



**LAND OFF SURFLEET ROAD, PINCHBECK
COMBINED FLOOD RISK ASSESSMENT &
DRAINAGE STRATEGY**

**On behalf of Minister Property Group
January 2022**

Document Control Sheet

Project Name Land off Surfleet Road, Pinchbeck (PE11 3XY)
Report Title Combined Flood Risk Assessment & Drainage Strategy
Client Minister Property Group
Date of Origin 28 January 2022
Project Number 1-198

Revision	Date	Issued for	Prepared by	Approved by
-	18/01/22	Planning	DT	DRM
A	28/01/22	Planning	DT	DRM

Contents

1	Introduction.....	5
2	Existing Site.....	6
2.1	Site Location	6
2.2	Site Hydrology.....	6
2.2	Site Topography.....	6
2.3	Site Geology	6
3	Development Proposals.....	8
4	Flood Risk	9
4.1	Policy & Best Practice	9
4.2	Fluvial Flooding	9
4.3	Surface Water Flooding.....	9
4.4	Groundwater Flooding.....	10
4.5	Artificial Flooding.....	10
4.6	Reservoir Flooding.....	10
4.7	Flood Vulnerability.....	11
5	Flood Mitigation	12
5.1	Flooding Mitigation Measures.....	12
5.2	Flood Warning.....	12
6	Surface Water (SuDS) Drainage Strategy	13
6.1	Surface Water Drainage Disposal	13
6.2	Surface Water Runoff Rate & Volume	14
6.2	Surface Water Drainage Proposals	14
6.3	Exceedance Events	14
6.4	Surface Water Management & Maintenance	14
7	Proposed Foul Water Drainage	17
8	Conclusion	18

Appendices

Appendix A – Site Location Plan

Appendix B – Existing Anglian Water asset mapping

Appendix C – Topographical Survey

Appendix D – British Geology Survey Information Extracts

Appendix E – Development Masterplan

Appendix F – Fluvial Flooding Information

Appendix G – Surface Water Flooding Information

Appendix H – Reservoir Flooding Information

Appendix I – Flood & Evacuation Plan

Appendix J – Drainage Strategy Plan and Associated Information

Appendix K – Anglian Water Pre-development Enquiry Response

1 Introduction

Civilistix Consulting Engineers has been commissioned by Minister Property Group to prepare a Combined Flood Risk Assessment (FRA) and Drainage Strategy to support a planning application for a proposed residential development consisting of 41 residential plots and associated infrastructure at Land off Surfleet Road, Pinchbeck (PE11 3XY).

In total, the development redline boundary occupies a total area of 1.749ha. Of this area, it is proposed 0.7329ha will become impermeable when the development is completed. When compared to the existing impermeable area of 0ha, as the site is greenfield, this presents an increase of 0.7329ha generating 42% of impermeable area.

The purpose of this combined FRA and Drainage Strategy is to demonstrate how this impermeable area can be satisfactorily drained without increasing flood risk onsite and elsewhere. The strategy has been developed in full accordance with National and Local standards as well as best practice documentation.

Specifically, this FRA and Drainage Strategy demonstrates that the proposed development does not lead to an increase in;

- Peak runoff rate of storm water runoff leaving the site
- Volume of runoff leaving the site
- Pollution to receiving waters from storm water runoff
- Flood risk to nearby or neighbouring sites

2 Existing Site

2.1 Site Location

The site is located at grid reference (524519, 326592) and is 1.749 ha in total area.

The address of the site is Land off Surfleet Road, Pinchbeck, Crossgate, PE11 3XY, United Kingdom.

The existing site is fully greenfield.

The site is bound by residential development to the south, west and north and a solar farm to the east.

A site location plan is shown in [Appendix A](#)

2.2 Site Hydrology

A private watercourse abuts the south and east boundary which conveys runoff south-east and ultimately to “Captains Drain” around 150m south of the development site.

Based on onsite observation and topographical survey information, it is believed the existing site drains via a combination of infiltration and discharge to the perimeter ditch network.

Existing Anglian Water asset mapping is shown in [Appendix B](#)

2.2 Site Topography

A Topographical survey of the site and surrounding area was prepared by EMP Drainage Ltd (ref; 4273/T/01-02), dated November 2021.

The Topographical survey indicates levels at the location of the existing land to be ~3.05 Above Ordnance Datum (AOD)

Levels show a fall from north to south of around 1:250, from around 3.61 AOD and 2.84 AOD respectively.

The Topographical survey is shown in [Appendix C](#)

2.3 Site Geology

An intrusive Ground Investigation was undertaken by Elemental GI Ltd, (ref; E21142) dated 12th November 2021. Key findings are shown below:

- Borehole No WS01 identifies 0.40m made ground/topsoil on top of sandy CLAY/SILT 0.95m deep and on top of silty SAND 2.0m deep. Water encountered from 1.0m deep.
- Borehole No WS02 identifies 0.35m made ground/topsoil on top of sandy SILT 3.0m deep. Water encountered from 0.95m deep.
- Borehole No WS03 identifies 0.40m made ground/topsoil on top of silty SAND 3.0m deep. Water encountered from 1.20m deep.
- Borehole No WS04 identifies 2.0m made ground/topsoil comprising gravelly sandy silt on top of SAND 3.0m deep. Water encountered from 0.80m deep.
- Borehole No WS05 identifies 0.30m made ground/topsoil on top of CLAY/SILT 0.65m deep and on top of SAND 1.0m. Water encountered from 0.70m deep.
- Borehole No WS06 identifies 1.40m made ground/topsoil on top of CLAY/SILT 3.10m deep and on top of SAND 4.0m. Water encountered from 1.10m deep.
- Borehole No WS06A identifies 0.50m made ground/topsoil on top of SILT 0.80m deep, on top of CLAY/SILT 2.0m and on top of SAND 3.0m deep. Water encountered from 1.45m deep.

- Borehole No WS07 identifies 0.70m made ground/topsoil on top of CLAY 0.75m deep, on top of CLAY/SILT 1.50m and on top of SAND 5.0m deep. Water encountered from 1.50m deep.

Results of British Geological Survey identifies Kellaways Formation and Oxford Clay Formation, Mudstone, Siltstone and Sandstone.

Environment Agency (EA) information indicates the site to be within a Third aquifer zone and within a high groundwater vulnerability area.

Locations and Logs in context to the site are provided in [Appendix D](#)

3 Development Proposals

Development proposals are for a residential development consisting of 41 residential units and associated external hard and soft landscaping and associated infrastructure. In summary, development proposals consist of the following;

- Construction of 41 residential plots (0.2209 ha in area)
- Creation of an adoptable estate road (0.2189 ha in area)
- Prepared private external hardstanding area (0.2931 ha in area)

In total development proposals provide an additional impermeable area of 0.7329ha. When compared to the existing site which is fully greenfield, this presents an increase in impermeable area of 0.7329ha.

Development plans of the site are provided in [Appendix E](#)

4 Flood Risk

4.1 Policy & Best Practice

This Combined Flood Risk Assessment & Drainage Strategy has been primarily designed in accordance with the following best practice drainage documentation;

- Cambridge Level 1 Strategic Flood Risk Assessment (SFRA), September 2010
- Department for Communities and Local Government National Planning Policy Framework, 2012.
- Environment Agency (EA) publications and modelling outputs
- CIRIA 753, 2015: The SuDS Manual; This document provides current best practice and National guidance on the planning, design, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments.
- Building Regulations Part H (2010); Drainage and Water Disposal.

4.2 Fluvial Flooding

The EA information shows that the site is protected by flood defences along each side of the River Glen. These are in the form of earth embankments and concrete floodwalls (these are identified by the EA as being in a “fair condition”). EA flood mapping shows these flood defences to offer a level of protection at least up to the 1:1000 year + climate change AEP event. Due to the distance of the site from the River Glen (~450), the development would only potentially be at risk of fluvial flooding if the existing defences along the River Glen catastrophically failed.

The fluvial flood level at the location of the site is inconclusive and is not provided within the EA model. The closest flood level provided is at node ref; “GLEN 5860” located directly within the River Glen channel, ~450m from the site. Flood level information taken at GLEN 5860 indicates a flood level of 4.81 AOD during the 100 year + 20% climate change event. This flood level however has been calculated directly within the channel of the river where water levels would rise significantly due to the restriction applied by the existing adjacent flood defences. On this basis, this level is suggested not to be accurate if the flood defences catastrophically failed since the restricting effect to flood water would decrease as water dispersed across the land between the site and the River Glen. Using this level to even gauge a ball park flood level at the location of the site (450m away from GLEN 5860) is therefore not seen to be possible however it can reliably be estimated to be significantly lower than that provided by GLEN 5860.

To offer some level of protection however from shallow flood levels (which it is considered may become apparent if the existing flood defences along the River Glen failed), proposed Finished Floor Levels (FFLS) will be raised a min of 0.30m above existing ground levels. It is believed this measure would offer protection against shallow flood levels allowing floodwater to continue to be naturally conveyed west to east in an instance of flood defence failure (following the natural topography of the existing ground levels).

No historic flood event within vicinity of the site from fluvial flooding has been recorded by the EA.

The site is not at risk from tidal flooding.

Fluvial flooding information is shown in **Appendix F**

4.3 Surface Water Flooding

Review of EA surface water flood mapping identifies the development to be within the “low / very low” flooding extents with flooding depth below 300mm.

Surface water flooding information is shown in **Appendix G**

It is believed therefore the existing site is at low / *very low* risk of surface water flooding.

Risks of surface water flooding will be further reduced by the implementation of a SuDS surface water drainage strategy identified in [Section 6](#).

4.4 Groundwater Flooding

Based on the Ground Investigation by Elemental GI Ltd, (ref; E21142) dated 12th November 2021, the following was observed

- Borehole No WS01 identifies 0.40m made ground/topsoil on top of sandy CLAY/SILT 0.95m deep and on top of silty SAND 2.0m deep. Water encountered from 1.0m deep.
- Borehole No WS02 identifies 0.35m made ground/topsoil on top of sandy SILT 3.0m deep. Water encountered from 0.95m deep.
- Borehole No WS03 identifies 0.40m made ground/topsoil on top of silty SAND 3.0m deep. Water encountered from 1.20m deep.
- Borehole No WS04 identifies 2.0m made ground/topsoil comprising gravelly sandy silt on top of SAND 3.0m deep. Water encountered from 0.80m deep.
- Borehole No WS05 identifies 0.30m made ground/topsoil on top of CLAY/SILT 0.65m deep and on top of SAND 1.0m. Water encountered from 0.70m deep.
- Borehole No WS06 identifies 1.40m made ground/topsoil on top of CLAY/SILT 3.10m deep and on top of SAND 4.0m. Water encountered from 1.10m deep.
- Borehole No WS06A identifies 0.50m made ground/topsoil on top of SILT 0.80m deep, on top of CLAY/SILT 2.0m and on top of SAND 3.0m deep. Water encountered from 1.45m deep.
- Borehole No WS07 identifies 0.70m made ground/topsoil on top of CLAY 0.75m deep, on top of CLAY/SILT 1.50m and on top of SAND 5.0m deep. Water encountered from 1.50m deep.

Locations and Logs in context to the site are provided in [Appendix D](#).

A summary of the Ground Investigation by Elemental GI Ltd, (ref; E21142) dated 12th November 2021 showing water level strikes is shown in [Appendix A](#)

Environment Agency (EA) information indicates the site to be within a Third aquifer zone and within a groundwater flooding area.

It is believed therefore the existing development site is at *low / medium* risk of groundwater flooding.

Risks of surface water flooding will be further reduced by the implementation of a SuDS surface water drainage strategy identified in [Section 6](#).

4.5 Artificial Flooding

No public surface or foul water sewers are within vicinity of the site (Refer to [Appendix B](#) showing AW asset mapping).

It is believed therefore the existing site is at *very low* risk of artificial flooding.

4.6 Reservoir Flooding

EA Reservoir Flood mapping identifies the site to be at very low risk of reservoir flooding.

Reservoir flooding information is shown in [Appendix H](#)

It is believed therefore all development is at *very low* risk* of reservoir flooding.

*(Due to the way reservoir flood mapping is formulated on the EA flood mapping portal and the absence of bespoke EA hydraulic modelling within vicinity of the site, the flood risk category of reservoir flooding is unknown in this instance) *

4.7 Flood Vulnerability

Technical guidance to the National Planning Policy Framework (NPPF) 2012, divides land use into five classifications as follows;

- Essential infrastructure e.g essential transport infrastructure and utility infrastructure, wind turbines
- Highly vulnerable e.g caravans, mobile homes and park home intended for permanent residential use
- More vulnerable e.g hospitals, residential institutions, dwelling houses
- Less vulnerable e.g shops, land and buildings used for agriculture, non-residential institutions, assembly and leisure
- Water compatible e.g docks, marinas and wharves, amenity open space, sports grounds (and essential facilities such as changing rooms)

The flood risk vulnerability categorisation for the development is “more vulnerable” development. “More vulnerable” development is permissible within flood zone 3a on the basis the exception test is passed and that it can be demonstrated, the development and its occupants will be safe across the lifetime of the development.

Vulnerability classification		Essential Infrastructure	Highly vulnerable	More vulnerable	Less Vulnerable	Water compatible
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	Exception Test	✓	✓	✓
	Zone 3a	Exception Test	x	Exception Test	✓	✓
	Zone 3b	Exception Test	x	x	x	✓

Key: ✓ Development is appropriate x Development should not be permitted

(Source: PPS25 Table D3)

Figure 2 – NPPF Flood Risk Vulnerability & Flood Zone Compatibility

5 Flood Mitigation

5.1 Flooding Mitigation Measures

To reduce the impacts of flooding, specifically from fluvial and potential groundwater flooding, the developer will undertake the following mitigation measures;

- Ensure proposed finished floor levels are a min of 0.60m higher than estimated 100year +40%cc flood levels.
- Preparation of an onsite SuDS Surface Water Drainage Strategy (refer to **Section 6**)
- Ensure an emergency flood plan and safe access and escape routes are in place across the lifetime of the development (see **Section 5.2 & 5.3**)

5.2 Flood Warning

The applicant will implement flood warnings and subscribe to the EA and local area flood warning service.

The flood warning service has 3 types of warning that will help the applicant prepare for flooding and take action;

- Flood alert
- Flood warning
- Severe flood warning

5.3 Flood & Evacuation Plan

Occupants should plan for flooding before and after a flooding event occurs. It is proposed the applicant will follow the guidance contained within **Appendix I**

Upon an imminent flood event occurring or during a flooding event and if safe to do so, occupants will group and subsequently exit the site onto Surfleet Road (towards the centre of Crossgate).

5.4 Existing and Proposed Flood Risk

A summary of the flood risk posed from each flood source before and after development (including with the implemented proposed mitigation measures) are provided within **Table 1** below;

Type of Flooding	Existing Risk Category	Proposed Risk Category
Fluvial flooding	High Risk	Low/Medium Risk
Surface Water flooding	Very Low Risk	Very Low Risk
Groundwater flooding	Low / Medium Risk	Low Risk
Artificial flooding	Very Low Risk	Very Low Risk
Reservoir flooding	Very Low Risk	Very Low Risk

Table 1 – Flood Risk Summary from all sources before and after development

6 Surface Water (SuDS) Drainage Strategy

6.1 Surface Water Drainage Disposal

Part H of the Building Regulations (2010) recommends surface water run-off shall discharge to one of the following, listed in order of priority:

- An adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable,
- A watercourse, or, where that is not reasonably practicable,
- A sewer.

Each disposal mechanism in turn has been reviewed in context of the development site;

Infiltration Disposal

An intrusive Ground Investigation carried out by Elemental GI Ltd, (ref; E21142) dated 12th November 2021 indicated the following;

- Borehole No WS01 identifies 0.40m made ground/topsoil on top of sandy CLAY/SILT 0.95m deep and on top of silty SAND 2.0m deep. Water encountered from 1.0m deep.
- Borehole No WS02 identifies 0.35m made ground/topsoil on top of sandy SILT 3.0m deep. Water encountered from 0.95m deep.
- Borehole No WS03 identifies 0.40m made ground/topsoil on top of silty SAND 3.0m deep. Water encountered from 1.20m deep.
- Borehole No WS04 identifies 2.0m made ground/topsoil comprising gravelly sandy silt on top of SAND 3.0m deep. Water encountered from 0.80m deep.
- Borehole No WS05 identifies 0.30m made ground/topsoil on top of CLAY/SILT 0.65m deep and on top of SAND 1.0m. Water encountered from 0.70m deep.
- Borehole No WS06 identifies 1.40m made ground/topsoil on top of CLAY/SILT 3.10m deep and on top of SAND 4.0m. Water encountered from 1.10m deep.
- Borehole No WS06A identifies 0.50m made ground/topsoil on top of SILT 0.80m deep, on top of CLAY/SILT 2.0m and on top of SAND 3.0m deep. Water encountered from 1.45m deep.
- Borehole No WS07 identifies 0.70m made ground/topsoil on top of CLAY 0.75m deep, on top of CLAY/SILT 1.50m and on top of SAND 5.0m deep. Water encountered from 1.50m deep.

Locations and Logs in context to the site are contained within **Appendix D**

A summary of the Ground Investigation by Elemental GI Ltd, (ref; E21142) dated 12th November 2021 showing water level strikes is shown in **Appendix A**

Due to groundwater being identified within 1.00m from ground level in several locations across the site, it is concluded infiltration discharge of surface water is not feasible. This is because it would not be possible to ensure a minimum of 1.0m separation (the minimum allowable within the SuDS manual) between groundwater and the formation level of infiltration structures.

Watercourse Connection

The site is adjacent to a private watercourse to the south-east and it is proposed the proposed development site will discharge into this at greenfield runoff rates.

6.2 Surface Water Runoff Rate & Volume

It is proposed all runoff from the proposed residential development and associated perimeter hardstanding areas will be attenuated and controlled at the 1:1 year greenfield runoff rate (equivalent to 2.14 l/s) for all storm events up to and including the critical 100 year plus 40% climate change event.

6.2 Surface Water Drainage Proposals

It is proposed the residential development and external hardstanding area (equivalent to an impermeable area of 0.7353 ha) will be connected via a carrier pipe network conveying flows to an attenuation pond. All flows will then be controlled to 2.14l/s via a pumping station discharging to the existing watercourse. A surface water pump station is required due to extensive site build-up (in excess of 1.0m of fill material) if a full gravity system was implemented due to a shallow existing ditch invert level and existing site levels.

All private external hardstanding areas will be constructed using permeable paving.

Further to providing attenuation to accommodate the critical 100 year plus 40% climate change event, the attenuation pond will also ensure runoff is fully treated in line with best guidance contained within The SuDS Manual prior to being discharged offsite.

6.3 Exceedance Events

Whilst it is a requirement to fully attenuate the 1 in 100 year critical storm event plus 40% climate change, it is also necessary to ensure storms which exceed this severity do not cause flooding to building areas or exacerbate flooding elsewhere.

It is proposed final hardstanding levels will be designed to provide conveyance routes taking storm flows away from building areas and towards areas which are less sensitive to flooding. Exceedance event flow routes have been shown on the drainage layout contained in [Appendix I](#).

6.4 Surface Water Management & Maintenance

For any surface water drainage system to operate as originally designed, it is necessary to ensure that it is adequately maintained to ensure its continued performance throughout its design life.

It is proposed the SuDS features used within this development will be fully maintained and managed a private management company.

Table 3 and **Table 4** stipulate the proposed maintenance activities and frequencies the private management company would carry out over the lifetime of the development (as contractually obliged).

Table 3: Operation and Maintenance Requirements for Pervious Pavements

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is

		most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 hours after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 4: Operation and Maintenance Requirements for Attenuation Basin

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly
	Cut the grass	Monthly (during growing season)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start then as required)
	Inspect inlets, outlets, bankside, structures pipework etc for evidence of blockage and damage	Monthly
	Inspect water body for signs of poor water quality	Monthly

	Inspect silt accumulation rates in main body of pond. Undertake contamination testing once some build up has occurred to inform disposal options	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base, include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water edge to min of 1m above water level	Annually
	Tidy all dead growth before start of growing season	Annually
Occasional Maintenance	Remove sediment from the main body when pool volume is reduced by 20%	Typically required every 20 -50 years
Remedial Actions	Repair erosion or other damage	As required
	Replant where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows	As required

7 Proposed Foul Water Drainage

It is proposed all foul water flows from development proposals will gravitate to the existing Anglian Water foul water drainage system to manhole ref 3401 located around 150m south of the development site.

As of OFWOT guidance (April 2018), a right to connect to the public foul sewer exists and will be agreed via a S106 agreement with Anglian Water as part of detailed design.

At this time however a pre-development enquiry has been submitted to Anglian Water to notify them of development proposals and to verify capacity within the existing sewer. Anglian Waters response confirms capacity exists within their existing combined sewer for proposed foul water flows.

Anglian Waters Predevelopment response is shown in [Appendix K](#).

The total foul water flow rate from the proposed development proposals can be calculated based on guidance given within Design and Construction Guidance (DCG).

Design and Construction Guidance (Appendix C B3.1) assumes a flow rate of 4000 litres per dwelling per day (l/d/d) for residential dwellings.

Based on a total of 41no. dwellings and over a 24-hour period the following foul water flow rates can be calculated;

- DWF Flow rate = $(41 \times 4000) / 86,400 = 1.90 \text{ l/s}$
- Peak flow rate (assuming a peak factor of 6) = $1.90 \times 6 = 11.40 \text{ l/s}$

It is recommended detailed design drawings are provided to Anglian Water in due course as part of a S106 application to formally agree the sewerage connections.

8 Conclusion

Civilistix Consulting Engineers has been commissioned by Minister Property Group to prepare a Combined Flood Risk Assessment and Drainage Strategy to support a planning application for a proposed residential development consisting of 41 residential plots and associated infrastructure at Land off Surfleet Road, Pinchbeck (PE11 3XY).

A summary of flood risk from each type of flooding source before and after flood mitigation measures are incorporated are shown below;

Type of Flooding	Existing Risk Category	Proposed Risk Category
Fluvial flooding	High Risk	Low/Medium Risk
Surface Water flooding	Very Low Risk	Very Low Risk
Groundwater flooding	Medium Risk	Low Risk
Artificial flooding	Very Low Risk	Very Low Risk
Reservoir flooding	Very Low Risk	Very Low Risk

To reduce fluvial and groundwater flooding, it is proposed the following mitigation measures are implemented;

- Ensure proposed finished floor levels are raised 0.60m above the 100-year+40% climate change AEP flood level
- Preparation of an onsite SuDS Drainage Strategy
- Ensure an emergency flood plan and safe access and escape routes are in place across the lifetime of the development

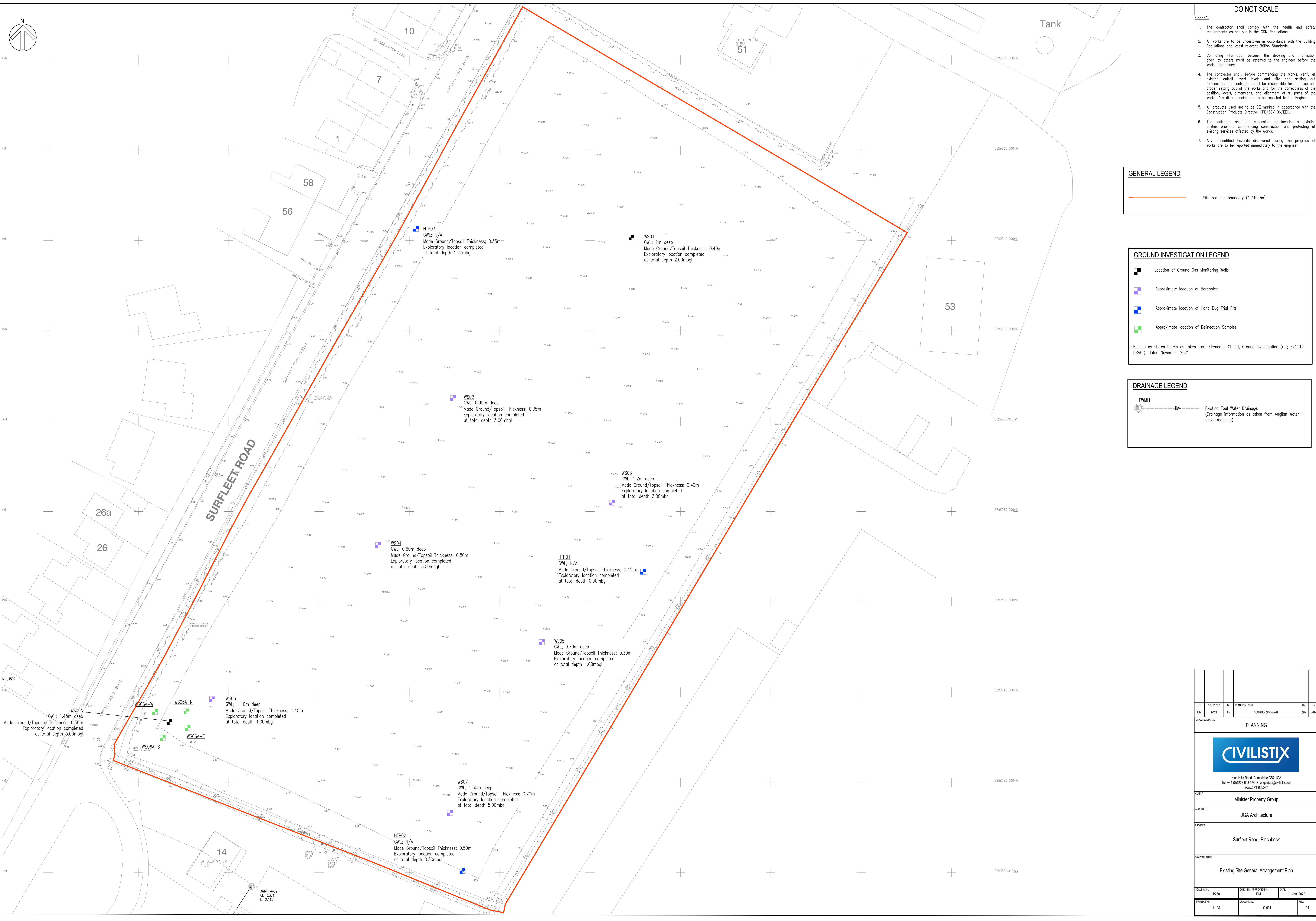
The drainage strategy identifies how a proposed surface and foul water drainage regime can be accommodated in full accordance with Local and National best practice drainage guidance, specifically demonstrating how;

- Existing runoff rate and volume are not exceeded
- Suitable maintenance measures are in place over the drainage systems design life
- Exceedance storm events can be satisfactorily mitigated

This report makes the following key conclusions;

- The use of infiltration to dispose of surface water is not possible due to high groundwater. Discharge of surface water is therefore proposed to the existing watercourse to the south-east of the site
- It is proposed the site discharges at the 1;1 year greenfield runoff rate (equivalent to 2.14l/s) for all storm events up to and including the 100 year plus 40% climate change event
- All foul water will be conveyed offsite by gravity to Anglian Water (AW) manhole (ref 3401) around 150m south of the site, agreed with AW as part of a predevelopment enquiry

Appendix A – Site Location Plan



GENERAL

1. The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
2. All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
3. Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
4. The contractor shall, before commencing the works, verify all existing, buried, invert levels and site and setting out dimensions. The contractor shall be responsible for the work and proper setting out of the works and for the correctness of the position, level, dimensions and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
5. All products used are to be CE marked in accordance with the Construction Products Directive CEN/EN 106/EC.
6. The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
7. Any unidentified hazards discovered during the progress of the works are to be reported immediately to the engineer.

Site red line boundary (1.749 ha)

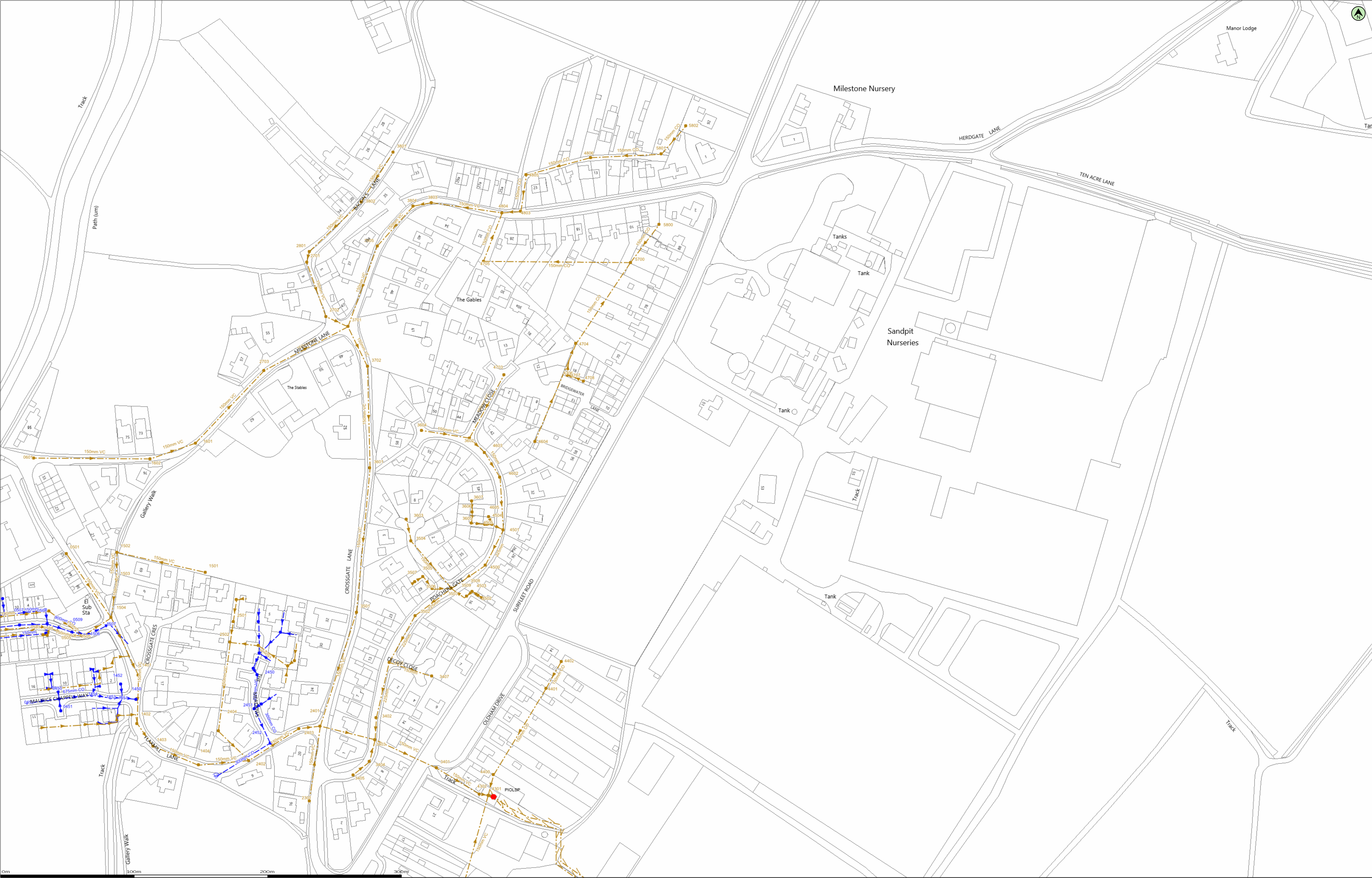
- Results as shown herein as taken from Elemental GI Ltd, Ground Investigation (ref; E21142 DRAFT), dated November 2021

FWMH

Existing Foul Water Drainage.
(Drainage information as taken from Anglian Water asset mapping)

P1	19/01/22	ET	PLANNING ISSUE						DW					
REV.	DATE	BY	SUMMARY OF CHANGE						CWK	PFO				
DRAWING STATUS:														
PLANNING														
 Nine Hills Road, Cambridge CB2 1GA Tel: +44 (0)1223 858 514 E: enquiries@civilistix.com www.civilistix.com Minster Property Group JGA Architecture Surfleet Road, Pinchbeck														
DRAWING TITLE:														
Existing Site General Arrangement Plan														
SCALE @ A1	1:250	CHECKED & APPROVED BY: DM				DATE	Jan. 2022							
PROJECT No.	1-198	DRAWING No.				C-001	REV.	P1						

Appendix B – Existing Anglian Water Asset Mapping



(c) Crown copyright and database rights 2021 Ordnance Survey 100022432 Date: 03/12/21 Scale: 1:1250 Map Centre: 524559.326664 Data updated: 30/11/21 Our Ref: 728922 - 1 Wastewater Plan A1

This plan is provided by Anglian Water pursuant to 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 2021 Ordnance Survey 100022432. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other users 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.

Foul Sewer	— — — — —	Outfall*
Surface Sewer	— — — — —	
Combined Sewer	— — — — —	
Final Effluent	— — — — —	Inlet*
Rising Main*	— — — — —	
Private Sewer*	— — — — —	Manhole*
Decommissioned Sewer*	— — — — —	

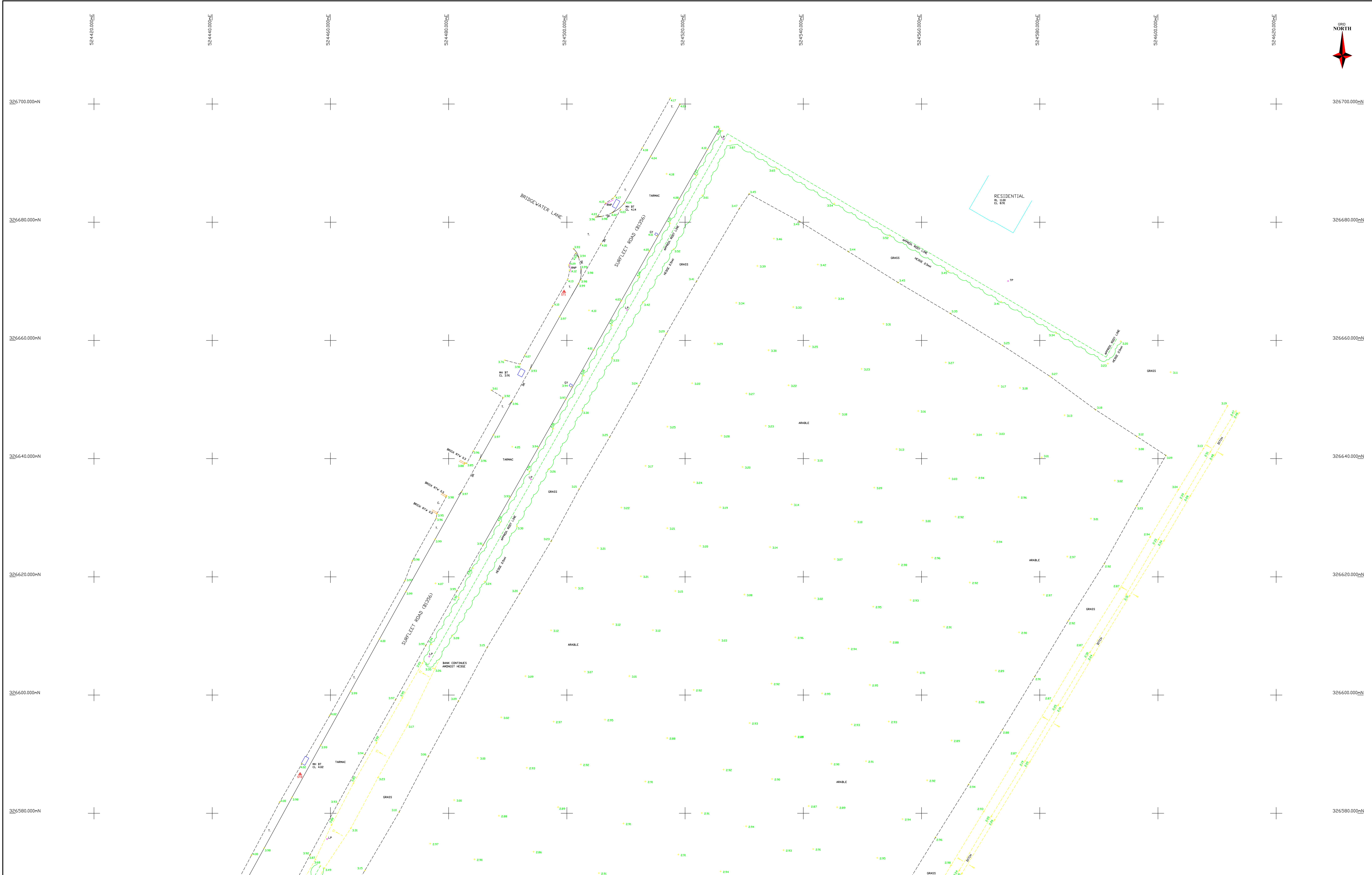
Ⓔ	Sewage Treatment Works	□	
Ⓔ	Public Pumping Station	●	
●	Decommissioned Pumping Station	●	

(*)Colour denotes effluent type

enquiries@civilstx.com
1-198 - Surfleet



Appendix C – Topographical Survey





EMP Drainage Ltd

Company details:
 Address: 25 High Street, Springfield, Ipswich, IP9 3AF
 Email: info@empdrainage.co.uk or g.p@empdrainage.co.uk
 Contact No: 01527 745 120 or 01570 880 041

NOTES:

The accuracy and content of this drawing are dependent on the original specification and drawings provided and should be consulted before use at other locations.

All other underground services are shown, at reasonable care has been taken within the original specification and requirements. Before use of this information the user should satisfy themselves of the completeness and accuracy of such details and consult EMP before undertaking any works. Due to the nature of the work and the fact that the drawings are a general illustration only, the drawings are not intended to be used as a basis for any other work.

Guarantee can be given that all services have been recorded. All 60/25 Type A Trench/Junctions/Manholes should be dug at correct locations.

Our aim is to produce the best possible results within the specification and cost constraints of our clients. All responsible Care has been taken in the survey and all information on this drawing, any discrepancies must be reported immediately to EMP and any other contractors are most welcome to check above and below are channel water courses listed.

Legend:

All levels and coordinates are related to the datum described.

The horizontal and vertical control of this survey is based on the Ordnance Survey National Grid and level datum is Network A94 GPS.

No claim is made for accuracy of this survey.

No claim applied to revenue scale factor for this survey.

Legend:

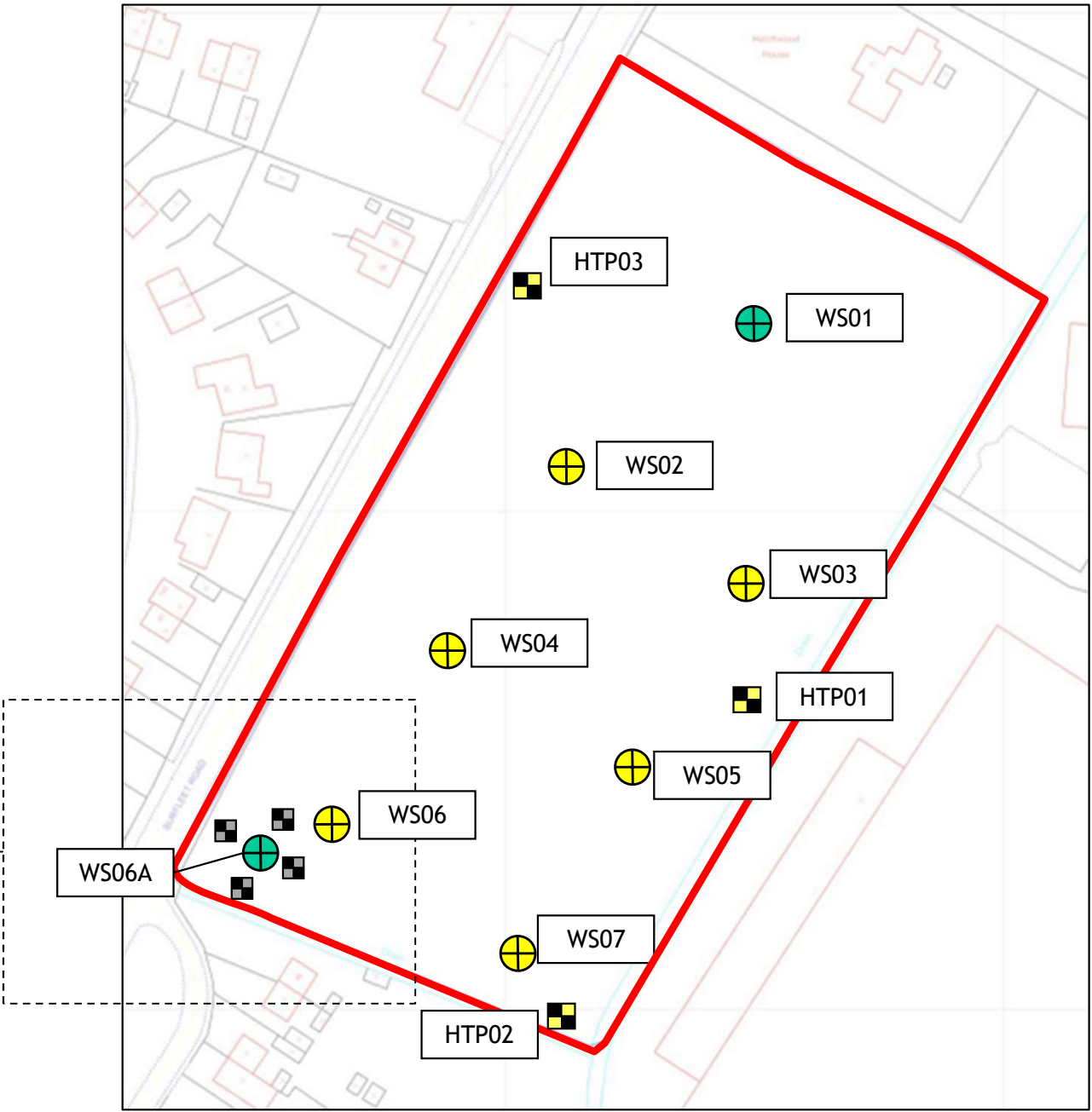
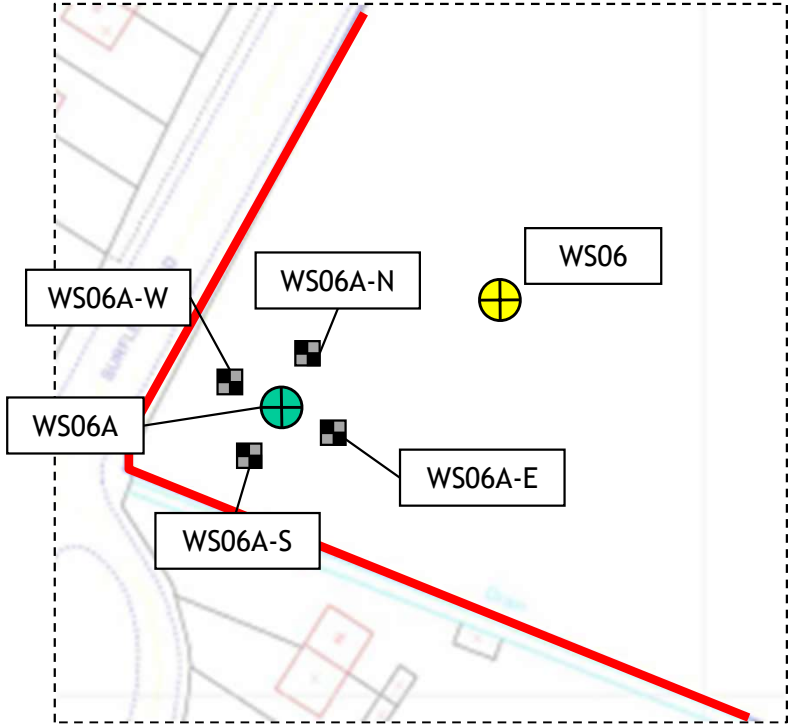
Services:

1. Sewer
2. Stormwater
3. Gas
4. Electric
5. Water
6. Cable
7. Drain
8. Manhole
9. Junction Box
10. Valve
11. Vent
12. Duct
13. Pipe
14. Cable
15. Manhole
16. Junction Box
17. Valve
18. Vent
19. Duct
20. Pipe
21. Cable
22. Manhole
23. Junction Box
24. Valve
25. Vent
26. Duct
27. Pipe
28. Cable
29. Manhole
30. Junction Box
31. Valve
32. Vent
33. Duct
34. Pipe
35. Cable
36. Manhole
37. Junction Box
38. Valve
39. Vent
40. Duct
41. Pipe
42. Cable
43. Manhole
44. Junction Box
45. Valve
46. Vent
47. Duct
48. Pipe
49. Cable
50. Manhole
51. Junction Box
52. Valve
53. Vent
54. Duct
55. Pipe
56. Cable
57. Manhole
58. Junction Box
59. Valve
60. Vent
61. Duct
62. Pipe
63. Cable
64. Manhole
65. Junction Box
66. Valve
67. Vent
68. Duct
69. Pipe
70. Cable
71. Manhole
72. Junction Box
73. Valve
74. Vent
75. Duct
76. Pipe
77. Cable
78. Manhole
79. Junction Box
80. Valve
81. Vent
82. Duct
83. Pipe
84. Cable
85. Manhole
86. Junction Box
87. Valve
88. Vent
89. Duct
90. Pipe
91. Cable
92. Manhole
93. Junction Box
94. Valve
95. Vent
96. Duct
97. Pipe
98. Cable
99. Manhole
100. Junction Box
101. Valve
102. Vent
103. Duct
104. Pipe
105. Cable
106. Manhole
107. Junction Box
108. Valve
109. Vent
110. Duct
111. Pipe
112. Cable
113. Manhole
114. Junction Box
115. Valve
116. Vent
117. Duct
118. Pipe
119. Cable
120. Manhole
121. Junction Box
122. Valve
123. Vent
124. Duct
125. Pipe
126. Cable
127. Manhole
128. Junction Box
129. Valve
130. Vent
131. Duct
132. Pipe
133. Cable
134. Manhole
135. Junction Box
136. Valve
137. Vent
138. Duct
139. Pipe
140. Cable
141. Manhole
142. Junction Box
143. Valve
144. Vent
145. Duct
146. Pipe
147. Cable
148. Manhole
149. Junction Box
150. Valve
151. Vent
152. Duct
153. Pipe
154. Cable
155. Manhole
156. Junction Box
157. Valve
158. Vent
159. Duct
160. Pipe
161. Cable
162. Manhole
163. Junction Box
164. Valve
165. Vent
166. Duct
167. Pipe
168. Cable
169. Manhole
170. Junction Box
171. Valve
172. Vent
173. Duct
174. Pipe
175. Cable
176. Manhole
177. Junction Box
178. Valve
179. Vent
180. Duct
181. Pipe
182. Cable
183. Manhole
184. Junction Box
185. Valve
186. Vent
187. Duct
188. Pipe
189. Cable
190. Manhole
191. Junction Box
192. Valve
193. Vent
194. Duct
195. Pipe
196. Cable
197. Manhole
198. Junction Box
199. Valve
200. Vent
201. Duct
202. Pipe
203. Cable
204. Manhole
205. Junction Box
206. Valve
207. Vent
208. Duct
209. Pipe
210. Cable
211. Manhole
212. Junction Box
213. Valve
214. Vent
215. Duct
216. Pipe
217. Cable
218. Manhole
219. Junction Box
220. Valve
221. Vent
222. Duct
223. Pipe
224. Cable
225. Manhole
226. Junction Box
227. Valve
228. Vent
229. Duct
230. Pipe
231. Cable
232. Manhole
233. Junction Box
234. Valve
235. Vent
236. Duct
237. Pipe
238. Cable
239. Manhole
240. Junction Box
241. Valve
242. Vent
243. Duct
244. Pipe
245. Cable
246. Manhole
247. Junction Box
248. Valve
249. Vent
250. Duct
251. Pipe
252. Cable
253. Manhole
254. Junction Box
255. Valve
256. Vent
257. Duct
258. Pipe
259. Cable
260. Manhole
261. Junction Box
262. Valve
263. Vent
264. Duct
265. Pipe
266. Cable
267. Manhole
268. Junction Box
269. Valve
270. Vent
271. Duct
272. Pipe
273. Cable
274. Manhole
275. Junction Box
276. Valve
277. Vent
278. Duct
279. Pipe
280. Cable
281. Manhole
282. Junction Box
283. Valve
284. Vent
285. Duct
286. Pipe
287. Cable
288. Manhole
289. Junction Box
290. Valve
291. Vent
292. Duct
293. Pipe
294. Cable
295. Manhole
296. Junction Box
297. Valve
298. Vent
299. Duct
300. Pipe
301. Cable
302. Manhole
303. Junction Box
304. Valve
305. Vent
306. Duct
307. Pipe
308. Cable
309. Manhole
310. Junction Box
311. Valve
312. Vent
313. Duct
314. Pipe
315. Cable
316. Manhole
317. Junction Box
318. Valve
319. Vent
320. Duct
321. Pipe
322. Cable
323. Manhole
324. Junction Box
325. Valve
326. Vent
327. Duct
328. Pipe
329. Cable
330. Manhole
331. Junction Box
332. Valve
333. Vent
334. Duct
335. Pipe
336. Cable
337. Manhole
338. Junction Box
339. Valve
340. Vent
341. Duct
342. Pipe
343. Cable
344. Manhole
345. Junction Box
346. Valve
347. Vent
348. Duct
349. Pipe
350. Cable
351. Manhole
352. Junction Box
353. Valve
354. Vent
355. Duct
356. Pipe
357. Cable
358. Manhole
359. Junction Box
360. Valve
361. Vent
362. Duct
363. Pipe
364. Cable
365. Manhole
366. Junction Box
367. Valve
368. Vent
369. Duct
370. Pipe
371. Cable
372. Manhole
373. Junction Box
374. Valve
375. Vent
376. Duct
377. Pipe
378. Cable
379. Manhole
380. Junction Box
381. Valve
382. Vent
383. Duct
384. Pipe
385. Cable
386. Manhole
387. Junction Box
388. Valve
389. Vent
390. Duct
391. Pipe
392. Cable
393. Manhole
394. Junction Box
395. Valve
396. Vent
397. Duct
398. Pipe
399. Cable
400. Manhole
401. Junction Box
402. Valve
403. Vent
404. Duct
405. Pipe
406. Cable
407. Manhole
408. Junction Box
409. Valve
410. Vent
411. Duct
412. Pipe
413. Cable
414. Manhole
415. Junction Box
416. Valve
417. Vent
418. Duct
419. Pipe
420. Cable
421. Manhole
422. Junction Box
423. Valve
424. Vent
425. Duct
426. Pipe
427. Cable
428. Manhole
429. Junction Box
430. Valve

Appendix D –Site Investigation Boreholes

NOTES:

-  Approx. Site Boundary
-  Approx. Location of Boreholes
-  Approx. Location of Ground Gas Monitoring Wells
-  Approx. Location of Hand Dug Trial Pits
-  Approx. Location of Delineation Samples



Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd		
Client:	Minster Property Group					
Contractor: RP Drilling			Project No: E21142 DRAFT	Sheet: 1 of 1	WS01	
Equipment: Window Sampler Drilling Rig			Logged by: JR	Date: 12th November 2021		
Field Monitoring and Sampling			Strata		Legend	Well
Depth (m)	Type	Result (SPT)	Depth (m)	Description		
0.50	B	N = 7	0.40	TOPSOIL comprising vegetation over brown silty sand with occasional rootlets.		
1.00	JT		0.95	Soft to firm brown sandy CLAY/SILT. ... becoming very sandy from 0.75m depth.		
		N = 3	2.00	Loose brown very silty SAND. ... with rare black inclusions noted from 1.20m depth. ... becoming very loose from 1.40m depth.		
				Exploratory location completed at 2.00m depth.		
			3m			
			4m			
			5m			
Water Observations: Water encountered from 1.00m depth during drilling. Water encountered from 0.90m depth 20mins after drilling.						
Remarks: 1) Borehole completed as a monitoring well.						
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)						

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd			
Client:	Minster Property Group						
Contractor: RP Drilling			Project No: E21142 DRAFT		Sheet: 1 of 1	WS02	
Equipment: Window Sampler Drilling Rig			Logged by: JR		Date: 12th November 2021		
Field Monitoring and Sampling			Strata			Legend	Well
Depth (m)	Type	Result (SPT)	Depth (m)	Description			
0.50	JT	N = 9	0.35	TOPSOIL comprising vegetation over brown silty sand with occasional rootlets.			
			1m	Soft brown and orangish brown mottled very sandy SILT. ... becoming soft to firm from 1.00m depth. ... becoming soft to very soft from 1.40m depth.			
2.50	B	N = 4	2m	... becoming grey from 1.95m depth.			
			3.00	... becoming soft to firm from 2.80m depth.			
			Exploratory location completed at 3.00m depth.				
			4m				
			5m				
Water Observations: Water encountered from 0.95m depth during drilling. Water encountered from 0.95m depth 20mins after drilling.							
Remarks: 1) Borehole terminated on completion of testing at 3.00m depth.							
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)							

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd		
Client:	Minster Property Group					
Contractor: RP Drilling			Project No: E21142 DRAFT	Sheet: 1 of 1	WS03	
Equipment: Window Sampler Drilling Rig			Logged by: JR	Date: 12th November 2021		
Field Monitoring and Sampling			Strata		Legend	Well
Depth (m)	Type	Result (SPT)	Depth (m)	Description		
0.10	JT			TOPSOIL comprising vegetation over brown silty sand with occasional rootlets.		
			0.40	Very loose brown very silty SAND.		
1.10	B	N = 8	1m	... becoming loose from 1.0m depth.		
		N = 1	2m	... becoming very loose from 1.0m depth.		
		N = 9	3.00	... becoming loose from 2.9m depth.		
				Exploratory location completed at 3.00m depth.		
			4m			
			5m			
Water Observations: Water encountered from 1.20m depth during drilling. Water encountered from 0.70m depth 20mins after drilling.						
Remarks: 1) Borehole terminated at 3.00m depth on adverse ground conditions (blowing sands).						
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)						

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd	
Client:	Minster Property Group				
Contractor: RP Drilling			Project No: E21142 DRAFT	Sheet: 1 of 1	WS04
Equipment: Window Sampler Drilling Rig			Logged by: JR	Date: 12th November 2021	
Field Monitoring and Sampling			Strata		Legend Well
Depth (m)	Type	Result (SPT)	Depth (m)	Description	
1.00	JTB	N = 2	0.10	TOPSOIL comprising vegetation over brown silty sand with occasional rootlets. MADE GROUND (Comprising reworked brown very sandy silt).	
			0.80	MADE GROUND (Comprising brown gravelly sandy silt. Gravel is medium to coarse and subangular of mixed lithology including brick fragments). ... with gravel absent and becoming very loose from 1.00m depth. ... becoming mottled with black colouring and occasional decayed vegetation from 1.80m depth.	
			2.00	Very loose dark grey very silty medium SAND.	
			3.00	Exploratory location completed at 3.00m depth.	
			4m		
			5m		
Water Observations: Water encountered from 0.80m depth during drilling. Water encountered from 0.84m depth 20mins after drilling.					
Remarks: 1) Borehole terminated on completion of testing at 3.00m depth.					
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)					

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd		
Client:	Minster Property Group					
Contractor: RP Drilling			Project No: E21142 DRAFT	Sheet: 1 of 1	WS05	
Equipment: Window Sampler Drilling Rig			Logged by: JR	Date: 12th November 2021		
Field Monitoring and Sampling			Strata		Legend	Well
Depth (m)	Type	Result (SPT)	Depth (m)	Description		
0.10	JT	N = 8 ▼	0.30	TOPSOIL comprising vegetation over brown silty sand with occasional rootlets.		
0.50	B		0.65	Firm brown very sandy CLAY/SILT.		
			1.00	Very loose to loose brown and orangish brown mottled very silty fine to medium SAND.		
				Exploratory location completed at 1.00m depth.		
			2m			
			3m			
			4m			
			5m			
Water Observations: Water encountered from 0.70m depth during drilling. Water encountered from 0.72m depth 20mins after drilling.						
Remarks: 1) Borehole terminated on completion of testing at 1.00m depth.						
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm²)						

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd		
Client:	Minster Property Group					
Contractor: RP Drilling			Project No: E21142 DRAFT	Sheet: 1 of 1	WS06	
Equipment: Window Sampler Drilling Rig			Logged by: JR	Date: 12th November 2021		
Field Monitoring and Sampling			Strata		Legend	Well
Depth (m)	Type	Result (SPT)	Depth (m)	Description		
0.50	JT		0.25	MADE GROUND (Comprising vegetation over reworked brown sandy silty topsoil with rare medium and subangular gravel of mixed lithology).		
			0.70	MADE GROUND (Comprising brown and greyish brown sandy silt). (Appears structureless and reworked)		
			1m	MADE GROUND (Comprising brown and greyish brown silty medium sand). (Appears structureless and reworked)		
			1.40	Soft grey and greyish brown very sandy CLAY/SILT with frequent decayed organic matter. ... becoming black and very soft with abundant organic matter from 1.85m depth.		
			3m			
			3.10	Loose grey very silty fine SAND with rare black organic inclusions.		
4.00						
			Exploratory location completed at 4.00m depth.			
			5m			
Water Observations: Water encountered from 1.10m depth during drilling. Water encountered from 0.73m depth 20mins after drilling.						
Remarks: 1) Borehole terminated on completion of testing at 4.00m depth.						
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)						

Site:		Site off Surfleet Road, Pinchbeck		Elemental GI Ltd	
Client:		Minster Property Group			
Contractor: RP Drilling			Project No: E21142 DRAFT		Sheet: 1 of 1
Equipment: Window Sampler Drilling Rig			Logged by: JR		Date: 12th November 2021
Field Monitoring and Sampling			Strata		Legend Well
Depth (m)	Type	Result (SPT)	Depth (m)	Description	
1.00	JTB	N = 1 N = 7 N = 5	0.50	TOPSOIL comprising brown sandy silt with rare medium and subangular gravel of mixed lithology.	
			0.80	Soft light brown sandy SILT. ... with a dark silt band with rootlets present between 0.75m and 0.80m depth.	
			1m	Very soft brown sandy CLAY/SILT. ... with frequent small sandy pockets and decayed organic matter present from 0.95m depth.	
			2.00	... becoming black and grey mottled from 1.70m depth.	
			3.00	Loose grey very silty fine SAND with rare black organic inclusions.	
			4m	Exploratory location completed at 3.00m depth.	
			5m		

Water Observations:

Water encountered from 1.45m depth during drilling. Water encountered from 1.05m depth 20mins after drilling.

Remarks:

1) Borehole completed as a monitoring well.

Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s)

HSV = Hand Shear Vane (kPa). PP = Pocket Penetrometer (daN/cm²)

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd
Client:	Minster Property Group			
Contractor: RP Drilling		Project No: E21142 DRAFT		Sheet: 1 of 1
Equipment: Window Sampler Drilling Rig		Logged by: JR		Date: 12th November 2021
Field Monitoring and Sampling				Strata
				Legend
				Well
Depth (m)	Type	Result (SPT)	Depth (m)	Description
0.45	JT ▼		0.35	TOPSOIL comprising vegetation over brown silty sand.
			0.70	MADE GROUND (Comprising reworked light brown sandy silt). ... with glass fragments present at 0.60m depth.
			0.75	Soft dark brown sandy CLAY.
1.00	B	N = 7	1m	Soft to firm grey sandy CLAY/SILT.
			1.50	... becoming soft from 1.40m depth.
			2m	Loose grey very silty medium SAND.
			3m	... with rare black decayed vegetation present between 1.60m and 2.80m depth.
		N = 3	4m	... becoming very loose from 2.50m depth.
		N = 4		
		N = 17	5.00	... becoming medium dense from 4.80m depth.
				Exploratory location completed at 5.00m depth.

Water Observations:

Water encountered from 1.50m depth during drilling. Water encountered from 0.52m depth 20mins after drilling (possible water from collapsed strata).

Remarks:

1) Borehole collapsed to 0.52m depth 20 mins after drilling.

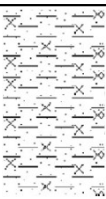
2) Borehole terminated on completion of testing at 5.00m depth.

Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s)

HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm²)

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd	
Client:	Minster Property Group				
Contractor: Engineer			Project No: E21142 DRAFT	Sheet: 1 of 1	HTP01
Equipment: Hand Tools			Logged by: JR	Date: 12th November 2021	
Field Monitoring and Sampling			Strata		Legend
Depth	Type	Result	Depth	Description	
(m)		(HSV/PP)	(m)		
			0.45	MADE GROUND (Comprising vegetation over reworked brown slightly gravelly silty sandy topsoil. Gravel is medium to coarse and subangular of brick fragments).	
			0.50	Soft brown very silty SAND.	
			Exploratory location completed at 0.50m depth.		
			1m		
			2m		
			3m		
			4m		
			5m		
Water Observations: No water encountered during excavation.					
Remarks: 1) Completed as a shallow hand dug pit to investigate local soil conditions at 0.50m depth.					
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)					

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd	
Client:	Minster Property Group				
Contractor: Engineer			Project No: E21142 DRAFT	Sheet: 1 of 1	HTP02
Equipment: Hand Tools			Logged by: JR	Date: 12th November 2021	
Field Monitoring and Sampling			Strata		Legend
Depth (m)	Type	Result (HSV/PP)	Depth (m)	Description	
0.20	JTT			MADE GROUND (Comprising vegetation over reworked brown slightly gravelly silty sandy topsoil. Gravel is medium to coarse and subangular of brick fragments and glass).	
			0.50	Exploratory location completed at 0.50m depth.	
			1m		
			2m		
			3m		
			4m		
			5m		
Water Observations: No water encountered during excavation.					
Remarks: 1) Completed as a shallow hand dug pit to investigate local soil conditions at 0.50m depth.					
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)					

Site:	Site off Surfleet Road, Pinchbeck			Elemental GI Ltd	
Client:	Minster Property Group				
Contractor: Engineer			Project No: E21142 DRAFT	Sheet: 1 of 1	HTP03
Equipment: Hand Tools			Logged by: JR	Date: 20th November 2021	
Field Monitoring and Sampling			Strata		Legend
Depth (m)	Type	Result (HSV/PP)	Depth (m)	Description	
1.20	J		0.35	TOPSOIL comprising vegetation over brown silty sand with occasional rootlets.	
			1m	Soft to firm light brown and dark brown mottled sandy CLAY/SILT.	
			1.20	... becoming very sandy and slightly damp from 1.00m depth.	
				Exploratory location completed at 1.20m depth.	
			2m		
			3m		
			4m		
			5m		
Water Observations: No water encountered during excavation.					
Remarks: 1) Completed as a shallow hand dug pit to investigate local soil conditions at 1.20m depth.					
Where they are unaccompanied by in situ tests, strength descriptions of granular soils are based on initial Engineer's field description(s) HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)					

Appendix E – Development Masterplan

Feasibility Site Layout

Scale: 1:500

schedule of accommodation

housetype	code	area	quantity
2B4P House	A	75m ²	13 no. units
2B4P House	B	78m ²	04 no. units
3B5P House	C	65m ²	14 no. units
4B6P House	D	102m ²	02 no. units
1B2P House	E	55m ²	04 no. units
3B5P House	F	92m ²	04 no. units

Total Number of Units 41 no. units

approximate site area :	1.75Ha / 4.32 acres
density :	23.4 dwellings per hectare
parking provision :	200%

Key

- Application site boundary
- Proposed Housing
- Existing Surrounding Buildings
- Private Rear Garden Area
- Public Open / Green Space
- Principal Highway / Road
- Private Drive
- Car Parking Spaces
- Pedestrian Footpaths
- Existing Tree Planting
- Proposed Tree Planting
(indicative only - to be designed and specified by Landscape Architect)
- Proposed Hedge / Shrub Planting
(indicative only - to be designed and specified by Landscape Architect)
- Housetypes - Primary Point of Access
- Primary Site Access



Disclaimer: This document and its design content is copyright protected ©. It shall be read in conjunction with all other associated project information including models, specifications, schedules and related consultants documents. Do not scale from documents. All scales noted correct at original paper size. All dimensions to be checked on site. Immediately report any discrepancies, errors or omissions on this document to the originator. If in doubt ask.

Source File:
20050 Model.pln

Rev	Date	Drawn	Note
P02	03/11/2021	JKG	Parking for corner plots amended. Plots 24-27 split into two blocks.
P03	11/01/2022	JKG	Layout updated and mix amended.
P04	20/01/2022	JKG	Access to Plots 38-41 amended, highway design changed, drainage features shown.


MINSTER
PROPERTY GROUP

JGA
ARCHITECTURE & PLANNING
e: hello@jg-a.co.uk t: 07429 162 747
Client
Minster Property Group Ltd.
Project Title
Proposed Residential Development at
Land off Surfleet Road,
Pinchbeck

Drawing Title
Feasibility Site Layout

Drawing Status
Preliminary

Scale(s)
1:500

Drawn
JKG

Project Number
20050

Original Paper Size
A1

Date
25.11.20

Revision
P04

Drawing Number
001

Revision
P04

Appendix F – Fluvial Flooding Information

dorothea@civillistix.com

Our ref: CCN-2022-246974

Date: 20/1/2022

Dear Dorothea

Provision of Flood Risk Information for land off Surfleet Road, Pinchbeck.

Thank you for your request to use our flood risk information for the above site. The information is set out below and attached. It is important you read any contextual notes on the maps provided.

If you are preparing a Flood Risk Assessment (FRA) for this site, please note this information may not be sufficient by itself to produce an adequate FRA to demonstrate the development is safe over its lifetime. Additional information may be required to carry out an appropriate assessment of all risk, such as consequence of a breach in defences.

We aim to review our information on a regular basis, so if you are using this data more than twelve months from the date of this letter, please contact us again to check it is still valid.

1. Flood Map

The attached map includes the current Flood Map for your area. The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

In some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.

The Flood Map also shows the location of formal raised flood defences and flood storage reservoirs. It represents areas at risk of flooding for present day only and does not take account of climate change.

The Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered flooding may occur from other sources such as surface water sewers, road drainage, etc.

2. Historic Flood Event Outlines

With regards to the history of flooding I can advise we do not have any records of flooding in this area. It is possible recent flooding may have occurred which we are currently investigating, therefore this information may be subject to change. It is possible other flooding may have occurred which other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist) have responsibility.

3. Schemes in the area

There are no ongoing capital projects to reduce or sustain the current flood risk to this site.

4. Fluvial Flood Risk Information

4.1 Fluvial Defence Information

The existing fluvial defences reducing the risk of flooding to this site consist of earth embankments and concrete floodwalls. They are in fair condition and reduce the risk of flooding (at the defence) to a 1% (1 in 100) chance of occurring in any year. We inspect these defences routinely to ensure potential defects are identified.

Refer to paragraph 3 for details of any ongoing capital projects to reduce the flood risk to this site.

4.2 Fluvial Modelled Levels and Flows

Available modelled fluvial flood levels and flows for the model nodes shown on the attached map are set out in the data table attached. This data is taken from the model named on the data table, which is the most up-to-date model currently available.

Please note these levels are “in-channel” levels and therefore may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences.

Our models may not have the most up to date climate change allowances. In time we will update our models for the latest allowances. You should refer to '[Flood risk assessments: climate change allowances](#)' to check if the allowances modelled are appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

4.3 Fluvial Modelled Flood Extents

Please find attached a map showing available modelled flood extents, taking into account flood defences, for your area. This data is taken from the model named on the map, which is the most up-to-date model currently available.

4.4 Fluvial Hazard Mapping

For certain locations we have carried out modelling to map the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from overtopping and / or breaching of defences at specific locations for a number of scenarios.

At present this information is available for fluvial flood risk in Northampton, Lincoln, Wainfleet and some isolated rural locations.

The number of locations we have this information for is expected to increase in time.

Detailed Hazard Mapping is available within the 2017 Update of South Holland Strategic Flood Risk Assessment. This can be downloaded via the following link:

<http://www.southeastlincslocalplan.org/water/>

5. Tidal Flood Risk Information

This site is not considered to be at risk from tidal flooding.

6. Development Planning

If you would like local guidance on preparing a flood risk assessment for a planning application, please contact our Sustainable Places team at lnplanning@environment-agency.gov.uk. It will help if you mention this data request and attach your site location plan.

We provide free preliminary advice; additional/detailed advice, review of draft FRAs and meetings are chargeable at a rate set to cover our costs, currently £100 (plus VAT) per hour of staff time. Further details are available on our website at <https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals>.

General advice on flood risk assessment for planning applications can be found on GOV.UK at <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>

Climate change will increase flood risk due to overtopping of defences. Please note, unless specified otherwise, the climate change data included has an allowance for 20% increase in flow. Updated guidance on how climate change could affect flood risk to new development - 'Flood risk assessments: climate change allowances' was published on GOV.UK in **July 2021**. The appropriate updated climate change allowance should be applied in a Flood Risk Assessment.

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

7. Data Licence and Other Supporting Information

We respond to requests for recorded information we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

This information is provided in accordance with the Open Government Licence which can be found here: <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Further information on flood risk can be found on the GOV.UK website at: <https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

8. Other Flood Risk Management Authorities

The information provided with this letter relates to flood risk from main river or the sea. Additional information may be available from other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist).

I hope we have correctly interpreted your request. If you have any queries or would like to discuss the content of this letter further please contact Frederic Stuhldreer using the email address below.

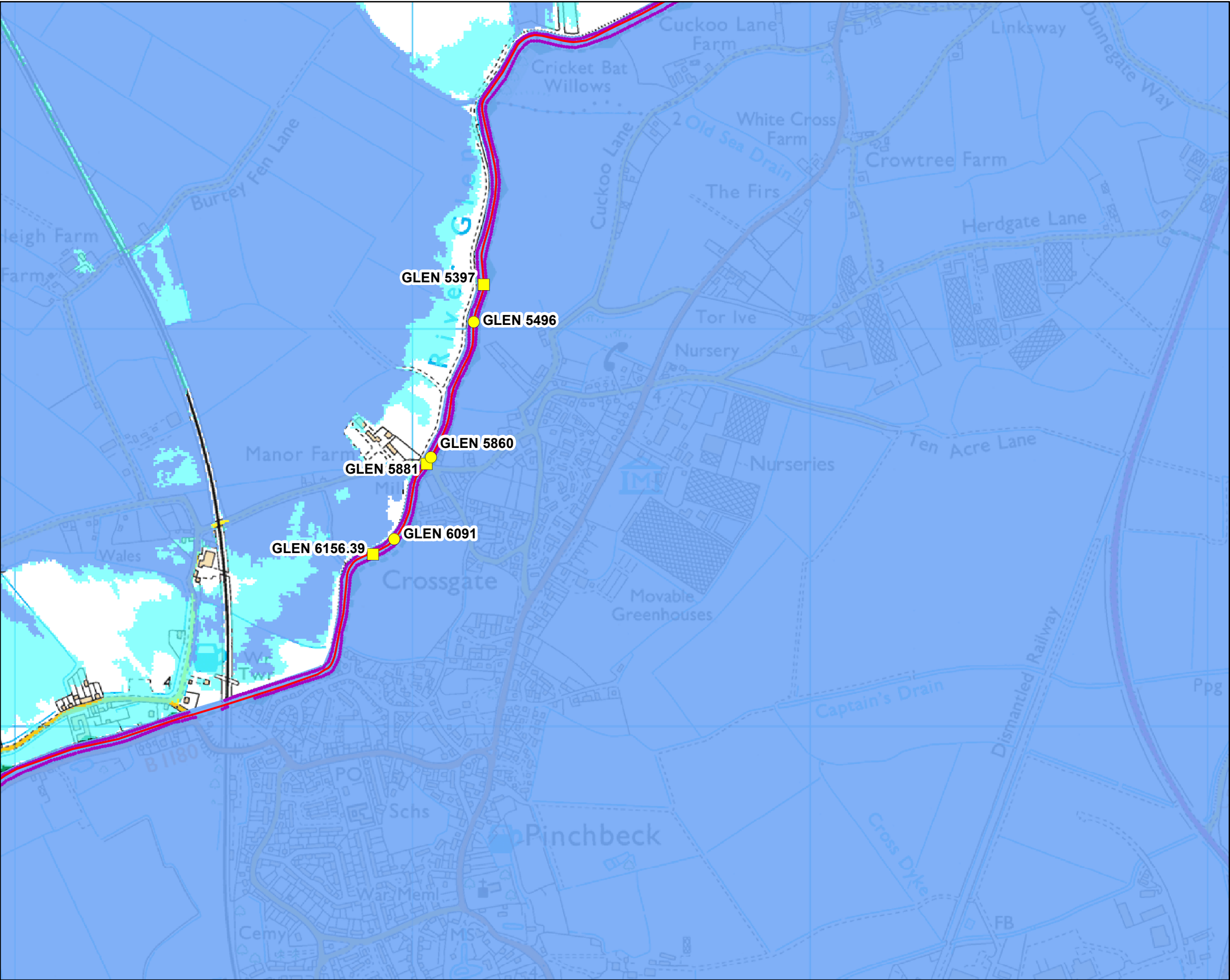
Yours sincerely,



for Alastair Windler
Welland and Nene Partnerships and Strategic Overview Team Leader
e-mail PSOWN@environment-agency.gov.uk

Enc.
Flood Map with Modelled Node Points
Modelled Fluvial Levels and Flows Data Sheet
Modelled Flood Extent Map

Flood Map centred on TF 24510 26592 - created January 2022 [Ref: CCN-2022-246974]



Scale 1:10,000



Legend

- Main River
- Raised Defences
- Flood Storage Areas
- Area at Risk of Flooding from Rivers or The Sea
- Extreme Flood Outline
- Level Node Points
- Flow Node Points

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.
- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue shows the extent of the Extreme Flood Outline, which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Created by the Partnerships and Strategic Overview Team, Kettering

Datasheet [Ref: CCN-2022-246974]
Model Name: Welland Catchment Strategic Model
Model Date: 2016

Fluvial Flood Levels (mODN)

The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).

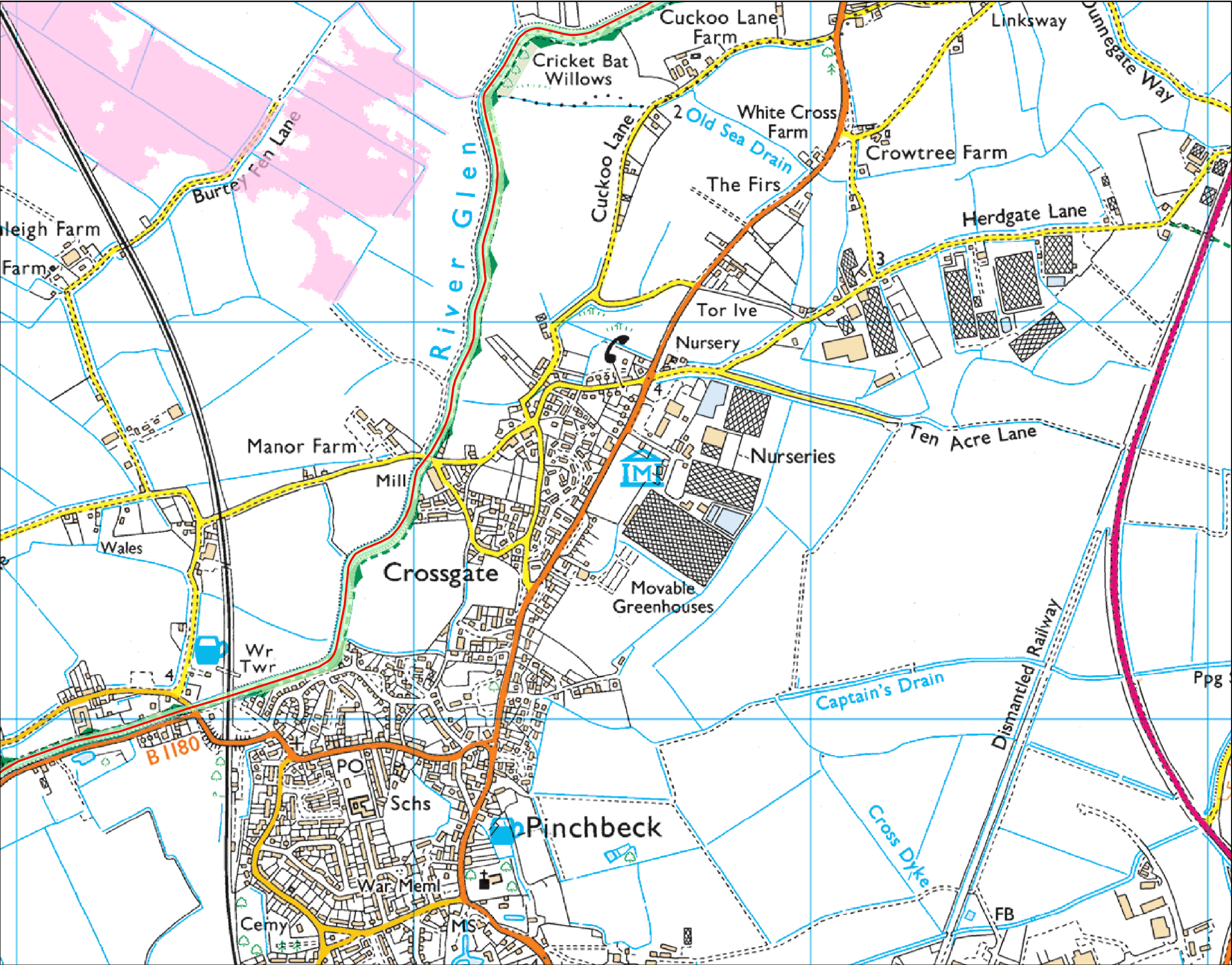
Node Label	Easting	Northing	Annual Exceedance Probability - Maximum Water Levels (mODN)											
			50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	3.33% (1 in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
GLEN 5496	524155	327018	3.98	4.12	4.21	4.29	4.27	4.29	4.31	4.32	4.80	4.36	4.45	4.85
GLEN 5860	524048	326677	3.98	4.13	4.21	4.29	4.28	4.29	4.32	4.33	4.81	4.38	4.49	4.86
GLEN 6091	523956	326471	3.99	4.14	4.22	4.30	4.30	4.31	4.34	4.35	4.82	4.40	4.53	4.90

Fluvial Flood Flows (m³/s)

The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second (m³/s).

Node Label	Easting	Northing	Annual Exceedance Probability - Maximum Flows (m³/s)											
			50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	3.33% (1 in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
GLEN 5397	524181	327112	27.85	31.09	32.77	34.95	35.50	36.34	37.04	37.64	45.94	40.79	49.78	57.19
GLEN 5881	524037	326660	27.01	30.30	31.96	34.08	34.67	35.52	36.24	36.81	44.92	39.91	49.12	57.08
GLEN 6156.39	523902	326434	26.57	29.99	31.61	33.71	34.31	35.17	35.91	36.44	44.46	39.52	48.78	57.04

Welland Glen Modelled Flood Extents (with defences)
Map centred on TF 24510 26592 - created January 2022 [Ref: CCN-2022-246974]





Scale 1:10,000



Modelled Flood Extents (with defences)

- Main River
- 5% (1 in 20) Fluvial Event
- 1% (1 in 100) Fluvial Event
- 1% (1 in 100) Fluvial Event inc Climate Change
- 0.1% (1 in 1000) Fluvial Event
- 0.1% (1 in 1000) Fluvial Event inc Climate Change

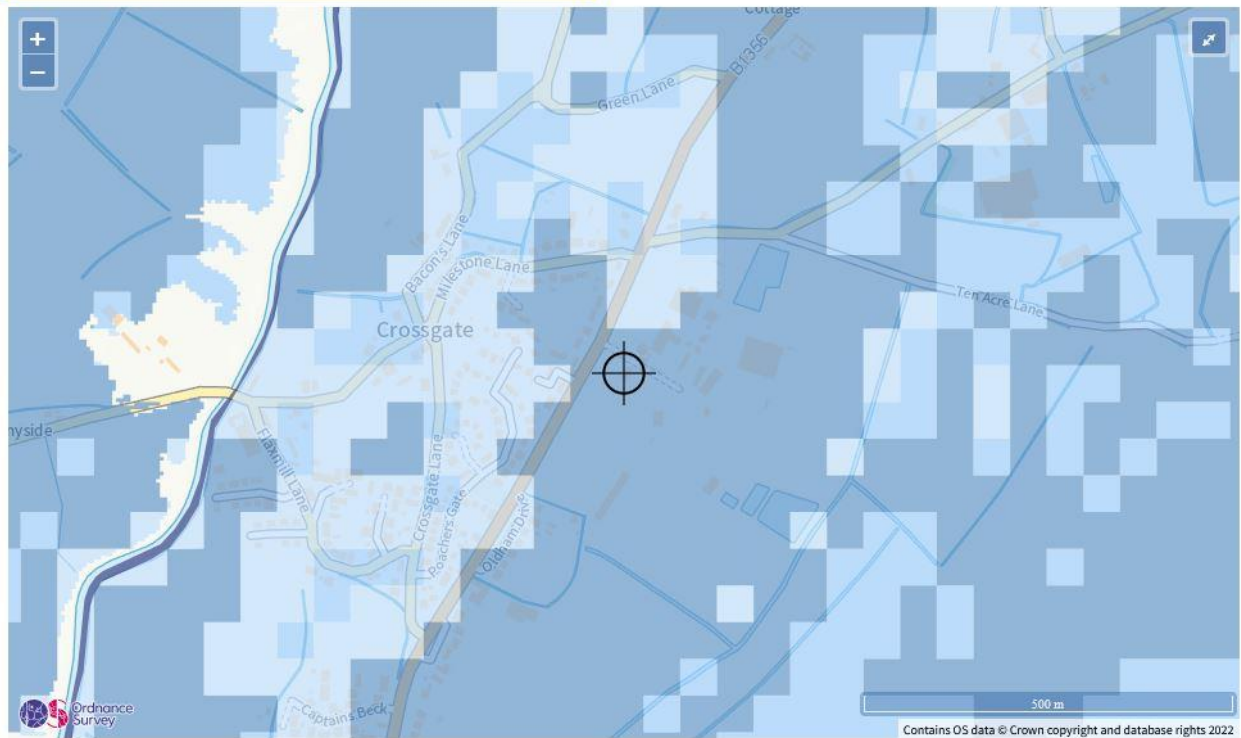
Created by the Partnerships & Strategic Overview Team, Kettering

Flood risk

Extent of flooding

Location

Land off Surfleet Road



Extent of flooding from rivers or the sea

High Medium Low Very low Location you selected

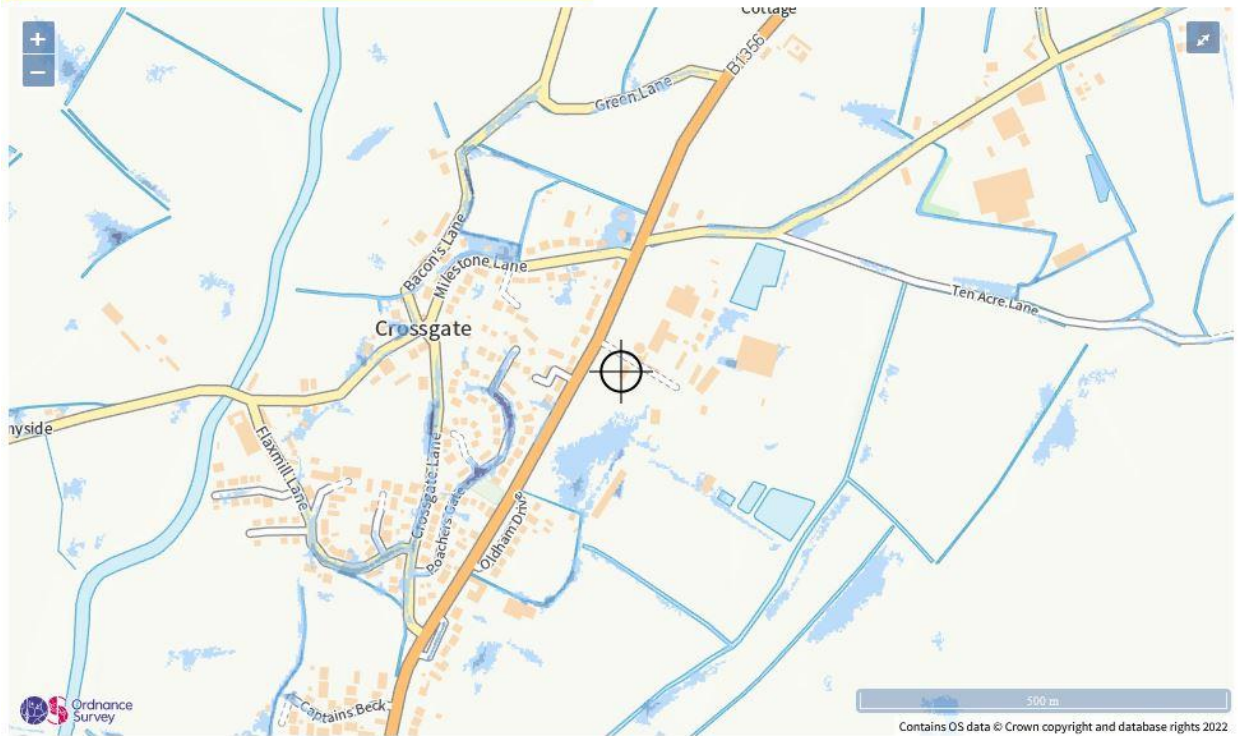
Appendix G – Surface Water Flooding Information

Flood risk

Extent of flooding

Location

Land off Surfleet Road



Extent of flooding from surface water

High Medium Low Very low Location you selected

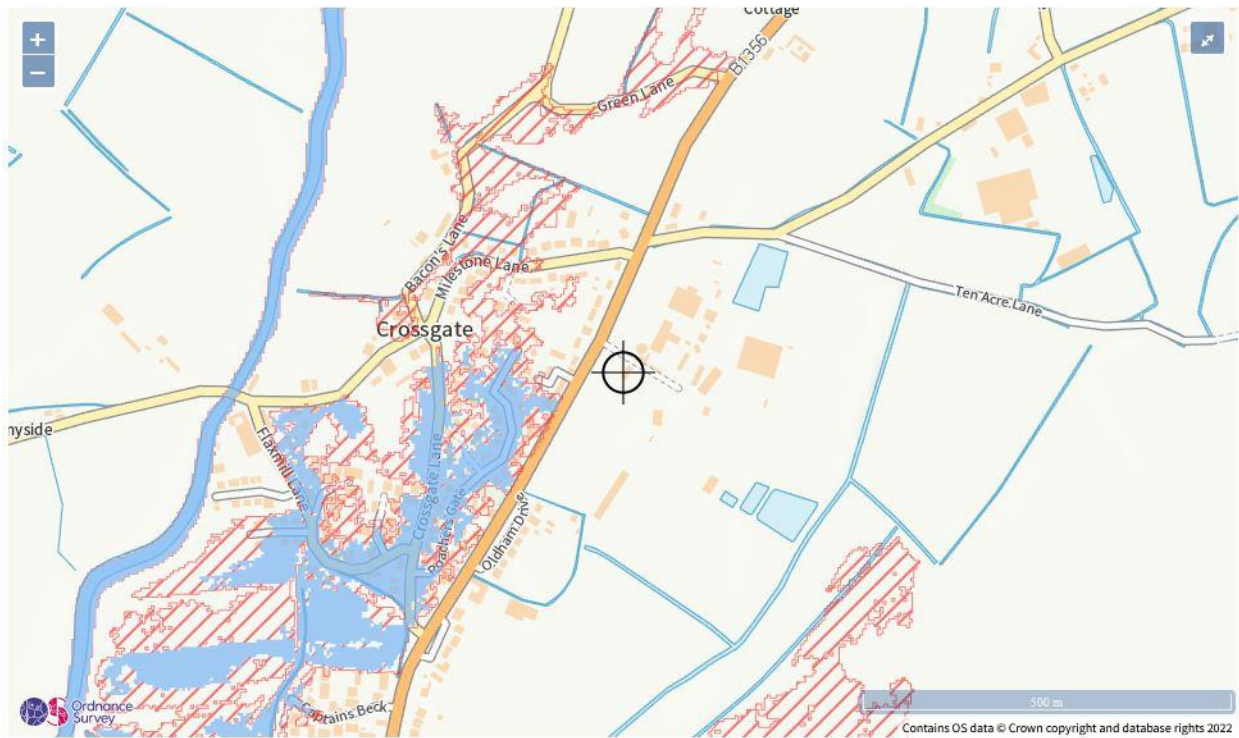
Appendix H - Reservoir Flooding Information

Flood risk

Extent of flooding

Location

Land off Surfleet Road



Maximum extent of flooding from reservoirs:

● when river levels are normal ■ when there is also flooding from rivers ⊕ Location you selected

Appendix I - Flood Plan

It is recommended the applicant and future owners; occupiers and landlords of the proposed dwelling prepare a flood plan to protect life and property during a flood event in line with the guidance provided below;

Before a flood

- Find out if you are at risk of flooding
- Find out if you can receive flood warnings
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture and electrical equipment
- Know how to turn off gas, electricity and water supplies
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery powered or wind up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property

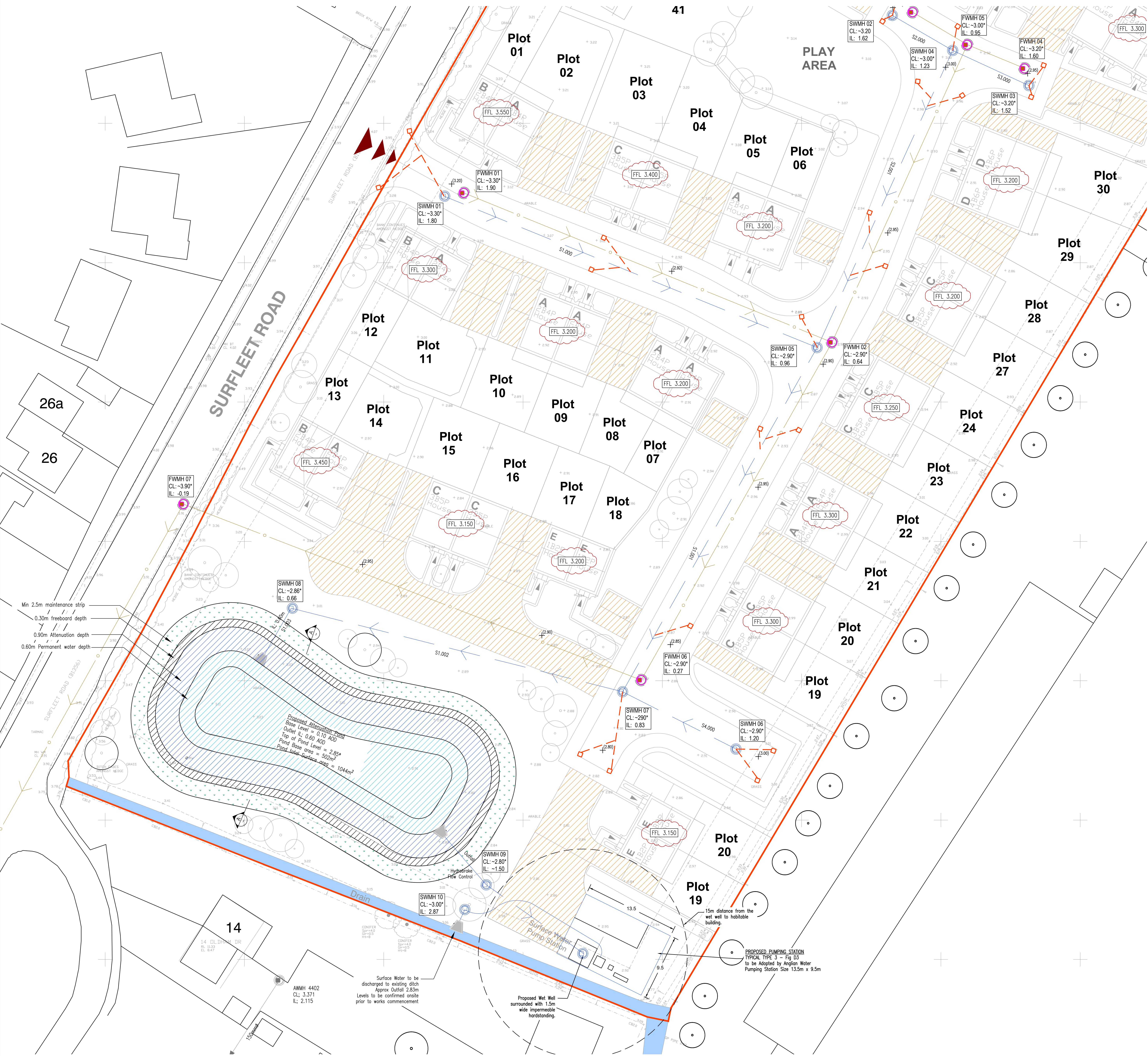
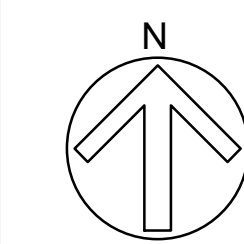
Imminently before a flood event

- Tune into your local radio station
- Fill jugs and saucepans with water
- Grab your flood kit
- Collect blankets, torch, medication and food
- Move important documents, personal items, valuables and lightweight belongings upstairs
- Raise large items of furniture or put them in large bags
- Move people, outdoor belonging, cars and pets to higher ground
- Switch off gas, water and electricity at the mains when water is about to enter your home
- Fit flood protection products such as flood boards, airbrick covers and sandbags
- Put plugs in sinks and baths and weight them down
- Move family and pets upstairs or to a high place with means to escape
- Listen to the advice of the emergency services and evacuate if told to do so
- Avoid walking or driving through flood water

After a flood

- If you have been flooded, contact insurance company as soon as possible
- Take photographs and videos of your damaged property as a record to the insurance company
- If you do not have insurance, contact your local authority for information on grants and charities that may help you
- Flood water can contain sewerage and chemicals. Always wear waterproof outerwear including gloves, wellington boots and face mask
- Have your electrics, central heating and water checked by a qualified person before switching them back on

Appendix J – Drainage Strategy Plan & Associated Information



GENERAL LEGEND

Site red line boundary (1.749 ha)

DRAINAGE LEGEND

- SWMH Proposed Surface Water Drainage (Pipe assumed to fall at 1:125).
- Proposed Foul Water Rising Main
- FWMH Proposed Foul Water Drainage (Pipe assumed to fall at 1:125).
- Indicates Cover level is indicative and to match proposed finished surface level
- Proposed Precast concrete headwall
- Proposed road drainage gully and spur to be put forward for adoption by Anglian Water (Under Section S104).
- Proposed Permeable Paving Car Park Construction to be designed and specified by Marshall.

DRAINAGE LEGEND

- FWMH Existing Foul Water Drainage. (Drainage information as taken from Anglian Water asset mapping)

FINISHED LEVELS LEGEND

- Proposed Finished Ground Level
- Proposed Finished Ground Level to match existing level
- Proposed Final Floor Levels to be reviewed upon receipt of EA Flood level mapping

DO NOT SCALE

GENERAL

- The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
- All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
- Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
- The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. The contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
- All products used are to be CE marked in accordance with the Construction Products Directive CPO/89/106/EEC.
- The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
- Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.

REV	DATE	BY	SUMMARY OF CHANGE	CHK	APP
P1	26/01/22	DT	ARCHITECTS LAYOUT UPDATED	DN	DM
P1	18/02/22	DT	PLANNING ISSUE	DN	DM

PLANNING



Nine Hills Road, Cambridge CB2 1GA
Tel: +44 (0)1223 668 574 E: enquiries@civilistix.com
www.civilistix.com

CLIENT: Minister Property Group

ARCHITECT: JGA Architecture

PROJECT: Surfleet Road, Pinchbeck

DRAWING TITLE

Proposed Drainage General Arrangement Plan
(Sheet 1 of 3)

SCALE @ A1:	1:250	CHECKED / APPROVED BY:	DM	DATE:	Jan 2022
PROJECT No:	1-198	DRAWING No:	C-010	REV:	P2

FOR CONTINUATION SEE C-010



GENERAL LEGEND

Site red line boundary (1.749 ha)

DRAINAGE LEGEND

- SWMH** → Proposed Surface Water Drainage (Pipe assumed to fall at 1:125).
- Proposed Foul Water Rising Main
- FWMH** → Proposed Foul Water Drainage (Pipe assumed to fall at 1:125).
- Indicates Cover level is indicative and to match proposed finished surface level
- Proposed Precast concrete headwall
- G** → Proposed road drainage gully and spur to be put forward for adoption by Anglian Water (Under Section S104).
- Proposed Permeable Paving Car Park Construction to be designed and specified by Marshall.

DRAINAGE LEGEND

- FWMH** → Existing Foul Water Drainage. (Drainage information as taken from Anglian Water asset mapping)

FINISHED LEVELS LEGEND

- +20.43 Proposed Finished Ground Level
- +20.43 Proposed Finished Ground Level to match existing level
- FFL 3.050** Proposed Final Floor Levels to be reviewed upon receipt of EA Flood level mapping

DO NOT SCALE

GENERAL

- The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
- All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
- Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
- The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. the contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
- All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
- The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
- Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.

REV	DATE	BY	SUMMARY OF CHANGE	CHK	APP
P2	26/01/22	DT	ARCHITECTS LAYOUT UPDATED	DM	DM
P1	18/01/22	DT	PLANNING ISSUE	DM	DM

DRAWING STATUS: PLANNING

CIVILISTIX

Nine Hills Road, Cambridge CB2 1GA
Tel: +44 (0)1223 668 574 E: enquiries@civilistix.com
www.civilistix.com

CLIENT: Minister Property Group

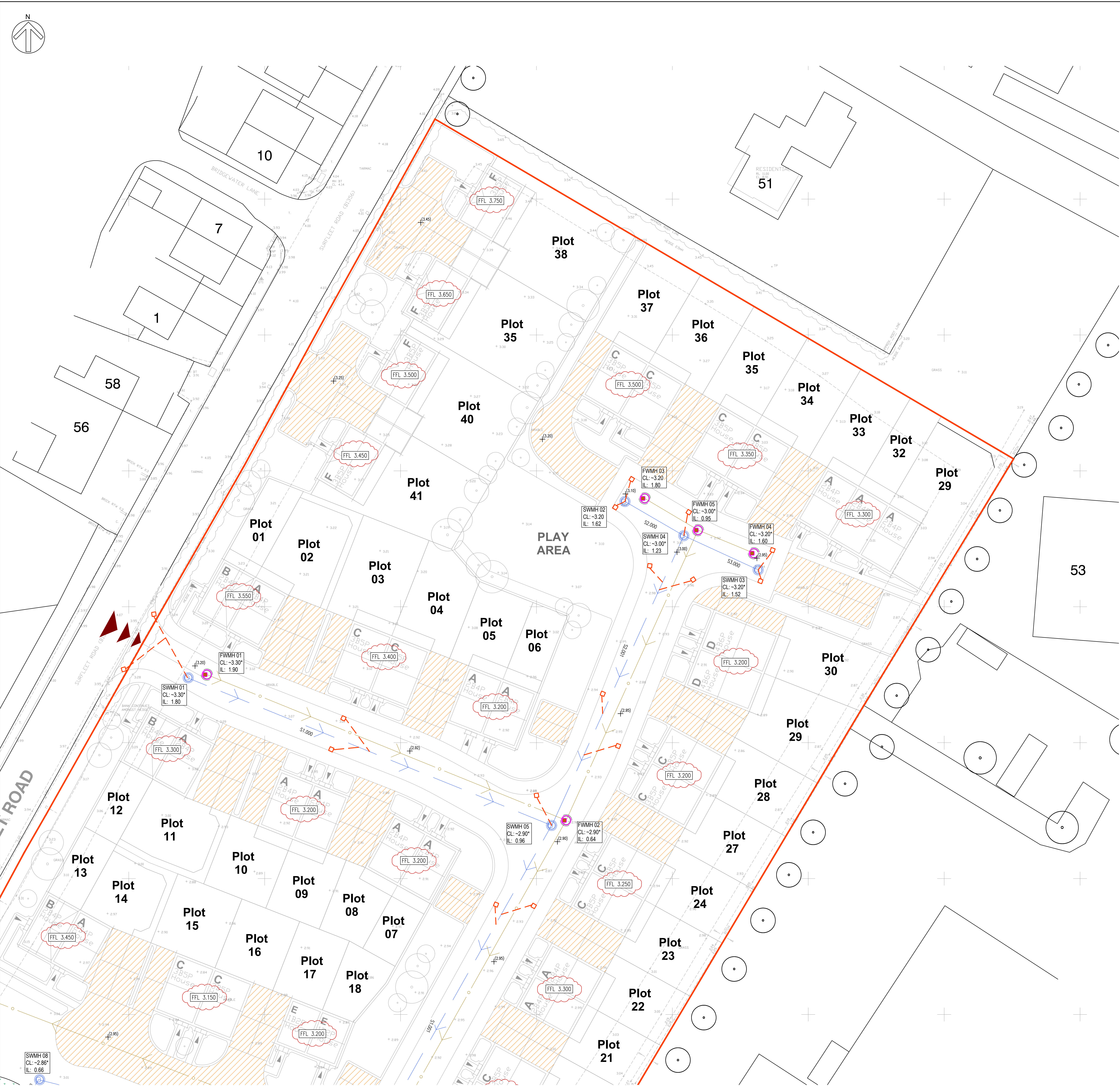
ARCHITECT: JGA Architecture

PROJECT: Surflect Road, Pinchbeck

DRAWING TITLE: Proposed Drainage General Arrangement Plan (Sheet 2 of 3)

SCALE @ A1: 1:250 CHECKED / APPROVED BY: DM DATE: Jan 2022

PROJECT No: 1-198 DRAWING No: C-011 No: P2



FOR CONTINUATION SEE C-010

GENERAL LEGEND

Site red line boundary (1.749 ha)

DRAINAGE LEGEND

- SWMH → Proposed Surface Water Drainage (Pipe assumed to fall at 1:125).
- Proposed Foul Water Rising Main
- FWMH → Proposed Foul Water Drainage (Pipe assumed to fall at 1:125).
- Indicates Cover level is indicative and to match proposed finished surface level
- Proposed Precast concrete headwall
- Proposed road drainage gully and spur to be put forward for adoption by Anglian Water (Under Section S104).
- Proposed Permeable Paving Car Park Construction to be designed and specified by Marshall.

DRAINAGE LEGEND

- FWMH → Existing Foul Water Drainage. (Drainage information as taken from Anglian Water asset mapping)

FINISHED LEVELS LEGEND

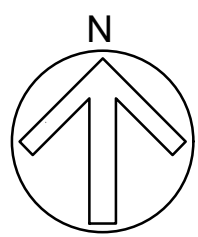
- +20.43 Proposed Finished Ground Level
- +20.43 Proposed Finished Ground Level to match existing level
- FFL 3.050 Proposed Final Floor Levels to be reviewed upon receipt of EA Flood level mapping

DO NOT SCALE

GENERAL

- The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
- All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
- Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
- The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. the contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
- All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
- The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
- Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.

PD	20/01/22	DT	ARCHITECTS LAYOUT UPDATED	DN	DM
PL	18/01/22	DT	PLANNING ISSUE	DN	DM
REV	DATE	BY	SUMMARY OF CHANGE	CHK	APP
DRAWING STATUS: PLANNING					
CLIENT: Minister Property Group					
ARCHITECT: JGA Architecture					
PROJECT: Surfleet Road, Pinchbeck					
DRAWING TITLE: Proposed Drainage General Arrangement Plan (Sheet 3 of 3)					
SCALE @ A1: 1:250		CHECKED / APPROVED BY: DM		DATE: Jan 2022	
PROJECT No: 1-198		DRAWING No: C-012		No: P2	



CATCHMENT PLAN LEGEND:

Catchment Area (ha)	Impermeable Area (ha)	Direct Discharge location
Catchment 1 (Roof areas)	0.2209 ha	Attenuation Pond
Catchment 2 (Private pavements)	0.1645 ha	Attenuation Pond
Catchment 3 (Parking bays)	0.1286 ha	Attenuation Pond
Catchment 4 (Main road)	0.2189 ha	Attenuation Pond
Total 0.7329 ha		

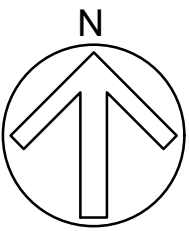
DO NOT SCALE

GENERAL

- The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
- All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
- Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
- The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. The contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer.
- All products used are to be CE marked in accordance with the Construction Products Directive (CPR) 89/106/EEC.
- The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
- Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.

REV	DATE	BY	ARCHITECTS LAYOUT UPDATED	DN	DN
P1	18/01/22	DT	PLANNING ISSUE	DN	DN
REV	DATE	BY	SUMMARY OF CHANGE	CHK	APP
DRAWING STATUS: PLANNING					
CIVILISTIX Nine Hills Road, Cambridge CB2 1GA Tel: +44 (0)1223 668 574 E: enquiries@civilstix.com www.civilstix.com					
CLIENT: Minister Property Group					
ARCHITECT: JGA Architecture					
PROJECT: Surfleet Road, Pinchbeck					
DRAWING TITLE: Surface Water Drainage Catchment Plan Sheet 1 of 2					
SCALE @ A1:	1:250	CHECKED / APPROVED BY:	DN	DATE:	Jan 2022
PROJECT No:	1-198	DRAWING No:	C-015	REV:	P2

FOR CONTINUATION SEE C-016



FOR CONTINUATION SEE C-015



CATCHMENT PLAN LEGEND:

Catchment Area (ha)	Impermeable Area (ha)	Direct Discharge location
Catchment 1 (Roof areas)	0.2209 ha	Attenuation Pond
Catchment 2 (Private pavements)	0.1645 ha	Attenuation Pond
Catchment 3 (Parking bays)	0.1286 ha	Attenuation Pond
Catchment 4 (Main road)	0.2189 ha	Attenuation Pond
Total 0.7329 ha		

- DO NOT SCALE**
- GENERAL**
- The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
 - All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
 - Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
 - The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. The contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
 - All products used are to be CE marked in accordance with the Construction Products Directive (CEN/ISO/BSI/EN).
 - The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
 - Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.

REV	DATE	BY	SUMMARY OF CHANGE	CHK	APP
P1	18/01/22	ST	PLANNING ISSUE	DW	DM
P2	26/01/22	ST	ARCHITECTS LAYOUT UPDATED	DW	DM

DRAWING STATUS: PLANNING

Nine Hills Road, Cambridge CB2 1GA
Tel: +44 (0)1223 668 574 E: enquiries@civilistix.com
www.civilistix.com

CLIENT: Minister Property Group

ARCHITECT: JGA Architecture

PROJECT: Surfleet Road, Pinchbeck

DRAWING TITLE: Surface Water Drainage Catchment Plan
Sheet 2 of 2

SCALE @ A1: 1:250	CHECKED / APPROVED BY: DM	DATE: Jan 2022
PROJECT No: 1-198	DRAWING No: C-015	REV: P2

Calculated by:

Dorothea Tomeli

Site name:

Land off Surfleet Road

Site location:

Pinchbeck PE11 3XY

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:

52.82261° N

Longitude:

0.15338° W

Reference:

1778268657

Date:

Dec 20 2021 09:14

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

1.7485

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):	2.45	2.45
1 in 1 year (l/s):	2.14	2.14
1 in 30 years (l/s):	6.01	6.01
1 in 100 year (l/s):	8.74	8.74
1 in 200 years (l/s):	10.33	10.33

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.

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	125.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.000
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SWMH 01	0.175	4.00	3.300	1200	524488.747	326609.554	1.500
SWMH 02	0.096	4.00	3.200	1200	524553.025	326635.497	1.575
SWMH 03	0.066	4.00	3.200	1200	524572.748	326625.429	1.675
SWMH 04	0.078	4.00	3.000	1200	524561.686	326630.463	1.771
SWMH 05	0.087	4.00	2.900	1200	524542.223	326587.825	1.937
SWMH 06	0.077	4.00	2.900	1200	524530.643	326530.209	1.700
SWMH 07	0.076	4.00	2.900	1200	524514.294	326538.420	2.079
SWMH 08	0.077	4.00	2.860	1200	524463.130	326546.935	2.206
Attenuation Pond	0.000		2.850	1	524461.733	326543.516	2.271

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S1.000	SWMH 01	SWMH 05	57.722	0.600	1.800	1.113	0.687	84.0	300	4.96	125.0
S2.000	SWMH 02	SWMH 04	25.246	0.600	1.625	1.379	0.246	102.6	300	4.42	125.0
S3.000	SWMH 03	SWMH 04	12.154	0.600	1.525	1.454	0.071	171.2	225	4.20	125.0
S2.001	SWMH 04	SWMH 05	46.870	0.600	1.229	0.963	0.266	176.2	450	5.20	125.0
S1.001	SWMH 05	SWMH 07	56.753	0.600	0.963	0.821	0.142	399.7	450	6.07	125.0
S4.000	SWMH 06	SWMH 07	18.295	0.600	1.200	1.046	0.154	118.8	225	4.30	125.0
S1.002	SWMH 07	SWMH 08	15.364	0.600	0.821	0.770	0.051	301.3	450	6.18	125.0
S1.004	SWMH 08	Attenuation Pond	30.179	0.600	0.654	0.579	0.075	402.4	525	6.79	125.0

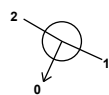
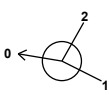
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
S1.000	1.716	121.3	83.0	1.200	1.487	0.175	0.0
S2.000	1.552	109.7	45.5	1.275	1.321	0.096	0.0
S3.000	0.996	39.6	31.3	1.450	1.321	0.066	0.0
S2.001	1.528	243.1	113.8	1.321	1.487	0.240	0.0
S1.001	1.011	160.7	238.1	1.487	1.629	0.502	0.0
S4.000	1.198	47.6	36.5	1.475	1.629	0.077	0.0
S1.002	1.166	185.4	310.7	1.629	1.640	0.655	0.0
S1.004	1.110	240.3	347.2	1.681	1.746	0.732	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
S1.000	57.722	84.0	300	Circular	3.300	1.800	1.200	2.900	1.113	1.487
S2.000	25.246	102.6	300	Circular	3.200	1.625	1.275	3.000	1.379	1.321
S3.000	12.154	171.2	225	Circular	3.200	1.525	1.450	3.000	1.454	1.321
S2.001	46.870	176.2	450	Circular	3.000	1.229	1.321	2.900	0.963	1.487
S1.001	56.753	399.7	450	Circular	2.900	0.963	1.487	2.900	0.821	1.629
S4.000	18.295	118.8	225	Circular	2.900	1.200	1.475	2.900	1.046	1.629
S1.002	15.364	301.3	450	Circular	2.900	0.821	1.629	2.860	0.770	1.640
S1.004	30.179	402.4	525	Circular	2.860	0.654	1.681	2.850	0.579	1.746

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S1.000	SWMH 01	1200	Manhole	Adoptable	SWMH 05	1200	Manhole	Adoptable
S2.000	SWMH 02	1200	Manhole	Adoptable	SWMH 04	1200	Manhole	Adoptable
S3.000	SWMH 03	1200	Manhole	Adoptable	SWMH 04	1200	Manhole	Adoptable
S2.001	SWMH 04	1200	Manhole	Adoptable	SWMH 05	1200	Manhole	Adoptable
S1.001	SWMH 05	1200	Manhole	Adoptable	SWMH 07	1200	Manhole	Adoptable
S4.000	SWMH 06	1200	Manhole	Adoptable	SWMH 07	1200	Manhole	Adoptable
S1.002	SWMH 07	1200	Manhole	Adoptable	SWMH 08	1200	Manhole	Adoptable
S1.004	SWMH 08	1200	Manhole	Adoptable	Attenuation Pond	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SWMH 01	524488.747	326609.554	3.300	1.500	1200	 0	S1.000	1.800	300
SWMH 02	524553.025	326635.497	3.200	1.575	1200	 0	S2.000	1.625	300
SWMH 03	524572.748	326625.429	3.200	1.675	1200	 0	S3.000	1.525	225
SWMH 04	524561.686	326630.463	3.000	1.771	1200	 1 2 0	S3.000 S2.000 S2.001	1.454 1.379 1.229	225 300 450
SWMH 05	524542.223	326587.825	2.900	1.937	1200	 1 2 0	S1.000 S2.001 S1.001	1.113 0.963 0.963	300 450 450
SWMH 06	524530.643	326530.209	2.900	1.700	1200	 0	S4.000	1.200	225
SWMH 07	524514.294	326538.420	2.900	2.079	1200	 1 2 0	S4.000 S1.001 S1.002	1.046 0.821 0.821	225 450 450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SWMH 08	524463.130	326546.935	2.860	2.206	1200		S1.002	0.770	450
Attenuation Pond	524461.733	326543.516	2.850	2.271	1		S1.004	0.654	525
							S1.004	0.579	525

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 | 2160

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	40	0	0

Node Attenuation Pond Online Head/Flow Control

Flap Valve	x	Invert Level (m)	0.579	Design Flow (l/s)	2.1
Replaces Downstream Link	✓	Design Depth (m)	1.400		

Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.001	2.100	2.000	2.100

Node Attenuation Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	3.0	Invert Level (m)	0.579
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	502.0	0.0	1.200	1044.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	30 year 360 minute winter	20.295	8.034
1 year 15 minute winter	76.857	30.991	30 year 480 minute summer	24.324	6.428
1 year 30 minute summer	71.439	20.215	30 year 480 minute winter	16.160	6.428
1 year 30 minute winter	50.133	20.215	30 year 600 minute summer	19.756	5.404
1 year 60 minute summer	48.435	12.800	30 year 600 minute winter	13.498	5.404
1 year 60 minute winter	32.179	12.800	30 year 720 minute summer	17.490	4.687
1 year 120 minute summer	30.053	7.942	30 year 720 minute winter	11.754	4.687
1 year 120 minute winter	19.966	7.942	30 year 960 minute summer	14.215	3.743
1 year 180 minute summer	23.233	5.979	30 year 960 minute winter	9.416	3.743
1 year 180 minute winter	15.102	5.979	30 year 1440 minute summer	10.161	2.723
1 year 240 minute summer	18.475	4.882	30 year 1440 minute winter	6.829	2.723
1 year 240 minute winter	12.274	4.882	30 year 2160 minute summer	7.160	1.979
1 year 360 minute summer	14.169	3.646	30 year 2160 minute winter	4.933	1.979
1 year 360 minute winter	9.210	3.646	100 year +40% CC 15 minute summer	488.233	138.153
1 year 480 minute summer	11.185	2.956	100 year +40% CC 15 minute winter	342.620	138.153
1 year 480 minute winter	7.431	2.956	100 year +40% CC 30 minute summer	320.551	90.705
1 year 600 minute summer	9.182	2.511	100 year +40% CC 30 minute winter	224.948	90.705
1 year 600 minute winter	6.274	2.511	100 year +40% CC 60 minute summer	214.603	56.713
1 year 720 minute summer	8.203	2.199	100 year +40% CC 60 minute winter	142.577	56.713
1 year 720 minute winter	5.513	2.199	100 year +40% CC 120 minute summer	129.587	34.246
1 year 960 minute summer	6.768	1.782	100 year +40% CC 120 minute winter	86.094	34.246
1 year 960 minute winter	4.483	1.782	100 year +40% CC 180 minute summer	97.729	25.149
1 year 1440 minute summer	4.949	1.326	100 year +40% CC 180 minute winter	63.526	25.149
1 year 1440 minute winter	3.326	1.326	100 year +40% CC 240 minute summer	75.977	20.078
1 year 2160 minute summer	3.574	0.988	100 year +40% CC 240 minute winter	50.477	20.078
1 year 2160 minute winter	2.462	0.988	100 year +40% CC 360 minute summer	56.677	14.585
30 year 15 minute summer	268.706	76.035	100 year +40% CC 360 minute winter	36.841	14.585
30 year 15 minute winter	188.566	76.035	100 year +40% CC 480 minute summer	43.979	11.622
30 year 30 minute summer	174.929	49.499	100 year +40% CC 480 minute winter	29.219	11.622
30 year 30 minute winter	122.757	49.499	100 year +40% CC 600 minute summer	35.604	9.738
30 year 60 minute summer	116.589	30.811	100 year +40% CC 600 minute winter	24.327	9.738
30 year 60 minute winter	77.459	30.811	100 year +40% CC 720 minute summer	31.433	8.424
30 year 120 minute summer	70.438	18.615	100 year +40% CC 720 minute winter	21.125	8.424
30 year 120 minute winter	46.797	18.615	100 year +40% CC 960 minute summer	25.432	6.697
30 year 180 minute summer	53.298	13.715	100 year +40% CC 960 minute winter	16.847	6.697
30 year 180 minute winter	34.645	13.715	100 year +40% CC 1440 minute summer	18.055	4.839
30 year 240 minute summer	41.604	10.995	100 year +40% CC 1440 minute winter	12.134	4.839
30 year 240 minute winter	27.641	10.995	100 year +40% CC 2160 minute summer	12.630	3.490
30 year 360 minute summer	31.221	8.034	100 year +40% CC 2160 minute winter	8.702	3.490

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SWMH 01	10	1.895	0.095	26.1	0.3296	0.0000	OK
15 minute summer	SWMH 02	10	1.700	0.075	14.3	0.1763	0.0000	OK
15 minute summer	SWMH 03	10	1.605	0.080	9.8	0.1536	0.0000	OK
15 minute winter	SWMH 04	10	1.343	0.114	35.7	0.2301	0.0000	OK
15 minute winter	SWMH 05	11	1.265	0.302	74.7	0.6125	0.0000	OK
15 minute winter	SWMH 06	9	1.276	0.076	11.5	0.1553	0.0000	OK
15 minute winter	SWMH 07	10	1.215	0.394	101.4	0.7330	0.0000	OK
15 minute summer	SWMH 08	10	1.203	0.549	133.9	1.0042	0.0000	SURCHARGED
360 minute winter	Attenuation Pond	352	0.747	0.168	15.7	90.6783	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SWMH 01	S1.000	SWMH 05	26.3	1.318	0.216	1.5350	
15 minute summer	SWMH 02	S2.000	SWMH 04	14.3	1.065	0.130	0.3389	
15 minute summer	SWMH 03	S3.000	SWMH 04	9.8	0.805	0.248	0.1480	
15 minute winter	SWMH 04	S2.001	SWMH 05	35.5	0.712	0.146	3.3546	
15 minute winter	SWMH 05	S1.001	SWMH 07	86.5	0.881	0.539	7.3226	
15 minute winter	SWMH 06	S4.000	SWMH 07	11.7	0.889	0.246	0.3972	
15 minute winter	SWMH 07	S1.002	SWMH 08	134.9	1.299	0.728	2.3312	
15 minute summer	SWMH 08	S1.004	Attenuation Pond	164.2	2.247	0.683	3.2885	
360 minute winter	Attenuation Pond	Head/Flow		2.1				72.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SWMH 01	10	1.960	0.160	63.9	0.5555	0.0000	OK
15 minute winter	SWMH 02	10	1.866	0.241	35.0	0.5673	0.0000	OK
15 minute summer	SWMH 03	10	1.845	0.320	24.1	0.6133	0.0000	SURCHARGED
15 minute summer	SWMH 04	10	1.819	0.590	95.4	1.1877	0.0000	SURCHARGED
15 minute summer	SWMH 05	10	1.753	0.790	188.8	1.6036	0.0000	SURCHARGED
15 minute winter	SWMH 06	9	1.631	0.431	28.1	0.8770	0.0000	SURCHARGED
15 minute winter	SWMH 07	9	1.527	0.706	265.1	1.3138	0.0000	SURCHARGED
15 minute summer	SWMH 08	9	1.445	0.791	289.1	1.4458	0.0000	SURCHARGED
720 minute winter	Attenuation Pond	705	1.000	0.421	19.7	251.1876	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SWMH 01	S1.000	SWMH 05	64.5	1.422	0.532	3.1381	
15 minute winter	SWMH 02	S2.000	SWMH 04	39.4	1.249	0.359	1.6550	
15 minute summer	SWMH 03	S3.000	SWMH 04	26.0	0.987	0.657	0.4834	
15 minute summer	SWMH 04	S2.001	SWMH 05	106.5	0.758	0.438	7.4262	
15 minute summer	SWMH 05	S1.001	SWMH 07	206.9	1.306	1.287	8.9921	
15 minute winter	SWMH 06	S4.000	SWMH 07	31.6	0.931	0.664	0.7276	
15 minute winter	SWMH 07	S1.002	SWMH 08	269.5	1.728	1.453	2.4343	
15 minute summer	SWMH 08	S1.004	Attenuation Pond	311.6	2.633	1.296	3.5335	
720 minute winter	Attenuation Pond	Head/Flow		2.1				116.7

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SWMH 01	10	3.238	1.438	116.2	4.9829	0.0000	FLOOD RISK
15 minute winter	SWMH 02	10	2.851	1.226	63.7	2.8813	0.0000	SURCHARGED
15 minute winter	SWMH 03	10	2.858	1.333	43.8	2.5584	0.0000	SURCHARGED
15 minute winter	SWMH 04	10	2.752	1.523	151.8	3.0649	0.0000	FLOOD RISK
15 minute winter	SWMH 05	10	2.620	1.657	317.6	3.3618	0.0000	FLOOD RISK
15 minute summer	SWMH 06	10	2.208	1.008	51.1	2.0530	0.0000	SURCHARGED
15 minute summer	SWMH 07	10	1.979	1.158	409.3	2.1558	0.0000	SURCHARGED
15 minute winter	SWMH 08	8	1.671	1.017	466.4	1.8595	0.0000	SURCHARGED
1440 minute winter	Attenuation Pond	1410	1.341	0.762	20.2	513.5895	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SWMH 01	S1.000	SWMH 05	111.2	1.579	0.916	4.0647	
15 minute winter	SWMH 02	S2.000	SWMH 04	62.5	1.202	0.569	1.7778	
15 minute winter	SWMH 03	S3.000	SWMH 04	43.7	1.100	1.104	0.4834	
15 minute winter	SWMH 04	S2.001	SWMH 05	157.1	0.992	0.647	7.4262	
15 minute winter	SWMH 05	S1.001	SWMH 07	324.1	2.046	2.017	8.9921	
15 minute summer	SWMH 06	S4.000	SWMH 07	50.9	1.279	1.068	0.7276	
15 minute summer	SWMH 07	S1.002	SWMH 08	415.2	2.621	2.239	2.4343	
15 minute winter	SWMH 08	S1.004	Attenuation Pond	478.2	3.110	1.990	4.5242	
1440 minute winter	Attenuation Pond	Head/Flow		2.1				205.0

Appendix K – Anglian Water Pre-development Enquiry Response



Pre-Planning Assessment Report

Proposed Residential Development at Land off Surfleet Road, Pinchbeck

InFlow Reference: PPE-0137197

Assessment Type: Used Water

Report published: 31/12/2021



Thank you for submitting a pre-planning enquiry.

This has been produced for Minster Property Group Ltd..

Your reference number is **PPE-0137197**.

This report can be submitted as a drainage strategy for the development should it seek planning permission.

If you have any questions upon receipt of this report, you can submit a further question via InFlow. Alternatively, please contact the Planning & Capacity team on **07929 786 955** or email planningliaison@anglianwater.co.uk

Section 1 - Proposed development

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	37

The anticipated residential build rate is:

Year	Y1
Build rate	37

Development type: Greenfield
Planning application status: Unknown
Site grid reference number: TF2453026596

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.

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 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 effluent quality arising from your development.

Water recycling centre

The foul drainage from this development is in the catchment of Spalding 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.

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 3401 on Surfleet Road at National Grid Reference NGR TF 24372 26417. The cover level is 3m and the invert level is -1m. 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. Therefore a capacity assessment has not been made on the public surface water network.

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](#). 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 that 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](#)

As 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

Your development site will be required to pay an infrastructure charge for each new property connecting to the public sewer that benefits from Full planning permission.

You will be required to pay an infrastructure charge upon connection for each new plot on your development site. The infrastructure charge are types of charges set out in Section 146(2) of the Water Industry Act 1991

The charge should be paid by anyone who wishes to build or develop a property and is payable upon request of connection.

Payment of the infrastructure charge must be made before premises are connected to the public sewer.

Infrastructure charge for water recycling:	£ 573.00
--	----------

The Water Recycling Infrastructure charge for your dwellings is:

Infrastructure charge	Number of units	Total
£ 573.00	37	£ 21201

Infrastructure 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 [website](#).

It has been assumed that the onsite used water network will be provided under Section 104 of the Water Industry Act

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 4 - Map of Proposed Connection Points

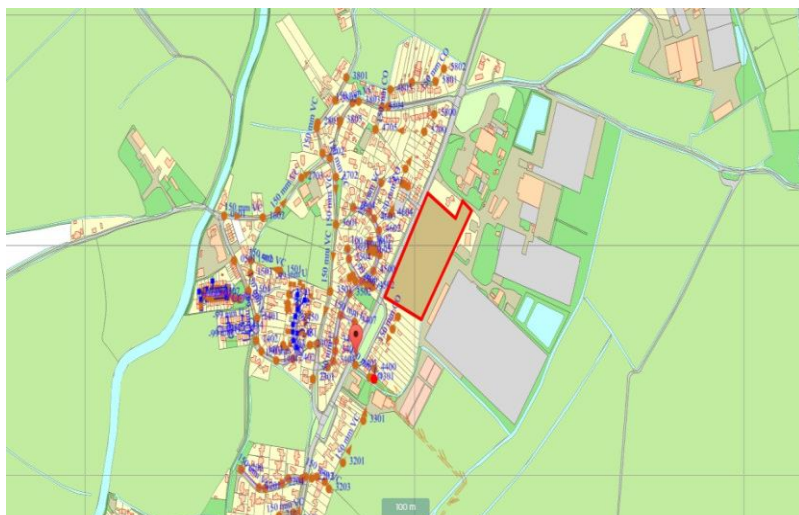


Figure 1: Showing your used water point of connection

Section 5 - Useful information

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](#) or via our Development Services team on **0345 60 66 087**.

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. .

Our preferred method of surface water disposal is through the use of Sustainable Drainage Systems or 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](#)

We recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for your site 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 do 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.

It is anticipated that all new sewer applications will need to have an approved Section104 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](#)

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 [digdat](#)

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](#)

Charging arrangements

Our charging arrangements and summary for this year's water and used water connection and infrastructure charges can be found on our [website](#)

Section 6 - 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.

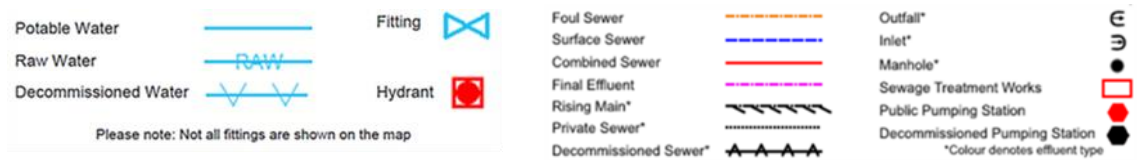
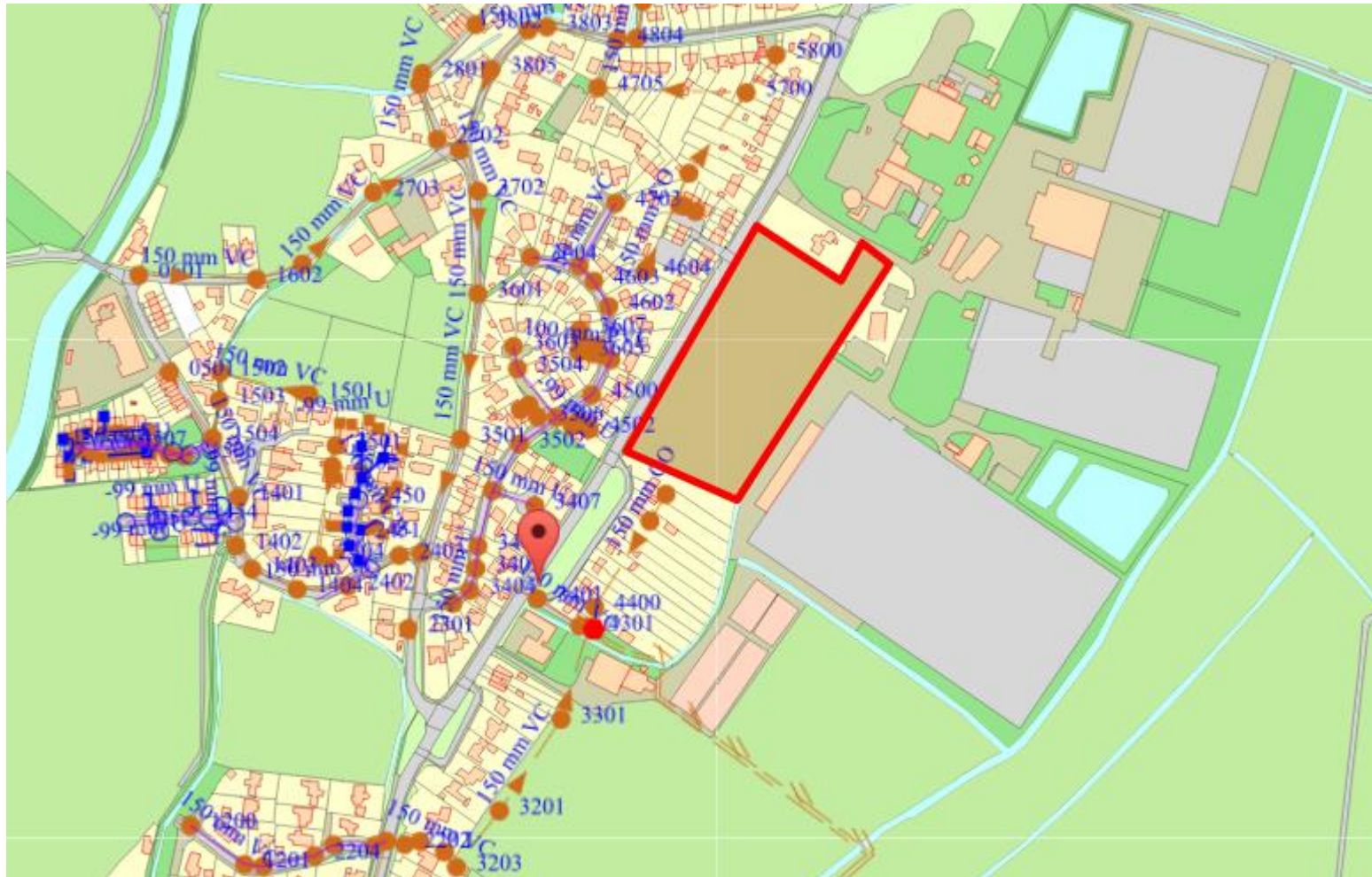
Whilst the information in this report is based on the presumption that proposed development obtains planning permission, nothing in this report confirms that planning permission will be granted or that Anglian Water will be bound to carry out the works/proposals contained within this report.

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).

Inflow reference: PPE-0137197

Used Water Connection Point: to the 150mm diameter sewer at manhole 3401 on Surfleet Road



@ Crown Copyright 2014. All rights reserved.
Ordnance Survey License Number 100022432