Drainage Strategy

Proposed Supported Living Development

93 Peterborough Road, Farcet, Peterborough, PE7 3BN

DOCUMENT REFERENCE	REVISION	DATE	STATUS
93PR-DS-001	**P01**	**October 2026**	**Planning**

Document Control

Project	Proposed single-storey supported living development
Site address	93 Peterborough Road, Farcet, Peterborough, PE7 3BN
Grid reference	520071E, 295133N (approximate site centre)
Local planning authority	Huntingdonshire District Council
Lead local flood authority	Cambridgeshire County Council
Sewerage undertaker	Anglian Water
Document	Drainage Strategy — 93PR-DS-001

Revision history

Revision	Date	Description	Prepared	Checked	Approved
P01	19/10/2026	First issue for planning — single-storey scheme			

Drawings referenced

Drawing no.	Revision	Title
9001	P00	Existing Site Location Plan
9003	P00	Existing Block Plan
9002	P02	Proposed Site Plan
0001	P01	Proposed Floor Plan and Roof Plan
2021	P01	Proposed Elevations
9004	P00	Proposed Vehicle Entrance

Basis of this document

This strategy is a desk-based assessment prepared to support a planning application. It draws on publicly available geological, hydrogeological and flood risk mapping, Anglian Water asset records and correspondence, the site topographical survey and the architectural drawings listed above. No intrusive ground investigation or infiltration testing has been undertaken at the time of writing. The calculations contained in this document are indicative and are intended to demonstrate that the proposed approach is feasible. Detailed design, hydraulic modelling and final sizing of all drainage components should be completed and certified by a suitably qualified drainage engineer prior to construction, typically to discharge a planning condition.

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1.0 Introduction

1.1 This document sets out the proposed strategy for managing surface water and foul water from the redevelopment of land at 93 Peterborough Road, Farcet, Peterborough, PE7 3BN. The approximate centre of the site lies at grid reference 520071E, 295133N.

1.2 The proposal involves the demolition of the existing dwelling at No. 93, together with the stables, workshop and associated outbuildings, and the construction of a single-storey supported living building. The building comprises six self-contained units, each with its own lounge and kitchen, bedroom and bathroom, arranged in three linked wings around a communal lounge, a staff office and an accessible WC. Associated works include a widened vehicular access from Peterborough Road, an internal access road, communal parking and landscaping.

1.3 The strategy has been prepared to accompany the planning application and to demonstrate that the development can be drained in a sustainable way, without increasing flood risk on the site or elsewhere. It has been prepared with regard to the National Planning Policy Framework (NPPF) and its supporting Planning Practice Guidance on flood risk, the DEFRA Non-Statutory Technical Standards for Sustainable Drainage Systems, CIRIA C753 *The SuDS Manual*, and the requirements of Cambridgeshire County Council as Lead Local Flood Authority.

1.4 Two drainage elements are considered: surface water arising from the roofs, access road and parking areas, and foul water arising from the residential units and staff facilities.

2.0 The Existing Site

2.1 Location and setting

Farcet is a village in Cambridgeshire, a short distance south of Peterborough city centre. The site sits behind the frontage properties on the western side of Peterborough Road, within a predominantly residential area. Farmland borders the site to the north and west, and residential properties lie to the south and east.

2.2 Site area and access

The planning boundary is broadly rectangular, with a narrower access strip running east to Peterborough Road, and encloses approximately **0.27 ha (2,700 m²)**, measured from the proposed site plan (drawing 9002 P02). Access is taken through the plot of the existing dwelling at No. 93, which will be demolished to allow the entrance to be widened (drawing 9004).

2.3 Current use

The site is currently occupied by the dwelling at No. 93, a group of former agricultural buildings including stables and a workshop, and a gravelled yard and vehicle route to the rear of the house. The remainder is largely grass paddock, with a small horse exercise area on the wider landholding to the west. Measured from the existing block plan (drawing 9003), the roofed area of existing buildings within the planning boundary is approximately **320 m²**, excluding the gravelled yard and access.

2.4 Topography

A topographical survey of the site has been carried out. Levels are generally flat, ranging from approximately 16.36 m AOD at the Peterborough Road entrance down to approximately 15.86 m AOD, with a gentle fall from the road westward across the site. Existing ground at the location of the proposed

building sits at around 16.00 m AOD. Beyond the western boundary, land continues to fall towards the Stanground Lode, at approximately 7.0 m AOD.

2.5 Geology

No intrusive ground investigation has yet been undertaken. British Geological Survey (BGS) mapping (Appendix B) indicates the following:

- **Bedrock** — Oxford Clay Formation: a grey, smooth to slightly silty mudstone of Jurassic age, with occasional bands of clay-rich limestone nodules.
- **Superficial deposits** — Oadby Member: a Quaternary diamicton (glacial till) of grey to brown clay and silty clay containing chalk, flint and rock fragments, with occasional lenses of sand and gravel.

Both strata are of low permeability. Very little rainfall is expected to soak into the ground, and natural runoff from the site would tend to drain towards the lower land and watercourse to the west.

2.6 Hydrogeology

DEFRA MAGIC mapping (Appendix C) classifies the bedrock as an **unproductive aquifer** and the superficial deposits as a **secondary (undifferentiated) aquifer**. Groundwater vulnerability is mapped as low, with the site lying at the edge of an area of medium-low vulnerability.

2.7 Watercourses

The nearest surface water feature is the **Stanground Lode**, approximately 300 m west of the site, which is designated a Main River by the Environment Agency (Appendix F). No watercourse or ditch adjoins the site boundary.

2.8 Flood risk

Long term flood risk mapping (Appendix D) shows the site at very low risk of surface water flooding. Small, isolated areas of shallow ponding are shown in the wider area under the low and medium risk scenarios, but the footprint of the proposed building lies outside these. The site lies outside the maximum mapped extent of reservoir flooding. Overall, the site is considered to be at low risk of flooding from the sources assessed.

2.9 Existing drainage and public sewers

Anglian Water asset records (Appendix E, Anglian Water ref. 1347604-1) show the following public sewers in the vicinity:

- A **225 mm vitrified clay combined sewer** running along Peterborough Road, passing the site entrance. Manhole 1101, adjacent to the entrance, has a recorded cover level of 16.43 m and invert level of 13.46 m (approximately 2.97 m deep).
- A **450 mm concrete foul sewer**, also running along Peterborough Road.
- A **225 mm surface water sewer** in Gazeley Gardens to the south, which could only be reached by crossing third-party land.

A CCTV survey of the existing dwelling has confirmed that its rainwater goods and soil stack discharge to a private combined drain which connects to the public sewer in Peterborough Road. Some rainwater pipes on the property discharge to a soakaway. Anglian Water has reviewed this evidence through its pre-planning enquiry service (ref. PPE-0201520) and confirmed that an existing positive surface water connection to the public combined network is proven for the site.

3.0 Surface Water Drainage Strategy

3.1 Design principles

In an undeveloped catchment, much of the rain that falls is intercepted by vegetation, evaporates or soaks into the ground, and the remainder reaches watercourses slowly. Development replaces this with hard surfaces, increasing both the volume and the speed of runoff. A sustainable drainage system (SuDS) seeks to reverse this by managing water as close as possible to where it falls, slowing it down, cleaning it, and releasing it at a controlled rate.

CIRIA C753 identifies four pillars of SuDS design: **water quantity**, **water quality**, **amenity** and **biodiversity**. The strategy for this site aims to address all four as far as the site constraints allow, while ensuring that the components chosen are practical to build and maintain.

3.2 Discharge hierarchy

Planning Practice Guidance and Building Regulations Part H require the destination for surface water to be selected in the following order of preference, with each option ruled out before moving to the next:

- **1.** Infiltration to the ground
- **2.** Discharge to a watercourse
- **3.** Discharge to a surface water sewer
- **4.** Discharge to a combined sewer
- **5.** Discharge to a foul sewer (not normally acceptable)

Applying the hierarchy to this site:

Option	Assessment	Outcome
1. Infiltration	BGS mapping shows low-permeability clay bedrock and clay-rich glacial till. Infiltration is not expected to be viable as the final means of discharge. Infiltration testing to BRE Digest 365 is recommended at detailed design to confirm this. SuDS features can still be used upstream, provided they are lined.	Not viable
2. Watercourse	The Stanground Lode lies about 300 m west. Reaching it would require crossing third-party land over which the developer has no rights. No other watercourse adjoins the site.	Not viable
3. Surface water sewer	The only public surface water sewer nearby is in Gazeley Gardens, which cannot be reached without crossing third-party land.	Not viable
4. Combined sewer	A public combined sewer runs in Peterborough Road at the site entrance, and the site already has a proven positive connection to it. Anglian Water has confirmed that a restricted-rate connection is acceptable.	**Selected**

While a combined sewer sits low in the hierarchy, it is the highest option available here. To limit the effect on the public network, the rate of discharge will be restricted to the lowest practicable figure.

3.3 Anglian Water position

Anglian Water's response to pre-planning enquiry PPE-0201520 confirmed that, providing the surface water hierarchy has been properly explored, connecting surface water to the combined network at a restricted rate, achieving a betterment over the existing arrangement, is acceptable. Anglian Water also advised that the minimum flow restriction it will adopt is **2 l/s**; any network designed to restrict below this would not be adoptable upstream of the control. A formal Section 106 application will be required

for the new connection.

3.4 Proposed discharge rate

The existing runoff rate has been estimated using the Modified Rational Method, based only on the roofed area of the existing buildings (approximately 320 m²). The gravelled yard and access have been excluded, so these figures understate the true existing rate and are therefore conservative. The calculation is set out in Appendix G.

Return period	Existing runoff (roofs only)	Proposed restricted rate	Reduction
1 in 1 year (100% AEP)	4.7 l/s	2.0 l/s	57%
1 in 30 years (3.3% AEP)	11.3 l/s	2.0 l/s	82%
1 in 100 years (1% AEP)	13.8 l/s	2.0 l/s	86%

The equivalent greenfield runoff rate (QBAR) for a site of this size on clay soils is estimated at below 1 l/s (Appendix G). Restricting flows to this level would require a very small flow control opening that is prone to blockage and would fall below Anglian Water's minimum adoptable rate. It is therefore proposed to restrict all surface water discharge to **2.0 l/s for all storm events up to and including the 1 in 100 year event plus a 40% allowance for climate change**. This represents the lowest practicable rate and a significant betterment over the existing situation.

3.5 Climate change and urban creep

The Environment Agency's peak rainfall intensity allowances for the Nene management catchment have been applied, using the upper end allowances for the 2070s epoch to reflect the lifetime of the development:

- **40%** uplift for the 1% annual exceedance probability (AEP) event, used to size storage; and
- **35%** uplift for the 3.3% AEP event, used to check that no flooding occurs on site.

An allowance of **10%** has also been added to the impermeable area to account for urban creep, such as future extensions and additional paving, over the life of the development.

3.6 Proposed impermeable areas

Impermeable areas have been measured from the proposed site plan (9002 P02) and proposed roof plan (0001 P01):

Surface	Area (m²)
Building roof (three linked wings and link corridors)	475
Access drive from Peterborough Road	330
Internal access road and turning area	410
Parking bays	230
Footpaths and bin store	75
Total impermeable area	**1,520**
Design area including 10% urban creep	**1,672 (0.167 ha)**

3.7 Assessment of SuDS components

Each of the principal component types in CIRIA C753 has been considered against the constraints of this site:

Component	How it works	Site assessment	Suitable?
Rainwater harvesting	Runoff from roofs is captured and stored in a butt or tank for reuse on site.	Water butts on rainwater downpipes can provide water for landscape watering. Larger shared systems are less practical as there is no single owner of individual downpipes, and butts offer no guaranteed storage in a storm.	Yes (water butts)
Green and blue roofs	Vegetated or water-storing layers on a roof surface.	The building has pitched tiled roofs consistent with surrounding properties. Green or blue roofs are not compatible with this roof form.	No
Infiltration systems	Features that store runoff and allow it to soak into the ground.	Clay geology is not expected to support infiltration. To be confirmed by testing, but not relied upon.	No
Proprietary treatment	Manufactured units that remove silt, oil and other pollutants.	Pollution risk from roofs and low-traffic residential parking is low and is addressed by permeable paving.	No
Filter strips	Gently sloping grassed areas that filter sheet flow from hard surfaces.	No suitable long linear hard areas discharging to open ground.	No
Filter drains	Gravel-filled trenches that store, convey and filter runoff.	Limited opportunity. Planted tree pits or planters between parking bays could accept exceedance flows from the car park.	Limited
Swales	Shallow vegetated channels that convey and treat runoff.	Insufficient open space for meaningful swales without compromising the layout.	No
Bioretention	Landscaped depressions where water ponds and filters through soil.	Limited open space; could not be accommodated without compromising the development.	No
Trees	Trees intercept rainfall and can be integrated with other SuDS.	Tree planting within landscaped areas adds interception and biodiversity value.	Yes (standalone)
Pervious pavements	Runoff passes through permeable surfacing into a stone sub-base used for storage.	Well suited to the access road and car park. A lined (Type C) system will provide source control, filtration and attenuation storage beneath trafficked areas.	**Yes**
Attenuation tanks	Below-ground voided structures (often geocellular) that store runoff.	Suitable as a supplementary or alternative storage element if detailed design requires it.	Yes
Detention basins	Dry landscaped hollows that fill during storms.	Insufficient open space and limited fall across the site.	No
Ponds and wetlands	Permanent water bodies providing storage and treatment.	Insufficient open space; not appropriate for this layout.	No

3.8 Proposed surface water system

With limited open space, the most efficient approach is to combine conveyance, treatment and storage in the same part of the site. It is therefore proposed that:

- The car park, parking bays and internal access road are surfaced in **lined (Type C) permeable block paving**. Rainfall passes through the joints into an open-graded stone sub-base, where it is filtered and stored before being collected by perforated pipes laid along the base of the system.

- Roof water is collected by sealed downpipes and carried in a piped network to the permeable paving sub-base or the main surface water run.
- The access drive is also surfaced in permeable paving, providing additional treatment and conveyance towards the outfall. A linear drainage channel is provided across the site entrance so that no surface water runs onto Peterborough Road.
- Flows pass through a **flow control chamber** (orifice or vortex control, with a non-return valve) located near the site entrance, limiting discharge to **2.0 l/s**, before connecting by gravity to the public combined sewer in Peterborough Road, subject to a Section 106 agreement with Anglian Water.

The indicative calculations in Appendix G show that approximately **110 m³** of attenuation storage is required to contain the 1 in 100 year plus 40% climate change event at a 2.0 l/s discharge. Assuming a stone sub-base with 30% voids, this can be provided by a **600 mm deep sub-base beneath approximately 640 m²** of permeable paving in the car park and internal road, giving around 115 m³ of storage. The permeable paving to the access drive provides further headroom. If detailed design shows a shortfall, a geocellular tank can be added beneath the parking area.

The site falls gently westward from the road, while the outfall is at the eastern entrance. The public combined sewer is approximately 3 m deep at manhole 1101, which gives sufficient depth for a gravity connection from the rear of the site. This should be confirmed against the topographical survey at detailed design.

3.9 Water quality

Using the simple index approach in CIRIA C753, runoff from residential roofs and low-traffic residential parking carries a low pollution hazard. Permeable paving with a stone sub-base provides mitigation indices which exceed the pollution hazard indices for suspended solids, metals and hydrocarbons, so no further treatment is required.

3.10 Biodiversity

Tree planting and soft landscaping around the car park will add to the amenity and biodiversity value of the drainage system. In line with the ecological recommendations for the site, any gullies or chambers should be amphibian-friendly, for example offset gully pots or gullies fitted with amphibian ladders, so that small animals are not trapped.

3.11 Requirements for detailed design

The detailed design should model the network for summer and winter storms from 15 minutes to 10,080 minutes (7 days), using current FEH rainfall data. The MADD factor should be set to zero, so that no rainfall is assumed to be lost or stored elsewhere on site. This is a conservative approach that maximises the storage provided. The model should demonstrate no flooding on site for the 3.3% AEP plus 35% event, and no flooding of buildings for the 1% AEP plus 40% event.

3.12 Summary

Surface water will be attenuated within lined permeable paving and restricted to **2.0 l/s** for all events up to the 1 in 100 year plus 40% climate change event, discharging to the public combined sewer in Peterborough Road at the site entrance.

4.0 Foul Water Drainage Strategy

4.1 Foul water from the six units, communal lounge, office and accessible WC will be collected by a private gravity network. Branch connections from each soil stack will feed a main run along the frontage of the building, leading east to a new connection to the public sewer in Peterborough Road. This connection may be to either the 450 mm foul sewer or the 225 mm combined sewer, as agreed with Anglian Water.

4.2 The final layout will be confirmed once soil and vent pipe positions are fixed by the architect. Where foul pipes pass through the permeable paving sub-base, they and any chambers within it must be sealed, so that stored surface water cannot enter the foul system.

4.3 The peak foul flow is estimated at approximately **0.3 l/s** (Appendix G), based on the Sewerage Sector Guidance allowance of 4,000 litres per dwelling per day applied to six units, plus a small allowance for staff facilities.

4.4 Where a new connection is made to the public sewer, or flows to the sewer increase, a Section 106 application must be made to Anglian Water.

5.0 Finished Floor Levels and Exceedance Flows

5.1 All accommodation is on the ground floor, so finished floor levels are important for the safety of residents. Finished floor levels should be set at least **300 mm above existing ground level**, giving an indicative level of about 16.30 m AOD, and at least 150 mm above adjacent finished external levels.

5.2 External levels should fall away from the building. In an event that exceeds the design capacity of the system, or if part of the system becomes blocked, overland flows will be directed along the access road and car park and away from the building. Planted areas between parking bays can accept exceedance flows. Flows will not be directed onto neighbouring land or onto Peterborough Road.

6.0 Maintenance and Management

6.1 Drainage systems only work as designed if they are properly maintained. Responsibility depends on whether a component is adopted by a statutory body or stays in private ownership. Possible owners include the landowner, the sewerage undertaker or a management company.

6.2 Apart from the final lateral connection, which may be adopted by Anglian Water, the system will be privately owned. The site operator will be responsible for maintaining the permeable paving, piped network, flow control and planters, either directly or through an appointed maintenance contractor. The schedule below sets out the minimum activities required.

Component	Type	Activity	Frequency
Permeable paving	Regular	Brush and vacuum the whole surface (standard cosmetic sweep).	Annually, after autumn leaf fall, or as indicated by site observations and manufacturer guidance. Focus on areas receiving runoff from adjacent hard surfaces.
	Regular	Mow and maintain adjoining landscaped areas.	As required
	Occasional	Remove weeds, using spot-applied herbicide rather than spraying.	As required; typically annually

Component	Type	Activity	Frequency
	Remedial	Lower any landscaping that has risen to within 50 mm of the paving surface.	As required
	Remedial	Repair depressions, rutting and cracked or broken blocks; replace lost jointing material.	As required
	Remedial	Rehabilitate the surface and upper sub-base by remedial sweeping.	Every 10 to 15 years, or if significant clogging reduces performance
	Monitoring	Initial inspection after installation.	Monthly for the first 3 months
	Monitoring	Inspect for poor operation or weed growth and act as needed.	Every 3 months, and within 48 hours of large storms, for the first 6 months
	Monitoring	Check silt build-up to set brushing frequency; inspect chambers.	Annually
Pipework, chambers and flow control	Regular	Inspect and identify any part not operating correctly; take remedial action.	Monthly for 3 months, then annually
	Regular	Remove debris from catchment surfaces where it may affect performance.	Monthly
	Regular	Clean silt traps, gullies and the entrance linear drain.	Every 6 months, and after autumn leaf fall
	Remedial	Repair or replace inlets, outlets, the flow control and the non-return valve.	As required
	Monitoring	Check all inlets, outlets, vents and overflows are in good condition and operating as designed.	Annually
Trees and planters	Regular	Remove litter; maintain planting; check inlets are clear.	Every 3 months and after storms

6.3 Maintenance falls into three categories:

- **Regular maintenance**: routine tasks such as sweeping and inspection. Carry out monthly, or after significant rainfall, during the first year. After that, settle into a routine of around every three months, with extra attention in autumn.
- **Occasional maintenance**: tasks needed less often but still on a planned cycle, such as weed control.
- **Remedial maintenance**: unplanned repairs in response to damage or failure.

6.4 Further guidance is given in Chapter 32 (Operation and maintenance) of CIRIA C753 *The SuDS Manual*, available free from www.ciria.org. A maintenance log should be kept and passed on with any change of ownership or management.

7.0 Conclusions

7.1 The site is at very low risk of surface water flooding, and the proposed building lies outside the areas of mapped risk. Overall, the site is at low risk of flooding from the sources assessed.

7.2 Infiltration, discharge to a watercourse and discharge to a surface water sewer have each been assessed and ruled out. The site already has a proven positive connection to the public combined sewer in Peterborough Road, and Anglian Water has confirmed that a restricted connection is acceptable.

7.3 Surface water will be restricted to **2.0 l/s**, the practical minimum, for all events up to the 1 in 100 year plus **40%** climate change event. This is at least an 86% reduction on the existing 1 in 100 year runoff rate.

7.4 Attenuation of approximately **110 m³** will be provided within the sub-base of lined permeable paving beneath the car park and internal road. Further capacity is available beneath the access drive and, if needed, in a supplementary geocellular tank.

7.5 Foul water will drain by gravity to the public sewer in Peterborough Road, subject to a Section 106 agreement with Anglian Water.

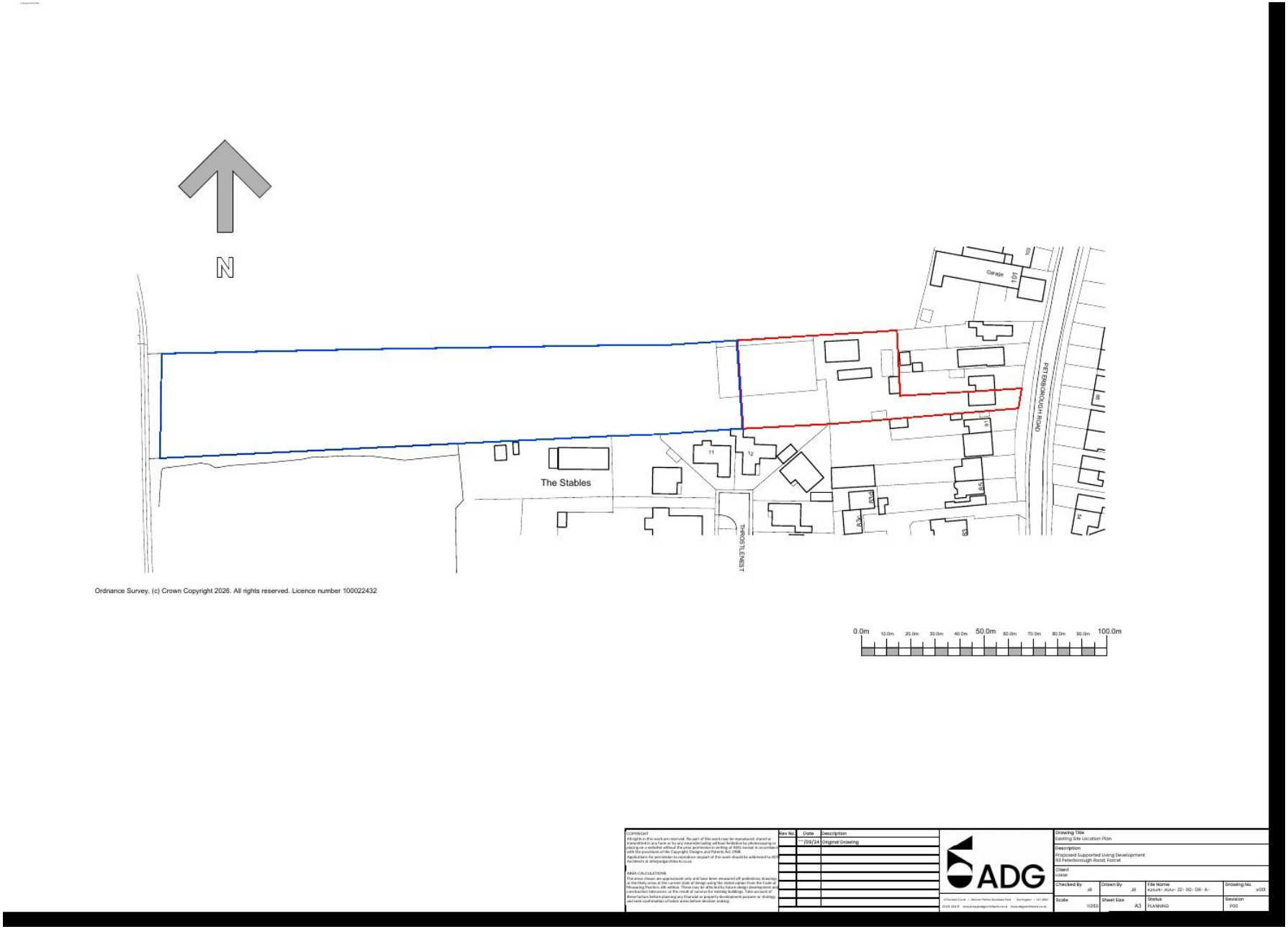
7.6 The system will be privately maintained by the site operator in line with the schedule in Section 6 and CIRIA C753.

7.7 The development can be drained sustainably without increasing flood risk on site or elsewhere. Final sizing should be confirmed through detailed design and hydraulic modelling by a suitably qualified drainage engineer.

Appendix A

Site Location and Proposed Scheme Drawings

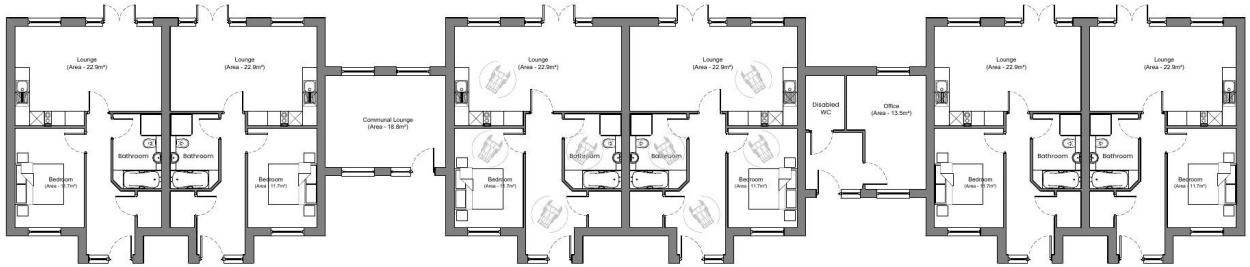
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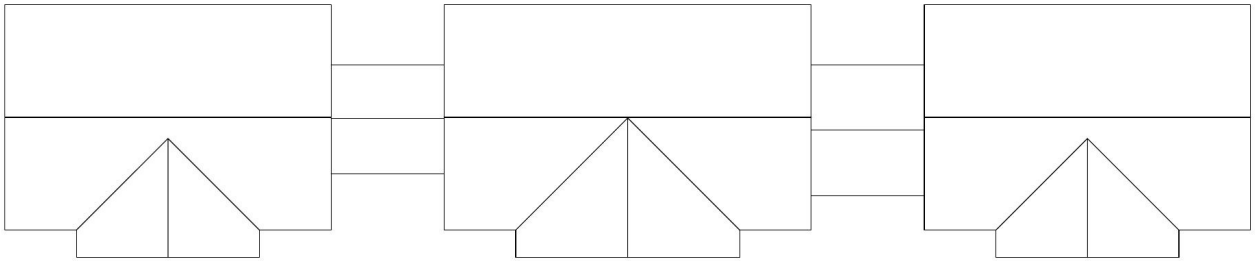
Drawing 9001 Rev P00 — Existing Site Location Plan.



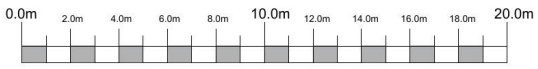
Drawing 9002 Rev P02 — Proposed Site Plan.



Proposed Floor Plan



Proposed Roof Plan



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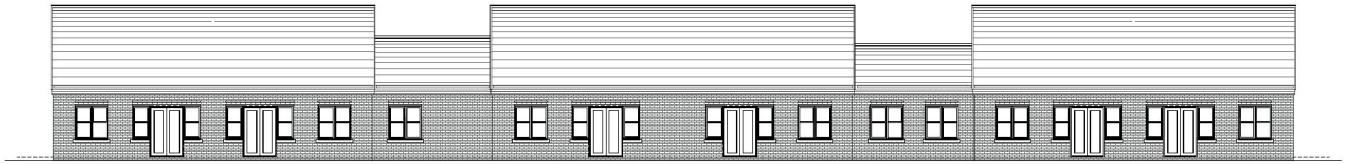
AREA CALCULATIONS
The areas shown are approximate only and have been measured off preliminary drawings as the likely areas at the current state of design using the stated option from the Code of Measuring Practice, 6th edition. These may be affected by future design development and construction tolerances, or the result of surveys for existing buildings. Take account of these factors before planning any financial or property development purpose or strategy and seek confirmation of latest areas before decision making.

Rev No.	Date	Description
	-/09/24	Original Drawing

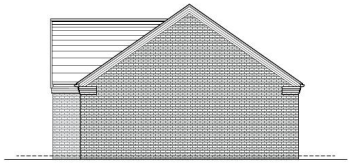
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6 Pioneer Court • Morton Palms Business Park • Darlington • DL1 4WD
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Drawing Title: Proposed Floor Plan and Roof Plan			
Description: Proposed Supported Living Development 93 Peterborough Road, Farcet			
Client: Laise			
Checked By: JB	Drawn By: JB	File Name: R2624- ADG- ZZ- 00- DR- A-	Drawing No.: 0001
Scale: 1:100	Sheet Size: A1	Status: PLANNING	Revision: P01

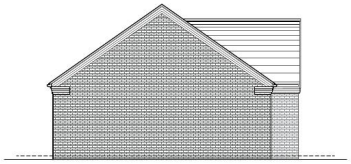
Drawing 0001 Rev P01 — Proposed Floor Plan and Roof Plan.



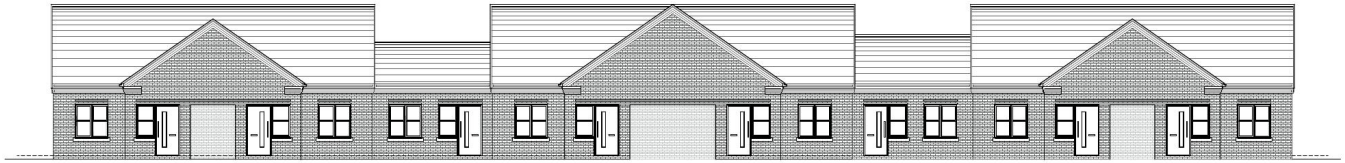
Proposed South Elevation



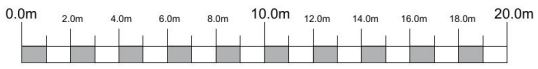
Proposed East Elevation



Proposed West Elevation



Proposed North Elevation



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Rev No.	Date	Description
	'/09/24	Original Drawing

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Drawing Title: Proposed Elevations			
Description: Proposed Supported Living Development 93 Peterborough Road, Farcet			
Client: Liaise			
Checked By: JB	Drawn By: JB	File Name: R2624- ADG- ZZ- 00- DR- A-	Drawing No.: 2021
Scale: 1:100	Sheet Size: A1	Status: PLANNING	Revision: P01

Drawing 2021 Rev P01 — Proposed Elevations.

Appendix B

British Geological Survey Mapping

Geology of Britain viewer extracts

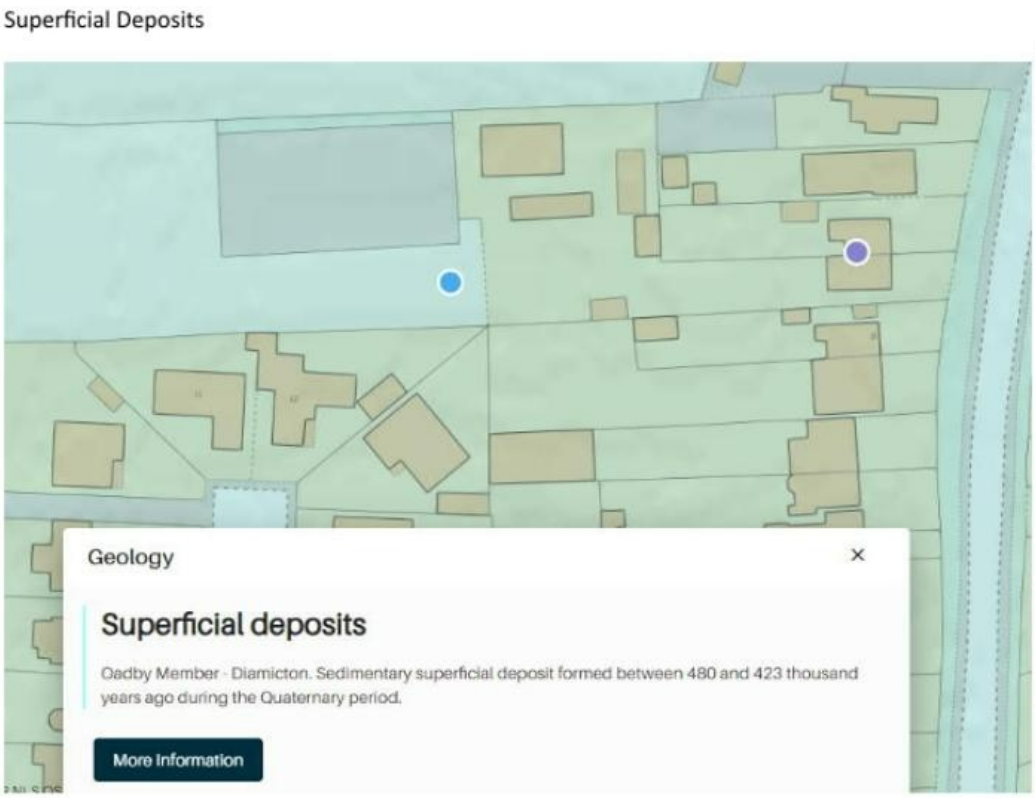


Figure B1 — BGS superficial deposits: Oadby Member (diamicton).

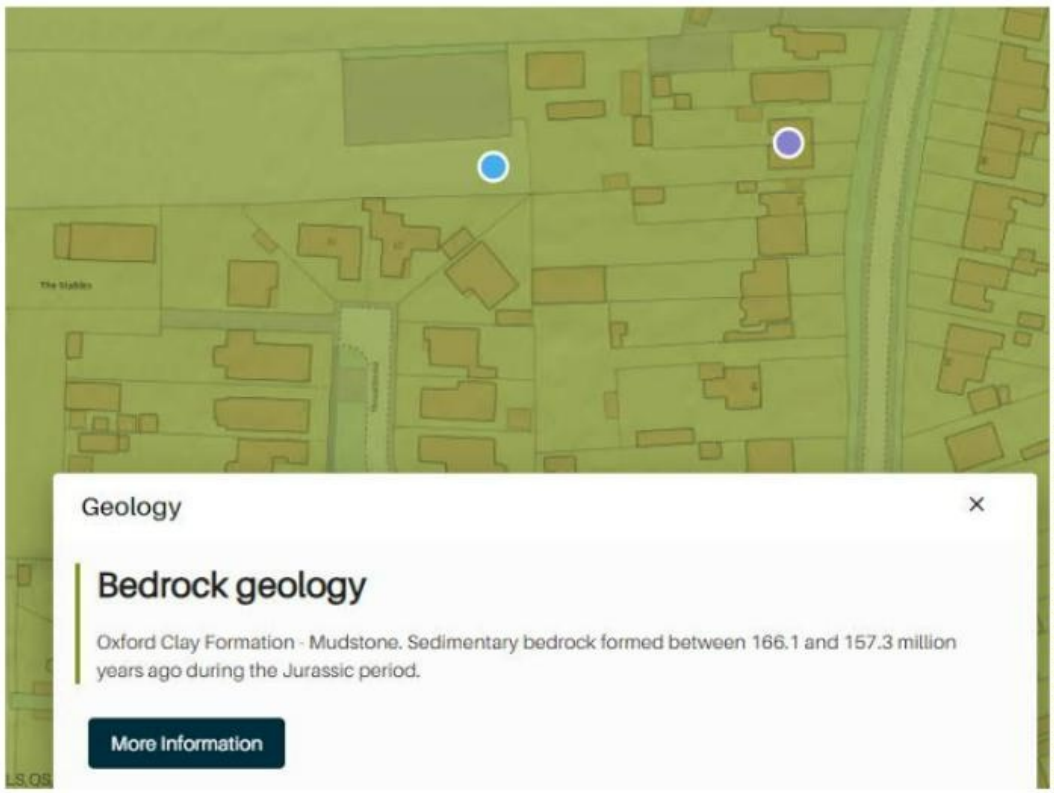


Figure B2 — BGS bedrock geology: Oxford Clay Formation (mudstone).

Appendix C

DEFRA MAGIC Map Extracts

Aquifer designation and groundwater vulnerability

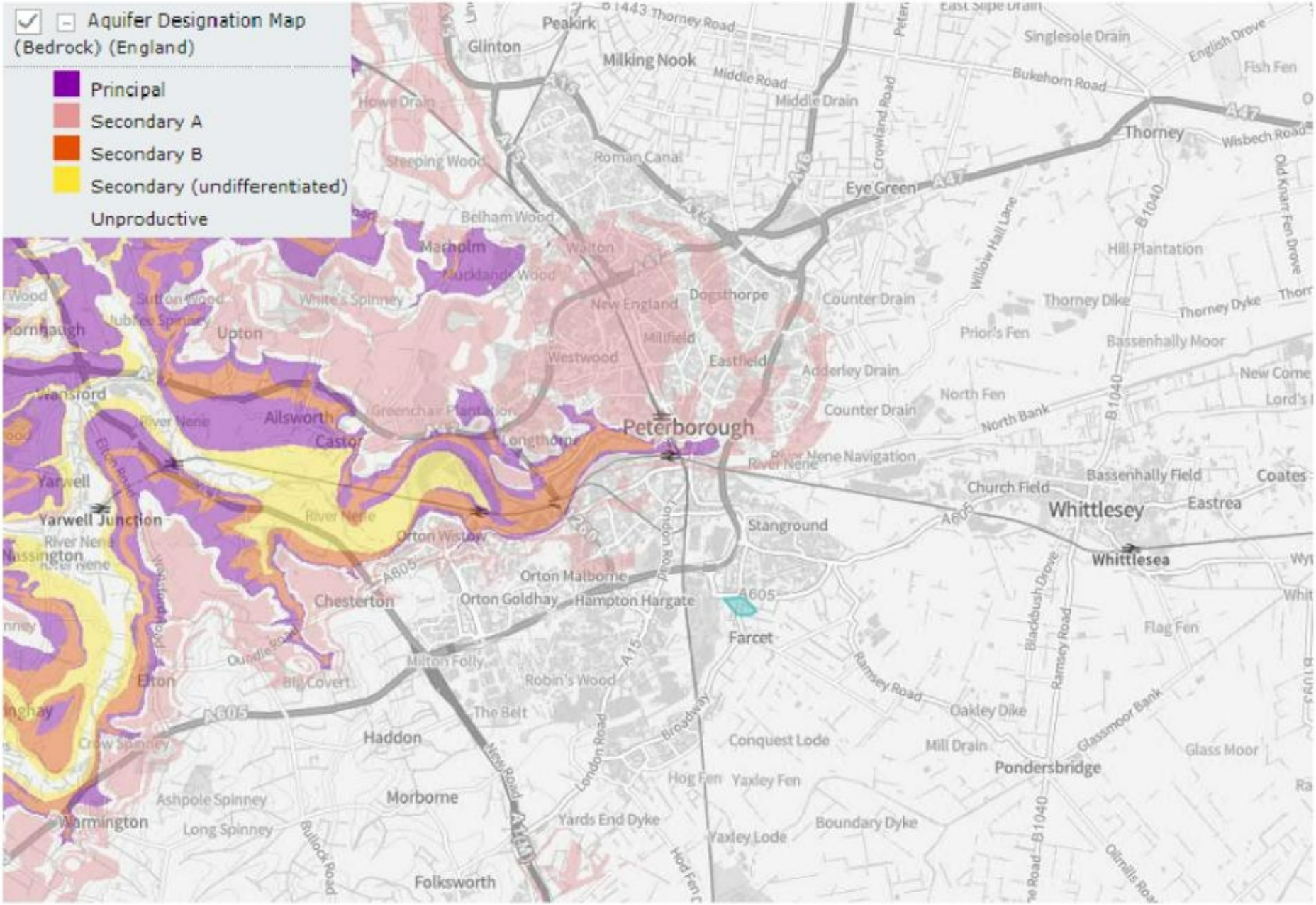


Figure C1 — Aquifer designation (bedrock). Site shown in blue outline.

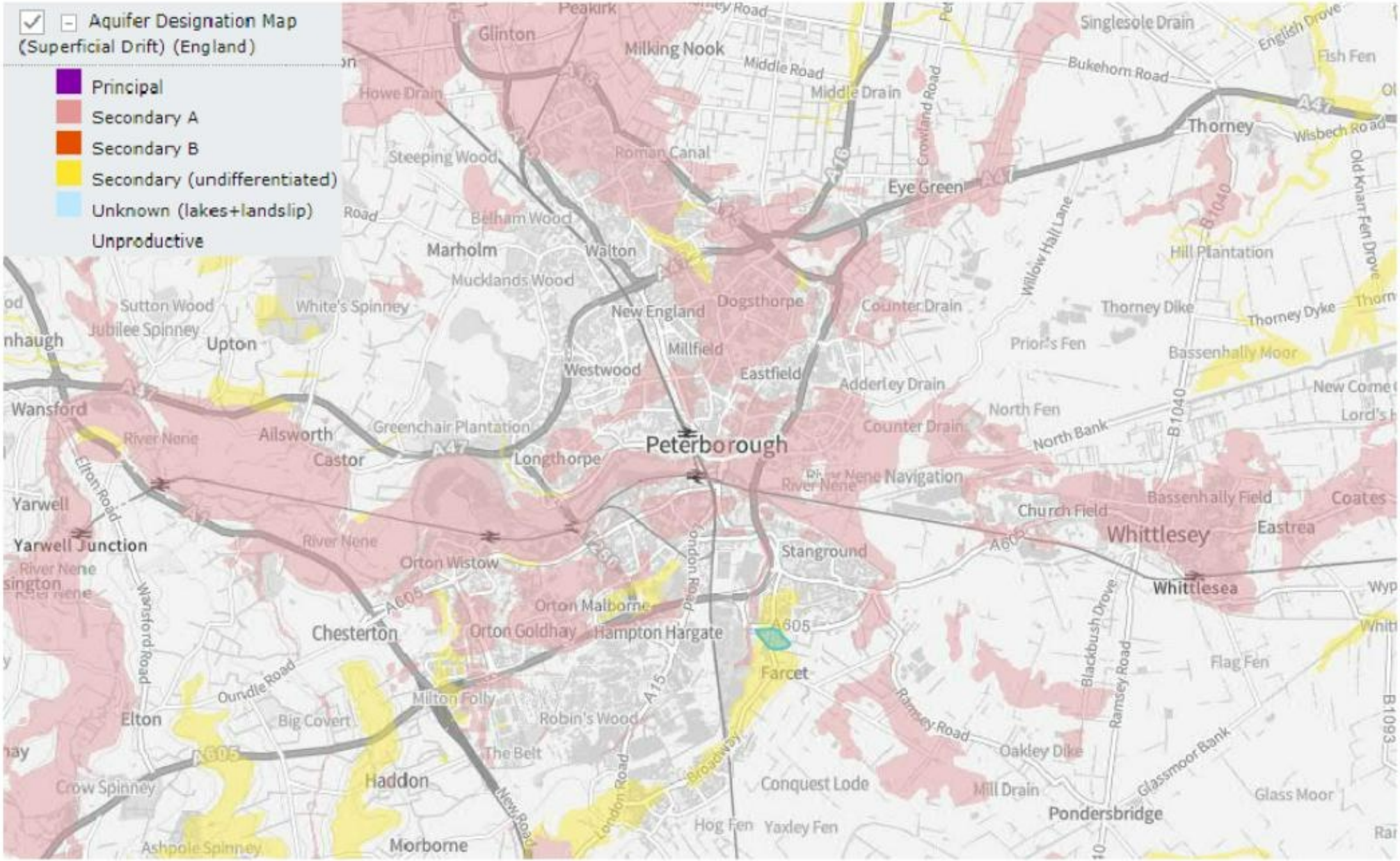


Figure C2 — Aquifer designation (superficial deposits).

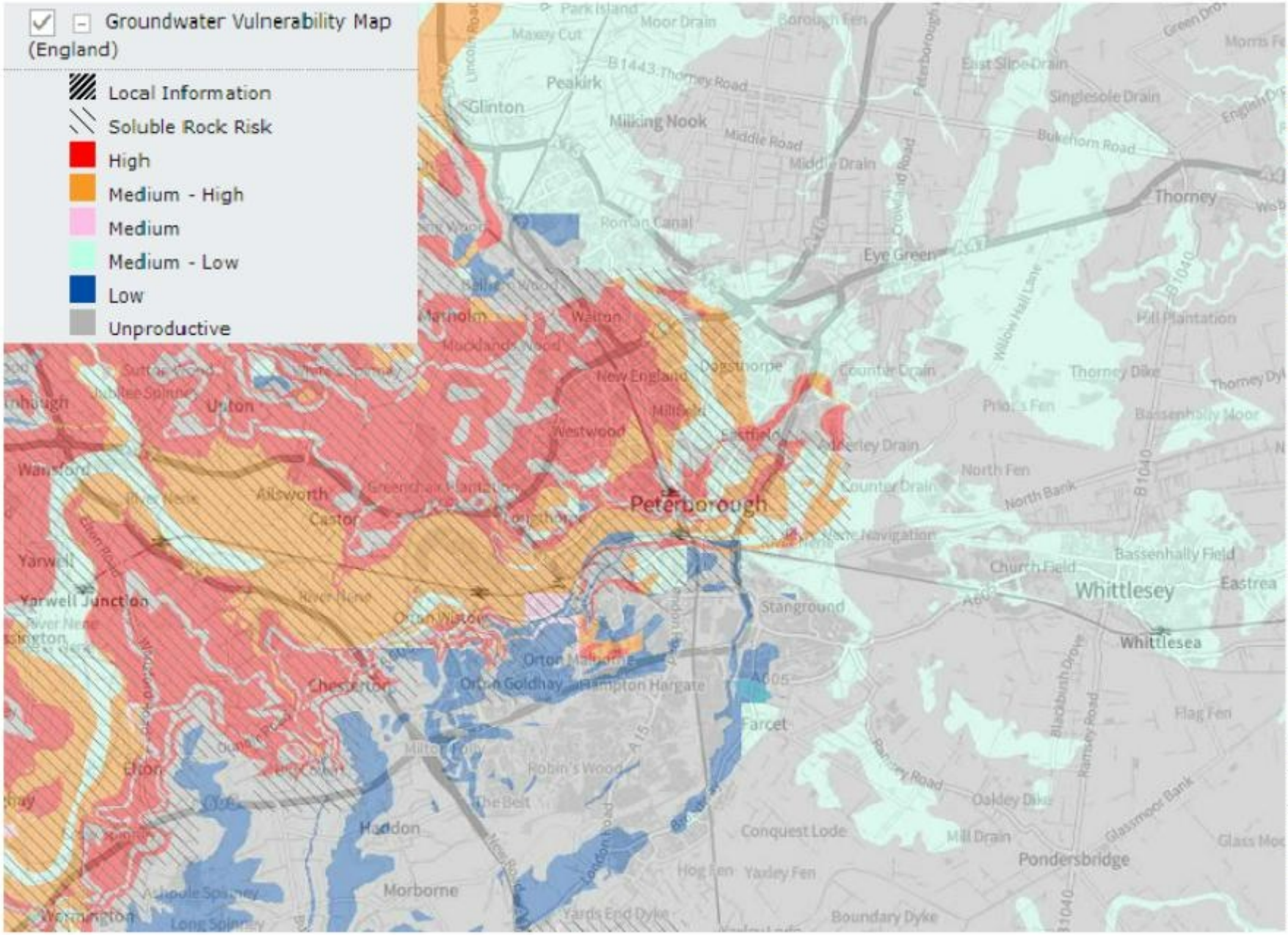


Figure C3 — Groundwater vulnerability.

Appendix D

Long Term Flood Risk Mapping

Surface water and reservoir flood risk extracts



Figure D1 — Extent of flooding from surface water.



Figure D2 — Surface water flood depth, low risk scenario.



Figure D3 — Surface water flood velocity, low risk scenario.



Figure D4 — Surface water flood depth, medium risk scenario.



Figure D5 — Surface water flood velocity, medium risk scenario.



Figure D6 — Maximum extent of flooding from reservoirs.

Appendix E

Anglian Water Asset Records

Wastewater plan and manhole schedule, Anglian Water ref. 1347604-1

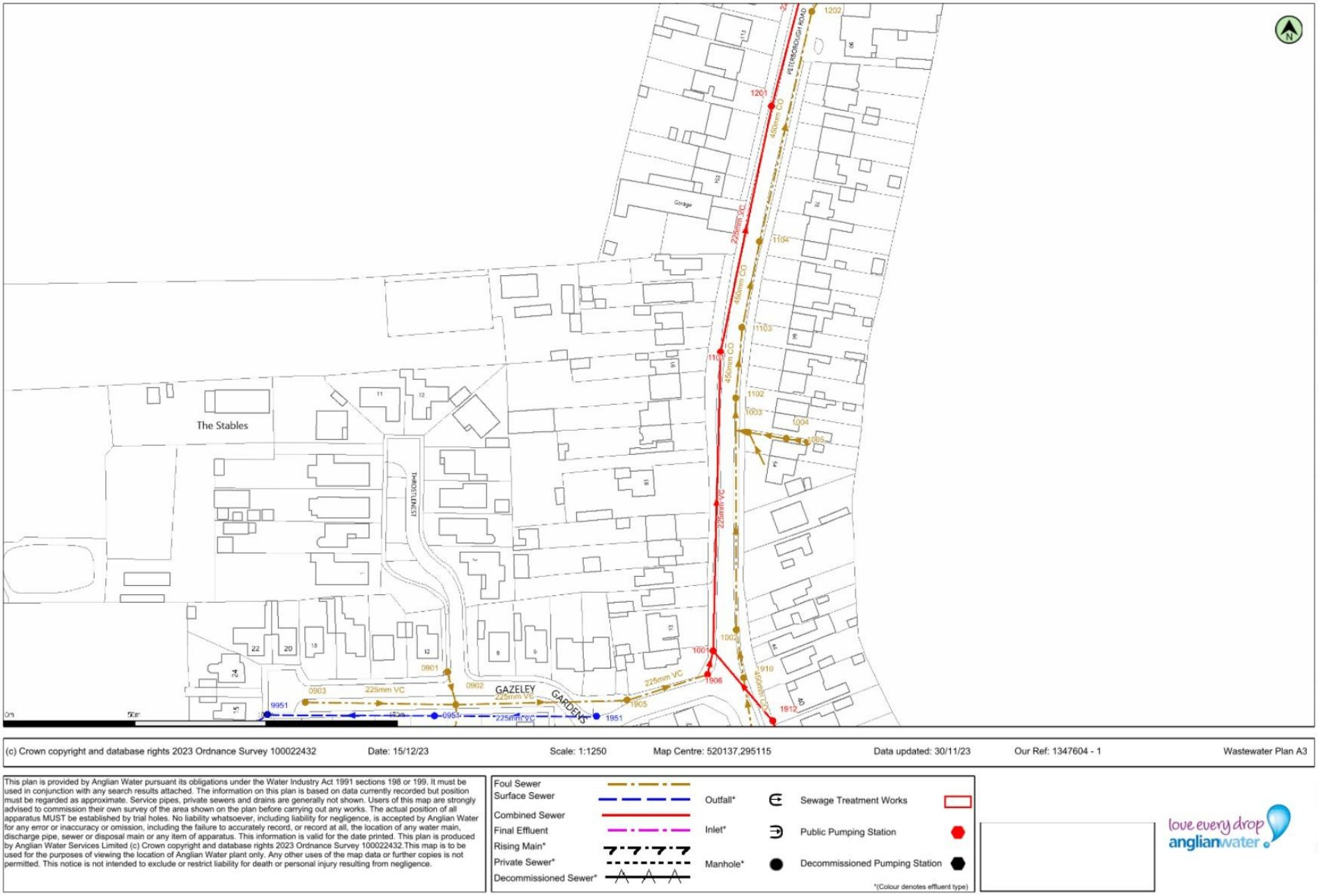


Figure E1 — Anglian Water wastewater plan.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
1001	C	16.76	13.87	2.89
1101	C	16.43	13.46	2.97
1201	C	15.89	13.18	2.71
1906	C	-	-	-
1912	C	-	-	-
0901	F	16.64	14.76	1.88
0902	F	16.63	14.55	2.08
0903	F	16.13	14.82	1.31
1002	F	16.6	13.28	3.32
1003	F	-	-	-
1004	F	-	-	-
1005	F	-	-	-
1102	F	16.27	13.07	3.2
1103	F	16.24	13.05	3.19
1104	F	16.1	12.95	3.15
1202	F	-	-	-
1905	F	16.78	14.24	2.54
1910	F	-	-	-
0951	S	-	-	-
1951	S	16.93	15.5	1.43
9951	S	-	-	-

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Our Ref: 1347604 - 1

Figure E2 — Anglian Water manhole schedule.

Appendix F

Environment Agency Main Rivers Mapping

Stanground Lode, approximately 300 m west of the site

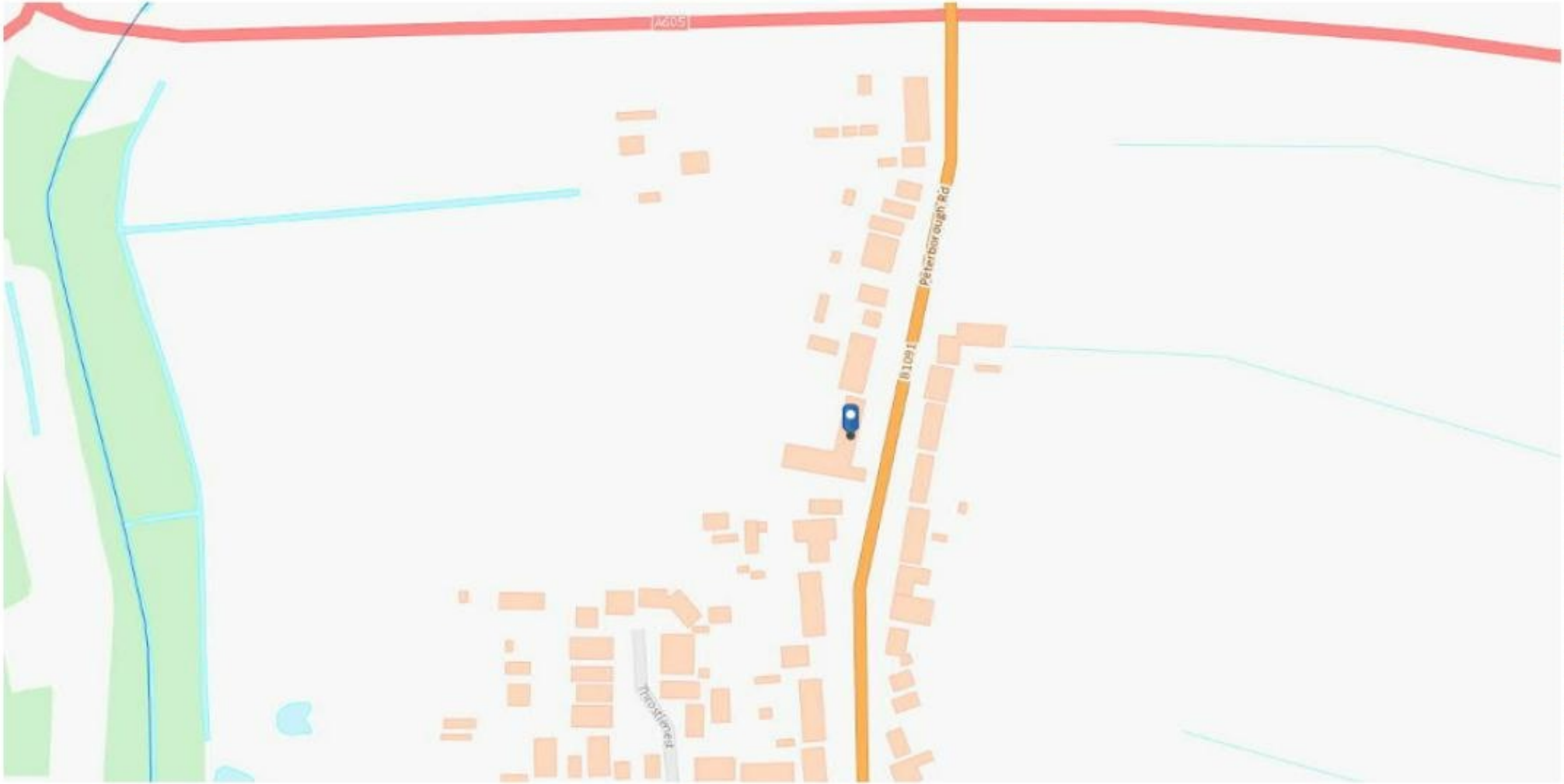


Figure F1 — Environment Agency Main Rivers map. Site location marked.

Appendix G

Indicative Drainage Calculations

Runoff rates, attenuation storage and foul flows

G1 Rainfall parameters

Indicative rainfall has been derived using the Flood Studies Report (FSR) method, with parameters typical of the Peterborough area: M5-60 = 20 mm and r = 0.40. These values are suitable for feasibility checks only. Detailed design should use site-specific FEH rainfall data.

Return period	5-minute rainfall depth	Rainfall intensity (I)
1 in 1 year	4.5 mm	53.8 mm/hr
1 in 30 years	10.9 mm	130.2 mm/hr
1 in 100 years	13.3 mm	159.6 mm/hr

G2 Existing runoff rate (Modified Rational Method)

$Q = 2.78 \times C_v \times C_r \times I \times A$, where $C_v = 0.75$ (volumetric runoff coefficient), $C_r = 1.3$ (routing coefficient), I is rainfall intensity in mm/hr and A is the impermeable area in hectares. Existing impermeable area A = 0.032 ha (existing roofs only, measured from drawing 9003). The gravelled yard and access are excluded, so the result is conservative.

Return period	I (mm/hr)	Calculation	Existing Q
1 in 1 year	53.8	2.78 × 0.75 × 1.3 × 53.8 × 0.032	4.7 l/s
1 in 30 years	130.2	2.78 × 0.75 × 1.3 × 130.2 × 0.032	11.3 l/s
1 in 100 years	159.6	2.78 × 0.75 × 1.3 × 159.6 × 0.032	13.8 l/s

G3 Greenfield runoff rate (IH124)

$QBAR\ (m^3/s) = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$, calculated for 50 ha and scaled down to the site area. With SAAR = 550 mm and SOIL = 0.45 (clay soils), QBAR for 50 ha ≈ 165 l/s, which is about 3.3 l/s/ha. For the site area of 0.27 ha, **QBAR ≈ 0.9 l/s**. This is below the practical minimum of 2 l/s, so 2.0 l/s is adopted as the limiting discharge.

G4 Attenuation storage estimate

Design impermeable area = 1,520 m² + 10% urban creep = **1,672 m²**. The event considered is the 1 in 100 year storm plus 40% climate change, with 100% runoff assumed from all impermeable surfaces and a constant 2.0 l/s outflow. Required storage = inflow volume − outflow volume, taking the critical (largest) value across the range of storm durations.

Storm duration	M100 depth (mm)	Depth +40% (mm)	Inflow (m³)	Outflow (m³)	Storage (m³)
15 min	24.2	33.9	56.7	1.8	54.9
30 min	31.9	44.7	74.7	3.6	71.1
60 min	40.4	56.6	94.6	7.2	87.4
120 min	49.3	69.0	115.4	14.4	101.0
240 min	**57.3**	**80.3**	**134.2**	**28.8**	**105.4**

Storm duration	M100 depth (mm)	Depth +40% (mm)	Inflow (m^3)	Outflow (m^3)	Storage (m^3)
360 min	63.2	88.5	147.9	43.2	104.7
600 min	71.0	99.4	166.1	72.0	94.1
960 min	78.8	110.3	184.4	115.2	69.2
1440 min	86.6	121.2	202.7	172.8	29.9

Critical storage is approximately **105 m^3** (240-minute storm). Allowing a margin, **110 m^3** is adopted for design.

Permeable paving storage check	
Paving area (car park, bays and internal road)	640 m^2
Sub-base depth	0.60 m
Void ratio (open-graded stone)	30%
Storage available (640 × 0.60 × 0.30)	**115 m^3 ≥ 110 m^3 required**

G5 Foul water flow estimate

Item	Basis	Peak flow
Six self-contained units	6 × 4,000 l/unit/day (Sewerage Sector Guidance), equivalent to 0.046 l/s per unit	0.28 l/s
Staff office, accessible WC and communal lounge	Nominal allowance	0.02 l/s
Total		**0.30 l/s**

These calculations are indicative and support the feasibility of the proposed strategy. Final design should be carried out using industry-standard hydraulic modelling software and current FEH rainfall data.

Appendix H

Outline Drainage Strategy Layout

Indicative arrangement on proposed site plan 9002 P02

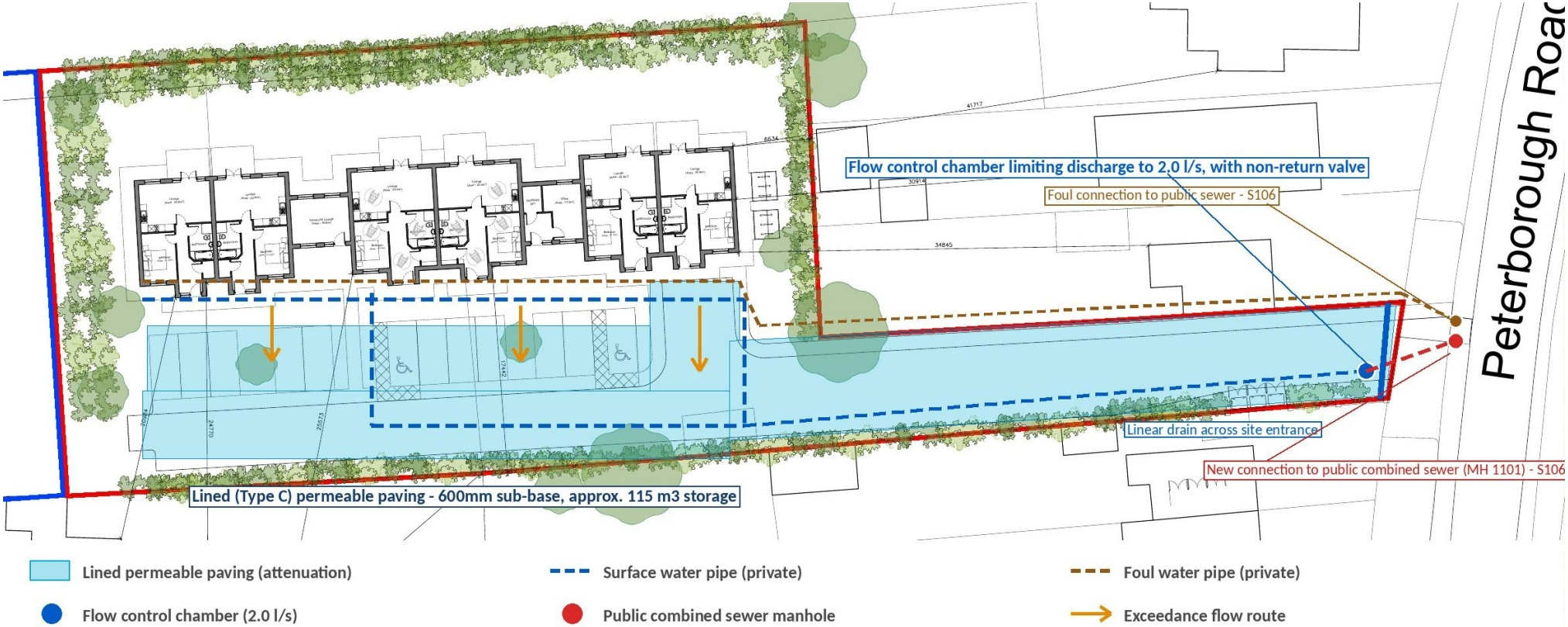


Figure H1 — Indicative surface and foul water drainage layout. Not for construction. Pipe routes, levels and component sizes are subject to detailed design.