Technical Note

Project: **Cranbourne Drive, Otterbourne**

Subject: **Preliminary Flood Risk and Drainage Review**

Client:	Barwood Land	**Version:**	Rv2
Project No:	06485	**Author:**	Charlotte Turner
Date:	14/12/2022	**Approved:**	Malcolm Crowther / Alison Caldwell

1 Introduction

1.1.1 PJA has been commissioned by Barwood Land to undertake a preliminary flood risk and drainage review to support a proposed residential-led development at Cranbourne Drive, Otterbourne.

1.1.2 This Technical Note sets out the findings of our initial review of potential flood risk, surface water drainage and foul water drainage at the Site, with the aim of enhancing understanding of the likely constraints and potential risks in this regard.

1.1.3 In addition, this Technical Note includes an initial high-level assessment of surface water attenuation requirements and initial guidance identifying the key opportunities and constraints to inform the evolving masterplan.

2 Site Context

2.1 Site Location

2.1.1 The proposed development is approximately 14.6ha and is located to the west of Otterbourne village in Hampshire. The Site is bound by Cranbourne Drive to the east, beyond which lies existing residential development. The M3 is situated to the west of the Site, beyond which lies existing woodland and greenfield land. Furthermore, Otterbourne Common and Primary School are situated to the south of the development.

2.1.2 A Site Location Plan is available in Figure 2-1.

LOCATION Park Point
17 High Street
Longbridge
B31 2UQ
UK

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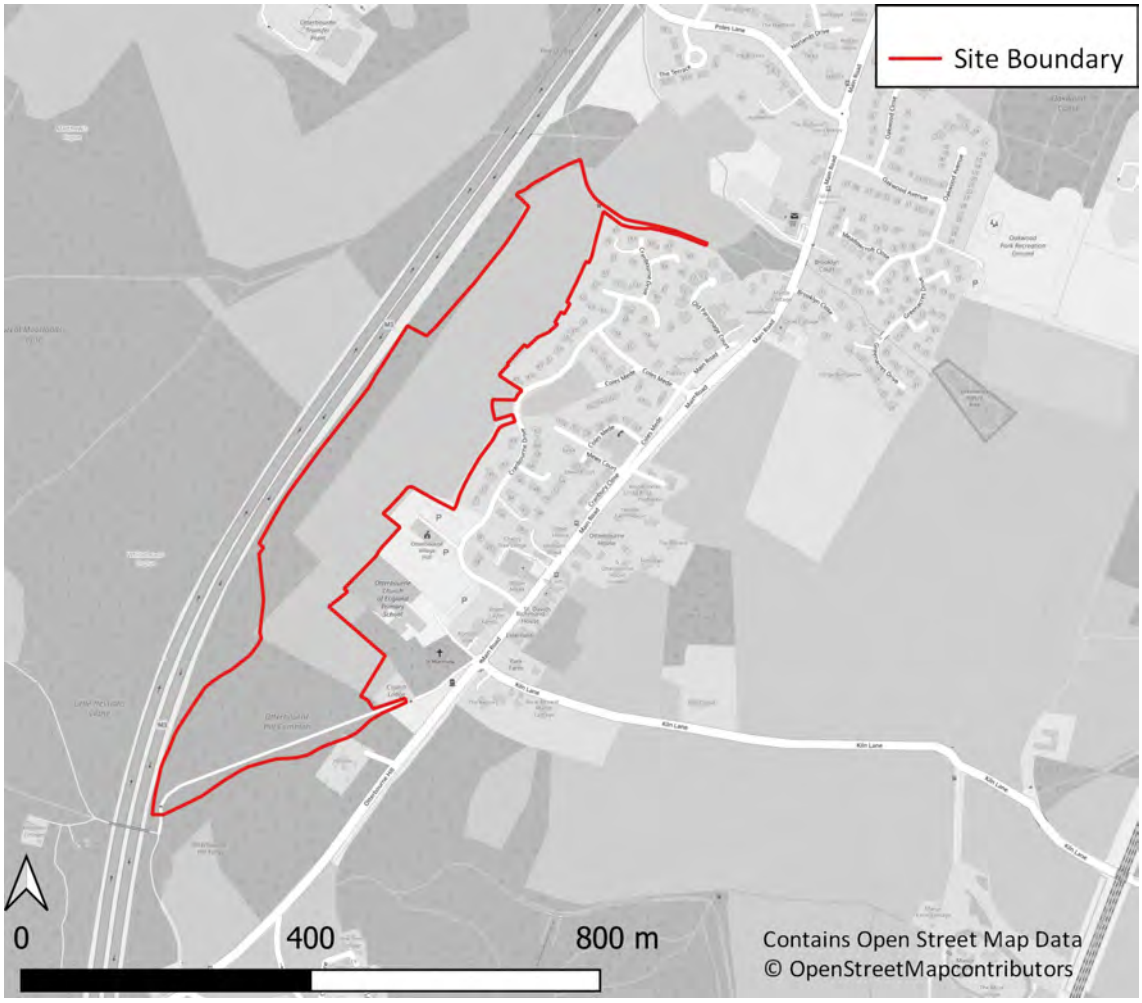


Figure 2-1: Site Location Plan

2.2 Site Topography

2.2.1 From a review of the topographic survey provided by Survey Hub, dated September 2022, the topography generally slopes north easterly towards Cranbourne Drive. The highest elevation is approximately 47.6mAOD to the southeast of the Site. The lowest elevation is 30.9mAOD situated to the northeast of the Site.

2.2.2 The Site topographic survey is included as Appendix H to this technical note.

2.2.3 An extract of the publicly available 1m DTM LiDAR is available in Figure 2-2.

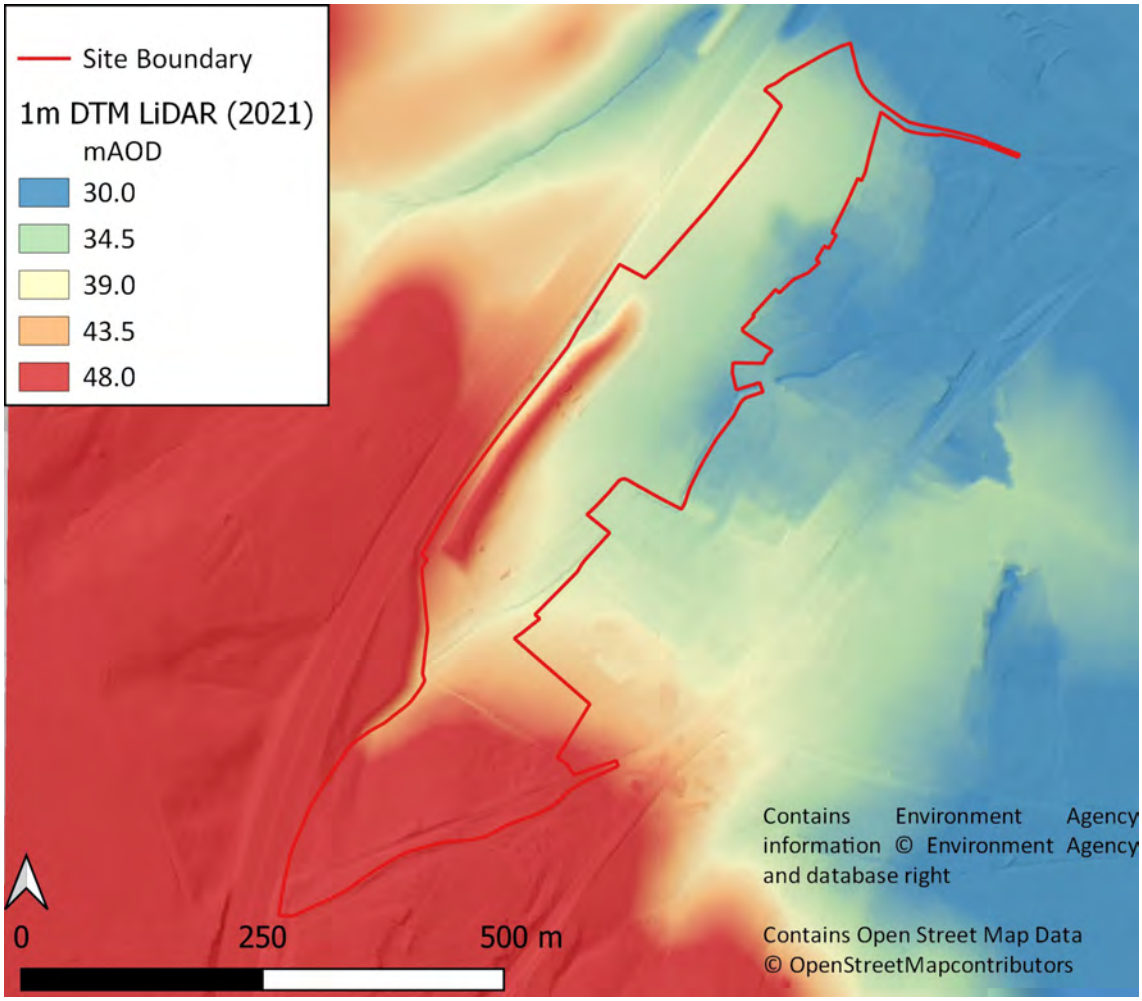


Figure 2-2: LiDAR 1m DTM Extract

2.3 Existing Hydrological Regime

2.3.1 The Otterbourne, an Environment Agency Main River, is situated within the Site Boundary to the east of the development, adjacent to Cranbourne Drive. The watercourse is assumed to be culverted underneath the existing primary school and village hall to the southeast before flowing north easterly through the development Site.

2.3.2 The upstream extent of the Otterbourne is classified as an ordinary watercourse, however after passing through the culvert it is shown to be classified as a Main River as indicated within the Flood Map for Planning.

2.3.3 The topographic survey provided by Survey Hub, dated September 2022, also shows two ordinary watercourses bisecting the Site to the southwest. These watercourses are assumed to flow north easterly, joining the Otterbourne.

2.3.4 Furthermore, the River Itchen, an Environment Agency Main River is situated approximately 2.3km to the east of the development.

2.3.5 These watercourses are identified within Figure 2-3.

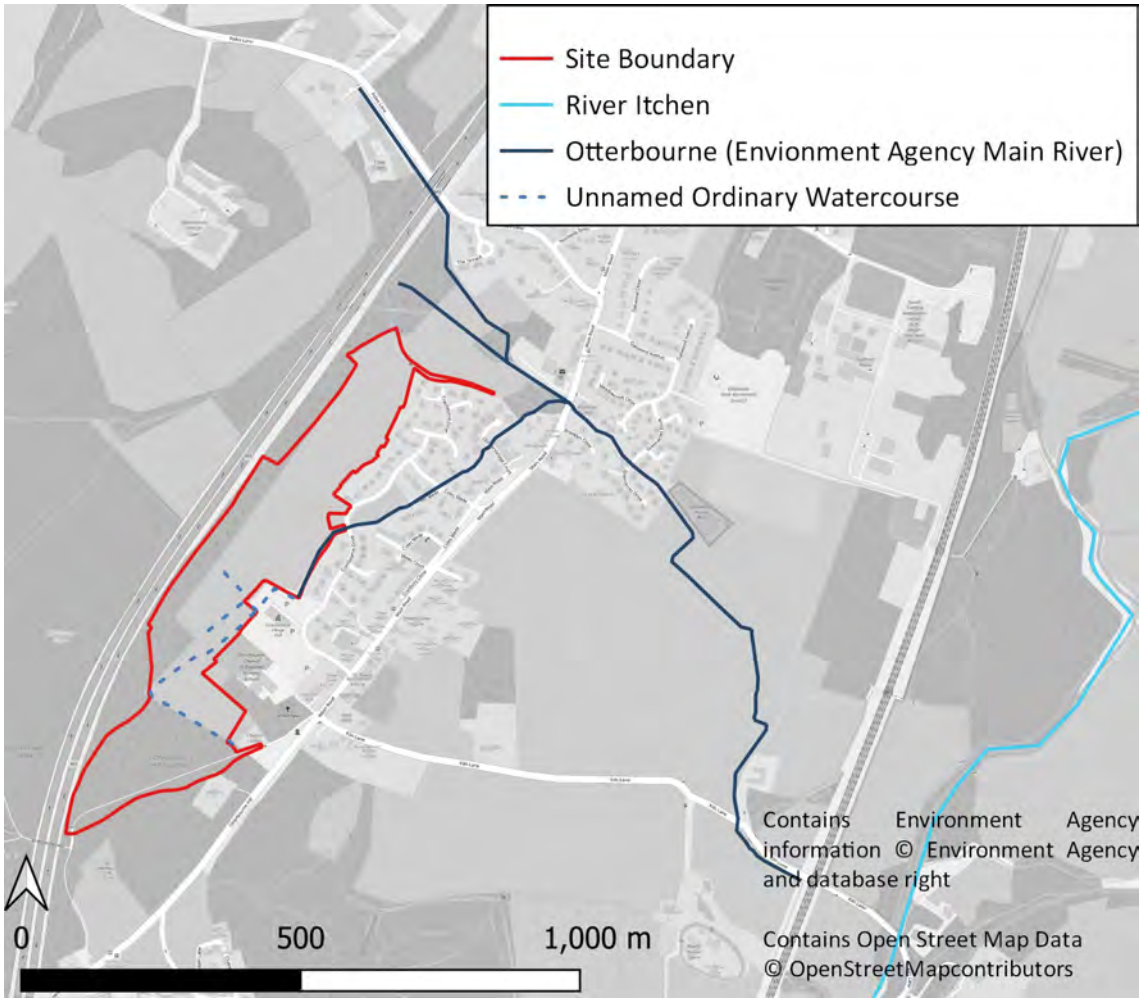


Figure 2-3: Existing Hydrological Regime

2.4 Existing Drainage

2.4.1 From a review of the existing Southern Water asset mapping, no public surface water or foul water sewers are situated within the Site.

2.4.2 The Southern Water asset mapping shows surface water and foul water sewers located to the east of the development, associated with existing residential development.

2.4.3 An extract of the Southern Water asset mapping is available in Figure 2-4 and included within Appendix A.

Figure 2-4: Southern Water Asset Mapping Extract

2.5 Site Geology

BGS Mapping

2.5.1 From a review of the publicly available British Geological Survey (BGS) Geology of Britain Viewer[1], the Site is underlain predominantly by a bedrock geology of 'London Clay Formation – Clay, Silt and Sand.'

2.5.2 To the north of the Site, a band of 'Lambeth Group – Sand' and 'Lambeth Group – Clay, Silt and Sand' is situated.

2.5.3 An extract of the BGS bedrock geology is available respectively in Figure 2-5.

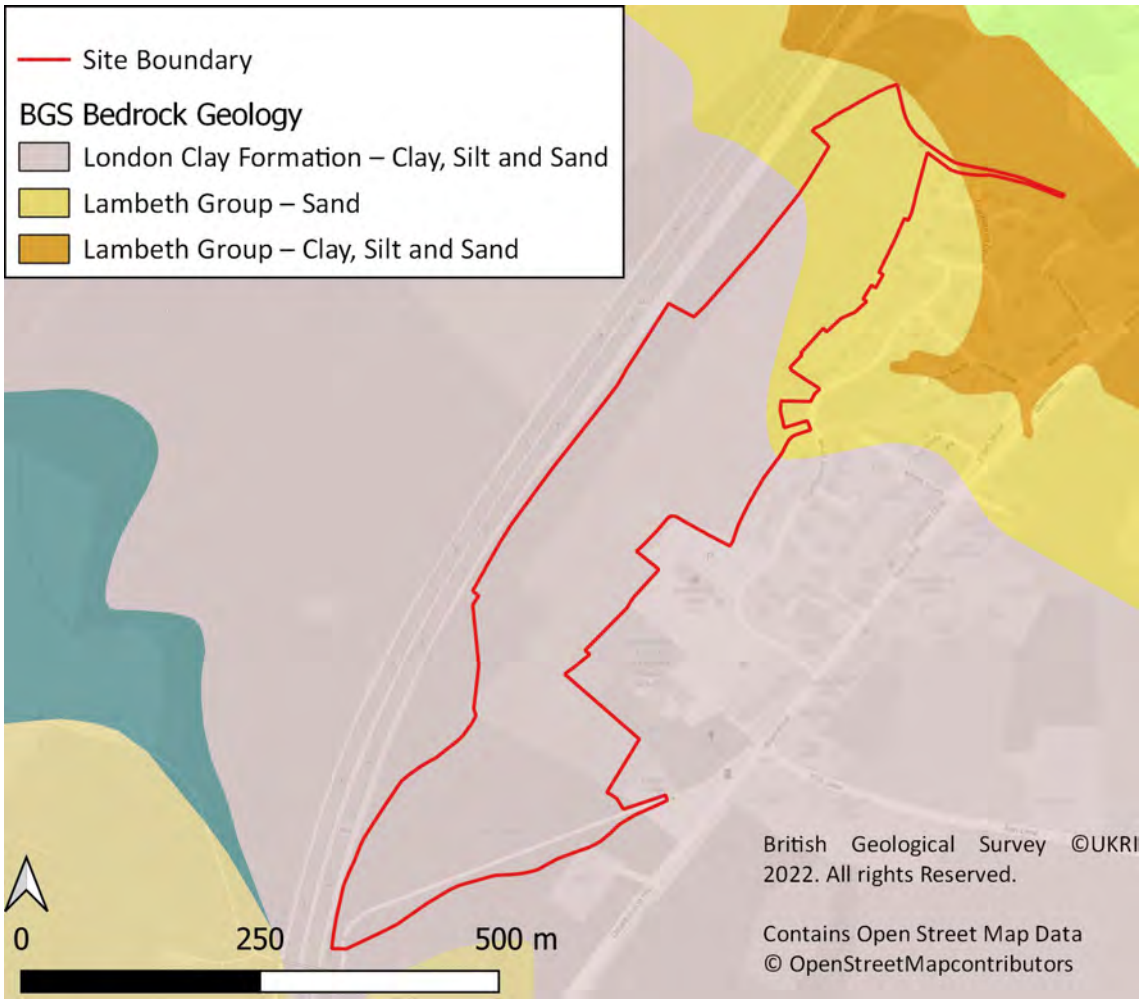


Figure 2-5: BGS Bedrock Geology Extract

[1] https://mapapps2.bgs.ac.uk/geoindex/home.html

2.5.4 The BGS Superficial Geology Mapping identifies that there are no superficial deposits situated within the Site.

Cranfield University Soilscape Viewer

2.5.5 The Cranfield University Soilscape viewer[2] describes the soils as 'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils' to the north and 'Freely draining very acid sandy and loamy soils' to the south of the development Site.

Hydrogeology

2.5.6 The publicly available DEFRA Magic Mapping[3] Bedrock Aquifer Map, identifies that the Site is underlain predominantly by an Unproductive Aquifer within its bedrock, which is defined as *"Strata that are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them."* This is consistent with the characteristics of London Clay bedrock.

2.5.7 To the north, a band of the Site is underlain by a Secondary A Aquifer within its bedrock, which is defined as "Aquifers that comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers".

2.5.8 The Site is situated with a Zone 1 Groundwater Source Protection Zone.

2.5.9 Given the predominant bedrock geology underlying the Site consists of London Clay Formation – Clay, Silt and Sand, discharging surface water via infiltration is unlikely to be viable.

2.6 Proposed Development

2.6.1 The Site proposal consists of a residential-led development. The proposed illustrative masterplan produced by BHB Architects dated October 2022, is available in Appendix B and an extract is available in Figure 2-6.

[2] http://www.landis.org.uk/soilscapes/
[3] https://magic.defra.gov.uk/MagicMap.aspx

Figure 2-6: Illustrative Masterplan

2.7 LLFA Pre-Application Advice

2.7.1 Hampshire County Council as the Lead Local Flood Authority (LLFA) were consulted regarding pre-application advice for the proposed development at Cranbourne Drive, Otterbourne. A response was received from the LLFA on the 18th November 2022 in relation to flood risk and drainage guidance for the development.

2.7.2 The letter states that flow paths should be retained within the Site in relation to fluvial and pluvial sources, with development restricted to areas at very low risk.

2.7.3 The surface water drainage strategy should consider the possibility of infiltrating surface water in accordance with BRE Digest 365 Design Guidance. If this is not viable, attenuated surface water should discharge to the existing watercourse within the development.

2.7.4 Furthermore, attenuation storage should be calculated so that flooding does not occur for the 1 in 30-year storm event plus the revised peak rainfall allowance. The 1 in 100-Year storm event plus peak rainfall allowance must not cause flood risk to buildings and should be accommodated within the proposed drainage system. Discharges to the watercourse should be restricted so that runoff from the development does not exceed the equivalent greenfield rate for each storm, or generally limited to Qbar.

2.7.5 The surface water drainage strategy should be designed to include sustainable drainage features to encompass multiple benefits of biodiversity, amenity, water quality and quantity.

2.7.6 Pre-application advice received from Hampshire County Council is available in Appendix G.

3 Potential Flood Risk

3.1.1 The potential flood risk to and from the Site has been assessed based on a review of publicly available information (e.g., Environment Agency flood data). A summary of the flood risk at the Site is provided in Table 3-1 and discussed in more detail in the chapters below.

Table 3-1: Potential Sources of Flood Risk

Source of Flooding	On Site Presence
Fluvial	✓
Surface Water	✓
Reservoirs	×
Groundwater	×
Sewers	×

3.2 Fluvial Sources

3.2.1 From a review of the publicly available Flood Map for Planning[4], the majority of the Site lies outside of the maximum extents of fluvial flood risk during the 1% AEP Event (Flood Zone 3) and 0.1% AEP Event (Flood Zone 2).

3.2.2 A small area to the southeast of the Site is situated within the 1% or 0.1% AEP events, associated with the Otterbourne, an Environment Agency Main River.

3.2.3 The LLFA state that there are four records of flooding within a 250m radius of the development. The mapping provided by Hampshire County Council shows no events to have taken place within the development boundary at Cranbourne Drive, Otterbourne.

[4] https://flood-map-for-planning.service.gov.uk/

3.2.4 The proposed residential development at the Site is classified as More Vulnerable development. Under Annex 3 of the NPPF, More Vulnerable development is only considered appropriate within Flood Zone 1 and Flood Zone 2. Given this, providing the development applies the Sequential Approach and steers More Vulnerable development away from Flood Zones 2 and 3, whilst at the same time providing safe access and egress, the Site should be considered appropriate for development.

3.2.5 An extract of the Flood Map for Planning is shown respectively in Figure 3-1.

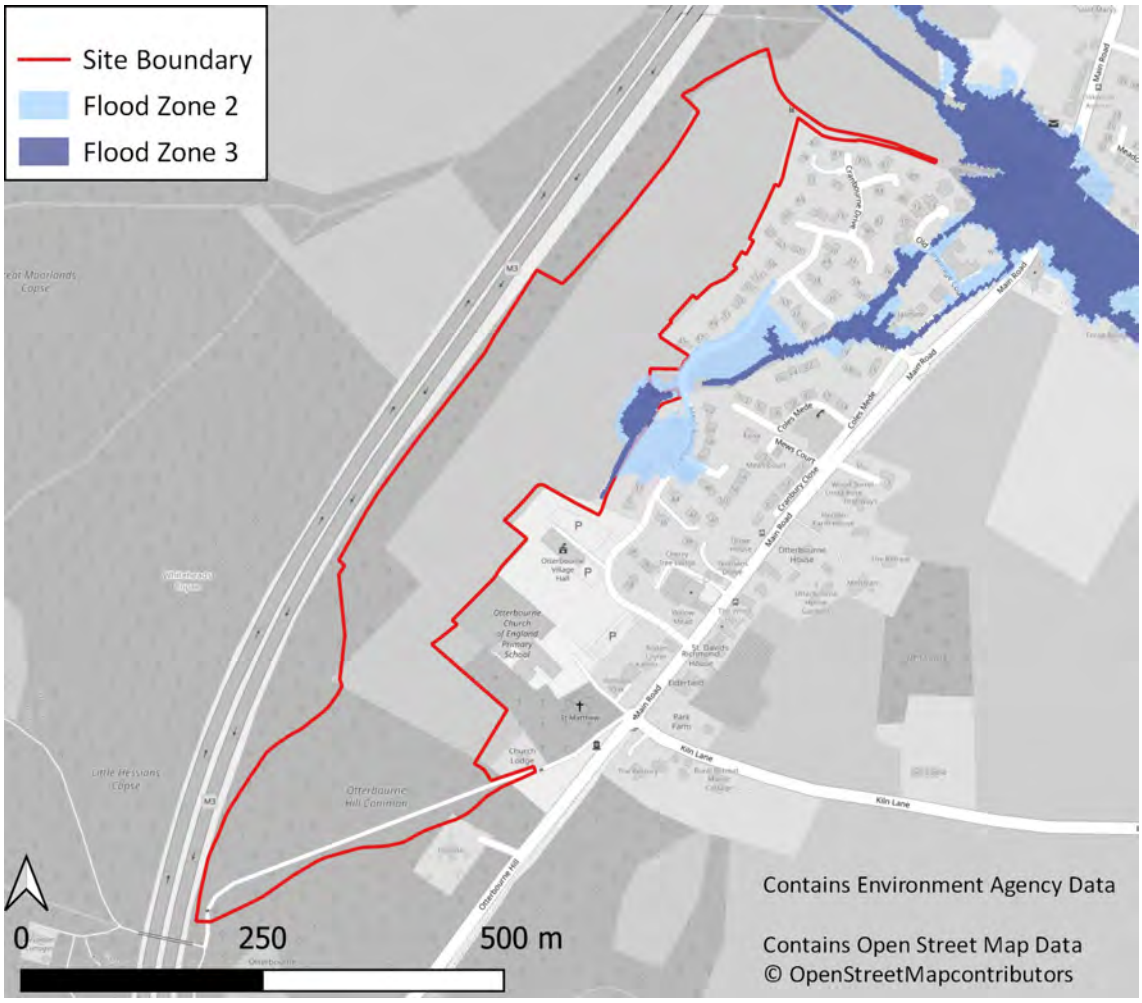


Figure 3-1: Flood Map for Planning Extract

3.2.6 Areas of the development are situated within Flood Zone 1, 2 and 3 as shown within Figure 3-1 above. The masterplan has applied the sequential approach and steers more vulnerable development away from Flood Zones 2 and 3. Where the development is situated within the 0.1% and 1% AEP events, water compatible development is currently proposed.

3.2.7 The proposed access road for the Site connects to Cranbourne Drive to the east of the development which is situated within Flood Zone 2 as shown within Figure 3-1. This location has been identified as the only point of vehicular access to the Site in the current masterplan, therefore safe access and egress have been considered further in Section 3.2.18.

3.2.8 In accordance with the NPPF, no development is permitted within Flood Zone 3a and 3b and therefore all development should be proposed outside of the functional floodplain in accordance with national guidance. Therefore, the potential fluvial flood risk at the Site may be considered to be at medium risk.

Vulnerability Classification

3.2.9 Annex 3 of the NPPF, reprinted in Table 3-2, summarises the flood risk vulnerability classification for the different types of development. The proposed residential development at the Site is classified as More Vulnerable development. An extract of the PPG Table 2 is provided in Table 3-3.

Table 3-2: Vulnerability Classification (Annex 3 NPPF Extract)

Class	Description
More vulnerable	Hospitals Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. Non–residential uses for health services, nurseries and educational establishments. Landfill* and Sites used for waste management facilities for hazardous waste. Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Source: Table 2, NPPF Planning Practice Guidance, Reference ID: 7-066-20140306	

Sequential and Exception Test Requirements

3.2.10 In accordance with the NPPF Table 3, More Vulnerable development is appropriate within Flood Zone 1 and Flood Zone 2 as shown within Table 3-3. Given this, no development is permitted within Flood Zone 3a and Flood Zone 3b and all development should be built outside of the functional floodplain in accordance with the NPPF.

Table 3-3: Flood risk vulnerability and flood zone 'incompatibility' (Flood Risk & Coastal Change PPG Table 2)

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b	Exception Test required*	X	X	X	✓*

"†" In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

"" In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, should be designed and constructed to:*

- *remain operational and safe for users in times of flood;*
- *result in no net loss of floodplain storage;*
- *not impede water flows and not increase flood risk elsewhere*

Hydraulic Modelling

3.2.11 PJA received a copy of the Environment Agency Hydraulic Model data for the River Itchen and Otterbourne on the 10th October 2022. It should be noted that this hydraulic model does not extend to include the full length of the watercourse present within the Site. The model was built utilising Flood Modeller and TUFLOW to produce a 1D-2D linked model to represent the watercourse and floodplain accurately.

3.2.12 The Otterbourne (Main River) has been modelled and the extents received from the Environment Agency match the extents shown within Figure 3-1 from the Flood Map for Planning.

3.2.13 In August 2022, the Environment Agency revised the PPG (Planning Policy Guidance), bringing it in line with changes introduced to the National Planning Policy Framework (NPPF) in 2021. These updates revised the definition of the functional floodplain (Flood Zone 3b) from an annual probability of 1 in 20 (5% AEP) to 1 in 30 (3.3% AEP) or greater in any year. This change will likely include more land to be defined as the functional floodplain and development within this flood zone is typically considered not to be appropriate.

3.2.14 Furthermore, the Environment Agency has modelled and provided the flood extents for the 3.33% AEP Event (1 in 30 Year Event) and the 1% AEP Event with 35% Climate Change for peak river flows (Design Event). These flood outlines, and the Flood Zones as shown within the Flood Map for Planning, are shown below in Figure 3-2.

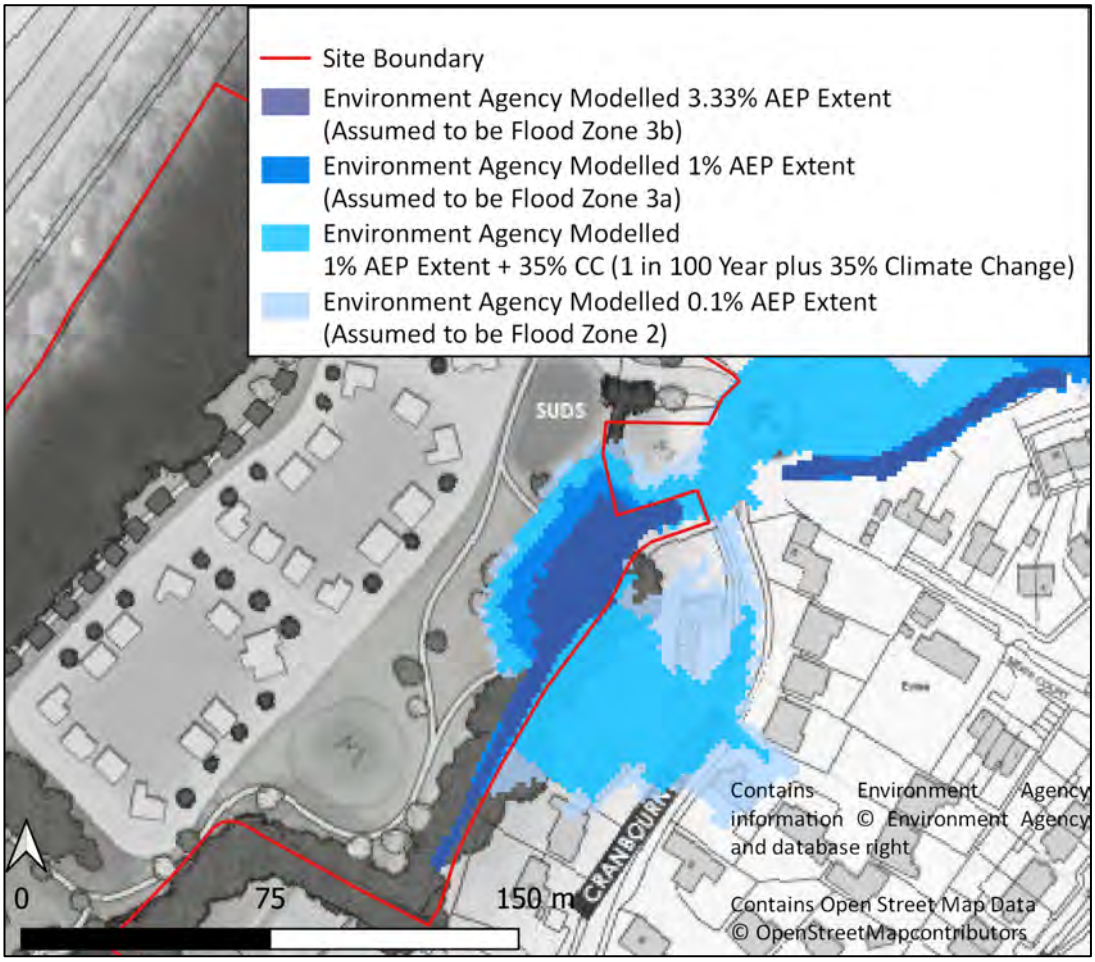


Figure 3-2: Environment Agency Modelled Extents

3.2.15 The flood extents provided in Figure 3-2 show that the proposed residential development is situated outside of the functional floodplain.

3.2.16 As such, it is advised that all development, including any Sustainable Drainage Systems (SuDS), is situated outside of the 3.33% and 1% AEP Events (assumed equivalent to Flood Zones 3b and 3a respectively) to demonstrate that a Sequential Approach to the development has been adopted and fluvial flood risk to the development is reduced as far as practicable.

3.2.17 It should be noted that the Environment Agency and / or Lead Local Flood Authority (LLFA) may require the hydraulic model to be extended upstream into the Site and made Site-specific to support any future planning application.

Hazard Rating

3.2.18 The received Environment Agency data also includes hazard grid mapping produced by the model, which provides further detailed information regarding the risk to the proposed development and its users. Figure 3-3 shows the 'Hazard to People Classification' mapping for the 1% AEP event plus 35% Climate Change for peak river flows.

3.2.19 The current Planning Practice Guidance: Flood Risk & Coastal Change requires safe access and egress to be provided for the 0.1%AEP plus climate change event. This event has not been run for the model data provided and may be required to demonstrate safe access and egress is available in accordance with the PPG.

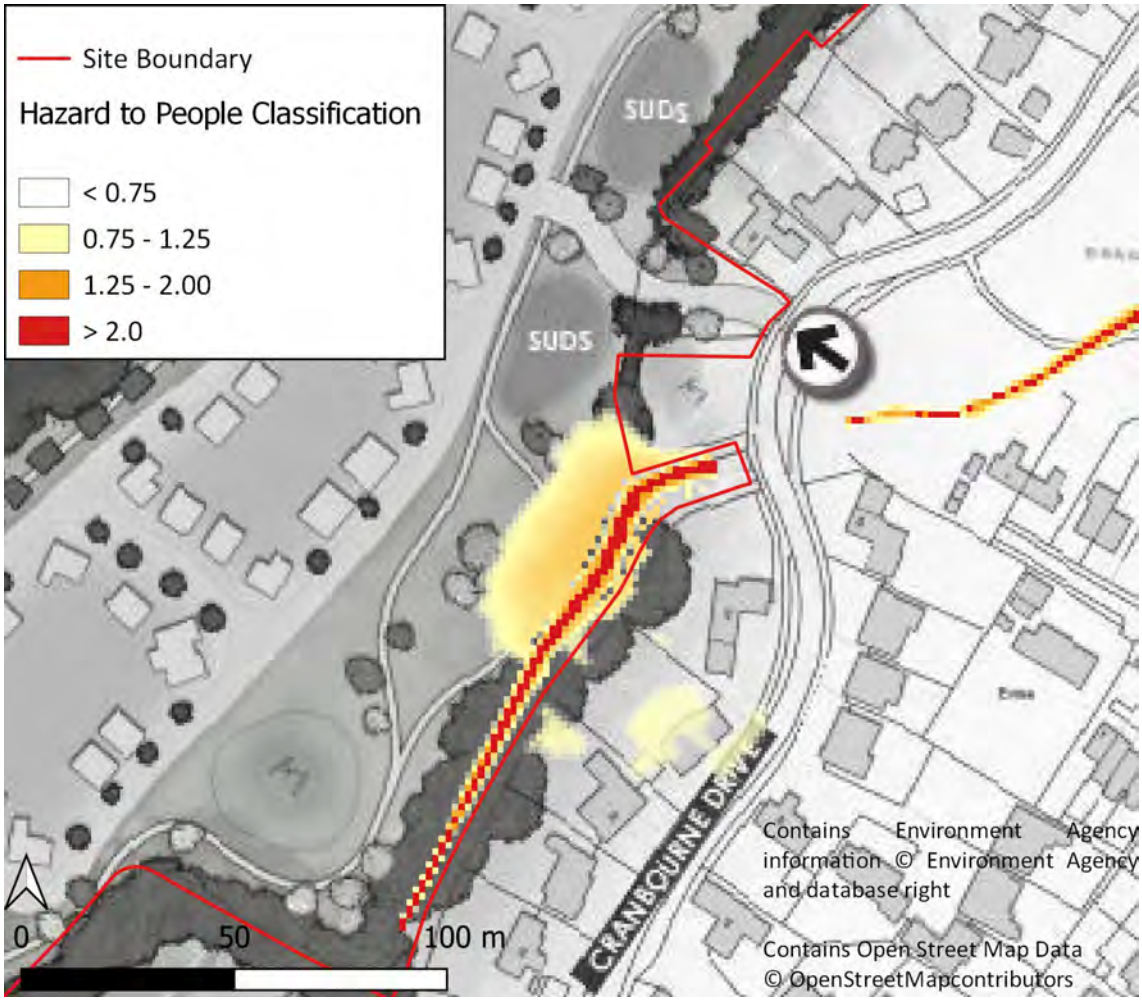


Figure 3-3: Hazard to People Classification Mapping

Table 3-4: Hazard to People Classification using Hazard Rating [5]

HR	Depth of flooding - d (m)												
	DF = 0.5				DF = 1								
Velocity v (m/s)	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.0	0.03 + 0.5 = 0.53	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.13 + 0.5 = 0.63	0.15 + 1.0 = 1.15	0.20 + 1.0 = 1.20	0.25 + 1.0 = 1.25	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25
0.1	0.03 + 0.5 = 0.53	0.06 + 0.5 = 0.56	0.12 + 0.5 = 0.62	0.15 + 0.5 = 0.65	0.18 + 1.0 = 1.18	0.24 + 1.0 = 1.24	0.30 + 1.0 = 1.30	0.36 + 1.0 = 1.36	0.48 + 1.0 = 1.48	0.60 + 1.0 = 1.60	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.55
0.3	0.04 + 0.5 = 0.54	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.19 + 0.5 = 0.69	0.23 + 1.0 = 1.23	0.30 + 1.0 = 1.30	0.38 + 1.0 = 1.38	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	1.13 + 1.0 = 2.13	1.50 + 1.0 = 2.50	1.88 + 1.0 = 2.88
0.5	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.25 + 0.5 = 0.75	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	2.50 + 1.0 = 3.50
1.0	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.38 + 0.5 = 0.88	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	2.25 + 1.0 = 3.25	3.00 + 1.0 = 4.00	3.75 + 1.0 = 4.75
1.5	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.50 + 0.5 = 1.00	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	2.00 + 1.0 = 3.00	3.00 + 1.0 = 4.00	4.00 + 1.0 = 5.00	5.00 + 1.0 = 6.00
2.0	0.13 + 0.5 = 0.63	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	0.63 + 0.5 = 1.13	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.75	6.00	7.25
2.5	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.60 + 0.5 = 1.10	0.75 + 0.5 = 1.25	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	1.80 + 1.0 = 2.80	3.40	4.00	5.50	7.00	8.50
3.0	0.18 + 0.5 = 0.68	0.35 + 0.5 = 0.85	0.70 + 0.5 = 1.20	0.88 + 0.5 = 1.38	1.03 + 1.0 = 2.05	1.40 + 1.0 = 2.40	1.75 + 1.0 = 2.75	3.10	3.80	4.50	6.25	8.00	9.75
3.5	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.80 + 0.5 = 1.30	1.00 + 0.5 = 1.50	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	3.00	3.40	4.20	5.00	7.00	9.00	11.00
4.0	0.23 + 0.5 = 0.73	0.45 + 0.5 = 0.95	0.90 + 0.5 = 1.40	1.13 + 0.5 = 1.63	1.35 + 1.0 = 2.35	1.80 + 1.0 = 2.80	3.25	3.70	4.60	5.50	7.75	10.00	12.25
4.5	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	1.00 + 0.5 = 1.50	1.25 + 0.5 = 1.75	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.00	5.00	6.00	8.50	11.00	13.50
5.0	0.28 + 0.5 = 0.78	0.60 + 0.5 = 1.10	1.10 + 0.5 = 1.60	1.38 + 0.5 = 1.88	1.65 + 1.0 = 2.65	3.20	3.75	4.30	5.40	6.50	9.25	12.00	14.75

Flood Hazard Rating (HR)	Colour Code	Hazard to People Classification
Less than 0.75		Very low hazard - Caution
0.75 to 1.25		Danger for some – includes children, the elderly and the infirm
1.25 to 2.0		Danger for most – includes the general public
More than 2.0		Danger for all – includes the emergency services

3.2.20 Table 3-2 defines the Hazard to People Classification based on the Flood Hazard Rating. The hazard mapping for the 1% AEP event plus 35% Climate Change for peak river flows shows that the majority of the development has a flood hazard rating of less than 0.75, showing the development to be at very low risk.

5 https://assets.publishing.service.gov.uk/media/602d04a98fa8f5037d371a08/FLOOD_HAZARD_RATINGS_AND_THRESHOLDS_explanatory_note.pdf

3.2.21 Furthermore, access and egress to the east of the development connects to Cranbourne Drive which is situated within Flood Zone 2. The mapping shows a hazard rating of approximately 0.5, representing a very low hazard to people classification allowing users and emergency response vehicles to access and egress the development safely during a design flood event.

3.3 Surface Water Sources

3.3.1 From a review of the publicly available, Long-Term Flood Risk Information, Flood Risk from Surface Water Map, the Site is predominantly identified to be at low risk from surface water flooding.

3.3.2 A surface water flow path is situated along the south-eastern border of the Site, associated with the Otterbourne, an Environment Agency Main River. A small area of surface water ponding is also situated to the east of the development assumed to be associated with a depression within the localised topography.

3.3.3 An extract of the Long-Term Flood Risk Information, Flood Risk from Surface Water mapping is available in Figure 3-4.

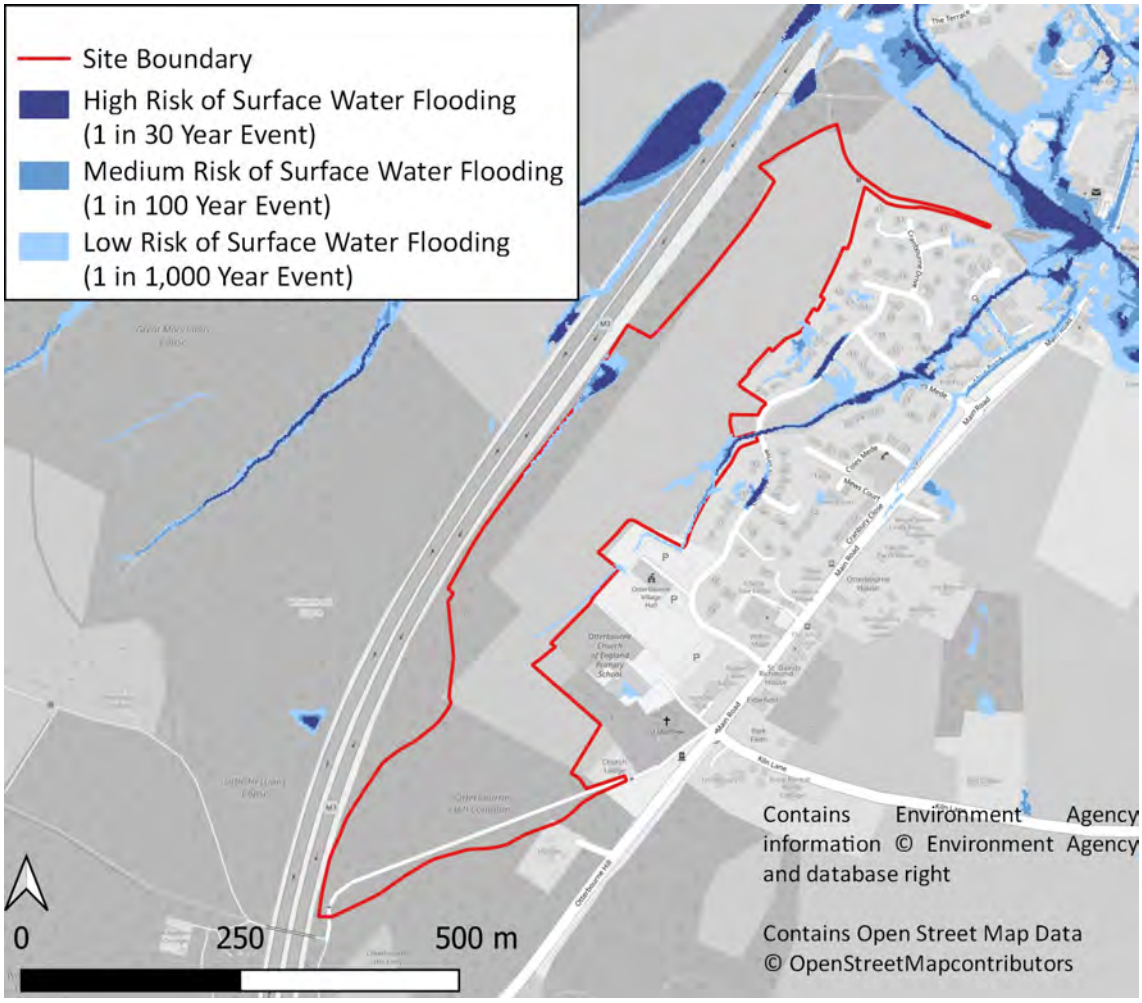


Figure 3-4: Long-Term Flood Risk, Surface Water Flood Risk Mapping

3.4 Groundwater Sources

3.4.1 Groundwater flooding tends to occur after long periods of sustained rainfall. Higher rainfall typically increases water infiltrating into the ground and results in the water table rising above normal levels.

3.4.2 From a review of the Level 1 Winchester City Council Strategic Flood Risk Assessment, groundwater flooding has been recorded within the Otterbourne area. Localised areas of flood risk have been mapped within Otterbourne for which groundwater was the contributory factor. Nonetheless, these areas of localised flood risk are not shown within the Site.

3.4.3 The BGS Geoindex identifies the nearest borehole to the Site is SU42SE113, situated within the red line boundary to the south of the development. The borehole was dug to approximately 3m below ground level and shows that no groundwater was encountered.

3.4.4 Given this, flood risk from groundwater sources may be considered to be low.

3.5 Sewer Sources

3.5.1 Sewer flooding occurs as a result of a number of influencing factors. It is most likely to occur during a large storm, when large volumes of rainwater enter the sewer; or it can also occur when pipes become blocked or damaged.

3.5.2 From a review of the existing Southern Water asset mapping, no public surface water or foul water sewers are situated within the Site.

3.5.3 The Winchester Level 1 Strategic Flood Risk Assessment states that sewer flooding was recorded within Otterbourne in 2006 due to prolonged heavy rainfall. The exact location of this flooding is unknown due to confidentiality reasons as specified by Southern Water.

3.5.4 Southern Water have been contacted regarding historic flood risk at the Site, however at the time of writing no formal response has been received.

3.5.5 Given this, sewer flood risk at the Site may be considered to be low.

3.6 Reservoir Failure

3.6.1 The publicly available Long-Term Flood Risk Information, Flood Risk from Reservoirs Mapping identifies that the Site is situated outside of the maximum extent of flooding from reservoirs.

3.6.2 Given this, flood risk from reservoirs is considered to be very low.

3.7 Canal Sources

3.7.1 There are no canals within the vicinity of the Site and as such, flood risk from canals may be considered negligible.

3.7.2 Given this, flood risk from canals may be considered to be very low.

4 Surface Water Drainage Strategy

4.1 Discharge Location

4.1.1 In accordance with national and local guidance, the surface water drainage hierarchy has been reviewed in the order of priority to determine the more suitable drainage location as identified in Table 4-1.

Table 4-1: Drainage Hierarchy (Derived from NPPF)

Discharge Location	Suitability	Comment
Collect for Re-Use	✓/×	Water butts and rainwater harvesting systems can collect rainwater for non-potable uses e.g., within gardens and other non-potable uses. The potential to incorporate rainwater harvesting and re-use measures will be assessed during the detailed design stage.
Infiltration	×	Given the identified underlying Site geology of London Clay Formation – Clay, Silt and Sand at the Site, discharging through infiltration from the Site is unlikely to be viable.
Watercourse	✓	There is an existing Environment Agency Main River and Unnamed Ordinary Watercourse situated within the Site.
Surface Water Sewer	✓	From a review of the Southern Water asset mapping, existing surface water sewers are situated to the east of the Site, serving existing residential development.
Combined Sewer	×	From a review of the Southern Water asset mapping, no existing public combined sewers are identified within the vicinity of the Site.

4.1.2 In accordance with the drainage hierarchy, the existing watercourse is identified as the most appropriate surface water discharge location for the Site.

4.2 Pre-Development Surface Water Runoff Rates

4.2.1 Greenfield runoff rates for the Site have been calculated using HR Wallingford Greenfield Runoff Rate Estimation Tool[6], the results are contained within Appendix C and are available in Table 4-2.

Table 4-2: Greenfield Runoff Rates

Event	14.61ha	1ha
1 in 1 Year	52.62	3.60
QBar	61.91	4.24
1 in 30 Year	142.38	9.75
1 in 100 Year	197.48	13.52

[6] https://www.uksuds.com/tools/greenfield-runoff-rate-estimation

4.2.2 Based on the Site topography, the Site has been calculated as two drainage catchments (Catchment A and Catchment B), shown in Appendix D as part of the Surface Water Drainage Strategy. The greenfield runoff estimation from each catchment has been provided in Table 4-3. In accordance with Hampshire County Council, the Site should limit discharge to a rate no greater than the QBar (Mean Annual Flood Event or a return period of approximately 1 in 2.3 years).

Table 4-3: Proposed Discharge Rate for each Drainage Catchment

Catchment	Proposed Developable Area [ha]	Proposed Discharge Rate (QBar) [l/s]
A	1.52	6.4
B	0.83	3.5
Total	**2.35**	**9.9**

4.2.3 To ensure the maximum peak discharge of surface water from the Site is maintained at a Greenfield runoff rate, on-Site attenuation will be required. The required storage volume for the attenuation of the 1 in 100 year event plus 45% climate change event for peak rainfall (design standard) has been calculated for drainage catchment A and B, assuming a proportion of impermeable area based on the concept masterplan and the estimated contributing area. At this preliminary stage it is proposed that the attenuation feature will outfall to the Otterbourne (Main River). The indicative location of the proposed attenuation feature and assumed outfall point are shown together with their estimated required capacity in the Surface Water Drainage Strategy drawing included in Appendix D.

4.2.4 It should be noted that land to the south of the development is proposed to stay as existing, undeveloped open space and therefore will continue to drain as existing.

4.2.5 A summary table of the volume of attenuation required for each catchment is provided in Table 4-4. This is based on an assumed impermeable contributing area of 60% for the catchment, with an additional 10% for urban creep.

Table 4-4: Summary of Attenuation Requirements

Drainage Catchment	Proposed Discharge Rate (l/s)	Proposed Impermeable Area [ha]	Proposed Attenuation Volume Required in 1 in 100 Year +45% Climate Change Event for peak rainfall [m^3]
A	1.52	1.00	620
B	**0.83**	**0.55**	**335**
Total	**2.35**	**1.55**	**955**

4.2.6 The proposed attenuation basin has been designed as a dry feature at this stage and will aim to provide multiple functions for amenity and biodiversity purposes, which may include a proposed permanent wet feature, particularly if such features are required to improve the Biodiversity Net Gain (BNG) scoring of the development. It should be noted that if a permanent wet feature is required then this may increase the plan area footprint of the attenuation feature. The exact nature of this requirement will be determined at the next stage of design.

4.3 SuDS Proposal

4.3.1 The National Planning Policy Framework (2021) and supporting Planning Practice Guidance (2022) requires that all new developments implement Sustainable Drainage Systems (SuDS) as the primary means of controlling surface water run-off in order to maintain flow rates and volumes discharged to the identified receptor post-development.

4.3.2 In addition to the water control benefits, CIRCA C753 'The SuDS Manual' states that: "SuDS can treat and clean surface water runoff from the urban areas so that the receiving environment is protected, while at the same time conveying, storing and infiltrating surface water to protect flood risk, river morphology and water resources, and delivering amenity and biodiversity value for the development."

4.3.3 A proposed surface water drainage strategy will therefore be designed to include SuDS which aim to provide multifunctional benefits for the development Site including limiting surface water flows to the existing greenfield discharge rates for all storm events up to, and including, the 1 in 100 Year plus 45% climate change event for peak rainfall.

4.3.4 The proposed SuDS features being explored for use within the proposed surface water drainage strategy at this stage may include:

- Swales;
- Attenuation Basins;
- Wetland Areas;
- Filter Drains;
- Filter Strips;
- Permeable Paving, and;
- Bio-retention areas.

4.3.5 Further to this, given the nature of the development Site, the proposed surface water drainage strategy has also been sensitivity tested, with an additional 10% impermeable area to account

for potential future development creep, to demonstrate the performance of the proposed surface water drainage system in events up to, and including the 1 in 100 year plus 45% climate change event for peak rainfall. This sensitivity test demonstrates the surface water drainage proposals can accommodate the additional 10% impermeable area without exacerbating third party flood risk. This also follows surface water guidance produced by Hampshire County Council as the Lead Local Flood Authority (LLFA) stating that the impact of urban creep should be included.

4.4 Future Operation and Maintenance of Surface Water Drainage

4.4.1 The responsibility for maintenance of the surface water drainage network and SuDS features may be offered to Southern Water for adoption under S104 of the Water Industry Act 1991. To meet the requirements for adoption, the proposed infrastructure will need to be designed and constructed according to Sewerage Sector Guidance – Design and Construction Guidance v2 (Water UK, 2020) and potentially to Southern Water's own particular adoptable standards.

4.4.2 At this stage it is assumed that the SuDS features will remain private and have therefore not been designed to Southern Water's adoptable standards. Should it be preferred that these features be offered to Southern Water for adoption, this may affect the current sizing and layout of the SuDS features as shown. Further to this, surface water drainage serving new roads may be offered for adoption by the Local Highway Authority.

4.4.3 Further details will be provided on the maintenance requirements of the proposed SuDS components across the Site as the surface water drainage design is developed.

5 Foul Water Drainage Strategy

5.1.1 Southern Water are the statutory water authority within the area. Asset mapping has been reviewed to understand the existing drainage system within the vicinity of the Site.

5.1.2 From a review of the existing Southern Water asset mapping, no public surface water or foul water sewers are situated within the Site.

5.1.3 The Southern Water asset mapping shows surface water and foul water sewers located to the east of the proposed development, associated with existing residential development.

5.1.4 An indicative foul water drainage strategy has been prepared (Drawing Reference 06485-WR-A-0501-P2 included as Appendix E) which implements measures to discharge foul water flows from the proposed development. Foul water flows can drain via gravity flow to existing manhole reference MH7103 to the east of the Site.

5.1.5 It is recommended that Southern Water are contacted through a Pre-Development Enquiry to understand if the existing foul water network has capacity for the proposed development at Cranbourne Drive, Otterbourne. It is recommended that the need for foul pumping is reviewed in accordance with Southern Water advice alongside earthworks, masterplanning and phasing at the next stage of design.

6 Conclusions and Recommendations

6.1.1 This Technical Note sets out our understanding of the Site and the key principles proposed to bring forward the proposed residential development in accordance with the National Planning Policy Framework (NPPF), taking into account local planning policy and best practice guidance.

6.1.2 This assessment considers that the proposed residential development may be delivered sustainably, without increasing flood risk or having a detrimental effect on water quality.

6.1.3 In August 2022, the Environment Agency revised the PPG (Planning Policy Guidance), bringing it in line with changes introduced to the National Planning Policy Framework (NPPF) in 2021. These updates revised the definition of the functional floodplain (Flood Zone 3b) from an annual probability of 1 in 20 (5% AEP) to 1 in 30 (3.3% AEP) or greater in any year.

6.1.4 The masterplan shows all residental development to be situated outside of the functional floodplain (Flood Zone 3b) to the east of the development. As such, it is advised that all development, including any Sustainable Drainage Systems (SuDS), is situated outside of the 3.33% and 1% AEP Events (assumed equivalent to Flood Zones 3b and 3a respectively) to demonstrate that a Sequential Approach to the development has been adopted and fluvial flood risk to the development is reduced as far as practicable.

6.1.5 The report concludes that the Site is largely considered to be at either very low or low risk of flooding from pluvial, reservoirs, canals, groundwater and sewers.

6.1.6 A Surface Water Drainage Strategy has been prepared to demonstrate that a sustainable drainage solution can be provided for the proposed development. The Surface Water Drainage Strategy has been designed in accordance with current sustainable development best practice and meets the requirements of Hampshire County Council (as the LLFA).

6.1.7 The proposed surface water drainage strategy aims to mimic the hydrological regime of the existing Site by discharging attenuated run-off to the Otterbourne (existing Main River) present within the Site. It is also recommended that infiltration testing in accordance with BRE Digest 365 Soakaway Design Guidance be undertaken to confirm the Site infiltration potential.

6.1.8 At this stage, it is proposed that surface water discharge from the Site will be sustainably manage to the site-specific equivalent greenfield QBar rate by vortex flow control device(s) for events up to and including the 1 in 100 year plus climate change (45%) rainfall event.

6.1.9 Site levels should be designed to convey overflow flow routes away from the proposed and existing development along strategic highways and green-blue corridors, ensuring safe access and egress to the proposed development.

6.1.10 A foul water drainage strategy has been outlined within this Technical Note, which should be developed with Southern Water during the next phase of design.

7 Limitations

7.1 Purpose

7.1.1 This document has been prepared for Barwood Land for their sole and specific use.

7.1.2 PJA Civil Engineering Ltd. accepts no responsibility or liability for any use that is made of this document other than by Barwood Land for the purposes for which it was originally commissioned and prepared.

7.1.3 The conclusions and recommendations contained herein are limited by the availability of background information and the planned use for the Site.

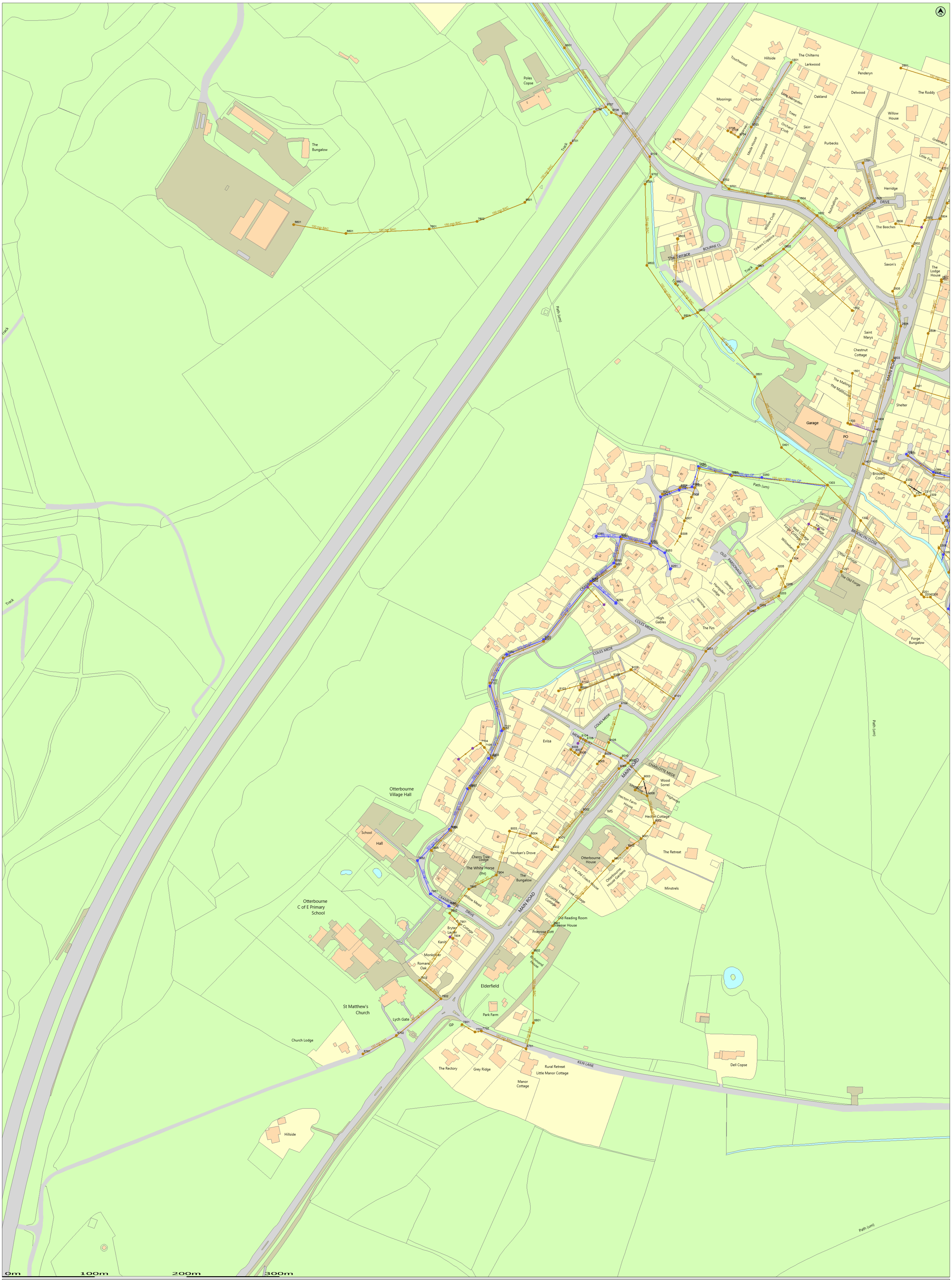
7.1.4 Third party information has been used in the preparation of this report, which PJA Civil Engineering Ltd, by necessity assumes is correct at the time of writing. Whilst all reasonable checks have been made on data sources and the accuracy of the data, PJA Civil Engineering Ltd accepts no liability for same.

7.2 CDM

7.2.1 The revised Construction (Design and Management) Regulations 2015 (CDM Regulations) came into force on April 2015 to update certain duties on all parties involved in a construction project, including those promoting the development. One of the designer's responsibilities under clause 9 (1) is to ensure that the client organisation, in this instance Barwood Land, is made aware of their duties under the CDM Regulations

7.3 Copyright

Appendix A Southern Water Asset Mapping



Data updated: 16/08/22

Scale: 1:1250 | Date: 20/09/22 | Wastewater Plan A0

Map Centre: 445764,123218 | Our Ref: 954966 - 1 | Powered by digdat

Foul Gravity Sewer | Combined Gravity Sewer | Culverted Water Course or Treated Effluent | Surface Water Gravity Sewer | Rising Main, Vacuum or Syphon

Combined Outfall | Foul Outfall | Surface Water Outfall | Surface Water Inlet

Combined Pumping Station | Surface Water Pumping Station | Foul Pumping Station | Water Treatment Works | Section 104 Area | Building Over Agreement Area

Foul Manhole | Combined Manhole | Surface Water Manhole | Side Entry Manhole, Detonation Chamber, Vortex Separator or Surface Water Soakaway

charlotte.turner@pja.co.uk

Plot

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0201	F	28.17	25.56	
0202	F	26.80	24.50	
0203	F	26.08	23.76	
0204	F	26.45	24.24	
0205	F	0.00	0.00	
0206	F	0.00	0.00	
0302	F	26.59	24.52	
0303	F	28.09	25.32	
0401	F	23.64	0.00	
0402	F	28.00	25.10	
0501	F	24.68	0.00	
0502	F	25.23	0.00	
0601	F	27.48	0.00	
0602	F	27.80	24.68	
0603	F	28.61	26.47	
0701	F	29.20	26.74	
0702	F	29.28	26.87	
0703	F	30.97	28.79	
0704	F	0.00	0.00	
0705	F	0.00	0.00	
0706	F	0.00	0.00	
1201	F	24.67	0.00	
1301	F	25.05	23.07	
1302	F	24.55	0.00	
1303	F	24.28	21.97	
1304	F	25.42	23.22	
1401	F	25.07	0.00	
1402	F	25.45	0.00	
1403	F	25.36	0.00	
1404	F	25.76	23.65	
1405	F	0.00	0.00	
1501	F	26.69	0.00	
1502	F	26.68	25.35	
1601	F	28.14	26.38	
1602	F	28.67	26.11	
1603	F	28.60	26.83	
1604	F	28.77	0.00	
1605	F	29.08	27.27	
1701	F	30.00	28.14	
1801	F	35.01	32.62	
2201	F	23.24	0.00	
2203	F	24.41	22.33	
2204	F	24.40	21.18	
2205	F	24.40	20.90	
2301	F	25.19	21.99	
2302	F	25.02	22.34	
2303	F	25.81	0.00	
2306	F	25.98	23.91	
2308	F	24.69	0.00	
2309	F	25.80	22.38	
2310	F	22.40	22.40	
2311	F	25.78	22.45	
2401	F	27.21	26.25	
2403	F	25.85	24.32	
2503	F	27.20	25.13	
2504	F	27.65	25.63	
2505	F	27.73	0.00	
2506	F	0.00	0.00	
2601	F	29.41	27.73	
2602	F	28.94	0.00	
2603	F	0.00	0.00	
2604	F	29.98	28.18	
2605	F	30.58	28.80	
2607	F	29.44	27.77	
2608	F	0.00	0.00	
2701	F	31.49	29.35	
2801	F	35.45	0.00	
5601	F	0.00	0.00	
6601	F	41.81	36.47	
6701	F	45.24	0.00	
6702	F	42.32	40.26	
7001	F	34.10	32.16	
7002	F	32.70	30.77	
7003	F	32.08	30.06	
7101	F	32.34	29.74	
7102	F	32.09	29.43	
7103	F	31.55	29.20	
7104	F	0.00	0.00	
7105	F	0.00	0.00	
7601	F	41.04	35.75	
7602	F	38.50	33.31	
7701	F	39.56	0.00	
7702	F	39.30	36.62	
7801	F	39.93	0.00	
7802	F	39.88	38.04	
7803	F	39.90	0.00	
7804	F	0.00	0.00	
7901	F	37.28	0.00	
7902	F	37.06	0.00	
7903	F	36.66	0.00	
7904	F	37.14	34.54	
7905	F	34.95	32.74	
8001	F	2.44	33.34	
8002	F	33.58	31.73	
8003	F	34.05	0.00	
8004	F	2.99	0.00	
8005	F	0.00	0.00	
8006	F	0.00	0.00	
8007	F	0.00	0.00	
8008	F	0.00	0.00	
8101	F	30.95	29.51	
8102	F	30.82	29.91	
8103	F	0.00	0.00	
8104	F	0.00	0.00	
8105	F	0.00	0.00	
8201	F	30.41	28.60	
8202	F	30.59	27.77	
8601	F	0.00	0.00	
8701	F	36.89	0.00	
8701	F	27.51	26.37	
8702	F	26.41	25.14	
8801	F	36.90	0.00	
8801	F	26.69	25.24	
8802	F	37.58	0.00	
8901	F	36.86	0.00	
8902	F	2.44	0.19	
9001	F	35.06	0.00	
9002	F	36.86	31.44	
9003	F	32.43	29.92	
9004	F	31.96	0.00	
9005	F	31.54	0.00	
9006	F	33.35	30.73	
9007	F	32.75	30.34	
9009	F	0.00	0.00	
9010	F	0.00	0.00	
9101	F	29.19	26.63	
9102	F	30.28	28.88	
9103	F	29.77	28.52	
9104	F	0.00	0.00	
9105	F	0.00	0.00	
9201	F	31.17	27.51	
9301	F	31.74	27.23	
9302	F	30.27	26.08	
9303	F	30.01	25.73	
9304	F	28.90	25.50	
9306	F	0.00	0.00	
9307	F	0.00	0.00	
9308	F	0.00	0.00	
9501	F	0.00	0.00	
9601	F	26.77	0.00	
9602	F	0.00	0.00	
9603	F	26.89	0.00	
9701	F	0.00	0.00	
9702	F	0.00	0.00	
9703	F	27.59	24.28	
9704	F	28.33	27.34	
9705	F	27.08	24.57	
9706	F	0.00	0.00	
9707	F	26.96	24.67	
9901	F	34.59	0.00	
9902	F	34.77	0.00	
0350	S	0.00	0.00	
0351	S	26.43	24.99	
0450	S	27.97	25.71	
2252	S	0.00	22.73	
2350	S	0.00	0.00	
2352	S	25.10	23.55	
2355	S	25.97	24.22	
2451	S	25.87	24.44	
7050	S	34.06	32.46	
7051	S	32.76	31.12	
7052	S	32.08	30.42	
7150	S	32.35	30.15	
7151	S	32.13	29.73	
7250	S	31.44	29.43	
7950	S	36.55	35.13	
7951	S	35.99	34.59	
7952	S	35.19	33.48	
8250	S	30.45	28.89	
8251	S	30.58	28.11	
8350	S	31.73	29.92	
9250	S	30.33	28.45	
9251	S	29.07	27.03	
9350	S	31.23	27.95	
9351	S	31.76	27.71	
9352	S	30.38	26.50	
9353	S	29.56	26.96	
9354	S	30.09	26.23	
9355	S	28.95	26.04	
9356	S	28.23	25.84	

Appendix B Concept Masterplan

BARWOOD
LAND

bhb architects
3923 Otterbourne, Winchester
SK05A - POS Plan | 1:1250 @ A0
October 2022

Appendix C Greenfield Runoff Rates

Print | Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Charlotte Turner
Site name:	Otterbourne
Site location:	Retford

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.00624° N
Longitude:	1.34914° W
Reference:	4284182794
Date:	Sep 20 2022 14:15

Runoff estimation approach FEH Statistical

Site characteristics

Total site area (ha): 14.61

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.517
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.14

Hydrological characteristics	Default	Edited
SAAR (mm):	786	786
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):		61.91
1 in 1 year (l/s):		52.62
1 in 30 years (l/s):		142.38
1 in 100 year (l/s):		197.48
1 in 200 years (l/s):		231.53

Appendix D Surface Water Drainage Strategy

A1 1:750 10 20 30 40 50

Catchment	Proposed Developable Area (ha)	Assumed Impermeable Area (ha)	Proposed Discharge Rate (l/s)	Indicative Attenuation Area (sqm)	Indicative Attenuation Volume (cubm)
A	1.52	1.00	6.4	1,240	620
B	0.83	0.55	3.5	690	335

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9

1. This Drawing is not to be reproduced in any part or form without the consent of PJA Civil Engineering Ltd. All copyright reserved.
2. No assessment of earthworks and proposed levels has been undertaken at this stage.
3. No assessment of the potential impact of a Surcharge Outfall has been undertaken at this stage.
4. Drawing should be read in conjunction with all other relevant scheme drawings.
5. Drawing Includes:
   - 5.1. Masterplan provided by BHB Architects in December 2022.
   - 5.2. Contour lines (1m) taken from Topographic Survey provided by Survey Hub in September 2022.
   - 5.3. OS Mapping provided by Barwood Land in September 2022.
   - 5.4. Flood Map for Planning Extents downloaded from the Environment Agency in September 2022.
6. Indicative Surface Water Drainage Strategy assumes:
   - 6.1. Attenuation Basins are 1.0m deep with 1:3 side slopes for Catchment A and B.
   - 6.2. Attenuation features to have a minimum 300mm freeboard.
   - 6.3. Volume within conveyance features has not been included within attenuation calculations at this stage.
   - 6.4. 60% impermeable area for all residential development, with an additional 10% for urban creep.
   - 6.5. Discharge limited QBar rate up to 1 in 100 year plus 45% climate change event.
   - 6.6. FEH Rainfall Data.
7. It is assumed that positive outfalls are available and of sufficient capacity and condition to receive outfalls from the Site.

KEY:

- Site Boundary
- Otter Bourne (Main River)
- Unnamed Ordinary Watercourse
- Catchment A
- Catchment B
- Indicative Location of Proposed Attenuation Basin
- Indicative Location of Proposed Conveyance Feature
- Indicative Location of Proposed Low Flow Channel
- Indicative Location of Headwalls
- Indicative Location of Flow Control
- Existing Southern Water Surface Water Sewer
- Indicative Location of Proposed Surface Water Sewer
- Flood Zone 2
- Flood Zone 3
- Environment Agency Modelled 3.33% AEP Event
- Environment Agency Modelled 1% AEP Event plus 35% Climate Change
- Location of Existing Headwall
- Assumed Culvert Route
- 8m Easement from Watercourses

POS WITH WILDFLOWER MEADOW PLANTING

Catchment B Attenuation:
Depth: 1.0m with 1:3 Side Slopes
Indicative CL: 34mAOD
Indicative IL: 33mAOD
Estimated Storage Area: 690m^2
Estimated Storage Volume: 335m^3

Indicative Bed Level of Watercourse: 30.52mAOD

Catchment A Attenuation:
Depth: 1.0m with 1:3 Side Slopes
Indicative CL: 33mAOD
Indicative IL: 32mAOD
Estimated Storage Area: 1,240m^2
Estimated Storage Volume: 620m^3

RISK ITEM No. 1
RISK ITEM No. 2
RISK ITEM No. 3

WORKING DRAWING
INCOMPLETE INFORMATION

Surface Water Drainage Strategy Risk Items:

Risk Item 1: Location, condition, capacity and downstream connectivity of the Otterbourne (an Environment Agency Main River) to be confirmed.

Risk Item 2: Exact basin dimensions required to attenuate surface water are subject to a earthworks & levels assessment and detailed drainage design.

Risk Item 3: External connectivity of watercourses within the Site should be checked before being abandoned or diverted.

REV	DATE	REVISION NOTE	BY
P2	13/12/2022	REVISED MASTERPLAN AND DRAINAGE STRATEGY	CT
P1	03/11/2022	REVISED MASTERPLAN AND DRAINAGE STRATEGY	CT
P0	26/09/2022	DRAFT FOR COMMENT	CT

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B31 2UQ • Tel: 0121 475 0234
Birmingham • Bristol
Exeter • London • Reading
pja.co.uk

CLIENT: Barwood Land

PROJECT: Cranbourne Drive, Otterbourne

DRAWING TITLE: Indicative Surface Water Drainage Strategy

DRAWING ISSUE STATUS: INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06485	- WR -	0500	- P2

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
A1@750	CT	AC /MC	Sept 2022

Appendix E Foul Water Drainage Strategy

A1 1:500 10 20 30

NOTES

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3. Drawing should be read in conjunction with all other relevant scheme drawings.
4. Drawing Includes:
   - 4.1. Masterplan provided by BHB Architects in December 2022.
   - 4.2. Contour lines (1m) taken from Topographic Survey provided by Survey Hub in September 2022.
   - 4.3. OS Mapping provided by Barwood Land in September 2022.
5. Connection to existing foul sewers subject to approval from Southern Water.
6. Foul strategy based on information at the time of writing and is subject to masterplanning information, topographic survey and Southern Water correspondence.

KEY:

- Site Boundary
- Otterbourne (Main River)
- Unnamed Ordinary Watercourse
- Existing Southern Water Surface Water Sewer
- Existing Southern Water Foul Water Sewer
- Indicative Location of Proposed Foul Water Gravity Sewer Connection
- Proposed Foul Water Outfall Manholes
- Location of Existing Headwall

POS WITH WILDFLOWER MEADOW PLANTING

SUDS

MH7103
CL: 31.55mAOD
IL: 29.20mAOD

RISK ITEM No. 1

Foul Water Drainage Strategy Risk Items:

Risk Item 1: Foul drainage strategy is subject to liaison and confirmation of discharge points and rates with Southern Water

WORKING DRAWING
INCOMPLETE INFORMATION

REV	DATE	REVISION NOTE	BY
P2	13/12/2022	REVISED MASTERPLAN AND DRAINAGE STRATEGY	CT
P1	03/11/2022	REVISED MASTERPLAN AND DRAINAGE STRATEGY	CT
P0	26/09/2022	DRAFT FOR COMMENT	CT

PJA
Seven House · High Street
Longbridge · Birmingham
B31 2UQ · Tel: 0121 475 0234
Birmingham · Bristol
Exeter · London · Reading
pja.co.uk

CLIENT
Barwood Land

PROJECT
Cranbourne Drive, Otterbourne

DRAWING TITLE
Indicative Foul Water Drainage Strategy

DRAWING ISSUE STATUS
INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06485	- WR -	0501	- P2

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
A1@500	CT	AC /MC	Sept 2022

Appendix F Causeway Flow Calculations

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Catchment B	0.500	5.00	34.000	79.007	89.616	1.000
Catchment A	0.910	5.00	33.000	69.842	64.099	1.000

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0
100	45	10	0

Node Catchment B Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	33.000	Product Number	CTL-SHE-0093-3500-0700-3500
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node Catchment A Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	32.000	Product Number	CTL-SHE-0123-6400-0700-6400
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.4	Min Node Diameter (mm)	1200

Node Catchment B Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	33.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	400.0	0.0	1.000	690.0	0.0

Node Catchment A Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	32.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	745.0	0.0	1.000	1240.0	0.0

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m³)	
Full Bore Velocity	✓		

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Catchment B	472	33.614	0.614	32.7	300.0008	0.0000	OK
480 minute winter	Catchment A	464	32.613	0.613	59.4	549.4023	0.0000	OK

Link Event (Outflow)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
15 minute summer	Catchment B	Hydro-Brake®	3.5	51.7
15 minute summer	Catchment A	Hydro-Brake®	6.4	94.5

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Catchment B	472	33.672	0.672	35.9	334.3620	0.0000	OK
600 minute winter	Catchment A	585	32.673	0.673	54.4	613.2947	0.0000	OK

Link Event (Outflow)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute summer	Catchment B	Hydro-Brake®	3.5	70.7
15 minute summer	Catchment A	Hydro-Brake®	6.4	94.4

Appendix G Hampshire County Council Pre-Application Advice

Hampshire County Council

Economy, Transport and Environment Department
Elizabeth II Court West, The Castle
Winchester, Hampshire SO23 8UD

Tel: 0300 555 1375 (General Enquiries)
0300 555 1388 (Roads and Transport)
0300 555 1389 (Recycling Waste & Planning)
Textphone 0300 555 1390
Fax 01962 847055
www.hants.gov.uk

Enquiries to	Thomas Callaway	*My reference*	SWM-PRE/2022/0547/
Direct Line	03707 798982	*Your reference*	
Date	18 November 2022	*Email*	Swm.consultee@hants.gov.uk

Dear Miss Turner,

Proposed development/FRA at 68 CRANBOURNE DRIVE, OTTERBOURNE, WINCHESTER, HAMPSHIRE SO21 2ET

Hampshire County Council as Lead Local Flood Authority has provided comments in relation to the above pre-application in our role as statutory consultee on surface water drainage for major developments.

In order to assist applicants in providing the correct information to their Local Planning Authority for planning permission, Hampshire County Council has set out the information it requires to provide a substantive response at https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/planning

Assessment of Flooding

The watercourses through the site may have an associated higher risk of fluvial and pluvial flooding than the rest of the site, which is at very low risk of flooding. Part of the site on the eastern boundary is within Flood Zones 2 and 3, and there is an associated risk of surface water flooding at this point and another area on the western boundary. Where the flood risk is associated with a flow path this should be retained and development should be restricted to the areas at very low risk. Exceedance flow routes and any flooded extents for the proposed development should be shown on a plan.

Surface Water Management

The proposed development should consider the possibility of infiltrating surface water runoff to ground, however the geology may not permit this. Attenuation of surface water runoff and discharging to a watercourse at a

restricted rate may be suitable if infiltration is not possible, due to the presence of watercourses on the site.

The required evidence for infiltration drainage includes records of testing to BRE 365 standard. This means utilising the slowest rate of three complete tests at each location, which should be representative of the proposed depth and location of any infiltration structures. Groundwater monitoring should be carried out in representative locations in the winter period, at a depth at least one metre below proposed infiltration structures.

Attenuation storage should be calculated so that flooding does not occur for the 1 in 30 year storm event plus the revised peak rainfall allowance. The 1 in 100 year storm event plus peak rainfall allowance must not cause flooding to buildings, however it has been suggested that runoff from this storm will also be completely accommodated within the system. Discharges to the watercourse should be restricted so that runoff from the development does not exceed the equivalent greenfield rate for each storm, or generally limited to Qbar.

Network calculations for the 1 in 1 year event, 1 in 30 year event plus peak rainfall allowance and 1 in 100 year event plus peak rainfall allowance are required where multiple features are linked together. Peak rainfall allowances have recently been revised for the 1 in 30 and 1 in 100 year events, and vary depending on location. Urban creep should be considered by including an additional 10% to impermeable areas in calculations.

SuDS Design and Selection of Drainage Features

SuDS should be designed to encompass the multiple benefits of biodiversity, amenity, water quality and quantity. The proposals currently show a good mix of drainage features. An assessment of water quality and treatment through the drainage system should be included in accordance with the simple index approach.

For the drainage of individual plots, it would be beneficial to not have these features crossing boundaries. Drainage features that are not to be adopted should be considered in a maintenance and management plan, including a schedule of maintenance activities.

Surface Water Checklist

Please consider the requirements of the LLFA for different types of planning application, including what documents should be submitted for review at https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/planning.

Ordinary watercourse consent may be required for structures such as headwalls proposed within a watercourse. This is required in addition to

planning permission. For more information please see the guidance and application form at https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/changewatercourse.

Yours sincerely,

Thomas Callaway
Senior FWM Project Officer

Hampshire County Council

Economy, Transport and Environment Department
Elizabeth II Court West, The Castle
Winchester, Hampshire SO23 8UD

Tel: 0300 555 1375 (General Enquiries)
0300 555 1388 (Roads and Transport)
0300 555 1389 (Planning)
Textphone 0300 555 1390
Fax 01962 847055
www.hants.gov.uk

Miss C Turner
PJA Civil Engineering Ltd
Park Point
17 High Street
Longbridge
Birmingham
B31 2UQ

Enquiries to Flood & Water Management

Direct line 01962 846730

Date 18/11/2022

My reference HFI-2022-0046

Your reference

E-mail fwm@hants.gov.uk

Dear Miss Turner,

Re: Historic Flood Information request for Land at Cranbourne Drive, Otterbourne

We refer to your request for historic flood information on 07/10/2022.

Thank you for your application for historic flood information for this site. Please find below the information we have on our systems that we believe to be relevant for this request. Kindly note the declaration on the final page with regards to this information.

Historic flooding information

We have reviewed our records of flood incidents for this area and have four records of flooding within a 250m radius of the site. This does not necessarily mean that other flood events have not occurred, they either may not have been reported or events may have occurred prior to 2012 – Hampshire County Council as Lead Local Flood Authority have only been maintaining flood records since then following the establishment of the Flood and Water Management Act 2010. The Environment Agency (EA) may hold data on flood events prior to this date.

Reference	Source	Date	Flood Source	Details
378-5047	HCC Highways	2011-12	Pluvial	Water flows down Crabs Hill and ponds on junction of A339
421-5019	HCC Highways	2011-12	Pluvial	Ditches and grips require maintenance
702-5070	HCC Highways	2013	Fluvial	River overtopping banks

21594659	HCC FWM	13/1/22	-	Concern that area is silting up

Please refer to attached map for the location of this flood event(s). Kindly note that outlines of areas highlighted as highway flooding on the map may include properties or other off-highway areas that were not impacted by flooding.

There have been no flood reports undertaken for this specific area under Section 19 of the Flood and Water Management Act where significant flooding was reported. Although we do not have enough information to determine whether Otterbourne was affected, a report for the general area has been published and can be viewed at: https://documents.hants.gov.uk/flood-water-management/Winchester-Eastleigh-areas-July2021.pdf

Flood risk from surface water

The EA's Updated Flood Map for Surface Water illustrates the potential area of surface water flooding taking into account the topography and permeability of the area. It also includes factors to take into account drainage provision. This information is designed to be high level and should not be used to indicate specific properties and risk but identify low points and potential flow routing. The mapping indicates that this address is primarily within an area at very low risk of surface water flooding. Very low risk means that each year this area has a chance of flooding of less than 0.1%, although part of the site may flood to a depth of 0.9m in small areas within the western and eastern boundaries.

For more information on this flood risk, please see https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

HCC has prepared Surface Water Management Plans which are available on our website. For more detailed information on flooding in the Winchester City Council administrative area, please see their Strategic Flood Risk Assessment, which can be found at https://www.winchester.gov.uk/planning-policy/winchester-district-local-plan-2011-2036-adopted/evidence-base/environment/strategic-flood-risk-assessment-2007.

Flood risk from watercourses

Watercourses are any natural or artificial channel above or below ground through which water flows. Watercourses are classified as either 'Ordinary Watercourse' or 'Main River'. Ordinary watercourses are watercourses that are not part of a Main River and include streams, ditches, drains, culverts etc. through which water flows. The Lead Local Flood Authority (LLFA - in this instance Hampshire County Council) are responsible for managing the risk from ordinary watercourses and have powers to ensure maintenance is undertaken by the relevant body, usually the adjacent landowner. For more information, see http://documents.hants.gov.uk/flood-water-management/HCCFloodRiskManagement-Landowners.pdf.

Main Rivers are typically larger streams and rivers, but some are smaller watercourses of local significance. Main Rivers are nationally managed by the Environment Agency, but responsibility for maintenance remains with the landowner.

There are three Main Rivers within 250m of this site. Known Ordinary watercourses are marked on the attached map(s); however it should be noted that many ordinary watercourses are not recorded centrally (such as small ditches etc.). The site is located within the water body catchment of the River Itchen.

For more information regarding fluvial (river) and tidal flooding and flood risk please contact the Environment Agency or refer to the following website: https://flood-map-for-planning.service.gov.uk/

Ordinary Watercourse Consenting

Hampshire County Council is responsible for issuing Ordinary Watercourse Consents. These consents assess the flood risk of proposed changes (both permanent and temporary) to ordinary watercourses and are a legal requirement of such work. We have no records of Ordinary Watercourse Consents (OWCs) within the search area.

Please refer to the Hampshire County Council OWC website for further information and the forms for consents:

https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/changewatercourse

The consenting process has a statutory timeframe of two months from when the application is validated. To request data relating to consents prior to 2012 please contact the EA on: psohiow@environment-agency.gov.uk

Any works proposed within eight metres of a main river are likely to require a flood risk permit from the Environment Agency. Please refer to the following for further information: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

Flood risk from sewers

For information regarding foul flooding, please contact Southern Water.

Vulnerability of site from groundwater

Groundwater is by definition hard to predict and difficult to manage. The geology of the site in question is primarily London Clay Formation clay, silt and sand.

Hampshire County Council hold no records of groundwater flooding in the area, however this does not necessarily mean that other flood events have not occurred. It can be difficult to define flooding as a result of groundwater particularly in those areas where silt, gravel and sand can lead to a perched water table which can prevent infiltration drainage from working as opposed to being a groundwater emergence flood event which tends to be seen linked to chalk aquifers.

Please note this information should only be used to establish relative, but not absolute, risk of groundwater flooding. A more detailed assessment including groundwater monitoring may be required.

More detailed information is available in relation to potential groundwater flood risk from the British Geological Society however it should be noted that this is a chargeable service. For further information please refer to:

https://www.bgs.ac.uk/research/groundwater/datainfo/GFSD.html

Hampshire County Council has a draft Groundwater Management Plan that is available on our website which contains useful information. It can be found at:

https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/groundwater-management-plan

Environmentally designated sites

We note that the site is within 250m of designated environmental sites:

- Otterbourne Primary School Meadow SINC;
- Long Mead SINC;
- Great Moorlands Copse Complex SINC;
- Otterbourne Wood SINC;
- Otterbourne Hill Common SINC

Drainage Assets

We do not hold information in relation to private or third party drainage assets but are aware that Hampshire County Council as Highways Authority are responsible for many assets within and draining the Highway.

It is the responsibility of Hampshire Highways to maintain their assets on the highway, and they are on a regular cleansing schedule. If there are any issues with any highway gullies, soakaways, culverts etc. from a maintenance perspective, this can be flagged on the online system:

https://www.hants.gov.uk/transport/roadmaintenance/roadproblems

If flooding issues are reported to Highways and are in relation to Highway infrastructure, we as LLFA may not have access to these records and you may need to place a request for this information using the above link.

If you have any further queries, please contact the Flood and Water Management (FWM) Team quoting the above reference

Kind regards
FWM Team fwm@hants.gov.uk

Please Note: The data supplied has been compiled from a variety of sources of varying reliability. The data is constantly being revised and validated to ensure the highest accuracy possible. However, the data should not be relied upon or considered completely accurate and the data is provided on the understanding that neither the County Council nor the disclosing officer is to be held responsible should you rely on this data and consequently suffer damage.

This response has been provided using the best knowledge and information submitted as part of the planning application at the time of responding and is reliant on the accuracy of that information.

Hampshire County Council defines significant flooding as 'flooding that affects 20 or more properties internally in one flood event within the same location OR flooding that affects significant lengths of highways affecting 20 or more properties and lasts for a period of 3 hours from the onset of flooding'. For more information on how we define flooding, please see our guidance on our website http://documents.hants.gov.uk/flood-water-management/FloodInvestigationsguidance.pdf

You may find the following websites useful –

- http://bluepages.org.uk/
- https://nationalfloodforum.org.uk
- https://nationalfloodforum.org.uk/about-flooding/reducing-your-risk/protecting-your-property/
- http://hummedia.manchester.ac.uk/institutes/mui/cure/research/documents/Property_owners_booklet_web_000.pdf (linked from the National Flood Forum)
- https://www.floodre.co.uk/

Users' Disclaimer

I understand that in using advice provided by the Hampshire Flood and Water Management Team I am aware of the following:

1. The Flood and Water Management (FWM) Team is part of Hampshire County Council ("We/Us/Our"). The Council holds copyright of this information and advice on behalf of the FWM team except where service level agreements state otherwise. No direct reproduction of this advice will be allowed as a direct copy, except for the purpose of Environment Information Requests.

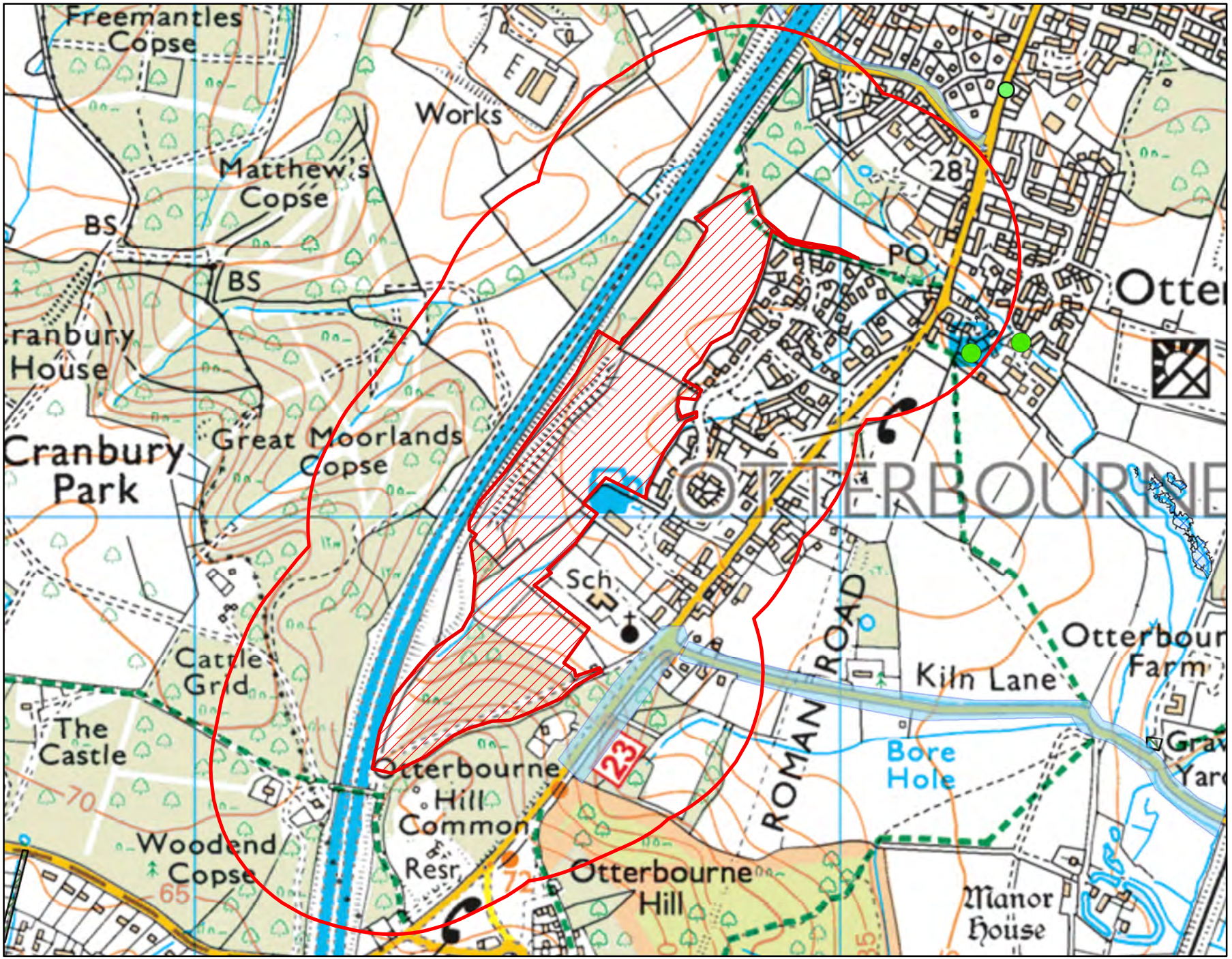
2. Advice provided by the Hampshire FWM Team will only be used for the purpose stated and will not be stored beyond the life of the project for which it was acquired.

3. Any personal information supplied in association with these records will not be used, copied, or passed to any third party without the consent of the Hampshire FWM Team and in accordance with the GDPR.

4. Whilst every reasonable effort is made to validate information supplied to and by the Hampshire FWM Team owing to the dynamic and judgmental nature of information relating to flooding, the Hampshire disclaims any responsibility for the accuracy or comprehensiveness of the information supplied, and accepts no liability for any indirect, consequential, or incidental damages or losses arising from use of the information.

5. I am aware of the Hampshire FWM Team charging schedule and understand I may be charged for the advice.

6. All web links are accurate as on the day they were accessed.



Legend

- Site
- 250m Buffer
- EA Recorded Flood Outlines
- Recorded Highway Flooding in Hampshire
- No Value

Hampshire Flood Enquiries

enq_status_name

- Resolved Flood Enquiry
- Passed to 3rd Party

Historic Flood Information Request

Historic Flooding Records

PJA Civil Engineering Ltd

Land at Cranbourne Drive, Otterbourne

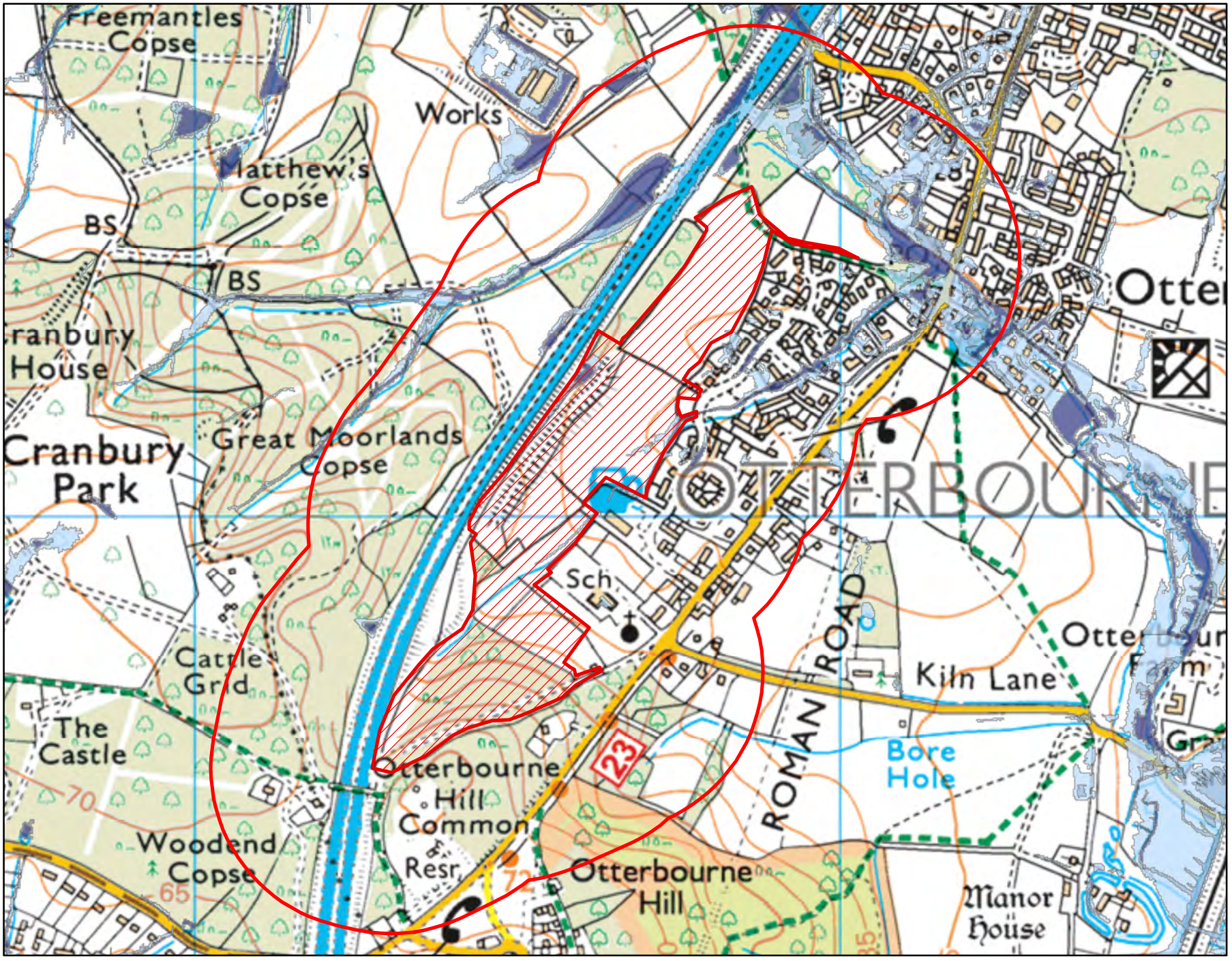
Notes:

0 0.15 0.3 Kilometers

1:8,000

Date:	18/11/2022	Sheet:	1 of 1
Revision:	1	Initials:	TC

Hampshire County Council



Legend

- Site
- 250m Buffer
- Flood Maps for Surface Water (High)
- Flood Maps for Surface Water (Medium)
- Flood Maps for Surface Water (Low)

Historic Flood Information Request

Flood Map for Surface Water

PJA Civil Engineering Ltd

Land at Cranbourne Drive, Otterbourne

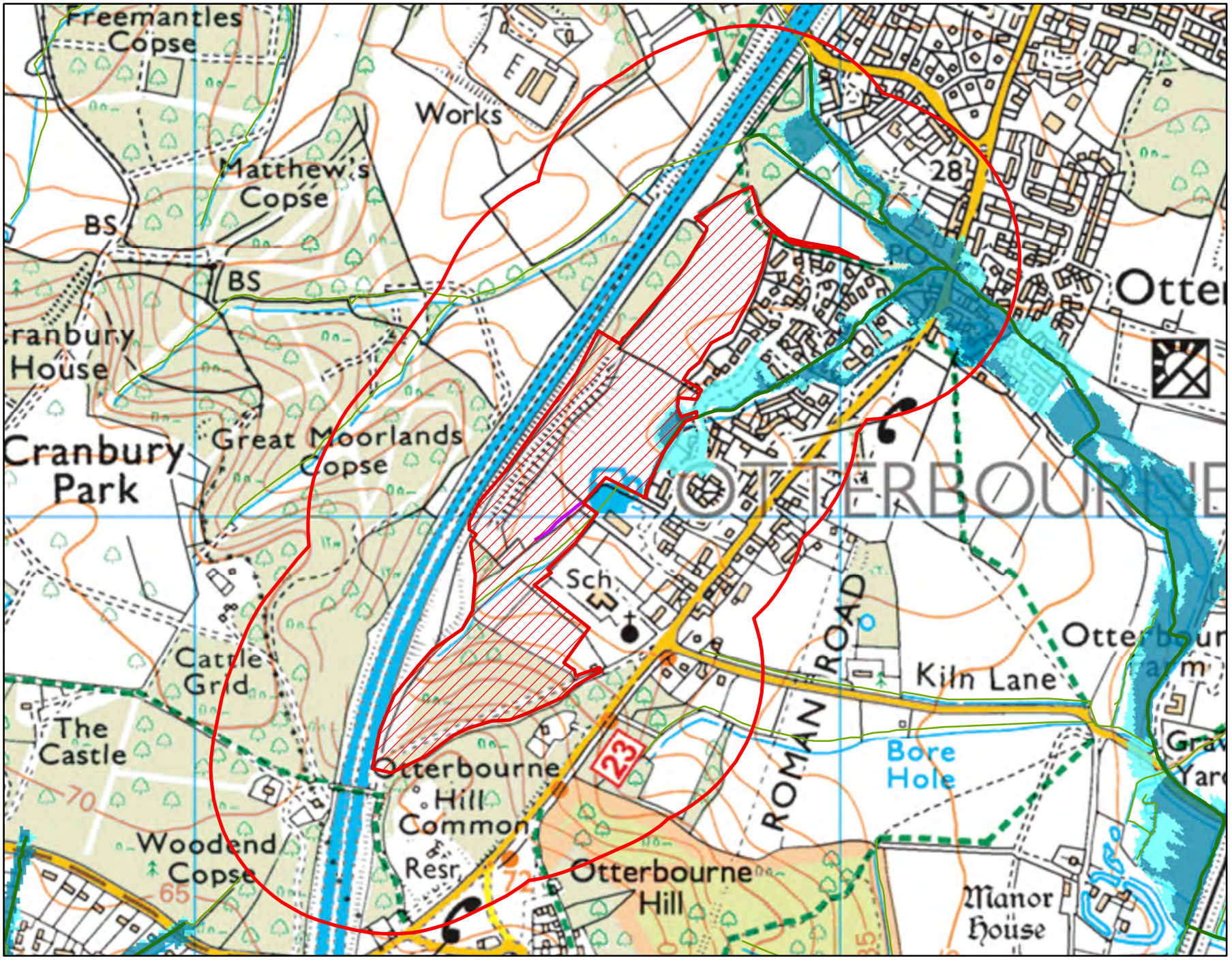
Notes:

0 0.15 0.3
Kilometers

1:8,000

Date:	18/11/2022	Sheet:	1 of 1
Revision:	1	Initials:	TC

Hampshire County Council



Legend

- Site
- 250m Buffer
- non main river

mainriv

- FRM Indicative Main River
- Detailed River Network - Offline Drainage
- Flood Zone 3
- Flood Zone 2

Historic Flood Information Request

EA Flood Zones and Detailed River Network

PJA Civil Engineering Ltd

Land at Cranbourne Drive, Otterbourne

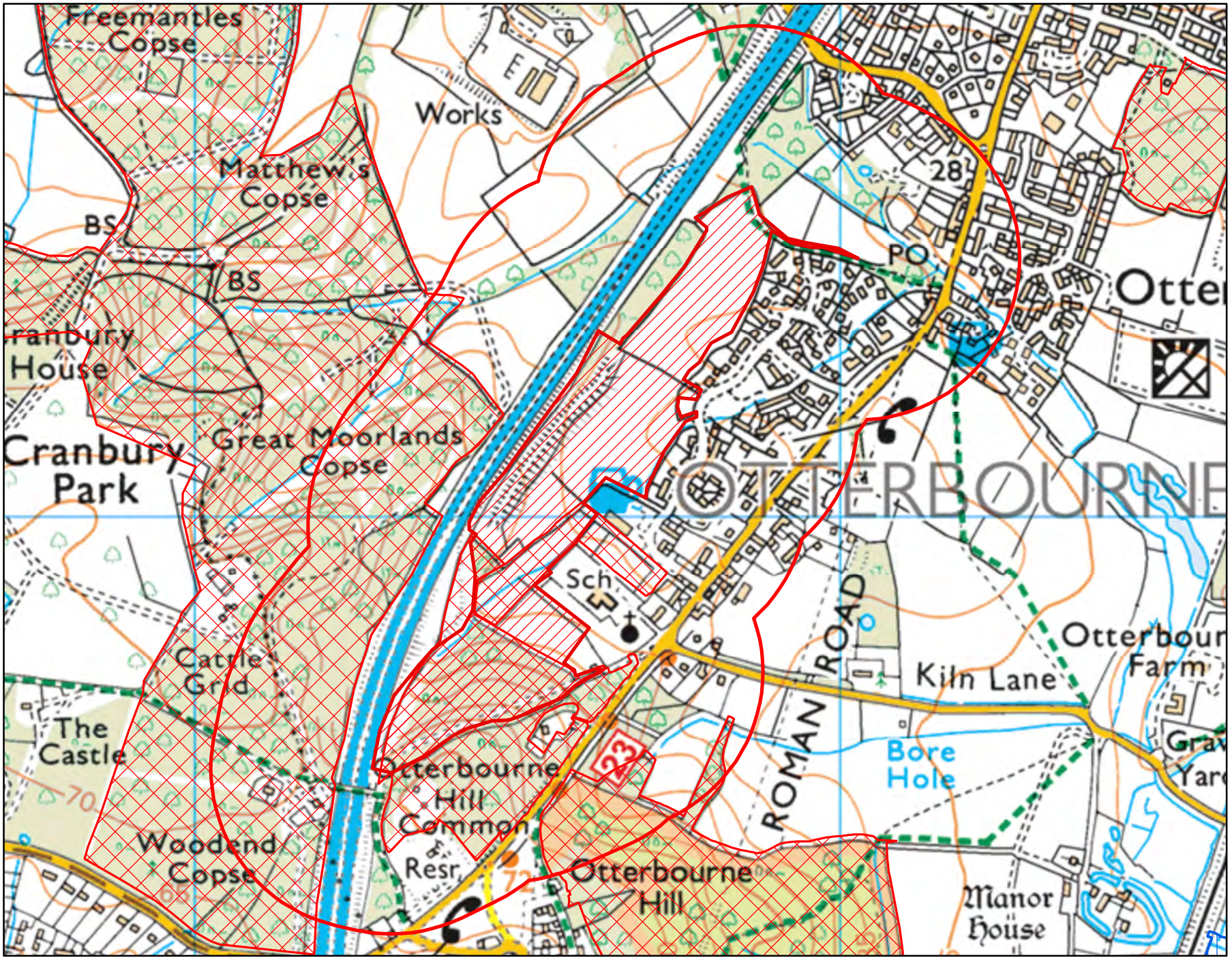
Notes:

0 0.15 0.3 Kilometers

1:8,000

Date:	18/11/2022	Sheet:	1 of 1
Revision:	1	Initials:	TC

Hampshire County Council



Legend

- Site
- 250m Buffer
- SSSI (Sites of Special Scientific Interest)
- SINC

Historic Flood Information Request

Environmental Designations

PJA Civil Engineering Ltd

Land at Cranbourne Drive, Otterbourne

Notes:

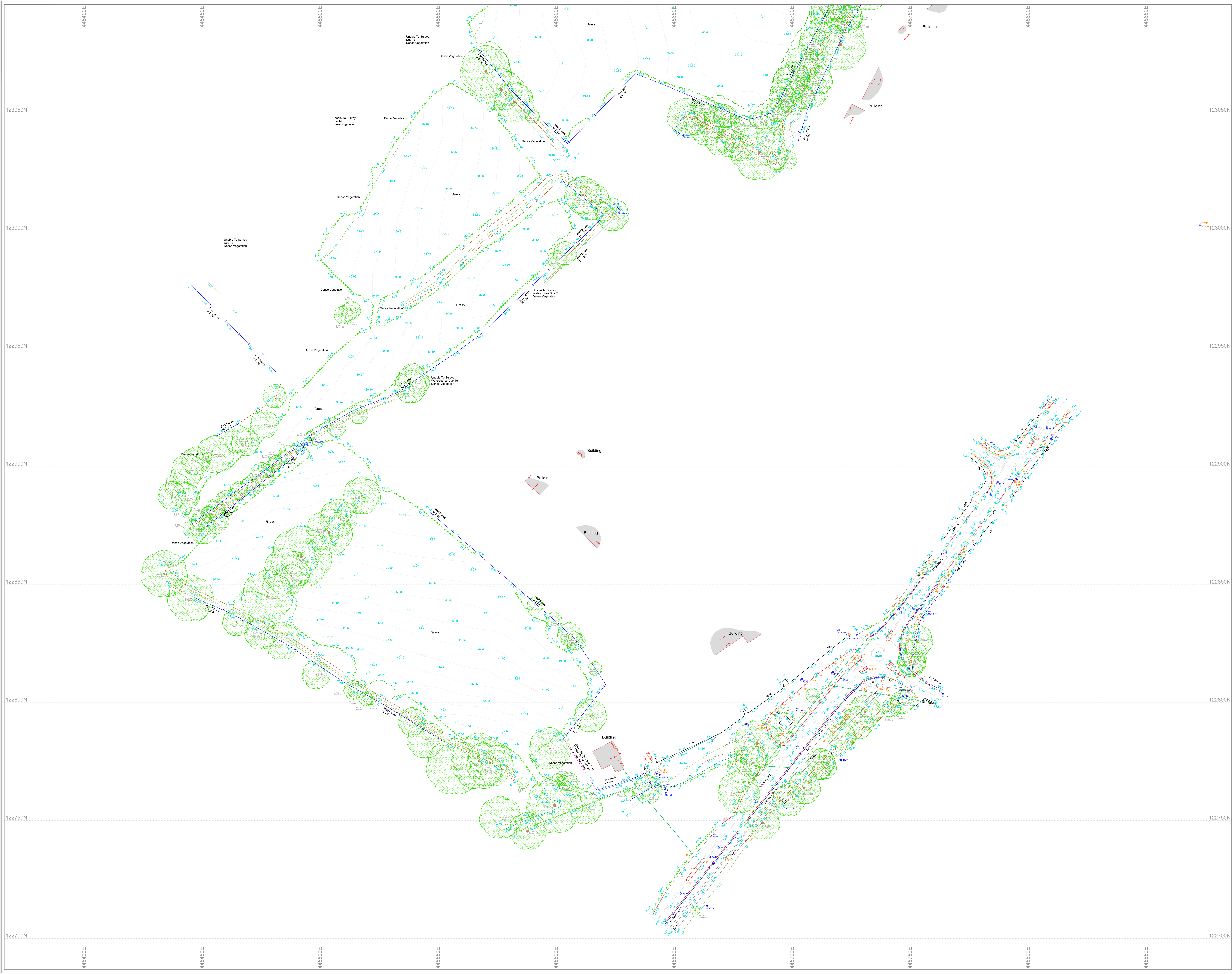
0 0.15 0.3 Kilometers

1:8,000

Date:	18/11/2022	Sheet:	1 of 1
Revision:	1	Initials:	TC

Hampshire County Council

Appendix H Topographic Survey



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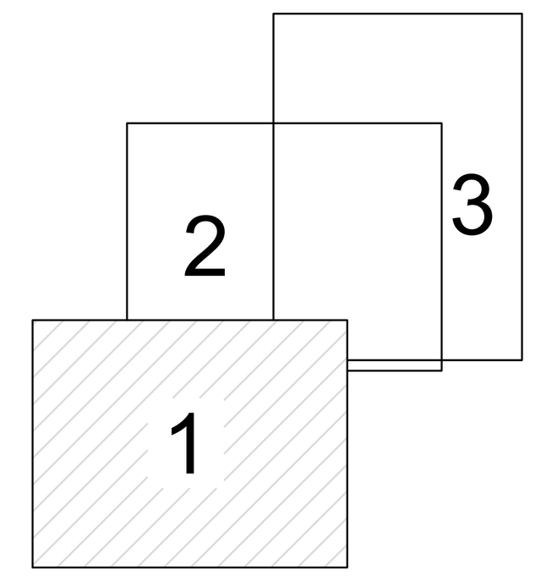

KEY:

BL	Bed Level	ANT	Antenna	LP	Lamp Post
CL	Cover level	AV	Air Valve	LR	Life Preserver
DP	Down Pipe	BB	Belisha Beacon	Mkr	Service Marker
DPG	Down Pipe/ Gully	BM	Benchmark	PB	Post Box
Gy	Gully	BO	Bollard	PM	Parking Meter
IL	Invert level	Box	Cable Box	PO	Post
KO	Kerb Outlet	BS	Bus Stop	PX	Crossing Control
MH	Manhole	BT	British Telecom	RP	Reflective Post
RE	Rodding Eye	CATV	Cable Television	RS	Road Sign
WL	Water level	CIG	Cigarette Bin	SC	Speed Camera
BH	Bore Hole	COMS	Communication Cover	SP	Sign Post
EL:	Eaves Level	DWB	Dog Waste Bin	SV	Stop Valve
Flat:	Flat Roof Level	EL	Electric Cover	SY	Stay
PL:	Parapet Level	EP	Electric Pole	TEL	Telecomms Cover
RL:	Ridge Level	ER	Earth rod	TL	Traffic Light
Spr. Lvl:	Arch Springing Level	FH	Fire Hydrant	TP	Telegraph Pole
UoB:	Underside of Beam	FIB	Fid Into Building	TS	Traffic Signal Cover
UoF:	Underside of Feature	FIG	Fid Into Ground	VP	Vent Pipe
ø	Trunk Diameter	FLT	Flood Light	WM	Water Meter
GP	Gate Post	Flag	Flag Pole	WO	Wash Out
MG/MD	Multi Bole Trunk	GL	Ground Light	WV	Water Valve
TCL	Tree Canopy Level	GP	Gas Pipe	FFL	Finished Floor Level
TT	Tactile Paving	GV	Gas valve	THL	Threshold Level
ACU	Air Conditioning Unit	IC	Inspection Cover		Gate

Boundary Line
Building Roof Line
Building
Building Canopy
Edge of Scrub
Edge of Vegetation
Embankment Bottom
Embankment Top
Kerb
Kerb - Drop
Kerb - Top

Fence
OS Detail
Steps
Trackway
Tree Canopy
Verge
Verge Concrete
Verge Grass
Verge Tarmac
Wall
Water Edge

Suffixes
(D) - Dilapidated (L) - Illuminated (R) - Retractable (RF) - Reflective

Station	Easting (m)	Northing (m)	Level (m)
STNA	446024.448	123182.721	29.912
STNB	446090.536	123239.927	27.318
STND	445871.723	123002.603	34.396
STNE	445794.028	122894.575	38.100
STNF	445730.544	122814.883	40.575
STNG	445687.705	122791.002	42.169
STNH	445641.581	122770.341	45.189
STNC	445523.858	122966.088	40.226
STNR	446173.341	123358.516	25.122

Survey Coordinates and Grid
Please note that the grid shown on this drawing is as follows;
- ☐ *Arbitrary*
- ☐ *Arbitrary but approx. related to North*
- ☐ *Best fit to an Ordnance Survey Digital Sheet*
- ■ *Related to the Ordnance Survey National GPS Network*

Levels
Please note that the levels shown on this drawing are as follows;
- ☐ *Arbitrary*
- ☐ *Related to an Ordnance Survey Bench Mark*
- ■ *Related to the Ordnance Survey National GPS Network*

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Client PJA Civil Engineering Ltd

Project Otterbourne
Winchester, SO21 2DR

Title Topographical Survey - 2D

Surveyed SS Checked NS Date 21/09/2022
Sheet No 1 of 3 Scale 1:500@A0

Job No. 5616 Rev. -

NOTES:
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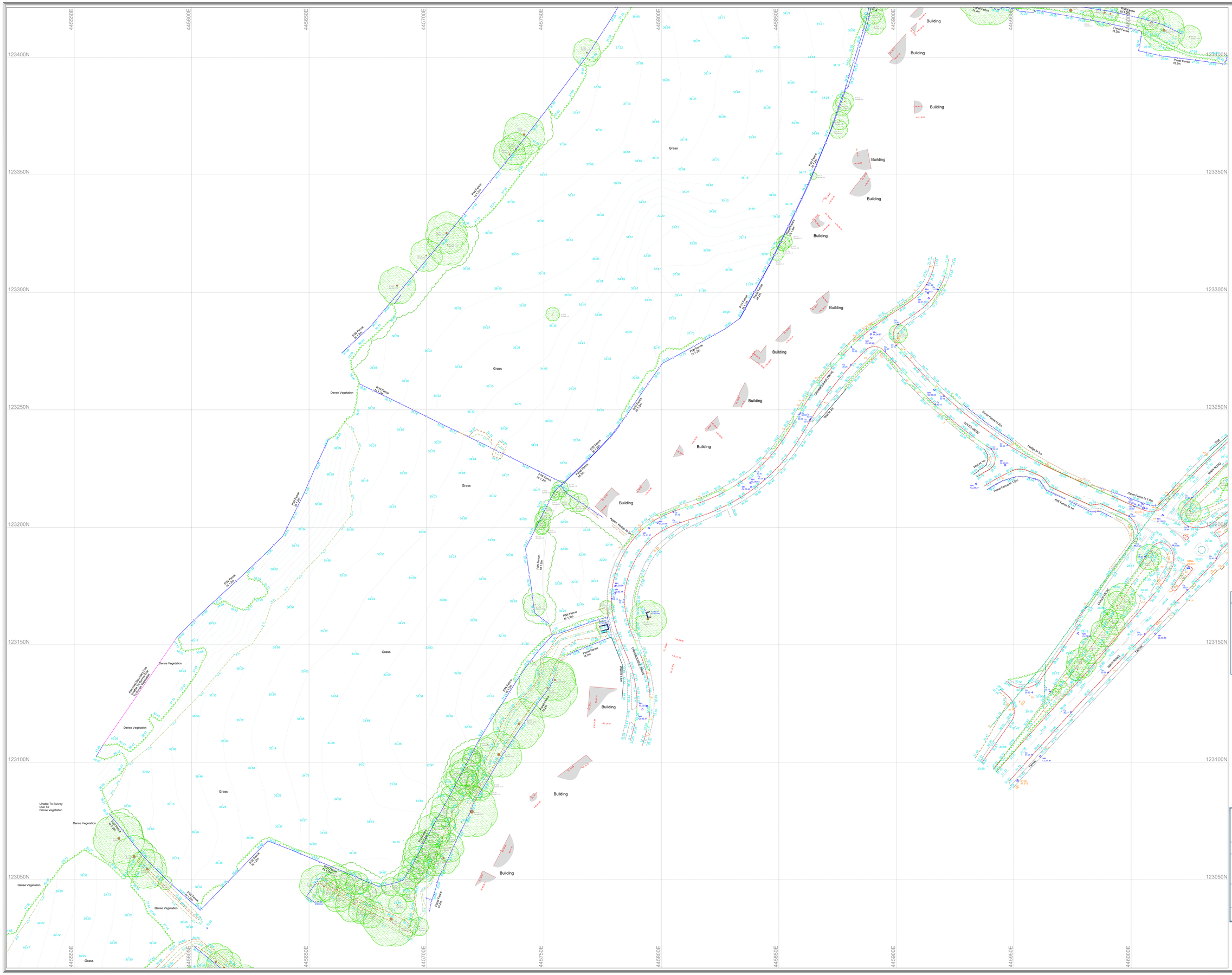
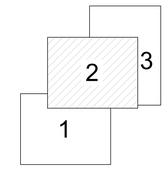
No liability will be taken for this plan if passed on to 3rd parties.
Some services/data may be omitted in areas of parked vehicles and vegetation.

THIS SURVEY HAS BEEN ORIENTATED TO THE ORDNANCE SURVEY (O.S) NATIONAL GRID (OSGB36) VIA A GLOBAL POSITION SYSTEM (GPS) AND THE O.S. ACTIVE NETWORK (OS NET).
A TRUE OSGB36 COORDINATE HAS BEEN ESTABLISHED NEAR TO THE SITE CENTRE VIA A TRANSFORMATION USING THE OSTN15 & OSGM15 TRANSFORMATION MODELS.
THE SURVEY HAS BEEN CORRELATED TO THIS POINT AND A FURTHER ONE OR MORE OSGB36 POINTS ESTABLISHED TO CREATE A TRUE O.S. BEARING FOR ANGLE ORIENTATION.
NO SCALE FACTOR HAS BEEN APPLIED TO THE SURVEY THEREFORE THE COORDINATES SHOWN ARE LOCAL PLANE GRID
PLEASE REFER TO SURVEY STATION TABLE TO ENABLE ESTABLISHMENT OF THE ON-SITE GRID.



LAYOUT KEY:



KEY:

BL	Bed Level	ANT	Antenna	LP	Lamp Post
CL	Cover level	AV	Air Valve	LR	Lilo Protected
DP	Down Pipe	BB	Belisha Beacon	MH	Service Marker
DPG	Down Pipe Gully	BM	Benchmark	PB	Post Box
Gy	Gully	BO	Bollard	PM	Parking Meter
IL	Invert level	Bus	Cable Box	PO	Post
KO	Kerb Outlet	BS	Bus Stop	PX	Crossing Control
MH	Manhole	BT	British Telecom	RP	Reflective Post
RE	Rodding Eye	CATV	Cable Television	RS	Road Sign
WL	Water level	CC	Cigarette Bin	SC	Speed Camera
BH	Bore Hole	COMC	Communication Cover	SP	Sign Post
ELC	Excess Level	DMD	Dog Waste Bin	SV	Stop Valve
FMH	Flat Roof Level	EL	Electric Cover	SY	Stay
PLL	Parapet Level	EP	Electric Pole	TEL	Telecomms Cover
RL	Ridge Level	FH	Earth rod	TL	Traffic Light
Spr. Lvl.	Arch Springing Level	FL	Fire Hydrant	TP	Telegraph Pole
UnBB	Underside of Beam	FW	Fol Into Building	TS	Traffic Signal Cover
UnFL	Underside of Feature	FG	Fol Into Ground	VT	Vent Pipe
Ø	Trunk Diameter	FLT	Flood Light	WM	Water Meter
GP	Gate Post	Flag	Flag Pole	WC	Wash Out
MC/VC	Multi Stem Trunk	GL	Ground Light	WV	Water Valve
TCL	Tree Canopy Level	GP	Gas Pipe	FFL	Finished Floor Level
TT	Textile Planting	GV	Gas valve	TKL	Trackway Level
ACU	Air Conditioning Unit	IC	Inspection Cover		Gate

Boundary Line
Building Front Line
Building
Building Canopy
Edge of Scrub
Edge of Vegetation
Embankment Bottom
Embankment Top
Kerb
Kerb - Dropped
Kerb - Top
Fence
GB Detail
Steps
Trackway
Tree Canopy
Verge
Verge Concrete
Verge Grass
Verge Tarmac
Wall
Water Edge

Suffixes
(D) - Dilapidated (L) - Illuminated (R) - Retractable (RF) - Reflective

Station	Easting (m)	Northing (m)	Level (m)
STNA	446024.448	123182.721	29.912
STNB	446090.536	123239.927	27.318
STND	445871.723	123002.603	34.396
STNE	445794.028	122894.575	38.100
STNF	445730.544	122814.883	40.575
STNG	445687.705	122791.002	42.169
STNH	445641.581	122770.341	45.189
STNC	445523.858	122966.088	40.226
STNR	446173.341	123358.516	25.122

Survey Coordinates and Grid
Please note that the grid shown on this drawing is as follows;
- ☐ *Arbitrary*
- ☐ *Arbitrary but approx. related to North*
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Levels
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Client: PJA Civil Engineering Ltd

Project: Otterbourne
Winchester, SO21 2DR

Title: Topographical Survey - 2D

Surveyed SS Checked NS Date 21/09/2022
Sheet No 2 of 3 Scale 1:500@A0

Job No. 5616 Rev. -

NOTES:
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A MINIMUM OF TWO OSGB36 COORDINATES (PREFERABLY FURTHER ONE OR MORE OSGB36 POINTS) ESTABLISHED TO CREATE A TRUE (O.S. BEARING) FOR ANGLE ORIENTATION.
ALL OS REDUCTION HAS BEEN APPLIED TO THE SURVEY THEREFORE THE COORDINATES SHOWN ARE LOCAL PLANE.
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LAYOUT KEY:

1 2 3

KEY:

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KO	Kerb Outlet	BS	Bus Stop	PX	Crossing Control
MH	Manhole	BT	British Telecom	RP	Reflective Post
RE	Rodding Eye	CATV	Cable Television	RS	Road Sign
WL	Water level	CIG	Cigarette Bin	SC	Speed Camera
BH	Bore Hole	COMS	Communication Cover	SP	Sign Post
EL:	Eaves Level	DWB	Dog Waste Bin	SV	Stop Valve
Flat:	Flat Roof Level	EL	Electric Cover	SY	Stay
PL:	Parapet Level	EP	Electric Pole	TEL	Telecomms Cover
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GP	Gate Post	Flag	Flag Pole	WO	Wash Out
MG/MD	Multi Bole Trunk	GL	Ground Light	WV	Water Valve
TCL	Tree Canopy Level	GP	Gas Pipe	FFL	Finished Floor Level
TT	Tactile Paving	GV	Gas valve	THL	Threshold Level
ACU	Air Conditioning Unit	IC	Inspection Cover		Gate

Boundary Line	Fence
Building Roof Line	OS Detail
Building	Steps
Building Canopy	Trackway
Edge of Scrub	Tree Canopy
Edge of Vegetation	Verge
Embankment Bottom	Verge Concrete
Embankment Top	Verge Grass
Kerb	Verge Tarmac
Kerb - Drop	Wall
Kerb - Top	Water Edge

Suffixes
(D) - Dilapidated (L) - Illuminated (R) - Retractable (RF) - Reflective

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Client Otterbourne

Project PJA Civil Engineering Ltd
Winchester, SO21 2DR

Title Topographical Survey - 2D

Surveyed SS Checked NS Date 21/09/2022

Sheet No 1 of 1 Scale 1:200@A0

Job No. 5616 Rev. -

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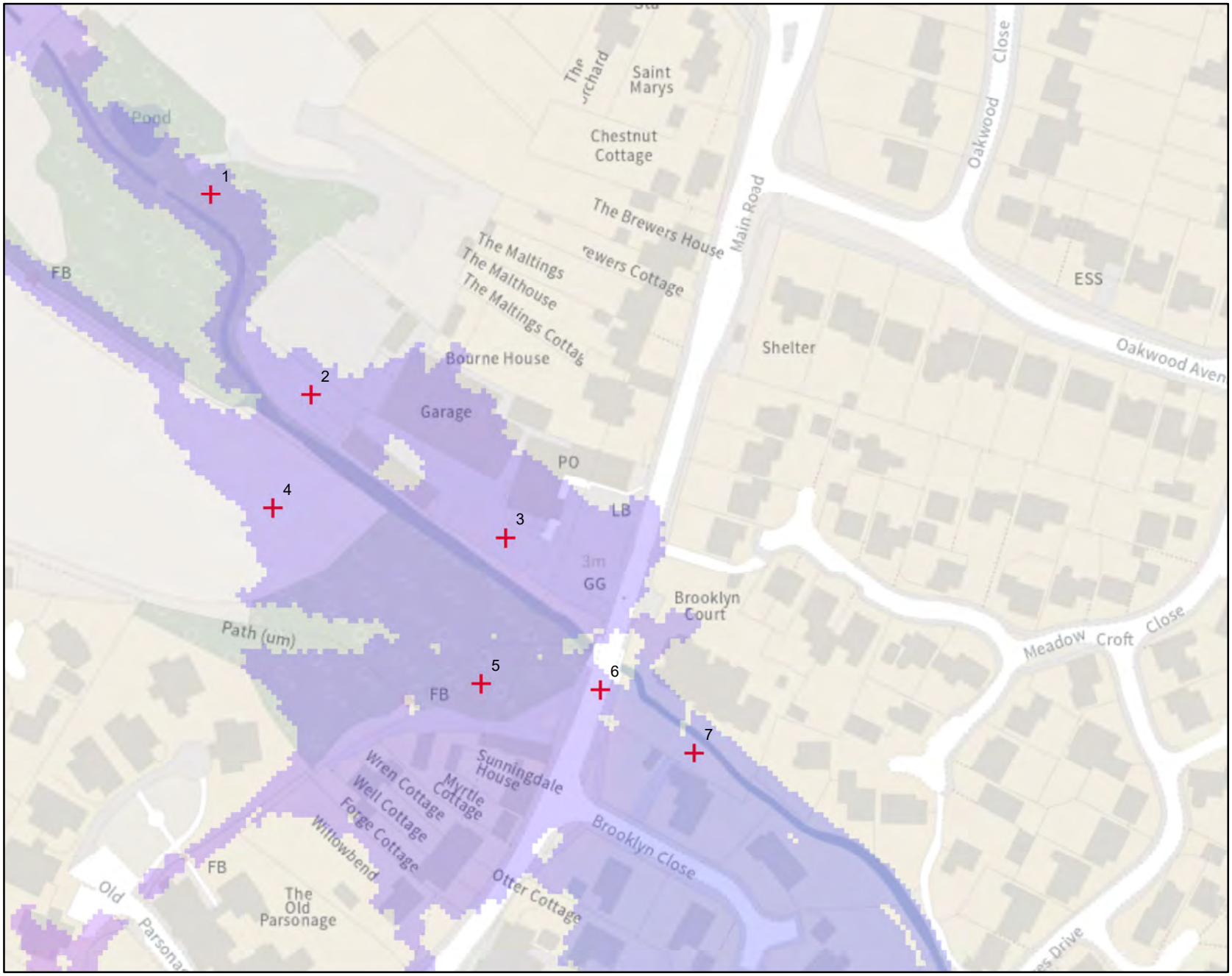
Appendix I Environment Agency Data

Levels Map Centred on NGR (SU 46162 23397) - Created 7 October 2022



Environment Agency

Legend

Location_Point

Water Depth

Value

High : 32.6755

Low : 16.709

1:1,633 *

*when printed at A4.

N

0 30 60

Metres

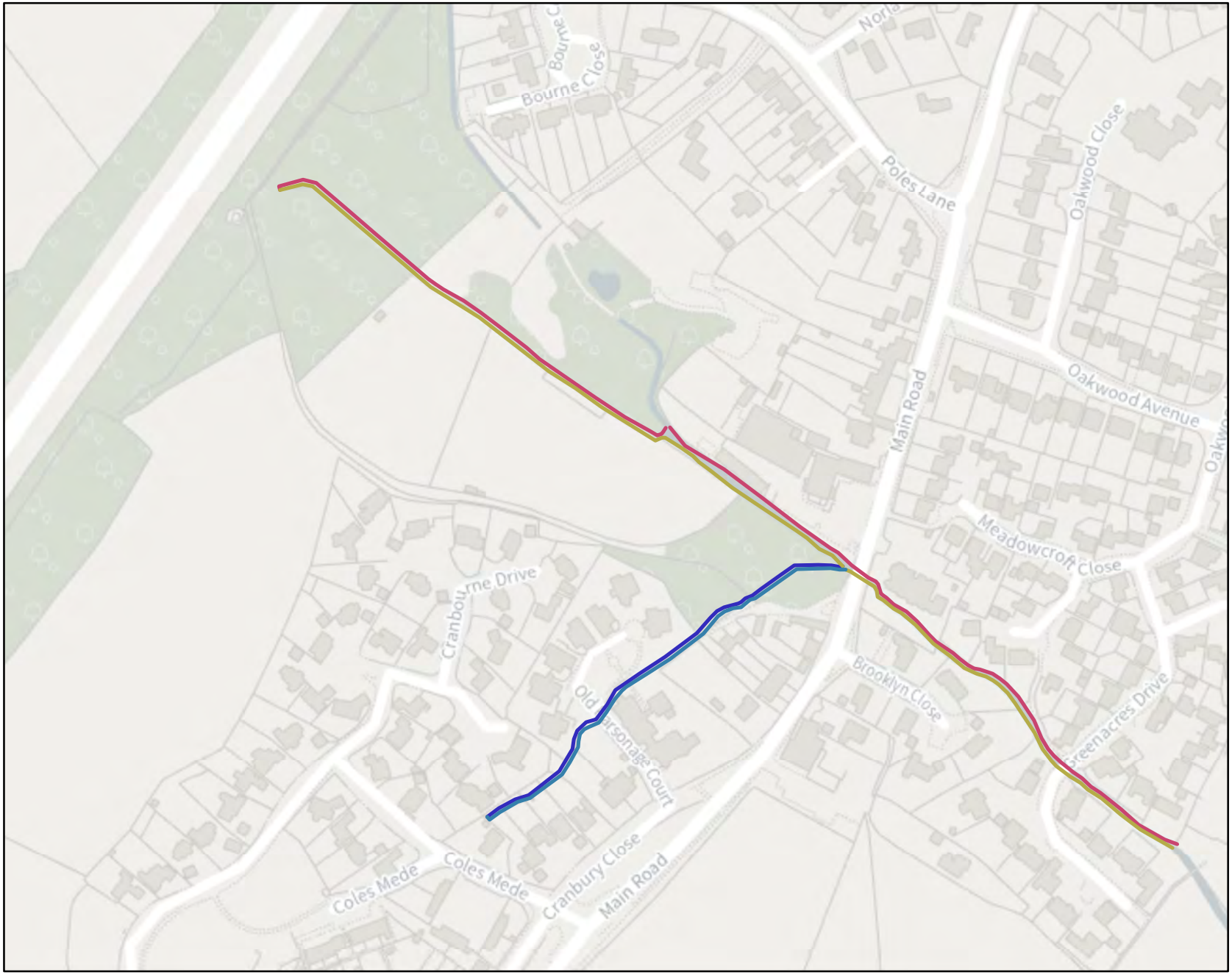
Contact Us: National Customer Contact Centre, PO BOX 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Water Depths & Levels for NGR (SU 46162 23397)

	Water Surface Level (mAOD*)
Point	1% Annual Probability/1 in 100 Year (Flood Zone 3)
1	25.15
2	25.10
3	25.10
4	25.10
5	25.10
6	25.08
7	24.36

Levels in metres above Ordnance Datum Newlyn

Defence map Centred on NGR (SU 46162 23398) - Created 7 **October** 2022



Environment Agency

Legend

asset_id

- 102020
- 102021
- 102022
- 186151

1:3,000 *

*when printed at A4.

N

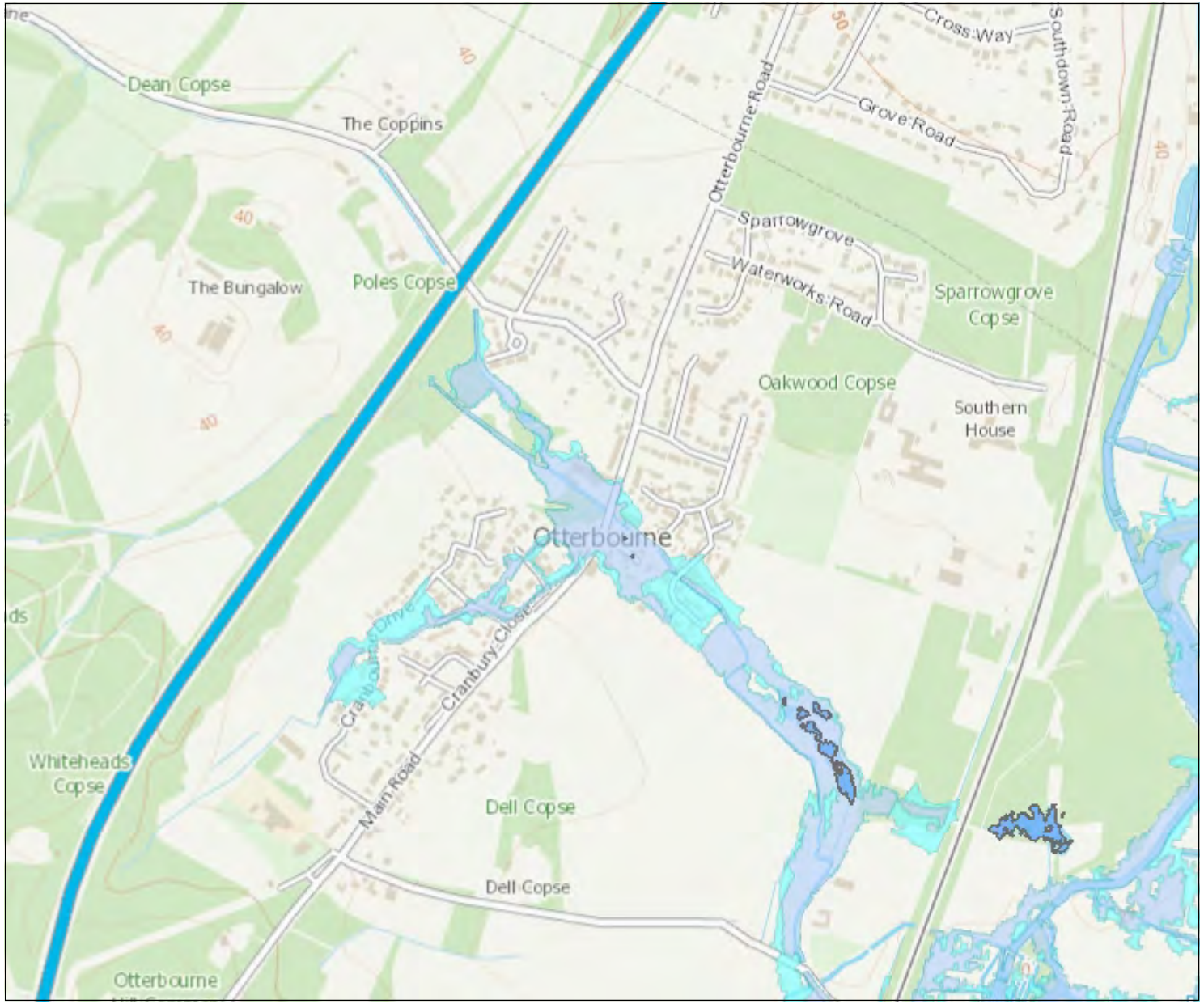
0 50 100

Metres

Contact Us: National Customer Contact Centre, PO BOX 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Asset ID	Asset sub-type	Length	Maintainer	Current condition	Design Standard of Protection (Years)	Date of last inspection
102020	Natural High Ground	618.56	Unknown	No Data	5	30/03/2022
102022	Natural High Ground	246.69	Unknown	No Data	5	30/03/2022
186151	Natural High Ground	609.25	Unknown	No Data	5	30/03/2022
102021	Natural High Ground	248.62	Unknown	No Data	5	30/03/2022

Flood Map for Planning (Rivers and Sea) - Centred on NGR SU 46162 23398 - Created 7 October 2022



Environment Agency

1: 10,000

0 Metres 250

N W E S

Flood Map for Planning (Rivers & Sea)

- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2
- All recorded flood outlines

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occuring each year.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Risk of flooding from Surface Water - Centred on NGR SU 46162 23398 - Created **October** 2022

Environment Agency

1: 10,000

0 Metres 250

N W E S

Likelihood of flooding from Surface Water

- High (>=3.3%)
- Medium (3.3% - 1%)
- Low (1% - 01%)
- Very Low

Likelihood of flooding from Surface Water

High:	Greater than or equal to 3.3% (1 in 30) chance in any given year
Medium:	Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
Low:	Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
Very Low:	Less than 0.1% (1 in 1,000) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on GOV.UK.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). E-mail: enquires@environment-agency.gov.uk

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Go to the version 1 of the licence.
Go to the version 2 of the licence.
Go to the Welsh version of the licence.

Use of Environment Agency Information for Flood Risk Assessments

Important

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

https://www.gov.uk/flood-risk-assessment-standing-advice
http://planningguidance.planningportal.gov.uk/

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

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.

2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.

3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.