ● [Medium](#) ● [Low](#) ○ [Very low](#)

[View the flood risk information for another location \(/postcode\)](#)

This information meets the requirements of the EU Floods Directive 2007/60/EC

Appendix E2

Fluvial Flood Risk

Appendix E3

Reservoir Flood Risk

Appendix F

Ground Investigations Report

Appendix G

Drainage Strategy Calculations and Drawing

Appendix H

Drainage Maintenance Schedule

DRAINAGE MAINTENANCE SCHEDULE

SUDS Feature	Regular Maintenance Activity	Frequency	Occasional Maintenance Activity	Frequency	Responsibility
Pipes and Manholes	Visual inspection	Monthly or as required	Cleaning/jetting when silt accumulation occurs	Annually or as required	
Foul Pump Stations	As recommended by manufacturer	Annually	As recommended by manufacturer	As required	
Permeable Paving	Visual Inspection	Monthly or as required	Remove debris and sweep	Annually or as required	
Detention Basin	- Remove litter - Inspect outlets - Mow grass to swales & margins at 75-100mm	Monthly or as required	- Outlet cleaning - Remove silt from channels - Remove silt from catchpits - Remove leaf accumulation	Annually or as required	

Appendix I

Anglian Water Pre-Development Enquiry

Appendix J

SCC Proforma

Title: SITE SPECIFIC FLOOD RISK ASSESSMENT
Project: Gateway 14, Stowmarket, Suffolk - Plot 4000
Client: Gateway 14 Ltd
Project No.: 61445

Appendix K

UKSuDS Greenfield Runoff Calculation

Appendix L

SuDS Risk Assessment

Appendix M

Aqua Swirl Data sheet



Colchester
01206 228800



London
020 7448 9910



Norwich
01603 230240



Cambridge
01223 314794



Bristol
01172 020070

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