POSBROOK LANE, TITCHFIELD

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY
ON BEHALF OF FOREMAN HOMES

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APPENDICES

1.0 INTRODUCTION

1.1 Odyssey has been commissioned by Foreman Homes to provide a Flood Risk Assessment and Drainage Strategy in support of a proposed development for a site at Posbrook Lane, Titchfield.

1.2 The site has been the subject of a previous planning application (ref. P/17/0681/OA) for the development of 150 dwellings. The revised development proposal for the site is to build up to 60 dwellings with associated infrastructure.

1.3 This report comprises of the following elements:

- Summary of relevant planning policy;
- Review of existing site conditions including the hydrology, geology and existing drainage regime of the site;
- Assessment of the existing flood risk to the site; and,
- Proposed surface water management and foul drainage strategy.

2.0 PLANNING POLICY

2.1 Flood and Water Management Act (2010)

2.1.1 The Flood and Water Management Act (FWMA) received royal assent on 8th April 2010. It was intended to implement Sir Michael Pitt's recommendations following the widespread summer 2007 floods. Guidance and information notes are published online by Defra to address a range of different aspects concerning the act.

2.1.2 The FWMA encourages the use of Sustainable Drainage Systems (SuDS) on development sites by removing the automatic right to connect to sewers.

2.1.3 The development proposals for this site will adhere to the FWMA through the provision of SuDS as a fundamental component of the surface water drainage scheme.

2.2 National Planning Policy Framework (2019)

2.2.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies, and how these policies should be applied. Planning practice guidance is available online and provides additional guidance to the NPPF, as well as links to relevant current detail documents. Please refer to section 2.3.

2.2.2 Paragraph 155 of the NPPF states that *'inappropriate development in areas at risk of flooding should be avoided by directing development away from areas of highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere'*.

2.2.1 Paragraph 163 states *'when determining planning applications, Local Planning Authorities (LPAs) should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessments (and the sequential and exception tests, as applicable) it can be demonstrated that:*

- *Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location;*
- *The development is appropriately flood resistant and resilient;*
- *It incorporates Sustainable Drainage Systems, unless there is clear evidence that this would be inappropriate;*

- *Any residual risk can be safely managed; and,*
- *Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.'*

2.2.2 All land in England and Wales is classified into three main Flood Zones which refer to the probability of river or sea flooding, ignoring the existence of defences. The PPG identifies and describes the Environment Agency (EA) flood zones as:

- Flood Zone 1: Low probability, land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%);
- Flood Zone 2: Medium probability, land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%)
- Flood Zone 3: High probability, land assessed as having a 1 in 100 or greater annual probability of river flooding (≥1%), or a 1 in 200 or greater annual probability of sea flooding (≥0.5%); and,
- Flood Zone 3b: The Functional Floodplain, land where water has to flow or be stored in times of flood (as identified by the LPAs in the Strategic Flood Risk Assessments).

2.2.3 In accordance with the NPPF, a site-specific Flood Risk Assessment (FRA) is required for:

- All proposals for development in Flood Zones 2 or 3;
- In Flood Zone 1, all proposals involving:
    - sites of 1 hectare or more,
    - land which has been identified by the EA as having critical drainage problems,
    - land identified in a strategic flood risk assessment as being at increased flood risk in future,
    - land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

2.3 Planning Practice Guidance (2019)

2.3.1 The Planning Practice Guidance (PPG) provides additional direction to the NPPF, and details each section to provide information on how to conform to the NPPF.

2.3.2 The current PPG sets out the following drainage hierarchy that the discharge of surface water runoff should adhere to, as follows:

- Into the ground (infiltration);
- To a surface water body;
- To a surface water sewer, highway drain, or another drainage system; and
- To a combined sewer.

2.3.3 This FRA shall address the aforementioned hierarchy, and assess the options available at the site in question.

2.4 Non-Statutory Technical Standards for Sustainable Drainage Systems (2015)

2.4.1 The Non-Statutory Technical Standards for Sustainable Drainage Systems was published by the Department for Environment, Food and Rural Affairs (DEFRA) in March 2015.

2.4.2 The standards are to be used in order to manage surface water runoff in accordance with Schedule 3 of the FWMA.

2.4.3 The document provides guidance on runoff destination, peak flow rate, volume and control of water quality and function.

2.4.4 The LPA may set local requirements for planning permission that have the effect of more stringent requirements than those of the standards.

2.5 Hampshire County Council Local Flood Risk Management Strategy (2013)

2.5.1 The Local Flood Risk Management Strategy (LFRMS) was produced in 2013 as a result of Hampshire County Council being designated as a Lead Local Flood Authority (LLFA) by the FWMA. The strategy details the different types of flooding that affect Hampshire, measures to overcome those issues, and shows the cost that flooding has on the county.

2.5.2 Section 4.5.3 discusses urban development and its impact on flooding. It is mentioned that Hampshire County Council have established a SuDS working group which will, in partnership with

other Risk Management Agencies, develop procedures and processes for the implementation of the SuDS Approving Body. They will also provide guidance and design principles for developers to ensure that new development does not increase the risk of local flooding.

2.5.3 Section 4.5.4.2 states that there is a need *'to ensure that the evidence base used to make planning decisions and formulate policy is consistent and appropriate for the local flood risk experienced across the county'*.

2.6 Hampshire County Council Preliminary Flood Risk Assessment (2011)

2.6.1 The Preliminary Flood Risk Assessment (PFRA) provides a high-level overview of flood risk from a variety and combination of flood sources. The data collected in the report has been used to identify local flood risk areas, and areas where further information is required to better determine and understand local flood risk.

2.6.2 Section 6.4.6 covers Major Developments and Flood Risk. It is discussed that it shall be *'ensured that new or proposed developments within Hampshire County Council's area will not increase flood risk and where practicable, shall reduce risk'*.

2.7 PUSH Strategic Flood Risk Assessment Update – Fareham Borough Council (2016)

2.7.1 The Partnership for Urban South Hampshire (PUSH) 2016 update provides a current overview on a range of topics covered in the original Strategic Flood Risk Assessment (SFRA), such as sources of flood risk, vulnerability to climate change, planning policy etc.

2.7.2 The update states that *'approximately 47% of Fareham Borough is currently covered by existing development'*, and discusses how SuDS can offer benefits to the delivery of a successfully surface water drainage strategy.

2.7.3 Tidal outlines have been forecast for years up to 2115, showing the most up-to-date predicted rises in sea level over the coming century due to climate change. Effects of climate change are expected to include rising sea levels and an increase in fluvial flood flows, putting additional pressure on settlements which are adjacent to rivers.

2.7.4 PUSH extracts can be seen in **Appendix A**.

3.0 EXISTING SITE CONDITIONS

3.1 Location

3.1.1 The site is located along Posbrook Lane, in the village of Titchfield, Hampshire, approximately 4km south-west of Fareham town centre. The Ordnance Survey (OS) grid reference for the centre of the site is (453610E, 105221N), and nearest the postcode for the site is PO14 4JA. A site location plan can be seen in **Appendix B**.

3.1.2 The site is currently undeveloped greenfield land, and is bounded by existing residential dwellings to the north, the River Meon to the east, existing hedgerow and residential dwellings to the south and Posbrook Lane to the west.

3.1.3 The proposal for the site is for up to 60 residential dwellings, consisting of houses with associated infrastructure. An indicative masterplan can be seen in **Appendix C**.

3.2 Topography

3.2.1 A topographical survey was completed in June 2016 by Encompass Surveys, which shows the existing levels across the site. The site slopes from west to east, with the highest point on site being 17.99mAOD (Above Ordnance Datum) in the west of the site, and the lowest being 6.84mAOD in the east of the site. The topographical survey can be seen in **Appendix D**.

3.3 Hydrology

3.3.1 The nearest EA designated main river, the River Meon, abuts the eastern boundary of the site. It continues flowing south for approximately 3km before discharging into the Solent in a southern direction. For EA records please see **Appendix E**.

3.3.2 It is noted that there is an ordinary watercourse located approximately 150m north-east of the site, which flows into the River Meon.

3.4 Geology and Hydrogeology

3.4.1 British Geological Survey (BGS) online maps (accessed October 2019) indicate that the site is underlain by Wittering Formation – Sand, Silt and Clay. There are also superficial deposits recorded as being present on site; these are River Terrace Deposits, 2 – Sand and Gravel. Refer to **Appendix F** for BGS records.

3.4.2 Whilst there are no specific on-site BGS borehole logs, there are ones in the immediate vicinity of the site. These cannot provide exact information on the geology on-site, but they can be useful to help establish the geology in the surrounding area. The following summaries discuss a selection of the borehole scans taken in the nearby area.

3.4.3 Scan SU50NW191 was taken approximately 25m north-east of the site, and shows a layer of *'fairly compact very clayey fine, medium and coarse irregular flint gravel'* extending down for 0.80m below ground level (bgl). From there, a variable layer of *'very silty clay with occasional and irregular flint gravel; fairly compact very clayey fine, medium and coarse irregular flint gravel; and very soft very gravelly clay'* extends down for a further 3.20m bgl. Finally, a layer of Bracklesham Beds described as *'firm to stiff dark grey silty clay with occasional irregular flint gravel at top of stratum'* extends for 0.60m to the bottom of the borehole at a depth of 5.00m bgl.

3.4.4 Scan SU50NW192 was taken approximately 185m north-east of the site, and shows a layer of Topsoil described as *'soft brown sandy clay becoming gravelly with increasing depth'* extending for 0.80m bgl. From there, a layer of Valley Gravel described as *'fairly compact medium and coarse irregular flint gravel'* extends for a further 2.20m bgl, and is noted as being *'brown fine sand below 2.5m'*. Finally, a layer of Bracklesham Beds described as *'firm dark grey-green and brown silty clay'* extends for 0.50m before a layer of Bagshot Beds described as *'dense dark grey very silty find sand'* extends for 3.00m to the bottom of the borehole at a depth of 6.50m bgl.

3.4.5 Scan SU50SW38 was taken approximately 380m to the south-west of the site, and shows a Topsoil layer described as *'soft/firm orange-brown fine sandy clay with some rootlets'* extending for 1.50m bgl. A layer of Plateau Gravel described as *'compact fine and coarse irregular flint gravel'* extends for a further 1.20m beyond this, before a layer of Bracklesham Beds described as *'medium-dense orange-brown silty fine sand'* extends for 1.30m to the bottom of the borehole at a depth of 4.00m bgl.

3.4.6 It is noted that no groundwater was encountered in any of these boreholes. For BGS records, refer to **Appendix F**.

3.4.7 BGS Hydrogeology mapping (accessed October 2019) shows that the site sits on the Bracklesham Group and Barton Group aquifer, described as a *'moderately productive aquifer'*.

3.4.8 The site is not situated in any of the EA's Groundwater Source Protection Zones (SPZs).

3.4.9 The site is, however, situated in a Groundwater Vulnerability Zone; classed as *'Minor Aquifer High'*.

3.4.10 Considering this, the development shall adhere to the EA's *'Approach to Groundwater Protection'* to ensure that groundwater quality is maintained and improved across the site, especially considering the SPZs.

3.5 Existing Drainage Regime

3.5.1 The site is currently in an undeveloped greenfield state. Considering the underlying soil characteristics, it is anticipated that surface water currently follows the natural topography of the land and flows into the River Meon, as infiltration is not deemed possible with the geological conditions.

3.5.2 According to Southern Water records, there is a surface water sewer network running through the neighbouring residential development to the north of the site. This network appears to discharge into the Ordinary Watercourse which discharges into the River Meon.

3.5.3 Southern Water records also show that there is a 150mm diameter foul sewer pipe which runs directly across the site and is part of a network which serves the neighbouring residential development to the north of the site. There are two manholes situated within the site, at estimated depths of 2.3m and 3.2m, respectively.

3.5.4 There is also a 1000mm diameter siphon sewer that originates from Posbrook Lane and runs along the southern boundary of the site, before continuing in an eastern direction cutting through the site. The siphon sewer then runs north-east before following the floodplain of the River Meon. Southern Water records are presented in **Appendix G**.

3.5.5 The developable area for this site is less than 50ha, meaning that the Institute of Hydrology (IoH) Report 124 Flood Estimation for Smaller Catchments (1994) method is suitable to estimate greenfield peak flow rates (50 ha is used in the formula and linearly interpolate the flow rate value based on the ratio of the development area). This methodology is approved in the CIRIA C753 SuDS Guidance; the parameters used can be seen in **Table 3.1**.

Table 3.1: ICP SuDS Parameters

PARAMETER	VALUE	UNIT
SAAR	800	mm
Soil Index	0.300	-
Region	7	-
Urban	0.000	-

3.5.6 **Table 3.2** summarises the estimated current greenfield discharge rates for the site. Calculations are provided in **Appendix H**.

Table 3.2 Existing Surface Water Discharge Rates

Return Period	Existing Greenfield Discharge Rates from site (l/s)	Existing Greenfield Discharge Rates per hectare (l/s/ha)
QBAR	8.6	2.1
Q_{30}	19.5	4.8
Q_{100}	27.5	6.8

4.0 SOURCES OF FLOOD RISK

4.1 Tidal Flooding

4.1.1 Tidal flood sources include the sea and estuaries, and tidal flooding is often caused by high tides with meteorological and storm events. Tidal flooding can be extremely rapid and its effects severe; deep fast-flowing water can create an extreme hazard.

4.1.2 According to the PUSH SFRA, the River Meon is tidal at the site. However, it is defended from tidal inundation by the harbour frontage at Hill Head. The EA flood maps at the site do not take into consideration the tidal flood defences at Hill Head. The proposed development footprints will be entirely located within Flood Zone 1 and will not be susceptible to tidal flood risk. All areas designated as Flood Zones 2 and 3 will be retained as open green space.

4.1.3 The PUSH SFRA contains no specific records of the site or Titchfield being affected by sea flooding; therefore the risk is considered to be low.

4.2 Fluvial Flooding

4.2.1 Fluvial flooding is caused by high flows in rivers or streams exceeding the capacity of the river channel and spilling into the floodplain, or in some cases non-designated floodplain, which can occur after a period of heavy rainfall.

4.2.2 The River Meon is the primary source of fluvial flood risk at the site. The areas designated as the tidal flood zones also double as fluvial flood extents. All proposed development will be sited within Flood Zone 1, whereas the areas in Flood Zones 2 and 3 will be set aside as open green space.

4.2.3 The flood risk vulnerability classification of residential dwellings is deemed as 'more vulnerable'. In accordance with the PPG, development of this nature in Flood Zone 1 is acceptable.

4.2.4 There are no records from the PUSH SFRA, or the Hampshire PFRA of any fluvial flooding on the site or in the immediate vicinity.

4.2.5 The risk of flooding from fluvial sources is therefore considered to be very low.

4.3 Surface Water Flooding

4.3.1 Surface water (pluvial) flooding usually occurs during high intensity rainfall, when the excess water cannot be absorbed into the ground. However, it can also occur with low intensity rainfall in areas where the land has a low permeability.

4.3.2 The EA's Risk of Flooding from Surface Water (RoFSW) mapping shows that in its current state, the majority of the site is at 'very low' risk of surface water flooding. A surface water flow route slightly infringes upon the northern boundary of the site, although no dwellings are proposed in this area. This area is subsequently at 'low' risk of flooding.

4.3.3 There are no records in the PUSH SFRA or the Hampshire PFRA of any pluvial flooding on the site or in the immediate vicinity.

4.3.4 The risk of flooding from pluvial sources is therefore considered to be low.

4.4 Groundwater Flooding

4.4.1 Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata. A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface and inundate low lying land. Periods of prolonged rainfall may also be a cause of groundwater flooding with aquifers and soils becoming saturated.

4.4.2 The PUSH SFRA Update discusses groundwater flooding, and states that *'the River Meon due to its highly permeable upstream geology is very sensitive to groundwater conditions and there has been previous groundwater flooding observed around Titchfield'*, but makes no specific mention of the site being affected by groundwater flooding in the past.

4.4.3 Nearby BGS boreholes did not encounter any groundwater, and the highest depth excavated was 6.5m bgl. The level of groundwater on site is assumed to be at least 6.5m bgl.

4.4.4 Therefore, The risk of flooding from groundwater sources is considered to be low.

4.5 Sewer Flooding

4.5.1 Flooding can occur due to the failure of existing foul or surface water drainage infrastructure. If flows within the drainage system exceed the designed capacity or foreign matter causes blockages, overflow to the surface can occur leading to flooding.

4.5.2 In September 2019, a Southern Water sewer collapsed along Posbrook Lane, resulting in 30 tankers being sent to pump waste away from the area. This incident was resolved with a temporary fix within 4 days; a permanent resolution is currently being devised by Southern Water.

4.5.3 No internal property flooding was recorded in this event, and there are no records of the site being affected by this flooding.

5.0 THE SEQUENTIAL TEST

5.1 The EA flood zones are the starting point for the sequential approach promoted by the NPPF, and are shown on the EA flood mapping. The PPG identifies that the overall aim of the Sequential Test is to steer new development to Flood Zone 1.

5.2 As stated by the NPPF, development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with lower probability of flooding. The SFRA will provide the basis for applying this test.

5.3 Following application of the Sequential Test, if it is not possible for the development to be located in zones with a lower probability of flooding (Flood Zone 1), proposed sites should take into account the flood risk vulnerability of land uses and consider reasonable sites in Flood Zone 2, and apply the Exception Test if required. Only where there are no reasonably available sites in Flood Zone 1 and Flood Zone 2 should the suitability of sites in Flood Zone 3 be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

5.4 The residential areas of the proposed development are entirely situated in Flood Zone 1, and are suitable for the proposed residential development in accordance with NPPF and PPG. The Sequential Test is therefore not required.

6.0 SURFACE WATER DRAINAGE STRATEGY

6.1 Surface Water Drainage Strategy Requirements

6.1.1 Any surface water drainage strategy must demonstrate that the proposed development can be drained in a sustainable manner, commensurate with local and national policy. The NPPF requires that flood risk to land and property is not increased as a result of new development.

6.1.2 A fundamental principle of sustainable development in terms of flood risk is the reduction of surface water runoff from new developments. Drainage calculations for this site have been carried out to ensure that any run-off or discharge is at greenfield rates or lower, so as not to worsen any existing flood risk.

6.2 Proposed Surface Water Drainage Strategy

6.2.1 The proposed surface water management strategy described below is outlined in Drawing 19-241/004 in **Appendix H**.

6.2.2 The most-preferred option of surface water discharge in the drainage hierarchy, as set out in the PPG is *'infiltration into the ground'*. However, as previously stated, the soil lies on a bedrock of Wittering Formation – Sand, Silt and Clay, which has a limited permeability. It is anticipated that surface water currently follows the natural topography of the land and flows into the River Meon, demonstrating a lack of infiltration into the underlying soil. It is therefore deemed that infiltration is not a feasible option for surface water discharge at the site.

6.2.3 The second-most preferred option of surface water discharge in the drainage hierarchy is *'to a surface water body'.* It is noted that the River Meon passes approximately 235m to the east of the site, running through open fields, which are under the control of the developer, therefore providing an open access point to connect into. It is proposed that the surface water generated by the development drains to the River Meon, thereby adhering to the most feasible option of the drainage hierarchy, as set out in the PPG.

6.2.4 It is proposed to incorporate SuDS into the site, which shall accept the runoff generated by the proposed development, in the form of an attenuation basin.

6.2.5 The basin has been designed to a depth of 1.0m, with slopes of a 1:3 gradient to allow for sufficient storage. This attenuation basin has been calculated to attenuate flows for all rainfall events up to 1 in 100-years plus 40% climate change storm.

6.2.6 Discharge from the basin shall be controlled via the use of a vortex flow control device, which shall limit the runoff to the greenfield rate for the site, 8.6l/s, as shown in **Table 6.1**. This shall ensure that the surface water runoff from the proposed development remains unchanged from greenfield conditions, therefore not worsening the impact on the River Meon, which shall be receiving the flows from the site.

Table 6.1 Proposed Discharge Rates from Proposed Development

Return Period	Existing Greenfield Discharge Rates from site (l/s)	Proposed Greenfield Discharge Rates (l/s)
QBAR	8.6	8.6
Q_{30}	19.5	8.6
Q_{100}	27.5	8.6
Q_{100} + 40% CC	----	8.6

6.2.7 Urban creep has been accounted for in drainage calculations by adding 10% of the roof areas to the total impermeable area.

6.2.8 In the event of exceedance, it is anticipated that surface water shall pool at the low point on site, and shall subsequently flow to the surface water sewer and attenuation basin, before discharging from the site.

6.2.9 MicroDrainage calculations and the Preliminary Drainage Strategy can be found in **Appendix H**.

6.3 Water Quality

6.3.1 Water quality is a key component of a SuDS system. Steps shall be taken to ensure that water quality on site and leaving the site is not negatively impacted by the proposed development. **Table 6.2** details the Pollution Hazard Indices of the different land use classifications of the site, in accordance with the CIRIA SuDS Manual (2015) C753.

Table 6.2: Pollution Hazard Indices for Proposed Development

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. <300 traffic movements/day	Low	0.5	0.4	0.4

6.3.2 The pollution hazard level for the proposed development is therefore 'low'. All surface water generated by the proposed development shall pass through the proposed attenuation basin before discharging from the site. The indicative SuDS mitigation indices for an attenuation basin can be seen in **Table 6.3** below.

Table 6.3: SuDS Mitigation Indices for Proposed SuDS Features

Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Attenuation Basin	0.5	0.5	0.6

6.3.3 As can be seen, the proposed SuDS feature for the site provides adequate water quality for the site, in accordance with the indices set out in the CIRIA SuDS Manual (2015) C753.

6.3.4 As previously mentioned, the site is situated in a Groundwater Vulnerability Zone; classed as *'Minor Aquifer High'*. The quality treatment provided to the surface water generated by the proposed development shall therefore ensure that there are no issues with groundwater contamination on the site.

6.3.5 The proposed basin shall be non-infiltrating, therefore, to prevent any seepage and subsequent groundwater contamination issues, it shall be lined.

6.4 SuDS Maintenance Requirements

6.4.1 Maintenance of the drainage system and of any implemented SuDS features will be carried out in accordance with the manufacturer guidance to minimise the residual flood risk of drainage system blockage and failure.

6.4.2 This maintenance shall be the responsibility of the developer to assign, but for clarity in this FRA, the tables below set out what maintenance measures need to be taken for an attenuation basin. **Table 6.4** is based on information taken from the CIRIA SuDS Manual (2015) C753.

Table 6.4 Maintenance Requirements for an Attenuation Basin

Maintenance Schedule	Required Action	Typical Frequency	Responsible Body
Regular Maintenance	Remove litter and debris	Monthly (or as required)	Private maintenance contractor, as identified by developer
	Cut the grass – public areas	Monthly (during growing season)	Private maintenance contractor, as identified by developer
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Annually, or as required	Private maintenance contractor, as identified by developer
	Inspect water body for signs of poor water quality	Monthly (May – October)	Private maintenance contractor, as identified by developer
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred to inform management and disposal options	Half yearly	Private maintenance contractor, as identified by developer
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually	Private maintenance contractor, as identified by developer
	Tidy all dead growth before start of growing season	Annually	Private maintenance contractor, as identified by developer
Occasional Maintenance	Remove sediment from the main body when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 20-25 years	Private maintenance contractor, as identified by developer

Remedial Actions	Repair erosion or other damage	As required	Private maintenance contractor, as identified by developer
	Replant, where necessary	As required	Private maintenance contractor, as identified by developer
	Aerate pond when signs of eutrophication are detected	As required	Private maintenance contractor, as identified by developer
	Realign rip-rap or repair other damage	As required	Private maintenance contractor, as identified by developer
	Repair/rehabilitate inlets, outlets and overflows	As required	Private maintenance contractor, as identified by developer

7.0 FOUL WATER DRAINAGE STRATEGY

7.1 Peak design discharges for residential dwellings will be calculated based on Sewers for Adoption 8th Edition:

Residential domestic flow = 4000 litres/dwelling/day (peak)

7.2 As previously discussed, there is a 150mm diameter foul sewer pipe which runs directly across the site and is part of a network which serves the neighbouring residential development to the north of the site. There are two manholes situated within the site, at estimated depths of 2.3m and 3.2m, respectively. It is proposed that foul flows from the development (2.8l/s) shall flow to the existing manhole ref. 6201, situated on site. This shall be achieved via gravity where possible, and for the plots where this is not feasible, flows shall be sent down to a private packaged pumping station, situated at the low point on site in the east. This pumping station shall then send the flows via a rising main up to the existing manhole ref. 6201. This is shown in the drainage strategy (Drawing no. 19-241/004) in **Appendix H**.

7.3 The existing foul sewer system, which currently runs across the site shall be abandoned and replaced by the proposed foul network, which shall run along the road on the development.

7.4 The pumping station shall be privately owned by the developer, who shall be responsible for organising its maintenance.

7.5 Subject to discussions with Southern Water, a Section 106 connection will be made in accordance with the Water Industries Act to seek approval to connect to the public sewer.

7.6 If any infrastructure upgrades to the existing network are required in order to accommodate the foul flows from the proposed development, a network reinforcement charge as part of the Southern Water new charging scheme will cover the cost of these upgrades. Southern Water records can be seen in **Appendix G**.

8.0 SUMMARY AND CONCLUSIONS

8.1 Odyssey has been commissioned by Foreman Homes to provide a Flood Risk Assessment and Drainage Strategy in support of a proposed development for a site at Posbrook Lane, Titchfield. The development proposal for this circa 4.0-hectare site is to build up to 60 dwellings with associated parking areas.

8.2 Based on EA fluvial floodplain mapping, the site is situated entirely in Flood Zone 1, land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (1% - 0.1% Annual Exceedance Probability [AEP]). The nearest EA designated main river, the River Meon, passes approximately 235m to the east of the site.

8.3 The Environment Agency's Risk of Flooding from Surface Water (RoFSW) mapping shows that in its current state, the majority of the site is at 'very low' risk of surface water flooding. A surface water flow route slightly infringes upon the northern boundary of the site, although no dwellings are proposed in this area. This area is subsequently at 'low' risk of flooding.

8.4 It is proposed that surface water generated by the development shall drain to an attenuation basin located at the east of the site. This basin shall discharge the flows at a rate equivalent to the current greenfield rate, therefore not exacerbating any flood risk to downstream areas by increasing the surface water runoff.

8.5 It is proposed that the foul drainage system implemented on the site shall connect into the existing Southern Water network which runs across the site at manhole ref. 6201. This will be subject to any Southern Water connection and infrastructure upgrade charges.

8.6 This FRA has demonstrated that the proposed development is fully compliant with the requirements of the NPPF. Issues relating to flood risk and drainage do not represent an obstruction to the proposals, and therefore should not hinder an approval for planning permission of the proposed development.

APPENDIX A

Partnership for Urban South Hampshire Extracts

PUSH Strategic Flood Risk Assessment – 2016 Update

Guidance Document: Fareham Borough Council

Flood Risk Overview

Sources of Flood Risk

Fareham occupies a central position in the PUSH sub-region, situated to the north west of Portsmouth. It covers a total area of approximately 74 km². The Borough has 8.5 km of open coastal frontage, 14.5 km of frontage on the tidal River Hamble and 11.5 km of frontage onto Portsmouth Harbour. The Wallington River and River Meon flow through the Borough, with a total main river length of 35 km. At present, approximately 9% of the Borough's land area is designated as within Flood Zones 2 and 3 (see SFRA Map: Flood Mapping Dataset).

The SFRA has shown that the primary source of flood risk to Fareham Borough is from the sea. The key parts of the Borough which are currently at risk of flooding from the sea are the Fareham frontage to Portsmouth Harbour, Portchester, Lower Swanwick and Warsash.

The secondary source of flood risk to the Borough is from rivers. The River Meon in Fareham Borough has a large floodplain in its downstream reach which is designated as a National Nature Reserve downstream of the village of Titchfield. The River Meon is defended from tidal inundation by the harbour frontage at Hill Head. If this defence were to fail, the River Meon would be inundated regularly by tidal flows. As such, 'undefended' Flood Zones show the Meon valley as predominantly at risk of tidal flooding. The Wallington River flows through the village of Wallington before discharging into Portsmouth Harbour. A number of properties in Wallington lie within the predicted flood outline of the Wallington River and its functional floodplain (Flood Zone 3b) and flooding has historically occurred in the village in the past – most notably in 2000. Upstream of Wallington, large areas of greenfield land are covered by the river's floodplain.

There have been some previous incidents of groundwater flooding adjacent to the upper part of the River Meon in Fareham Borough, while Fareham has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure.

Key physical characteristics that may constrain development

Approximately 47% of Fareham Borough is currently covered by existing development. A number of environmentally designated areas represent a significant constraint on development in the Borough, covering approximately 13% of its area. As such there may be only limited sites upon which development can be permitted following consideration of other planning constraints.

The topography of the Borough ranges from sea level to approximately 50 metres above ordnance datum (mAOD) for the majority of the Borough with the exception of the area to the north of Portchester which rises to approximately 110 mAOD on Portsdown Hill, the Borough's steepest slope. The areas of lowest elevation are exclusively along the coastline or within the Wallington or Meon river valleys. Much of the existing development in the Borough, including Fareham town, Locks Heath and the northern part of Portchester is situated on higher ground away from tidal and fluvial floodplains, suggesting that future development outside areas of flood risk should be possible in the Borough.

Geologically, the Borough is underlain by low and moderately permeable bedrock formations for all areas to the south and west of and including the town of Fareham. To the north east of Fareham, the Borough is underlain by the chalk outcrop of Portsdown Hill. Moderately permeable superficial deposits overlie much of the bedrock in Fareham Borough. Low permeability superficial deposits are present in the Wallington valley and at the foot of Portsdown Hill, reducing the permeability of those areas not covered by artificial surfaces in terms of surface water runoff generation. This can potentially make the installation of Sustainable Drainage Systems (SUDS) difficult in attempting to reduce the flood risk to 'downstream' sites when promoting new development.

Vulnerability to Climate Change

The SFRA has generated predicted tidal outlines for a number of years up to 2115 (see SFRA Map: *Flood Mapping: Climate Change* Dataset). These outlines account for the most up-to-date predicted rises in sea-level over the coming century due to climate change and they therefore allow the identification of locations that will be most vulnerable to this change due to their topography. In Fareham Borough, the areas most vulnerable to rising sea levels are Portchester (both to the north and west of Portchester Castle), the village of Wallington and the frontage between Town Quay and Hoeford Lake. In addition to this effect of rising sea levels, it is anticipated that climate change will result in an increase in fluvial flood flows. This may put additional pressure on settlements which are adjacent to rivers such as Wallington village and Titchfield.

Existing defence assets and likely future investment

The coastal frontages of Fareham Borough are either: low-lying and subject to some form of coastal defence; or are composed of higher ground which protects the land behind from coastal flooding.

Of the low-lying areas, only some are protected from a present day 1 in 200 year tidal flood. Areas below the minimum standard of protection required for new development are on the Hamble estuary (particularly around Warsash), the Fareham frontage between Town Quay and Hoeford Lake and the Portchester frontage on Portsmouth Harbour. In these areas, while many defences do not offer protection to a 1 in 20 year tidal flood, it is not thought that flood protection is the primary purpose of the majority of these defences. The coastal defences in Fareham are, however, likely to be susceptible to climate change, as 100 years of predicted sea level rise would mean that almost all man-made defences fail to offer protection from a 1 in 20 year tidal flood. On some frontages where defences can prevent inundation of large areas by tidal flooding, significant investment will be required in improving and maintaining existing flood defences (see SFRA Map: Infrastructure Dataset). In order to consider the sustainability of investing in improved defences, the 'danger to people from breaching' index (see SFRA Map: Infrastructure: Danger to Public/ Property Dataset) will provide indications as to where the residual risk due to breaching may remain unfavourably high following improvements to defences to protect from extreme tidal floods.

Sequential and Exception Test

National Planning Policy Framework (NPPF) and The Planning Practice Guidance sets out the Government's objectives for achieving sustainable development through the avoidance and management of flood risk. The NPPF aims to ensure that flood risk is taken into account at all stages

of the planning process to avoid inappropriate development in areas of flood risk. To achieve this aim the Planning Practice Guidance provides a decision making tool to ensure that sites with a low probability of flooding are developed in preference to areas at higher risk. The Sequential Test is the decision process which Local Authorities must demonstrate when developing their Local Plans. This SFRA has developed a suite of mapping outputs to assist Local Authorities in applying the Sequential Test.

When applying the Sequential Test, the Flood Mapping Dataset of the SFRA will provide all the necessary information required upon which to base decisions regarding the location of future development in relation to flood risk. Within The Flood Mapping Dataset, the key map required for applying the Sequential Test is the Environment Agency's Flood Map for Planning, shown as Flood Zone 2 and Flood Zone 3 in conjunction with the Historic Flood Map.

The Flood Mapping Dataset also contains 4 other Mapsets which provide useful information to support Local Authorities when applying the Sequential Test, these include:

- *Hazard Map* – Undefended Flood Hazard
- *Flooding from Other Sources* – including Surface Water, Groundwater, Sources of Overland Flow
- *Flood Warning Areas*
- *Climate Change* - Outlines for years 2025, 2055, 2085 and 2115

In the original SFRA these guidance documents included specific advice on how to apply at the time the PPS25 Sequential and Exception Tests. This advice has since been updated and incorporated into other guidance notes. For the purpose of efficacy and ensuring this text remains contemporary, it will not be reproduced here and signposted to relevant key guidance below:

- The National Planning Policy Framework
- Planning Practice Guidance: Flood Risk and Coastal Change
- Flood risk assessment for planning applications
- Flood risk assessment: standing advice

It is requested that if in applying any of this guidance that links are found to be broken or require updating that contact is made with the SFRA helpdesk through contact details on the mapping webpage.

Planning Policy

When developing Local Plans, Local Authorities are advised by the NPPF to prepare criteria-based polices in line with their Core Strategy's Sustainability Appraisal, against which the Exception Test can be tested. This will minimise the need to consider this element of the Exception Test for each individual planning application.

By assisting Local Authorities, at the site allocation level, in steering new development to areas with the lowest probability and hazard of flooding, the use of the SFRA outputs (in particular Flood Mapping and Infrastructure Datasets) will mean that site specific flood risk assessments in these areas will be more likely to satisfy criteria c) of the Exception Test.

SFRA Mapping Outputs

Table 2 summaries the most relevant mapping outputs and their purpose, for each of the key users of the PUSH SFRA.

Key Users	Relevant SFRA Mapping Dataset	Purpose
Planning Policy	***Flood Mapping:*** NPPF Sequential Test and Relevant Supporting Information	***Flood Mapping Dataset*** provides all the necessary information to help planners apply the Sequential Test and Exception Test when allocating new sites for development. ***Flood Mapping Dataset*** also allows planners to identify sites with the lowest probability of flooding and lowest flood hazard / danger and how the extent of flooding is likely to change in the future due to climate change.
Development Control	***Flood Mapping:*** NPPF Sequential Test and Relevant Supporting Information	***Flood Mapping Dataset*** helps Development Control personnel to: o Prepare specifications for site specific FRAs. o Review site specific FRAs for new development sites and check for compliance with the NPPF.
Risk Management	***Flood Mapping:*** NPPF Sequential Test and Relevant Supporting Information	***Flood Mapping Dataset*** helps Flood Risk Managers to identify variations in flood hazards / dangers to existing development. The data also provides mapping to show how the extent of flooding is likely to increase over time due to climate change.
	Infrastructure: Appropriate Defence Standards and Levels of Investment	***Infrastructure Dataset*** helps Flood Risk Managers to: o Identify shortfalls in existing defences in providing appropriate standards of defence, now and in the future. o Identify indicative levels of investment required to provide the appropriate standards, now and in the future.
Emergency Planning	***Flood Mapping:*** NPPF Sequential Test and Relevant Supporting Information	***Flood Mapping Dataset*** can provide emergency planners with information on the variation of flood probability and hazard across the sub region. Such information can aid in the development of emergency plans and evacuation routes during flood events.
	Infrastructure: Appropriate Defence Standards and Levels of Investment	***Infrastructure Dataset*** can help Emergency Planners to: o Identify indicative standards of defence, now and in the future.

Recommendations for Site Specific Flood Risk Assessments

Whilst the information presented in this SFRA will inform Local Authorities and facilitate their strategic allocation of sites for future development, it should not preclude the need for developers to undertake site specific flood risk assessments (FRAs). A SFRA, by its very nature, is a high level assessment of flood risk at the local authority level. It does not provide sufficiently detailed information to satisfy all of the requirements of a site specific FRA as outlined in the National Planning Policy Framework.

To improve the efficiency of disseminating general guidance, the Environment Agency has produced a suite of standing advice and guidance on producing Flood Risk Assessments.

- Flood Risk Assessment: Guidance for completing flood risk assessment to accompany a planning application
    - When you need an assessment
    - When you don't need an assessment
    - When to follow standing advice
    - How to do an assessment
    - Get information to complete an assessment

- Flood Risk Assessment: Guidance for planning authorities on review of flood risk assessments submitted as part of planning applications
    - Check if you need to consult
    - Flood zone 1
    - Flood zone 2
    - Flood zone 3
    - What you need to check in an assessment
    - Extra flood resistance and resilience measures

The following sections provide additional specific guidance for assessing flood risk at the site specific level within Fareham Borough and indicate how the outputs from the SFRA can inform such assessments.

Tidal Flooding

Flooding from tidal sources is one of the primary sources of flood risk within Fareham Borough and the areas at risk are predicted to increase significantly by 2115. *Flood Mapping* Dataset shows the existing areas at risk of tidal flooding and the associated undefended flood hazard. The index of flood hazard represents a gradation of hazard within the Flood Zones based on a combination of the depth of flood water and the velocity of the water (indicative ranges for which have been assumed based on distance from the coastline). It should also be noted that this dataset was derived during the evolution of the 2007 work package and has not been updated as part of the 2016 update. For this reason in areas where there have been flood mapping updates since 2007, there may be discrepancies in the data presented. Where this occurs it is recommended that further advice is sought from the SFRA Helpdesk team or local Environment Agency office.

The frontages where existing defences provide the minimum standards required for new development (i.e. 1 in 200 years for tidal flooding), are identified in the *Infrastructure: Overview* Dataset by a purple line. Indicative Areas Benefiting from Defences (ABDs) are also shown in this dataset. The Indicative ABDs have been defined as areas where the crest levels of the existing defences are consistently equal to or higher than the present day 1 in 200 year extreme sea level.

If small lengths of defences have crest levels which fall below the 1 in 200 year extreme sea level (even for a short length), the area behind the defence has not been classed as an Indicative ABD. The frontage of Portchester is an example of where this study has not been able to define an Indicative ABD due to small lengths of defence where the crest levels fall below the 1 in 200 year extreme sea level. The gaps in the defence level can also be viewed in more detail using *Infrastructure: Defence Level*. It should be noted that other areas may potentially be classified as ABDs if more detailed modelling assessments of the defences, which is beyond the scope of this SFRA, are carried out.

The *Flood Mapping: Hazard Map* Dataset shows the flood hazard (in terms of danger to people) associated with a hypothetical breach in the defences for the whole of the tidal frontage. The Indicative ABDs shown in *Infrastructure: Overview* define which of the hazard maps is most appropriate for consideration. Hazard Map for Flood Zone 2 is only appropriate for considering present day flood hazards within an ABD. To aid interpretation, the areas where this index is not appropriate for present day analysis are hatched out. The benefit of showing hazard information in the hatched out areas is to allow planners and developers to understand the likely residual risks that would remain if they were to invest in defending an area to a 1 in 200 year standard. The Hazard Map for Flood Zone 2 (Undefended Flood Hazard) should be used to assess the variation of flood hazard within the Flood Zones for all areas outside the Indicative ABDs.

The benefit of both the undefended flood hazard maps and the danger from breaching maps is that the gradation of flood hazard within the Flood Zones can facilitate both planners and developers to ensure that development is steered away from the areas of highest hazard. The hazard mapping presented in *Flood Mapping: Hazard Map*, however, should only be applied when appropriate consideration has been taken of alternative sites at a lower probability of flood risk (i.e. within Flood Zone 1) have been considered.

The flood hazard information, for both the undefended and breach scenario, developed as part of this SFRA, has been undertaken at a strategic level and is therefore at an appropriate level of detail to allow Local Authorities to strategically allocate sites for development. The hazard data has been classified into 4 categories to illustrate the gradation of flood hazard within Flood Zones 2 and 3 in line with best practice guidance as set out in Defra/ EA Guidance FD2320. The hazard data has not been calculated using modelling or other detailed numerical methods and is therefore not appropriate for identifying design parameters as part of site specific FRAs. It is therefore recommended that FRAs for sites located within the flood hazard zones should still include a quantitative assessment of flood hazard based on more detailed assessments of defence standards, defence failure scenarios and overland conveyance of flood flow.

The impact of climate change on increasing sea levels has a significant effect on the extents of Flood Zones 2 and 3 by 2115, especially on frontages around parts of Fareham Creek and North

Portsmouth Harbour including communities around Portchester. The NPPF expects consideration to be given to both current and future flood zones at the site specific level, taking account of climate change. The climate change flood extents presented should be used when undertaking a site specific FRA to inform the assessment of the long term sustainability of developments currently within Flood Zone 1 and the likely increases in flood risk in Flood Zones 2 and 3.

The defence information provided in the *Infrastructure Dataset* can provide developers undertaking site specific FRAs with an indication of the equivalent tidal return period of the crest level of the existing defences in the present day and an indicative level of investment that may be required to raise defence standards to the minimum required for new development. Such investment could be secured through the development process by Section 106 agreements.

Wave Overtopping

The Wave Energy mapset included within *Flood Mapping: Flooding from Other Sources*, shows how exposure to wave energy varies along the frontage of the study area. Such information can be used to assess, at a high level, the risk of flooding caused by extreme wave overtopping. Fareham's harbour frontages experience low wave energies but its open coast frontage experiences moderate wave energies. Based on information from other similarly exposed frontages in the PUSH sub-region, it is recommended that all applications for development within the vicinity of the open coast frontage of Fareham Borough include an assessment of extreme wave overtopping, regardless of which Flood Zone the site is in. This will ensure that this risk is always considered for new development in the relevant locations. The assessment of extreme wave overtopping should be appropriate to the scale of risk and may, in some cases, be ruled out as a significant risk quite easily, but should nevertheless be addressed.

Fluvial Flooding

Parts of Fareham Borough are at risk of fluvial flooding from the Wallington River and River Meon. The *Flood Mapping* Dataset shows the fluvial Flood Zones, which show the Wallington Village and Titchfield to be the key areas at risk of fluvial flooding in the Borough.

In Fareham Borough there is more fluvial flood risk data available than in other parts of the PUSH sub-region. The two principal rivers in the Borough, the Meon and Wallington are two of the most significant in the sub-region, with a number of flood risk areas and historic records of flooding. Hydraulic modelling of the River Wallington has been finalised as part of the Environment Agency's ongoing Strategic Flood Risk Mapping programme. Therefore, it has been possible in this SFRA to designate Flood Zone 3b (defined by NPPF as the 'functional floodplain') for the River Wallington by using a modelled 1 in 25 year flood outline. This is in accordance with the Planning Practice Guidance. The River Meon does not have a modelled flood outline to define Flood Zone 3b, but the Environment Agency have provided a detailed historic flood outline which they have recommended is used to define Flood Zone 3b for this SFRA. Where this information is not available (in Fareham Borough this represents only a small part of the River Hamble) fluvial Flood Zone 3 has been assumed to be functional floodplain, in line with the Planning Practice Guidance precautionary approach and should be tested by site specific FRAs, where required.

Unlike the tidal Flood Zones, flood levels associated with the fluvial Flood Zones have not been identified as part of this SFRA. The variations in previous modelling approaches for the rivers within the PUSH sub-region, coupled with the spatial variation on flood levels along the river valleys, meant that it was not possible to provide a consistent approach to identifying fluvial flood levels without re-modelling a number of rivers. Such detailed assessments were outside the scope of this SFRA.

Developers undertaking a FRA for a site within the fluvial Flood Zones should obtain the most up to date flood risk data from the Environment Agency. If no further information is available then a site specific FRA may need to include a numerical assessment to refine the understanding of fluvial flood risk, and agree the form of this assessment with the Environment Agency.

Undefended flood hazard information, has also been developed for the fluvial Flood Zones 2 and 3. This information can provide developers with an indication of the varying degree of flood hazard within the Flood Zones which can facilitate the design and layout of development sites to avoid areas of high hazard. As with the tidal flood hazard data, this dataset was derived during the evolution of the 2007 work package and has not been updated as part of the 2016 update. For this reason, in areas where there have been flood mapping updates since 2007, there may be discrepancies in the data presented. Where this occurs it is recommended that further advice is sought from the SFRA Helpdesk team or local Environment Agency office.

It is recommended that FRAs for sites located within the flood hazard zones to undertake a more detailed quantitative assessment of flood hazard based on an improved understanding of defences and flow routes.

Surface Water/Overland Flow Flooding

The dataset *Flood Mapping: Flooding from Other Sources* show both maps for potential surface water flooding and the variation in the potential source of overland flow across the PUSH sub-region. The areas shown in red and orange relate to areas of very high and high potential for generating overland flow. Notably, the urban areas are indicated as red or orange due to the high runoff potential from urban land uses.

Within Fareham Borough there are a number of areas which have a high to very high potential for generating overland flow. FRAs for sites that are found to be within or in the vicinity of these areas, especially if the local topography places the site at a lower elevation than the surrounding land and hence downstream of the source, should consider the impacts and management of flooding due to overland flow.

In particular the area to the north of Fareham proposed for the major new community of Welborne, is situated on permeable geology,indicating that development could have a high impact on surface water runoff regimes if not controlled. Site specific FRAs should therefore carefully consider the impact of development on the local surface water runoff regime and should design SUDS options appropriately, in order to manage surface water runoff.

Groundwater Flooding

Within the PUSH region the key areas at risk of groundwater flooding are north of Fareham Borough in East Hampshire, Winchester, Eastleigh and Test Valley where highly permeable geology meets lower permeability geology as shown in *Flood Mapping: Flooding from Other Sources: Groundwater,* which has been verified by inspection of the historical incident records. The River Meon due to its highly permeable upstream geology is very sensitive to groundwater conditions and there has been previous groundwater flooding observed around Titchfield. The Wallington is also subject to a significant permeable catchment area upstream of Fareham. Site specific FRAs within Fareham Borough should seek to ascertain whether a site has been previously affected by groundwater flooding if it lies adjacent to the River Meon or Wallington River.

Flooding from Infrastructure

Historically, a number of parts of Fareham Borough have recorded incidents of flooding caused by problems relating to drainage infrastructure as shown in Dataset *Flood Mapping: Flooding from Other Sources*. When undertaking a site specific FRA for a large development site, consultation with Southern Water should always be undertaken to investigate whether the proposed development will have an adverse impact on the local drainage system.

Sustainable Urban Drainage Systems (SUDS)

Conventional surface water drainage systems have traditionally used underground pipe networks to efficiently convey water away from sites. In the past this has led to problems of downstream flooding, reductions in groundwater recharge and waste pollution incidents associated with surface water overwhelming combined sewers. Both 'Making Space for Water' and the 'Water Framework Directive' have highlighted the need for an improved understanding and better management of how our urban environments are drained. The SUDS management train approach, as shown in Figure 2, is the principle that a range of SUDS which feed into each other can often offer benefits to the delivery of a successful surface water system/strategy.

The NPPF states that Local Authorities should prepare and implement planning strategies that help to deliver sustainable development, by using opportunities offered by new development to reduce the causes and impacts of surface water flooding. By implementing polices to encourage developers to incorporate SUDS wherever possible, Local Authorities can help to mitigate the impacts that development has on surface water runoff rates and volumes.

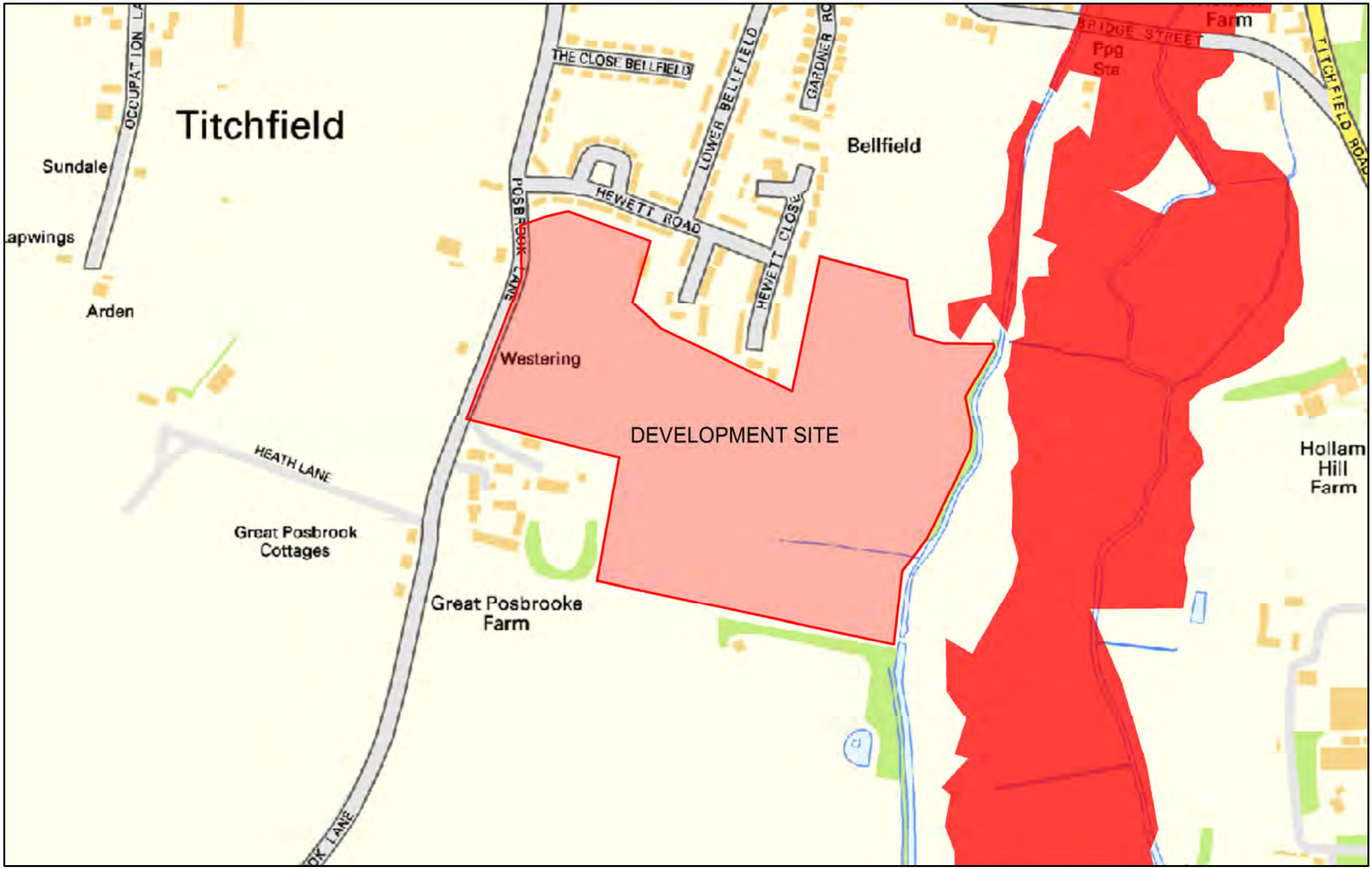
Emergency Planning

As well as informing the development control process, the outputs of the SFRA can also be used by the Local Authority to inform their Emergency Planning Polices. The Flood Mapping Datasets are particularly useful when considering the feasibility and sustainability of key access routes within their administrative boundaries. The benefit of producing such outputs on a sub-regional scale mean that the Local Authority can also consider access to the Borough beyond their administrative boundary where key access routes (e.g. M27) cross a number of Local Authorities.

Additional Guidance

- Flood risk assessment for planning applications; Environment Agency
- Flood risk assessment: standing advice; Environment Agency
- National Planning Policy Framework; DCLG
- National Planning Policy Framework Quick Guide; Environment Agency
- Planning Practice Guidance – Online web-based resource: DCLG
- Flood and coastal risk guidance: climate change allowances: Environment Agency
- Development and Flood Risk: Guidance for the Construction Industry CIRIA (2004)
- Flood Risk Assessment Guidance for New Development: FD2320/TR2 Environment Agency / DEFRA
- Susdrain online resource: The community for sustainable drainage CIRIA
- Fareham BC emergency planning flooding – online resource
- Fareham BC Local Plan SFRA evidence – online resource

Historic Flood Map



Hampshire County Council

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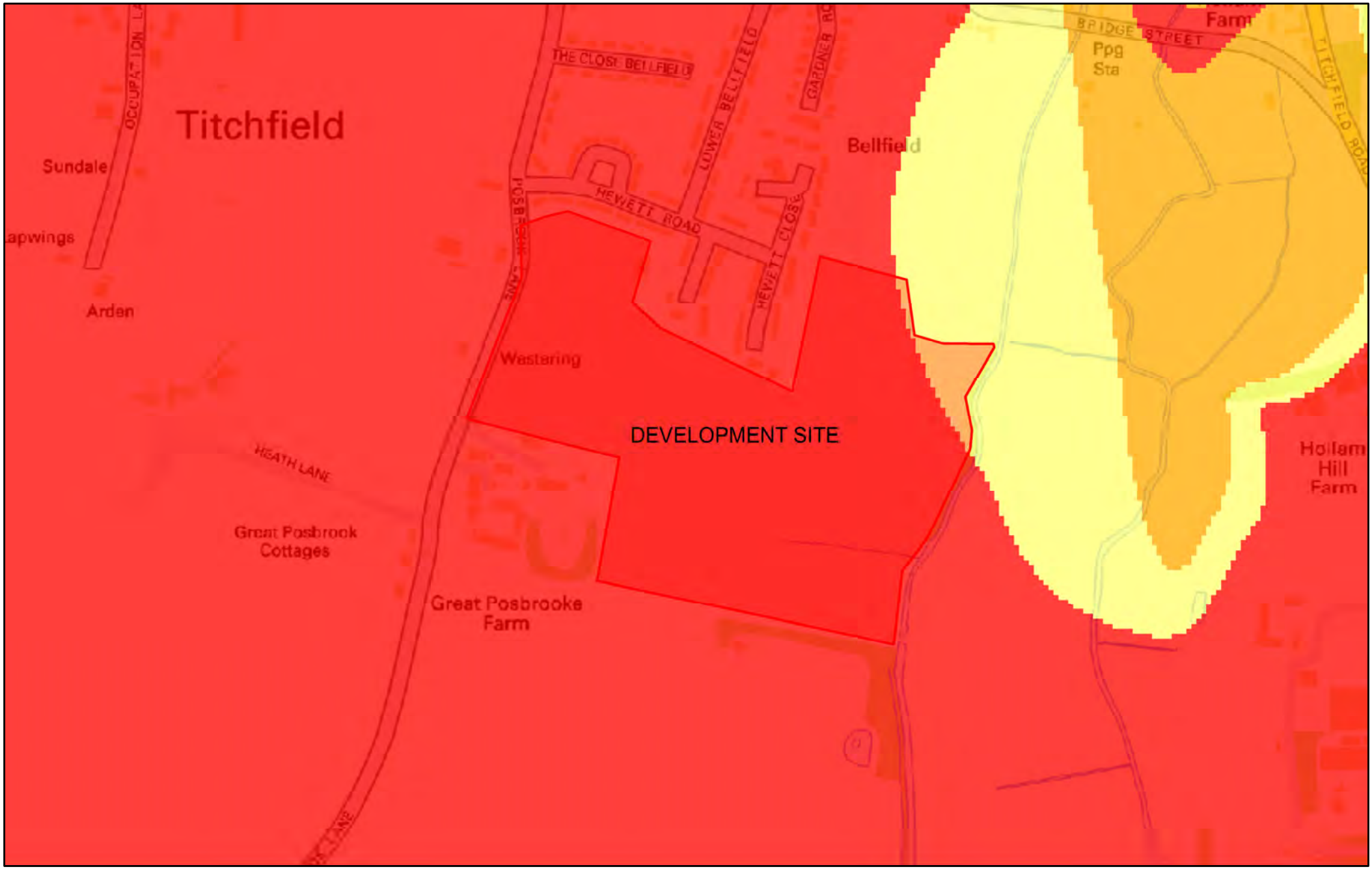
Groundwater Flood Risk - Bedrock Permeability



Hampshire County Council

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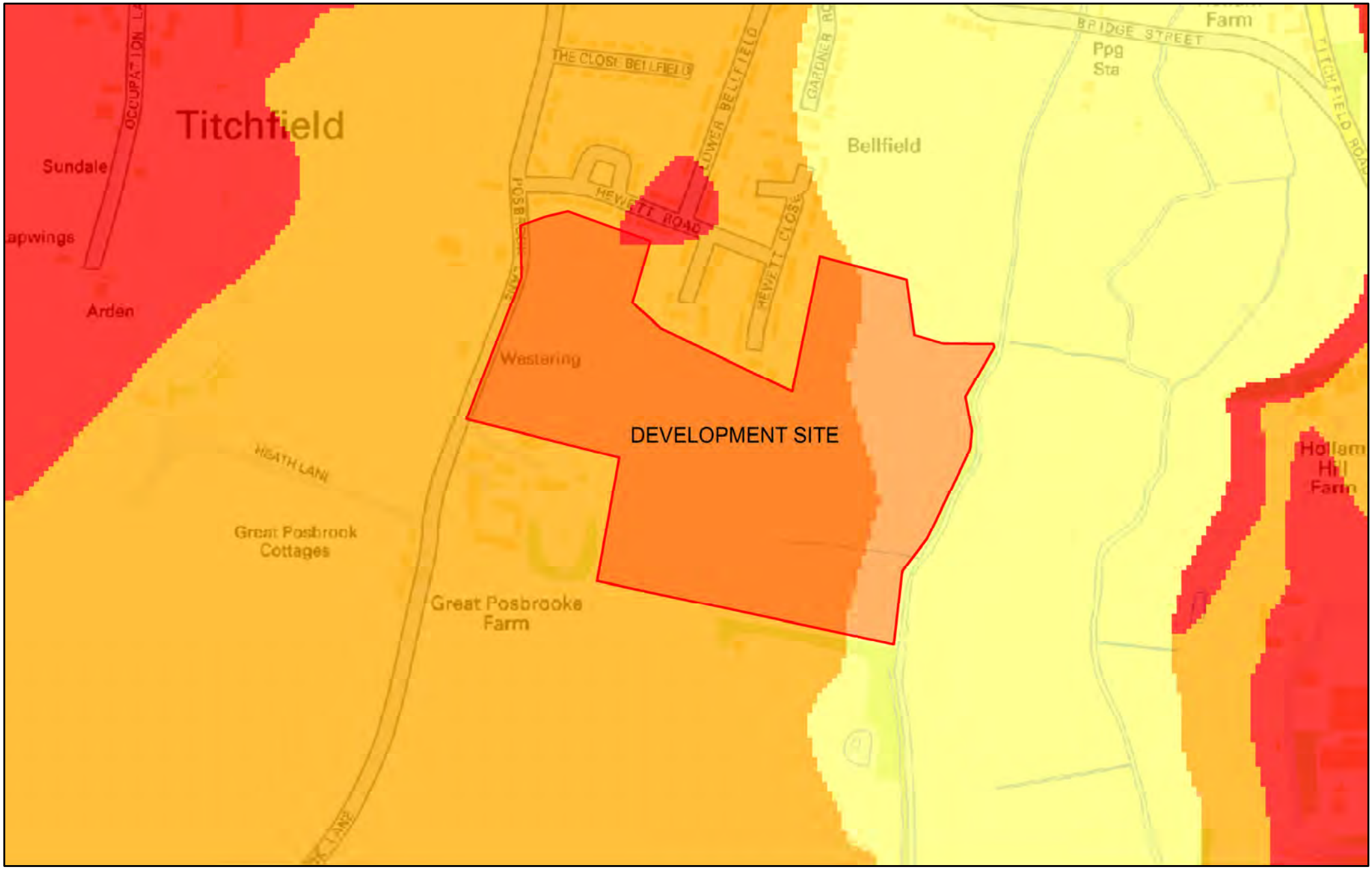
Impact on Surface Water Runoff



Hampshire County Council

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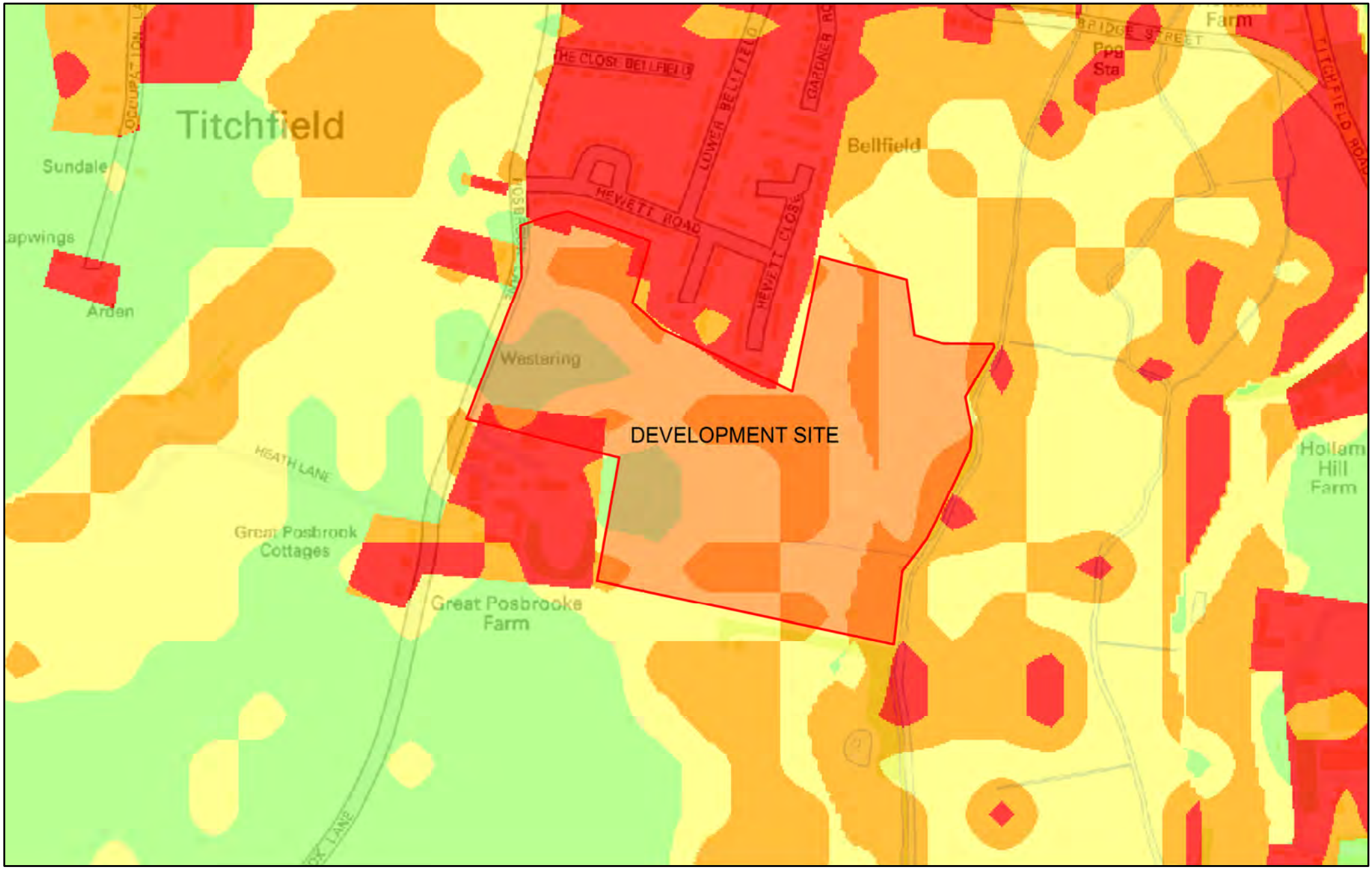
Potential Sources of Overland Flow



Hampshire County Council

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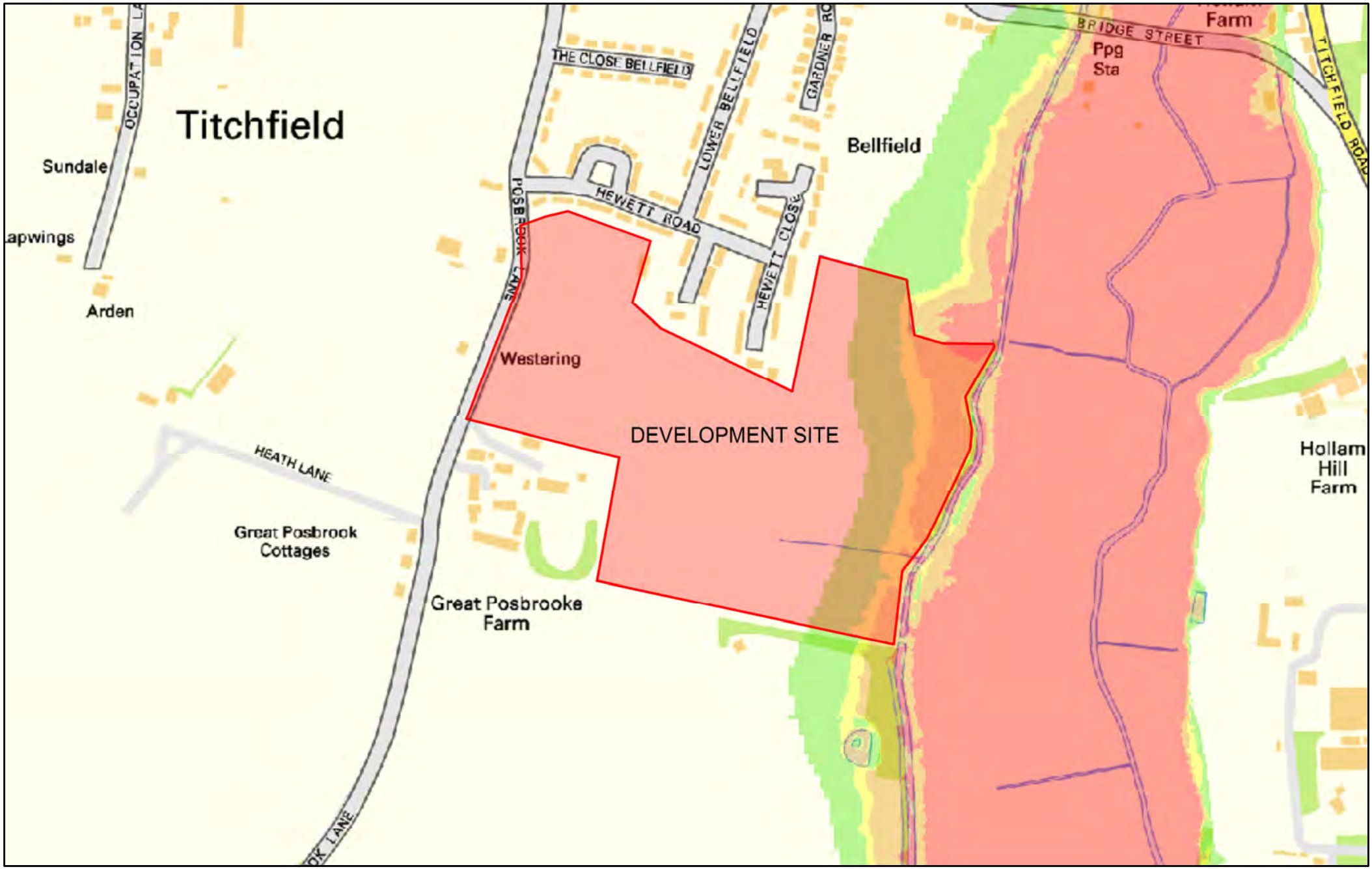
Flood Zone 2 (Undefended) Hazard Map



Hampshire County Council

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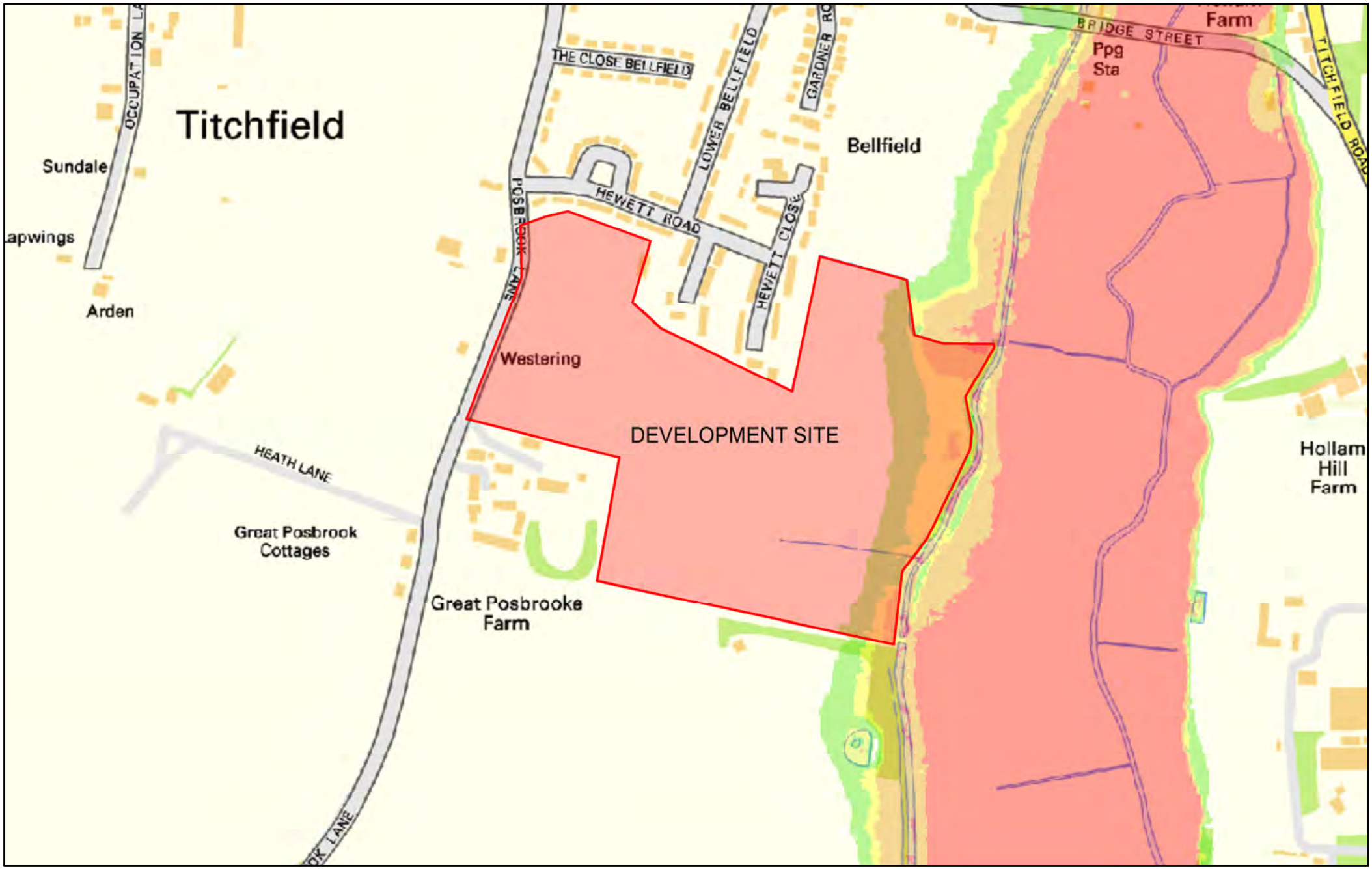
Flood Zone 3 (Undefended) Hazard Map



Hampshire County Council

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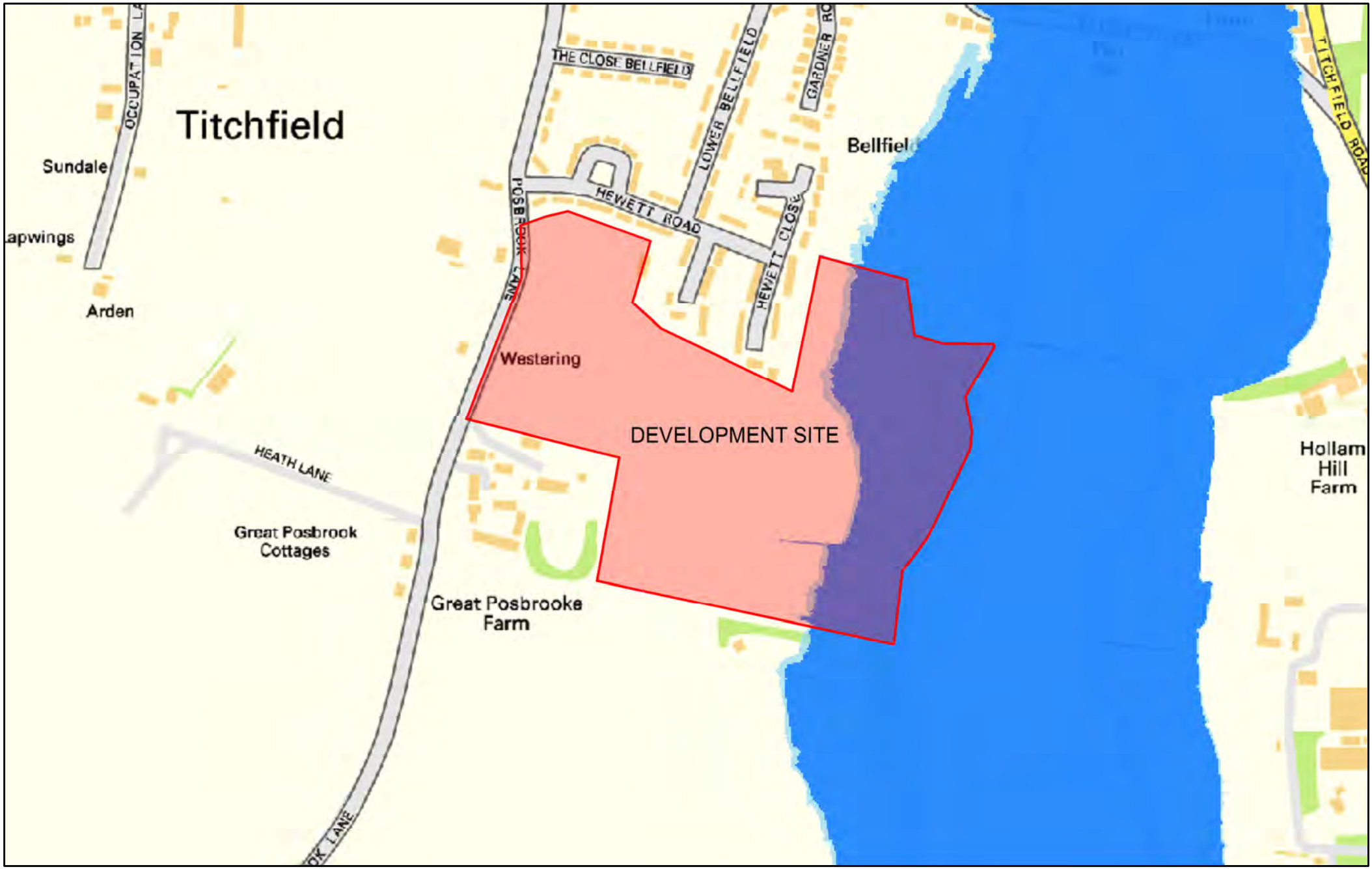
Tidal Flood Zone 2 & 3 - Climate Change 2115



Hampshire County Council

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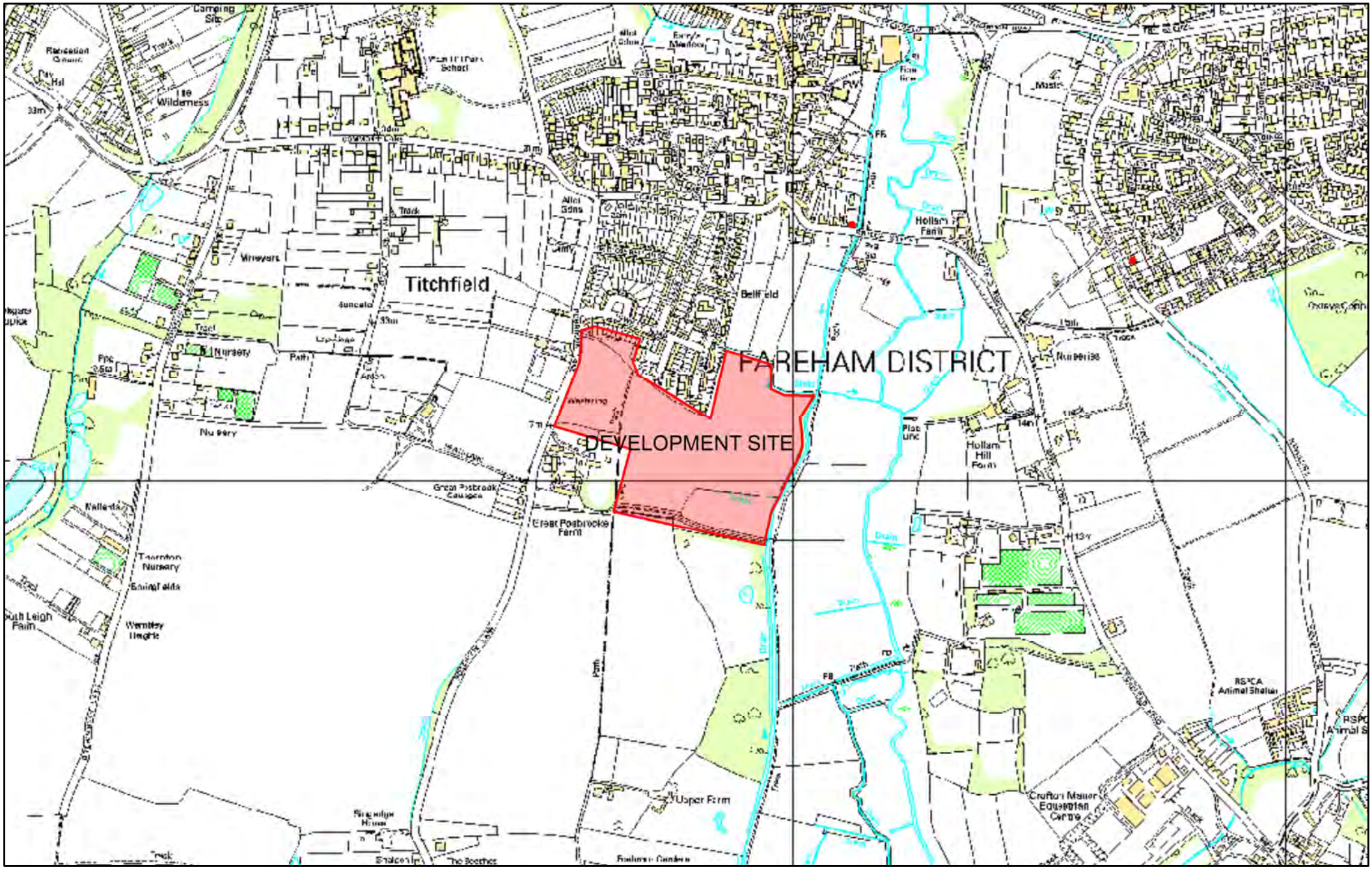
Southern Water Observed Flooding



Hampshire County Council

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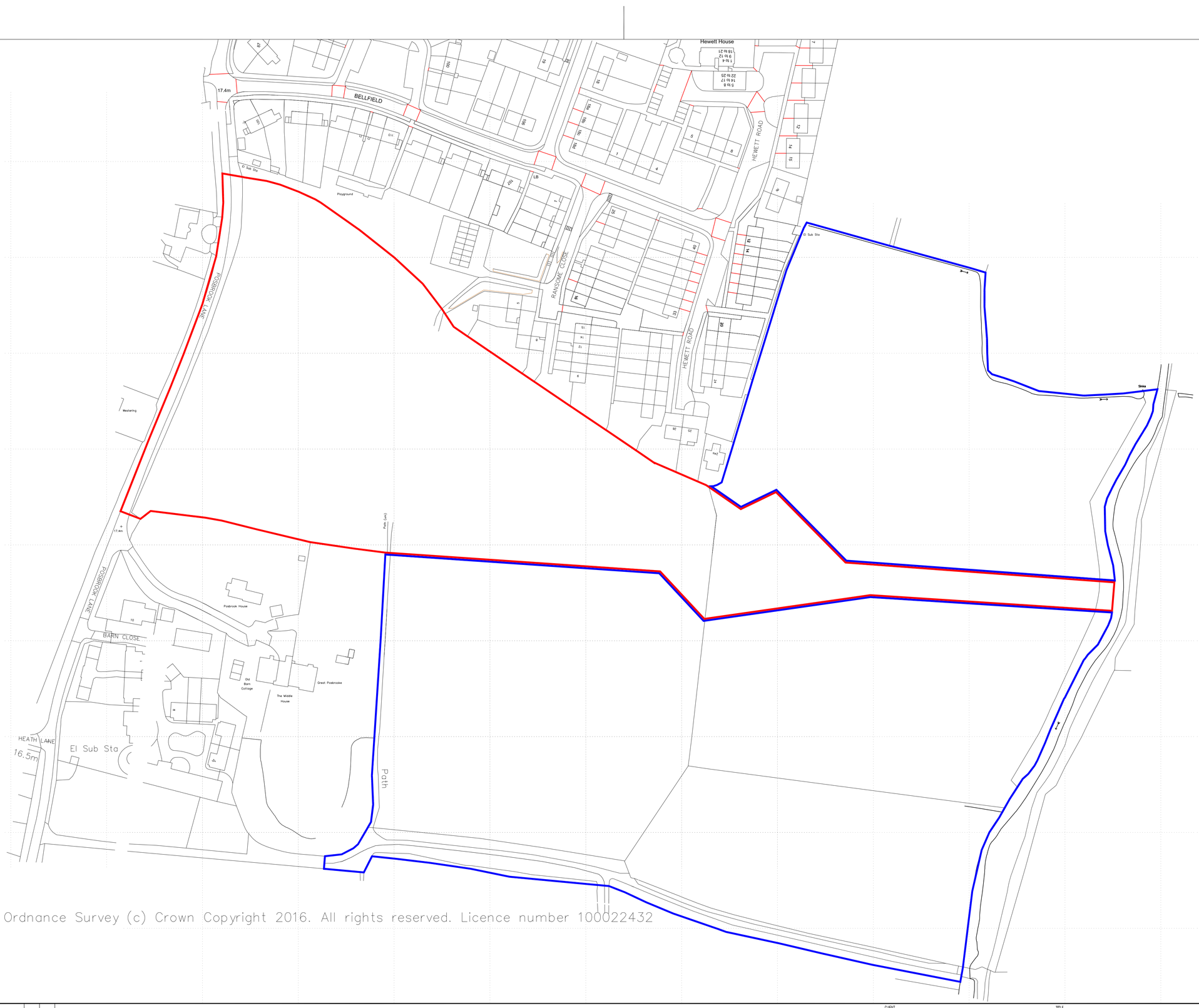
APPENDIX B

Site Location Plan



N

Rev	Date	Description	By	PM
REVISIONS				

0 10 15 20 30 40 50 60 70 80 90 100m

CLIENT: FOREMAN HOMES

TITLE: Posbrook Lane, Titchfield
Location Plan

Scale @ A1: 1:1000
Date: © Oct'19
Drawn by:
Checked by:
Drawing No: 16.092.01
Revision: -

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APPENDIX C

Indicative Masterplan

GENERAL NOTES

This drawing forms part of an application for planning permission on behalf of the client named below, it shall not be used for any other purpose without the express permission of HGP Architects.

This drawing is only to the stated scale if it is printed correctly. HGP cannot accept responsibility for the incorrect scaling of drawings printed by third parties.

All dimensions are in mm unless noted otherwise.

Buildings are illustrated at design levels only. Actual building levels may be adjusted by +/- 0.25m during construction to achieve a minimum waste to landfil as required under the National Planning Policy for Waste.

The general direction of the car park and site falls are shown indicatively only. All car parking and internal site road levels may be locally varied (with some falls potentially reversed) during construction to achieve a minimum waste to landfil as required under the National Planning Policy for Waste.

This drawing is to be read in conjunction with all other HGP Planning drawings and all supporting documents.

This drawing may incorporate information from other professionals and as such HGP Architects cannot accept responsibility for the integrity and accuracy of such information.

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

In addition to the hazards/ risks normally associated with the type of work detailed on this drawing, please note the following:

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.

0 5 10 15 20 25 30 40m

REVISIONS DATE DRN CKD REV

CLIENT

PROJECT

Posbrook Lane, Titchfield

TITLE

Illustrative Site Plan

STATUS

Planning

Drawn	Checked	Scale	Date
HE	HE	1:500	Oct'19

Drawing No. Revision

16.092.02

HGP ARCHITECTS

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ISO 9001 Quality Management FS 10342

APPENDIX D

Topographical Survey

NOTES:

Drainage:
All drainage invert information has been obtained through visual inspection only, with no entry into manholes. Therefore the complete accuracy cannot be guaranteed. Where drainage is of critical importance we suggest the services of a specialist drainage expert be used.

Trees:
Every effort has been made to identify and detail all trees on site but where trees are of critical importance we suggest the use of a specialist such as an arborist. Tree spread and heights are indicative.

GPS:
GPS levels and grid are obtained using industry standard guidelines and can vary according to the quality of the GPS network at the time of survey. Therefore all GPS detail is relative to the time and date of the survey.

LEGEND

TREE SPECIES INFORMATION

ALDER	ALD	LOCUST	LOC
ASH	ASH	LONDON PLANE	LPN
ASPEN	ASP	MAGNOLIA	MAG
BEECH	BCH	MAPLE	MPL
CEDAR	CED	OAK	OAK
CHERRY	CHY	PINE	PNE
CYPRESS	CYP	POPLAR	POP
ELM	ELM	PRUNUS	PNS
FIR	FIR	RHODODENDRONS	RDN
FRUIT	FRT	ROWAN	RWN
HAWTHORN	HAW	SILVER BIRCH	SIB
HAZEL	HAZ	SORBUS	SOR
HOLLY	HLY	SWEET CHESTNUT	SCH
HORSE CHESTNUT	HCH	SYCAMORE	SYC
HORNBEAM	HRM	WALNUT	WNT
LABURNUM	LBM	WILLOW	WLW
LARCH	LAR	YEW	YEW
LIME	LIM	SPECIES UNKNOWN	SPU
		COPPICED	COP

TREE ANNOTATIONS: Tree Species / Tree Bolt Size / No of Bolts
Tree Height / Tree Canopy Spread

FENCE INFORMATION

BARBED WIRE FENCE	BWF
CORRUGATED IRON FENCE	CIF
CLOSE BOARD FENCE	CBF
CHAIN LINK FENCE	CLF
CHESTNUT PALING	CPF
CRASH BARRIER	CBR
HANDRAIL	HDL
IRON RAILINGS	IRF
LARCH LAP FENCE	LLF
MISCELLANEOUS FENCE	MSF
PALISADE FENCE	PDF
PICKET FENCE	PKF
POST AND CHAIN FENCE	PCF
POST AND RAIL FENCE	PRF
POST AND WIRE FENCE	PWF
STOCK WIRE FENCE	SWF
TRELLIS FENCING	TLF

LEVEL INFORMATION

BASEMENT LEVEL	BTL
BED LEVEL	BL
COVER LEVEL	CL
DAMP PROOF COURSE	DPC
FLOOR LEVEL	FL
INVERT LEVEL	IL
OUTFALL LEVEL	OL
THRESHOLD LEVEL	THL
POOL WATER	PW
SURFACE WATER	SW
UNABLE TO LIFT	UTL
WATER LEVEL	WL

SURFACE INFORMATION

CONCRETE	Conc
BRICK PAVERS	BP
FLOWERBED	FB
PAVING SLABS	PS
RETAINING WALL	RWall
TACTILE PAVING	Tac

FEATURE INFORMATION

BOLLARD	BD	NOTICE BOARD	NB
BRITISH TELECOM BOX	BTB	POST	P
BRITISH TELECOM IC	BTIC	RAIN WATER PIPE	RWP
BUS STOP	BS	RAISED FLOWERBED	RFB
CABLE TELEVISION BOX	CATB	ROAD SIGN	RS
CABLE TELEVISION IC	CATV	RODDING EYE	RE
EARTHING ROD	ER	SERVICE MARKER POST	SMP
ELECTRICITY CABLE PIT	ELCP	SOIL VENT PIPE	SVP
ELECTRICITY CONTROL BOX	ECB	STOP COCK	SC
ELECTRICITY POLE	EP	STOP VALVE	SV
FIRE HYDRANT	FH	TELEGRAPH POLE	TP
INSPECTION COVER	IC	TELEPHONE CALL BOX	TCB
LAMP POST	LP	TRAFFIC SIGNAL	TS
LETTER BOX	LB	TRAFFIC SIGNALS IC	TSIC
LITTER BIN	BIN	WATER METER	WM
KERB OUTLET	KO	WATER TAP	Tap
NAME PLATE	NP		

Level Datum:
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Grid:
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Northpoint:

ENCOMPASS SURVEYS

Encompass Surveys Ltd
Unit 28
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Knowle Lane
Fair Oak, Eastleigh
Hampshire SO50 7PZ

Tel: 023 80692002 Email: info@encompass-surveys.co.uk
Fax: 023 80697125 Website: encompass-surveys.co.uk

Client:	Foreman Homes		
Survey Location:	Phase 1 Posbrook Lane Titchfield		
Survey type:	Topographical	Scale:	1:200 A0
Drawing ref:	ENC/260616-9V5 Topo	Date:	June 16
Drawn/QA:	AB/CW	Revision:	-

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LIME	LIM	SPECIES UNKNOWN	SPU
		COPPICED	COP

TREE ANNOTATIONS: Tree Species / Tree Bolt Size / No of Bolts
Tree Height / Tree Canopy Spread

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LEVEL INFORMATION

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DAMP PROOF COURSE	DPC
FLOOR LEVEL	FL
INVERT LEVEL	IL
OUTFALL LEVEL	OL
THRESHOLD LEVEL	THL
POOL WATER	PW
SURFACE WATER	SW
UNABLE TO LIFT	UTL
WATER LEVEL	WL

SURFACE INFORMATION

CONCRETE	Conc
BRICK PAVERS	BP
FLOWERBED	FB
PAVING SLABS	PS
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INSPECTION COVER	IC	TELEPHONE CALL BOX	TCB
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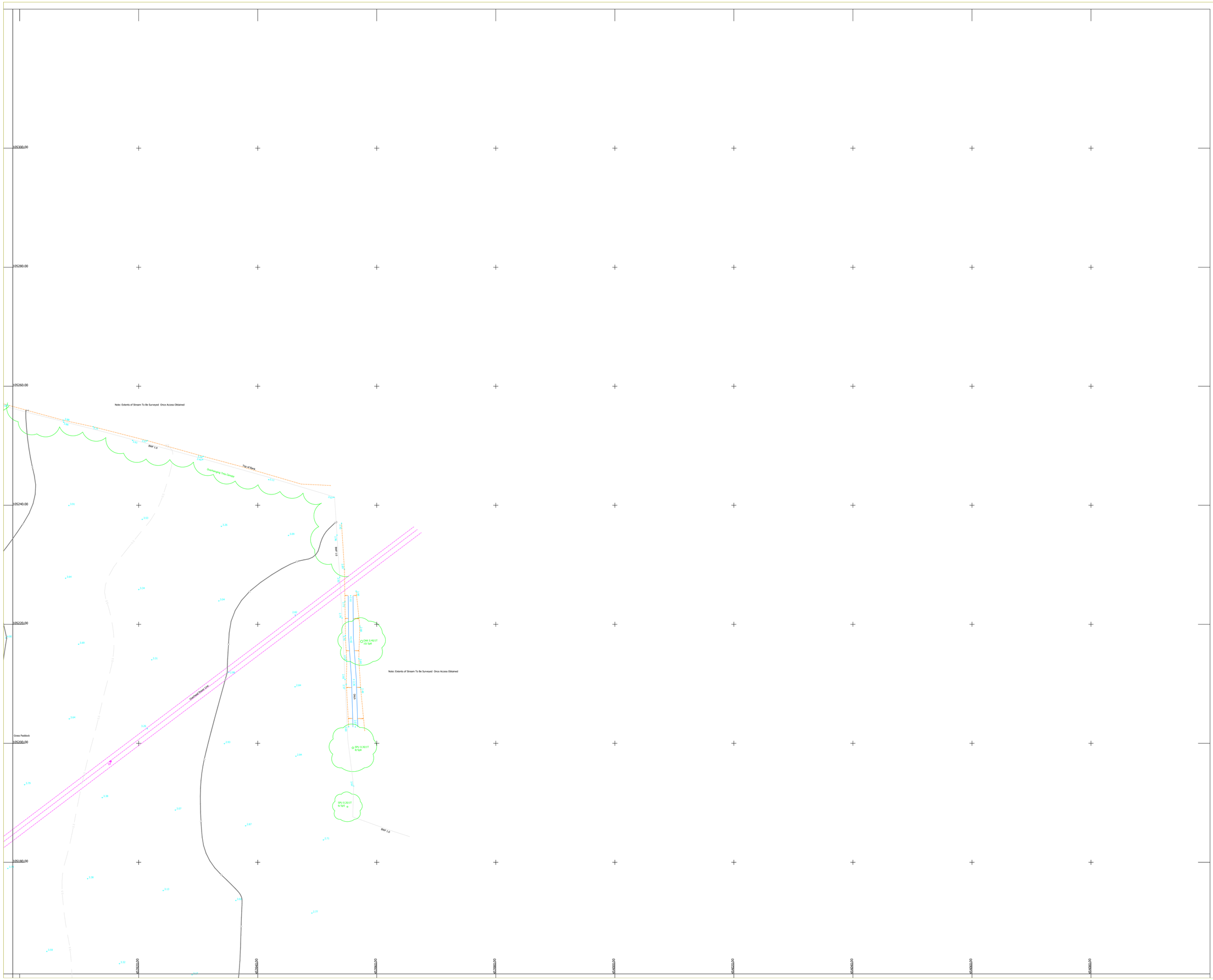

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LEGEND

TREE SPECIES INFORMATION

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ASH	ASH	LONDON PLANE	LPN
ASPEN	ASP	MAGNOLIA	MAG
BEECH	BCH	MAPLE	MPL
CEDAR	CED	OAK	OAK
CHERRY	CHY	PINE	PNE
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LABURNUM	LBM	WILLOW	WLW
LARCH	LAR	YEW	YEW
LIME	LIM	SPECIES UNKNOWN	SPU
		COPPICED	COP

TREE ANNOTATIONS: Tree Species / Tree Bolt Size / No of Bolts
Tree Height / Tree Canopy Spread

FENCE INFORMATION

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LEVEL INFORMATION

BASEMENT LEVEL	BTL
BED LEVEL	BL
COVER LEVEL	CL
DAMP PROOF COURSE	DPC
FLOOR LEVEL	FL
INVERT LEVEL	IL
OUTFALL LEVEL	OL
THRESHOLD LEVEL	THL
POOL WATER	PW
SURFACE WATER	SW
UNABLE TO LIFT	UTL
WATER LEVEL	WL

SURFACE INFORMATION

CONCRETE	Conc
BRICK PAVERS	BP
FLOWERBED	FB
PAVING SLABS	PS
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FEATURE INFORMATION

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TREE ANNOTATIONS: Tree Species / Tree Bolt Size / No of Bolts
Tree Height / Tree Canopy Spread

FENCE INFORMATION

BARBED WIRE FENCE	BWF	BASEMENT LEVEL	BTL
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PALISADE FENCE	PSF	UNABLE TO LIFT	UTL
PICKET FENCE	PKF	WATER LEVEL	WL
POST AND CHAIN FENCE	PCF		
POST AND RAIL FENCE	PRF		
POST AND WIRE FENCE	PWF		
STOCK WIRE FENCE	SWF		
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SURFACE INFORMATION

CONCRETE	Conc
BRICK PAVERS	BP
FLOWERBED	FB
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RETAINING WALL	RtWall
TACTILE PAVING	Tac

FEATURE INFORMATION

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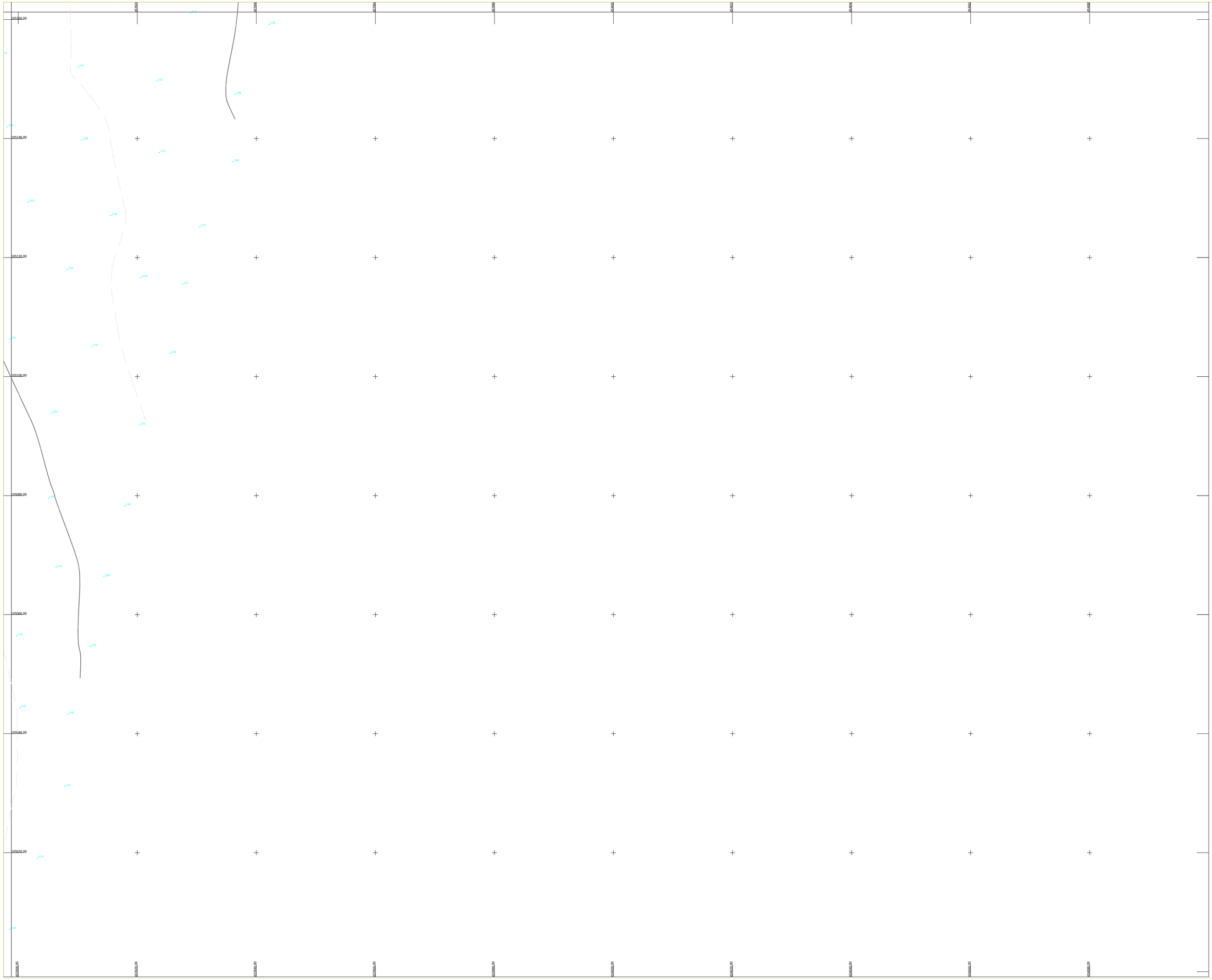

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COVER LEVEL	CL
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FLOOR LEVEL	FL
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LEVEL INFORMATION

SURFACE INFORMATION

		CONCRETE	Conc
		BRICK PAVERS	BP
		FLOWERBED	FB
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LETTER BOX	LB	TRAFFIC SIGNALS IC	TSIC
LITTER BIN	BIN	WATER METER	WM
KERB OUTLET	KO	WATER TAP	Tap
NAME PLATE	NP		

Level Datum:
Levels are related to OS datum derived from GPS

Grid:
Grid is related to OSGB36 derived from the GPS Network.

Northpoint:

ENCOMPASS SURVEYS

Encompass Surveys Ltd
Unit 28
Deer Park Farm Industrial Estate
Knowle Lane
Fair Oak, Eastleigh
Hampshire SO50 7PZ

Tel: 023 80692002 Email: info@encompass-surveys.co.uk
Fax: 023 80697125 Website: encompass-surveys.co.uk

Client:	Foreman Homes		
Survey Location:	Phase 1 Posbrook Lane Titchfield		
Survey type:	Topographical	Scale:	1:200 A0
Drawing ref:	ENC/260616-9V5 Topo	Date:	June 16
Drawn/QA:	AB/CW	Revision:	-

APPENDIX E

Environment Agency Records

NOTES AND ASSUMPTIONS

1. The model results are based on the latest data that was obtained from the Environment Agency in October 2019.

LEGEND

- Risk of Flooding from Surface Water - 1 in 30 Year Extent
- Risk of Flooding from Surface Water - 1 in 100 Year Extent
- Risk of Flooding from Surface Water Flooding - 1 in 1000 Year Extent

N

0 100 200 300 400 m

ODYSSEY

Tuscany House
White Hart Lane
Basingstoke
Hampshire RG21 4AF

Telephone: 01256 331144
Fax: 01256 331134
E: enquiries@odysseyconsult.co.uk
W: www.odysseyconsult.co.uk

Job Title: POSBROOK LANE, TITCHFIELD	Client: FOREMAN HOMES	Scale: 1:5000 @ A3	Date: OCT 19	Designed: NM
Figure Title: ENVIRONMENT AGENCY RISK OF FLOODING FROM SURFACE WATER		Drawn: NM	Checked: GG	Approved: GG
		Job No: 19-241	Figure No: FIGURE 2	Rev

NOTES AND ASSUMPTIONS

1. The model results are based on the latest data that was obtained from the Environment Agency in October 2019.

ODYSSEY
Tuscany House
White Hart Lane
Basingstoke
Hampshire RG21 4AF
Telephone: 01256 331144
Fax: 01256 331134
E: enquiries@odysseyconsult.co.uk
W: www.odysseyconsult.co.uk

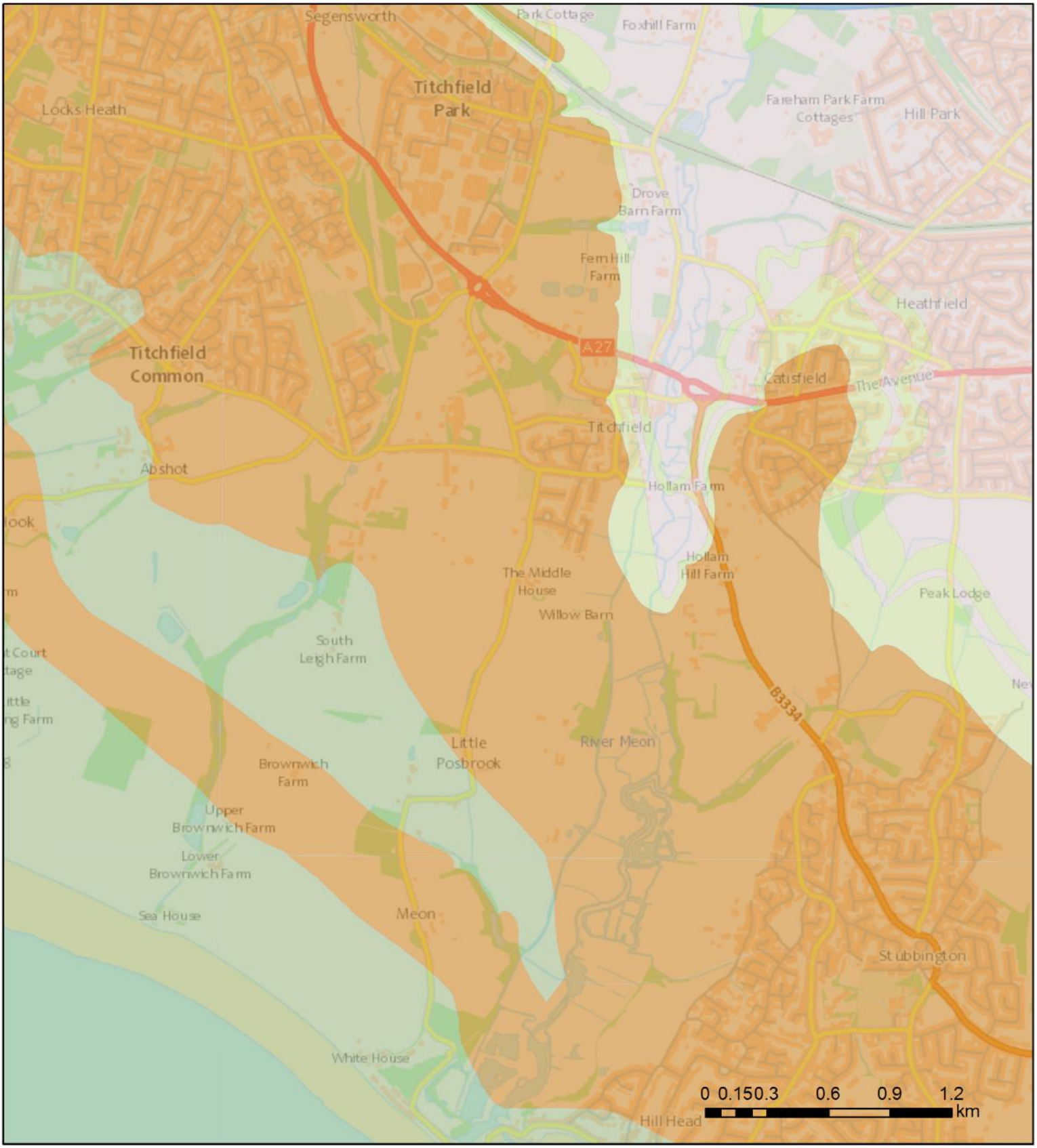
Job Title: POSBROOK LANE, TITCHFIELD	Client: FOREMAN HOMES	Scale: 1:5000 @ A3	Date: OCT 19	Designed: NM
Figure Title: ENVIRONMENT AGENCY FLOOD MAP FOR PLANNING		Drawn: NM	Checked: GG	Approved: GG
		Job No: 19-241	Figure No: FIGURE 1	Rev:

APPENDIX F

British Geological Survey Records

19-241 Bedrock

GEOINDEX ONSHORE



Map Key

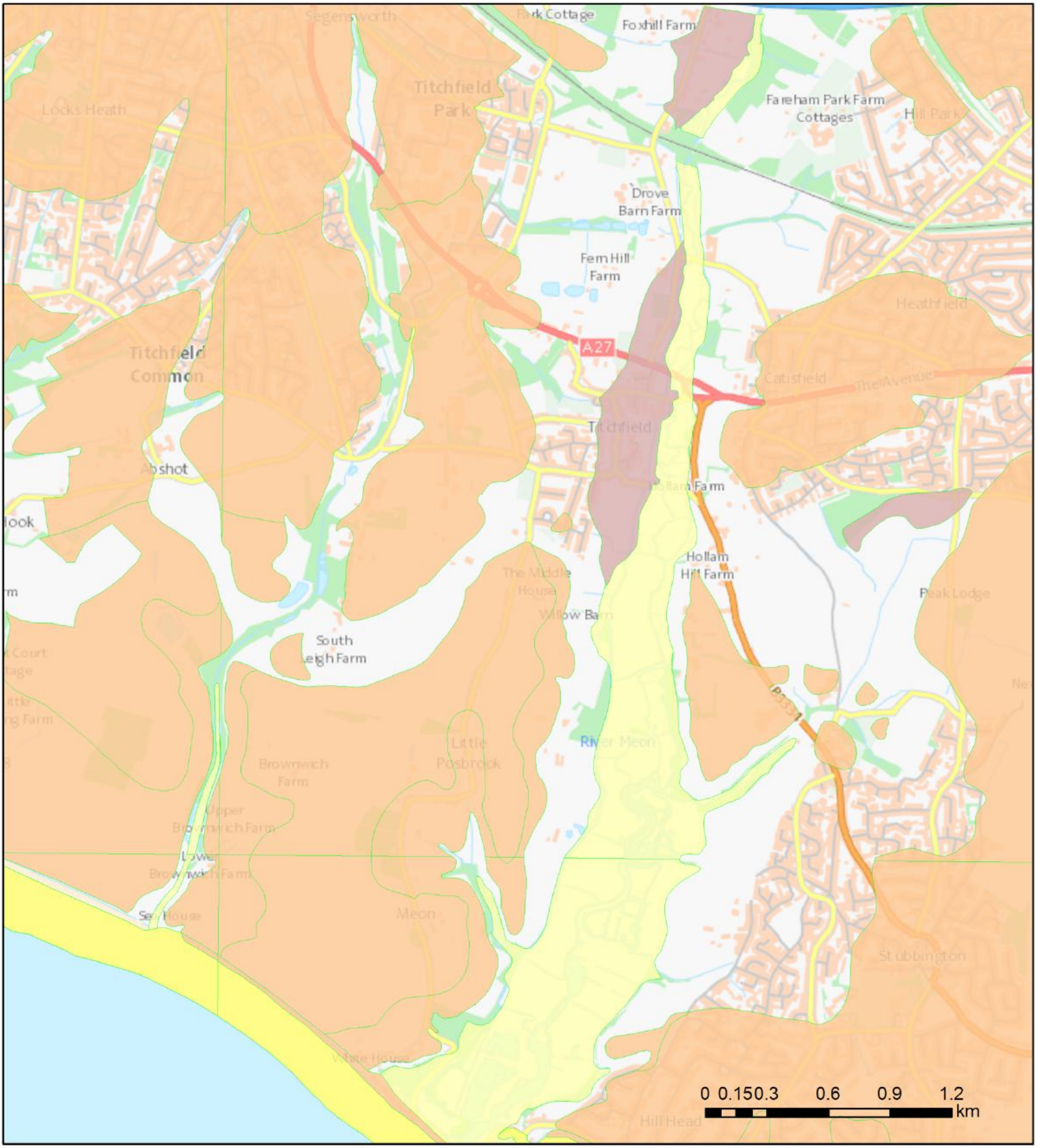
Bedrock geology 1:50,000 scale

- LONDON CLAY FORMATION - CLAY, SILT AND SAND
- SPETISBURY CHALK MEMBER - CHALK
- LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION, NEWHAVEN CHALK FORMATION, CULVER CHALK FORMATION AND PORTSDOWN CHALK FORMATION (UNDIFFERENTIATED) - CHALK
- BOGNOR SAND MEMBER - SAND
- EARNLEY SAND FORMATION - SAND, SILT AND CLAY
- BECTON SAND FORMATION AND CHAMA SAND FORMATION (UNDIFFERENTIATED) - SAND, SILT AND CLAY
- BARTON CLAY FORMATION - CLAY
- PORTSDOWN CHALK FORMATION - CHALK
- LAMBETH GROUP - CLAY, SILT AND SAND
- MARSH FARM FORMATION - CLAY, SILT AND SAND

Selection Results

19-241 Superficial Deps

GEOINDEX ONSHORE



Map Key

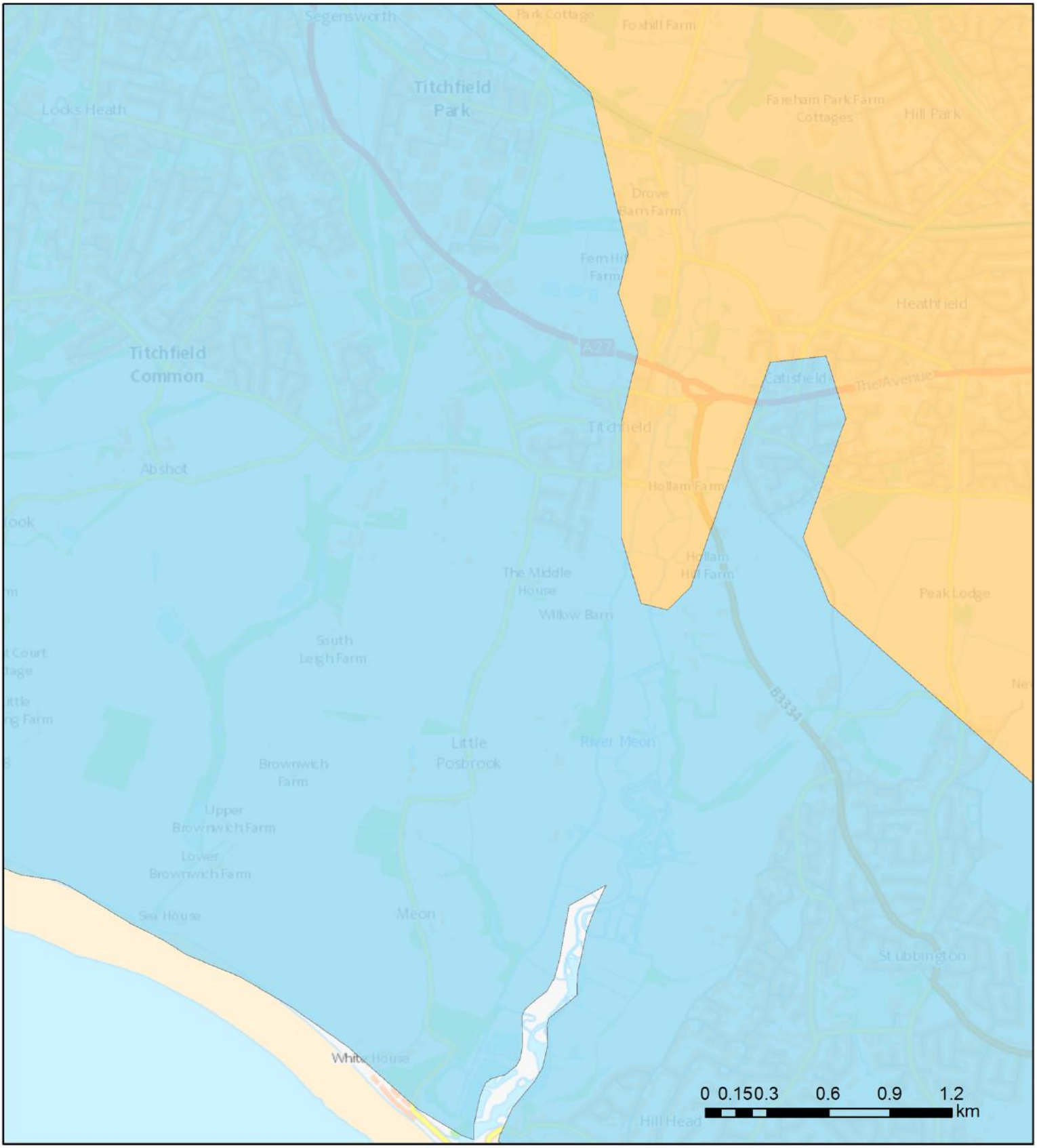
Superficial deposits 1:50,000 scale

- ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
- RAISED MARINE DEPOSITS - SAND AND GRAVEL
- HEAD - CLAY, SILT, SAND AND GRAVEL
- RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL
- BEACH AND TIDAL FLAT DEPOSITS (UNDIFFERENTIATED) - CLAY, SILT, SAND AND GRAVEL
- TIDAL FLAT DEPOSITS - CLAY AND SILT
- PEAT - PEAT

Selection Results

19-241 Hydrogeology

GEOINDEX ONSHORE



Map Key

Hydrogeology 1:625,000 scale

Aquifers with significant intergranular flow

Highly productive aquifer

Moderately productive aquifer

Low productivity aquifer

Aquifers in which flow is virtually all through fractures and other discontinuities

Highly productive aquifer

Moderately productive aquifer

Low productivity aquifer

Rocks with essentially no groundwater

Selection Results

APPENDIX G

Southern Water Utilities Ltd Records

Foreman Homes Ltd
Unit 1 Station Industrial Park
Duncan Road
Park Gate
SO31 1BX

Your ref	SMK
Our ref	215604
Date	25 May 2016
Contact	searches@southernwater.co.uk Tel 0845 272 0845 0330 303 0276 Fax 01634 844514

Attention: Laura Whitaker

Dear Customer

Re: Provision of public sewer and water main record extract

Location: Land to the East of Posbrook Lane, Titchfield, Fareham, PO1 44JD

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

VAT receipt

Ordered by:

Foreman Homes Ltd
Duncan Road
Park Gate
SO31 1BX

VAT registration number: 813 0378 56
Order reference: 215604
Your reference: SMK

Receipt for provision of an extract from the public sewer and/or water main records.

Location	Costs
Land to the East of Posbrook Lane Titchfield Fareham PO1 44JD	£41.60
Net total	£41.60
VAT	£8.32
Total	£49.92
Paid	**Paid in full**

Thank you for your payment:

Received on: 19 May 2016

For enquiries regarding the information provided in this receipt, please contact the LandSearch team:

Tel: 0845 270 0212
0330 303 0276 (individual consumers)

Email: searches@southernwater.co.uk

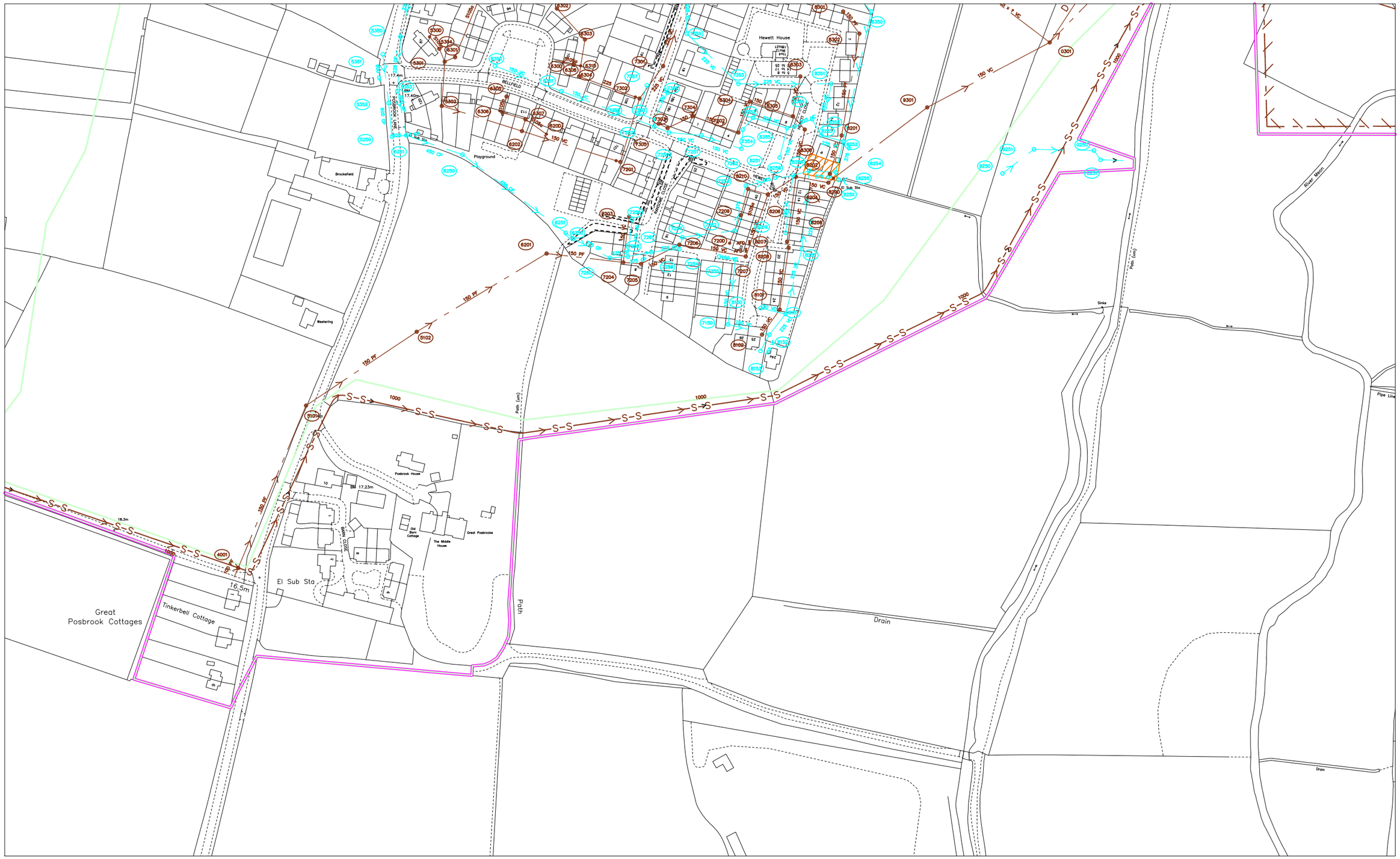
Web: www.southernwater.co.uk

LandSearch
Southern Water Services
Southern House
Capstone Road
Chatham
Kent
ME5 7QA

Southern Water

SEWER RECORDS PAGE 1 OF 2

105386



104809

453297

454239

O.S. REF. SU5305SE	Drawn by: yadavsa	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may Include Bonded Asbestos Cement
	Scale: 1:2500	
Title: 215604_Land to the East of Pos	Date: 25/05/2016	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

N

Southern Water

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	
0250X	5.52	4.5	UNK	UNK	CIRC	
0251X	5.39	4.43	UNK	UNK	CIRC	
0301X	3.5	2.46	225	VC	CIRC	
4001X	16.972	15.09	150	PF	CIRC	
5101X	18.22	14.32	150	PF	CIRC	
5102X	16.94	13.68	150	PF	CIRC	
5250X	17.6	15.57	525	CP	UNK	
5251X			450	CP	CIRC	
5301X	17.88	16.36	UNK	UNK	UNK	
5302X	16.74	15.07	150	VC	CIRC	
5304X			UNK	UNK	CIRC	
530DX			UNK	UNK	CIRC	
5350X	18.29	17.22	225	CP	CIRC	
5351X	18.27	17.19	600	CP	CIRC	
5352X			600	CP	CIRC	
5353X	17.55	16.09	600	CP	CIRC	
6201X	14.09	11.87	150	PF	CIRC	
6202X			150	VC	CIRC	
620DX			UNK	UNK	CIRC	
6250X	16.06	14.42	450	CP	CIRC	
6251X	13.12	11.72	300	VC	CIRC	*
6251Y	13.12	12.15	300	VC	CIRC	*
6252X	12.75	10	375	CP	CIRC	
6301X			UNK	UNK	UNK	
6302X	17.07	15.87	UNK	UNK	UNK	
6303X	16.33	15.08	UNK	UNK	CIRC	
6304X	16.48	14.61	225	UNK	CIRC	
6305X			UNK	UNK	CIRC	
6306X			UNK	UNK	CIRC	
6307X			UNK	UNK	CIRC	
6308X			UNK	UNK	CIRC	
630DX			UNK	UNK	CIRC	
631DX			UNK	UNK	CIRC	
6350X	17.43	16.21	150	VC	CIRC	
6351X	16.7	15.25	150	VC	CIRC	
7150X	7.35	6.2	150	VC	CIRC	
7201X	14.81	11.58	225	VC	CIRC	
7202X	8.75	7.34	150	VC	CIRC	
7203X	12.13	10.09	150	VC	CIRC	
7204X	10.41	9.09	150	VC	CIRC	
7205X	10.27	8.46	150	VC	CIRC	
7206X	9.45	7.65	150	VC	CIRC	
7207X	7.13	6.16	150	VC	CIRC	
7209X			UNK	UNK	CIRC	
720DX			UNK	UNK	CIRC	
7250X	13.1	11.2	150	VC	CIRC	
7251X	10.45	9.16	150	VC	CIRC	
7252X	8.49	6.73	225	VC	CIRC	
7253X	7.665	5.49	375	CP	CIRC	
7254X	7.97	6.77	150	VC	CIRC	
7255X	7.44	6.59	150	VC	CIRC	
7256X	12.08	10.05	150	VC	CIRC	
7257X	9.59	6.95	UNK	UNK	CIRC	
7258X	9.14	6.95	375	CP	CIRC	
7259X	10.35	8.99	375	CP	CIRC	
7260X	10.98	9.2	375	CP	CIRC	
7261X	9.93	7.35	375	CP	CIRC	
7262X	7.436		375	UNK	CIRC	
7301X	12.6	10.9	225	VC	CIRC	
7302X	14.38	11.17	225	VC	CIRC	
7303X	12.92	12.84	UNK	UNK	UNK	
7304X	13.11	12.03	150	UNK	UNK	
7305X	13.1	11.4	150	VC	CIRC	
7351X	13.08	12.12	150	VC	CIRC	
7352X	13.83	11.93	150	VC	CIRC	
7353X	8.81	7.47	225	VC	CIRC	
7354X	8.27	6.44	225	VC	CIRC	
7355X	11.9	10.71	225	VC	CIRC	
7356X			UNK	UNK	UNK	
7357X			UNK	UNK	UNK	
735DX			150	VC	CIRC	
8101X	6.39	4.99	150	VC	CIRC	
8102X	6.75	5.3	150	VC	CIRC	
8150X	6.46	5.48	150	VC	CIRC	
8151X	6.15	5.34	225	VC	CIRC	
8152X	6.12	5.43	225	VC	CIRC	
8153X	6.7	5.48	150	VC	CIRC	
8201X	5.51	4.09	150	VC	CIRC	
8202X	5.478	3.748	150	VC	CIRC	
8204X	5.203	3.723	150	VC	CIRC	
8205X	6.04	4.27	150	VC	CIRC	
8206X	6.49	5.03	150	VC	CIRC	
8207X	6.1	4.61	150	VC	CIRC	
8208X	6.18	4.67	150	VC	CIRC	
820DX			UNK	UNK	UNK	
8210X			UNK	UNK	CIRC	
8251X	6.23	5.85	150	VC	CIRC	
8252X	5.7	4.84	375	CP	CIRC	
8253X	5.68	4.79	225	VC	CIRC	
8254X	5.486		375	CP	CIRC	
8255X	5.342		375	CP	CIRC	
8256X	5.896		375	CP	CIRC	
8257X	6.03	5.08	225	VC	CIRC	
8258X	6.001		375	CP	CIRC	
8259X	6.33	5.39	150	VC	CIRC	
8301X	6.36	5.32	150	PF	CIRC	
8302X	5.59	5.04	150	PF	CIRC	
8303X	6.75	5.61	150	VC	CIRC	
8304X	8.21	6.6	150	VC	CIRC	
8305X	6.71	5.3	150	VC	CIRC	
8306X	5.83	4.91	150	VC	CIRC	
8350X	6.01	5.16	UNK	UNK	UNK	
8351X	5.77	4.97	225	VC	CIRC	
8352X	8.31	6.22	225	VC	CIRC	
8353X	5.78	7.9	225	VC	CIRC	
8354X	6.15	5.58	225	VC	CIRC	
8355X			225	VC	CIRC	
9250X	6.02	5.02	UNK	UNK	CIRC	
9251X	5.93	4.83	UNK	UNK	CIRC	
9301X	4.24	3.14	150	VC	CIRC	

LINE STYLES / COLOURS

- Brown — Foul
- Foul Syphon Sewer
- Foul Vacuum Main
- Foul Rising Main
- Red — Combined
- Combined Syphon Sewer
- Combined Rising Main
- Lateral Drain
- Orange — Building Over Agreement Area
- Dark Blue — Treated Effluent
- Purple — Sludge
- Sewer Catchment
- Section 104 Area
- Light Blue — Surface Water
- Surface Water Rising Main
- Yellow — Private
- Green — Access Shaft
- Decommissioned

MATERIALS

AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
XXX	Other
ZZZ	Unknown

LEGEND - SEWERS

- Manhole (SW)
- Manhole (F&C)
- Lamp hole (SW)
- Lamp hole (F&C)
- Pumping Station (SW)
- Pumping Station (F&C)
- Side entry manhole (SW)
- Side entry Manhole (F&C)
- Blind shaft (SW)
- Blind shaft (F&C)
- Ejector station (SW)
- Ejector station (F&C)
- Watertight door (SW)
- Watertight door (F&C)
- Flushing ch. Mn-e (SW)
- Flushing ch. Mn-e (F&C)
- Flushing ch. No-e (SW)
- Flushing ch. No-e (F&C)
- Demarcation Chamber
- Washout (SW)
- Washout (F&C)
- Rodding Eye (SW)
- Rodding Eye (F&C)
- Gauging point (SW)
- Gauging point (F&C)
- Intercept chamber (SW)
- Intercept chamber (F&C)
- Storm Tank (SW)
- Storm Tank (F&C)
- Vortex chamber (SW)
- Vortex chamber (F&C)
- Label ellipse
- Dummy/S24 manhole
- Outfall
- Penstock chamber
- Damboards
- Storm Overflow
- Backdrop manhole
- Other (s)
- Other
- Change in sewer (s)
- Change in sewer
- Reflux valve
- Flap valve
- Cascade
- Anode
- Valve
- Closed Valve
- Air Valve
- Hatch box (SW)
- Hatch box (F&C)
- Direction arrow
- Emptying valve
- Catchpit
- Soakaway
- Inlet
- Balancing Pond
- Wastewater treatment works
- Marine treatment works
- Outfall headworks
- Vent
- Vent column
- Tidal storage tank
- Blank end
- Head of Public Sewer
- Micro Pumping Station

SHAPES (S)

A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

NODE REFERENCING SYSTEM

- 1st digit: hundred metre easting identifier
- 2nd digit: hundred metre northing identifier
- 3rd digit: sewer type identifier
  - 0-4 = Foul/Combined
  - 5-9 = Surface Water
- 4th digit: next sequential node

Drawn by:	yadavsa
Title:	215604_Land to the East of Pos
Date:	25/05/2016

Southern Water

105340

104855

453285

454252

LEGEND - MAINS

- Distribution Main / Communication pipe
- Trunk Main
- RAW — Raw water main
- NP — Non potable
- Abandoned main
- P P — Proposed Main
- FM — Fire main
- Non SWS
- Sluice valve
- Closed valve
- AV — Air valve
- Butterfly valve
- Pressure reducing valve
- Reflux valve
- mv — Motorised valve
- Clockwise closing valve
- Fire Hydrant
- WO — Washout
- WOH — Washout hydrant
- M — Meter
- Capped end
- EP — Emptying plug
- Stopcock
- SP — Leak Noise Correlator Survey Point
- AN — Anode
- TC — Telemetry cable
- AP — Access point / hatchbox

MATERIALS

Dialysis machine	D
Break pressure tank	BPT
Change node	
Pumping station	
Booster station	
Insertion Flow Meter Point	
Water tower	
Service reservoir	
Water Supply Works	
Bore hole / Well	
Intake	
Customer site	
Swab insertion point	

Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

Drawn by:	yadavsa
Scale:	1:2500
Date:	25/05/2016

O.S.Ref: SU5305SE

TITLE: 215604_Land to the East of Pos

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd. accept no responsibility in the event of inaccuracy. The actual positions of pipes should be determined on site.

Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

Southern Water

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APPENDIX H

Micro Drainage Calculations and Preliminary Drainage Strategy

(Drawing No. 19-241/004)

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	4.040	Urban	0.000
SAAR (mm)	800	Region Number	Region 7

Results l/s

QBAR Rural	8.6
QBAR Urban	8.6
Q100 years	27.5
Q1 year	7.3
Q30 years	19.5
Q100 years	27.5

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	4.333	0.333	8.6	207.4	O K
30 min Summer	4.402	0.402	8.6	255.1	O K
60 min Summer	4.480	0.480	8.6	310.1	O K
120 min Summer	4.562	0.562	8.6	370.6	O K
180 min Summer	4.608	0.608	8.6	406.1	O K
240 min Summer	4.639	0.639	8.6	430.0	O K
360 min Summer	4.677	0.677	8.6	459.7	O K
480 min Summer	4.694	0.694	8.6	473.0	O K
600 min Summer	4.702	0.702	8.6	479.2	Flood Risk
720 min Summer	4.706	0.706	8.6	482.9	Flood Risk
960 min Summer	4.683	0.683	8.6	464.6	O K
1440 min Summer	4.631	0.631	8.6	423.7	O K
2160 min Summer	4.555	0.555	8.6	365.3	O K
2880 min Summer	4.484	0.484	8.6	313.0	O K
4320 min Summer	4.377	0.377	8.6	237.7	O K
5760 min Summer	4.291	0.291	8.6	179.7	O K
7200 min Summer	4.229	0.229	8.5	139.0	O K
8640 min Summer	4.186	0.186	8.3	111.4	O K
10080 min Summer	4.158	0.158	8.0	94.0	O K
15 min Winter	4.370	0.370	8.6	232.8	O K
30 min Winter	4.447	0.447	8.6	286.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.896	0.0	206.4	19
30 min Summer	85.351	0.0	258.3	33
60 min Summer	53.214	0.0	328.2	62
120 min Summer	33.177	0.0	409.8	122
180 min Summer	25.166	0.0	466.6	182
240 min Summer	20.685	0.0	511.5	242
360 min Summer	15.690	0.0	582.1	360
480 min Summer	12.897	0.0	637.9	478
600 min Summer	11.077	0.0	684.8	526
720 min Summer	9.782	0.0	725.6	594
960 min Summer	7.788	0.0	769.8	722
1440 min Summer	5.647	0.0	836.2	980
2160 min Summer	4.095	0.0	916.5	1364
2880 min Summer	3.260	0.0	972.7	1756
4320 min Summer	2.419	0.0	1080.9	2504
5760 min Summer	1.958	0.0	1170.2	3176
7200 min Summer	1.662	0.0	1241.0	3888
8640 min Summer	1.453	0.0	1301.6	4504
10080 min Summer	1.297	0.0	1353.9	5240
15 min Winter	136.896	0.0	231.7	18
30 min Winter	85.351	0.0	289.8	33

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	4.534	0.534	8.6	349.6	O K
120 min Winter	4.626	0.626	8.6	419.9	O K
180 min Winter	4.681	0.681	8.6	463.0	O K
240 min Winter	4.717	0.717	8.6	491.9	Flood Risk
360 min Winter	4.760	0.760	8.6	526.8	Flood Risk
480 min Winter	4.782	0.782	8.6	545.0	Flood Risk
600 min Winter	4.793	0.793	8.6	553.6	Flood Risk
720 min Winter	4.796	0.796	8.6	556.3	Flood Risk
960 min Winter	4.767	0.767	8.6	532.4	Flood Risk
1440 min Winter	4.705	0.705	8.6	482.0	Flood Risk
2160 min Winter	4.588	0.588	8.6	390.6	O K
2880 min Winter	4.477	0.477	8.6	308.3	O K
4320 min Winter	4.313	0.313	8.6	194.3	O K
5760 min Winter	4.205	0.205	8.4	123.4	O K
7200 min Winter	4.151	0.151	7.9	89.7	O K
8640 min Winter	4.133	0.133	7.0	78.8	O K
10080 min Winter	4.121	0.121	6.3	71.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	53.214	0.0	367.9	62
120 min Winter	33.177	0.0	459.3	120
180 min Winter	25.166	0.0	522.8	178
240 min Winter	20.685	0.0	573.0	236
360 min Winter	15.690	0.0	652.1	350
480 min Winter	12.897	0.0	714.6	462
600 min Winter	11.077	0.0	767.0	570
720 min Winter	9.782	0.0	812.6	670
960 min Winter	7.788	0.0	861.9	760
1440 min Winter	5.647	0.0	935.4	1068
2160 min Winter	4.095	0.0	1026.7	1492
2880 min Winter	3.260	0.0	1089.7	1876
4320 min Winter	2.419	0.0	1211.3	2592
5760 min Winter	1.958	0.0	1310.8	3224
7200 min Winter	1.662	0.0	1390.1	3752
8640 min Winter	1.453	0.0	1458.2	4488
10080 min Winter	1.297	0.0	1517.2	5152

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 454200 105200 SU 54200 05200
C (1km)	-0.026
D1 (1km)	0.438
D2 (1km)	0.327
D3 (1km)	0.384
E (1km)	0.298
F (1km)	2.267
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.831

Time (mins) From:	To:	Area (ha)
0	4	0.831

Model Details

Storage is Online Cover Level (m) 5.000

Tank or Pond Structure

Invert Level (m) 4.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	572.0	1.000	909.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0136-8600-1000-8600
Design Head (m)	1.000
Design Flow (l/s)	8.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	136
Invert Level (m)	4.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	8.6
Flush-Flo™	0.299	8.6
Kick-Flo®	0.664	7.1
Mean Flow over Head Range	-	7.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.9	1.200	9.4	3.000	14.5	7.000	21.7
0.200	8.4	1.400	10.1	3.500	15.6	7.500	22.4
0.300	8.6	1.600	10.7	4.000	16.6	8.000	23.1
0.400	8.5	1.800	11.3	4.500	17.5	8.500	23.8
0.500	8.2	2.000	11.9	5.000	18.4	9.000	24.5
0.600	7.8	2.200	12.5	5.500	19.3	9.500	25.1
0.800	7.7	2.400	13.0	6.000	20.1		
1.000	8.6	2.600	13.5	6.500	20.9		

N

17.4m

POSBROOK LANE

BELLFIELD

120

113

El Sub Sta

Playground

SHARED POS

1-2

3

4

5

6

26

25

24

23

19-22

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15-18

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33

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24

24a

25

26

Sinks

Westering

Posbrook House

10

Path (um)

17.4m

CONNECT INTO EXISTING NETWORK

EXISTING SEWER RUN TO BE ABANDONED

EXISTING SEWER RUN TO BE ABANDONED

DIVERT EXISTING SEWER

EXISTING SEWER RUN TO BE ABANDONED

EXISTING 1000mm SYPHON SEWER TO BE RETAINED

EXISTING SYPHON SEWER DEPTH TO BE CONFIRMED

FOR CONTINUATION SEE DRAWING BELOW

FOR CONTINUATION SEE INSET ABOVE

HYDROBRAKE FLOW CONTROL DISCHARGE LIMITED TO 8.6 l/s

FW

1000

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS ISSUED BY THE ARCHITECT.
3. SURROUNDING TOPOGRAPHICAL DATA WAS PRODUCED BY ENCOMPASS SURVEYS IN JUNE 2016. ODYSSEY DOES NOT TAKE RESPONSIBILITY FOR THE ACCURACY OF THE SURVEY INFORMATION.
4. SITE LAYOUT HAS BEEN PROVIDED BY HGP ARCHITECTS (DRAWING NO. 16.092.02 REV. J)
5. PROPOSALS ARE INDICATIVE ONLY TO DEMONSTRATE THE PRELIMINARY DRAINAGE STRATEGY AND ARE SUBJECT TO EVOLVE IN LINE WITH DETAILED DESIGN REQUIREMENTS.
6. THE FOUL PUMPING STATION IS TO BE PRIVATE AND UNDERGROUND

LEGEND:

- SITE BOUNDARY
- EXISTING FOUL SYPHON SEWER PIPE
- EXISTING FOUL SEWER NETWORK
- PROPOSED SURFACE WATER SEWER NETWORK INC. MANHOLES
- PROPOSED FOUL WATER SEWER NETWORK INC.MANHOLES
- PROPOSED PRIVATE PACKAGED PUMPING STATION
- PROPOSED RISING MAIN
- PROPOSED ATTENUATION BASIN
- HYDROBRAKE CHAMBER
- INDICATIVE HEADWALL

Rev	Amendments	Drn	Chk	App	Date

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Job Title

POSBROOK LANE
TITCHFIELD

Drawing Title

PRELIMINARY DRAINAGE STRATEGY

Client

FOREMAN HOMES

Scale	Date	Designed
1:500 @ A1	OCT 19	NA
Drawn	Checked	Approved
NA	GG	GG
Job No	Drawing No	Rev
19-241	19-241/004	

P:\19-241 - Posbrook Lane, Titchfield\Tech\Acad\Drawings\19-241-004 Preliminary Drainage Strategy.dwg