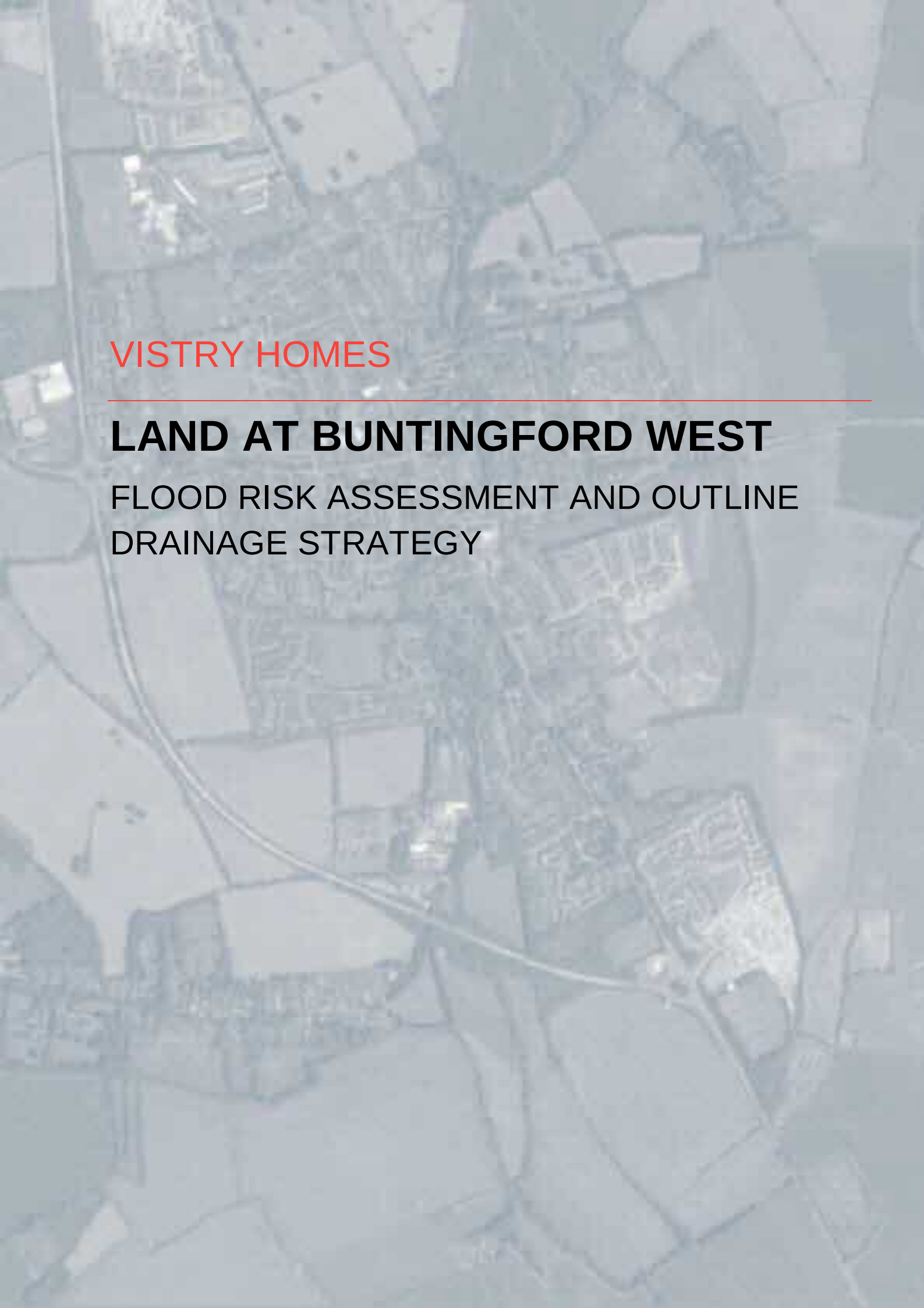

VISTRY HOMES

LAND AT BUNTINGFORD WEST

FLOOD RISK ASSESSMENT AND OUTLINE DRAINAGE STRATEGY

VISTRY HOMES

LAND AT BUNTINGFORD WEST

FLOOD RISK ASSESSMENT AND OUTLINE DRAINAGE STRATEGY

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EXECUTIVE SUMMARY

This report presents the Flood Risk Assessment (FRA) and Drainage Strategy prepared by WSP on behalf of Vistry Homes to support the outline planning application for a proposed mixed-use development at the land west of Luynes Rise, Buntingford, Hertfordshire.

The outline planning application seeks approval (with all matters reserved except for access) for a development of 350 dwellings, with up to 4,400 sqm of commercial and services floorspace (Use Class E and B8), and up to 500 sqm of retail floorspace (Use Classes E) and other associated works including drainage, access into the site from the A10 and Luynes Rise (but not access within the site), allotments, public open space and landscaping.

The application includes for some landscaping west of the A10. The works to this additional area will not change catchment parameters or flooding on or off Site as the topography, permeability of ground surfaces and drainage regime will not change. Therefore, this Flood Risk Assessment addresses flood risk and drainage to the proposed development area only.

The Site is located on land to the west of Buntingford, Hertfordshire. The Site is bounded by existing residential development to the north-east, the A10 to the west and south, and the existing Watermill Industrial Estate and the Buntingford Wastewater Treatment Works (WwTW) to the south-east.

The Site is located approximately 100m west of the River Rib. The River Rib is designated as a Main River and is under EA ownership and maintenance. There is an existing 525mm culvert underneath the A10 that passes through the Site west to east via an existing drainage ditch before continuing through the rear gardens at Meadow View. There are no existing foul or surface water sewers within the Site boundary.

The Site is found to be at Low to Negligible risk from all sources of flooding, including tidal/fluvial, groundwater, surface and artificial.

It is proposed to discharge surface water from the Proposed Development to the existing Thames Water surface water sewer network located within Peasmead. The local surface water sewer network discharges to the River Rib via an existing outfall downstream of the development. Surface water will be attenuated to the Qbar Greenfield rate of 36 l/s via the provision of swales, permeable paving and detention basins prior to discharge to the local surface water sewer network in Peasmead (TWMH Ref: 0804). Surface water will be attenuated for all storms up to and including the design 1 in 100 year + 40% climate change event.

It is proposed that foul water from the development will discharge to the local foul sewer network via two connections, one to TWMH 8906 and one to TWMH 0802. Where the on-Site network is too low to discharge via gravity, the on-Site network will be pumped to a level to allow for a gravity discharge. Thames Water have indicated that further modelling of the local sewer network is required to confirm capacity in the local network to serve the development. Thames Water will only undertake this modelling should planning permission be granted.

1. INTRODUCTION

1.1. APPOINTMENT AND BRIEF

1.1.1. WSP have been appointed by Vistry Homes to undertake a Flood Risk Assessment (FRA) and Drainage Strategy to support the outline planning application for a proposed mixed-use development at the land west of Luynes Rise, Buntingford, Hertfordshire, hereafter referred to as the 'Proposed Development'. This report relates solely to the above Site.

1.1.2. The outline planning application seeks approval (with all matters reserved except for access) for a development of 350 dwellings, with up to 4,400 sqm of commercial and services floorspace (Use Class E and B8), and up to 500 sqm of retail floorspace (Use Classes E) and other associated works including drainage, access into the site from the A10 and Luynes Rise (but not access within the site), allotments, public open space and landscaping.

1.1.3. This report is intended for the sole benefit of the parties named above and shall not be capable of assignment. WSP shall not be liable for any use of the report for any reasons other than that for which the report was originally prepared and provided.

1.1.1. This report is based on the interpretation and assessment of data provided by third parties. WSP cannot be held responsible for the accuracy of the third-party data and the conclusions and findings of this report may change if the data is amended or updated after the date of consultation.

1.2. REPORT SCOPE

1.2.1. The National Planning Policy Framework (NPPF) Section 14 '*Meeting the Challenge of climate change, flooding and coastal change*' requires a planning application to be accompanied by a Site-specific FRA. This report comprises both the FRA and the proposed drainage strategy for the scheme including design considerations and constraints that have been applied in order for relevant consultees such as the Environment Agency (EA), Thames Water (TW), and Hertfordshire County Council (HCC), acting asLead Local Flood Authority, to comment/approve in principle prior to planning submission.

1.2.2. This report is a holistic risk-based assessment of potential flooding from possible sources, including fluvial, tidal, groundwater and surface water run-off. It also identifies and examines the residual flood risk to the proposed development and the wider area.

1.2.3. Whilst completing the assessment, consideration has been given to the National Planning Policy Framework (NPPF), Planning Practice Guidance, British Standard 8533:2011, Assessing and Managing Flood Risk in Development, British Standard 8582:2013 Code of Practice for Surface Water Management for Development Sites, and regional and local planning policies.

1.3. OBJECTIVE OF STUDY & METHODOLOGY

1.3.1. This report investigates flood risk in the vicinity of the Site from the various potential sources to ensure the sustainability and safety of the proposed development over its lifetime. This report also sets out the FRA and ODS for the Proposed Development and demonstrates how the Proposed

Development will manage and discharge surface water, via Sustainable Drainage Systems (SuDS), in addition to foul water flows.

1.3.2. The following documents and policies have been reviewed to inform this report:

- Hertfordshire County Council Local Flood Risk Management Strategy 2 (2019-2029);
- Hertfordshire County Council Adopted Core Strategy (2011-2031);
- East Hertfordshire Surface Water Management Plan and Appendices (2017);
- East Hertfordshire District Plan – The Development Strategy (2018);
- East Hertfordshire District Plan – Chapter 6 Buntingford (2018);
- East Hertforshire Level 1 and 2 Strategic Flood Risk Assessment (SFRA) (2016);
- National Planning Policy Framework (NPPF) (2021);
- 360Geomatics – Topographical Survey (August 2020);
- Thames Water Asset Records (2014);
- British Geological Society (BGS) Online Viewer, 1:50,000 Bedrock and Superficial deposits;
- Defra's Online Survey Data;
- DEFRA's online Magic Map; and
- GOV.UK's online Long-Term Flood Maps.

1.3.3. This report makes use of third-party information and contains EA information © Environment Agency.

2. EXISTING SITE

2.1. SITE LOCATION

2.1.1. The Site is located on land to the west of Buntingford, Hertfordshire. The Site is bounded by existing residential development to the north-east, the A10 to the west and south and the existing watermill industrial estate and the Buntingford Wastewater Treatment Works (WwTW) to the south-east.

2.1.2. The Site is centred at:

- **National Grid Reference:** TL 35871 28775
- **Easting, Northing**: 535871, 228775
- **Nearest Postcode:** SG9 9SQ

2.1.3. Refer to Figure 1 and to the location plan in Appendix A for more details of the extent of the planning application boundary.

Figure 1 - Site Location Boundary

2.2. EXISTING TOPOGRAPHY

2.2.1. A topographical survey has been prepared by Prospaplans Ltd and is available within Appendix A.

2.2.2. The Site generally falls moderately from the west to the east. There is a high point at the northwest boundary at the boundary with the A10 of approximately +118.5mAOD. The Site generally falls towards the eastern boundary with the existing residential area. The Site low point is located at the eastern extent adjacent to the existing wastewater treatment works at approximately 88.0mAOD.

2.3. EXISTING WATERBODIES

2.3.1. The Site is located approximately 100m west of the River Rib. The River Rib is designated as a Main River and is under EA ownership and maintenance. The River Rib originates near the East Hertfordshire village of Therfield and runs parallel with the A10 through Chipping, Wyddial, Buntingford, Westmill, Braughing, Puckeridge and Standon, before dividing the villages of Thundridge and Wadesmill and continuing until it reaches its confluence with the River Lea near Hertford.

2.3.2. There is an existing 525mm culvert underneath the A10 that passes through the Site west to east via an existing drainage ditch before continuing through the rear gardens at Meadow View.

2.3.3. Aspenden Brook is located approximately 300m south of the Proposed Development. There are no other watercourses or flood defences in the vicinity of the Site.

2.4. EXISTING SEWERS

2.4.1. Based on Thames Water (TW) asset records (August 2020) there are a number of combined and foul sewers in vicinity of the Site. There are no existing foul or surface water sewers within the Site boundary.

2.4.2. The sewer records indicate the presence of the following sewers in the vicinity of the Site within the existing residential development to the east:

- A 450mm diameter surface water sewer and a 150mm diameter foul water sewer in Luynes Rise;
- A 600mm diameter surface water sewer and a 150mm diameter foul water sewer in Peasmead; and
- A 675mm diameter surface water sewer and a 225mm diameter foul water sewer in Barley Croft;

2.4.3. The adjacent residential scheme to the north-east was constructed by Bovis Homes circa 1990-2000 and provisions were made within the Thames Water adopted surface water drainage network to accommodate potential future development from this Site. The above noted sewers in Luynes Rise and Peasmead are an example of this with large diameter surface water sewers located at the head of drainage runs to receive future flows from the proposed development.

2.4.4. The Thames Water existing sewer records are provided in Appendix C.

2.5. GEOLOGY AND HYDROGEOLOGY

2.5.1. This section of the report has been informed by mapping from the British Geological Survey (BGS) Geology of Britain viewer and DEFRA's Magic Map.

2.5.2. It is understood from the BGS 'Geology of Britain viewer' that the underlying bedrock geology of the Site predominantly comprises of the Lewes Nodular Chalk Formation and Seaford Chalk Formation with overlying deposits of the Lowestoft Formation. The eastern extent of the Site located in closest proximity to the River Rib has overlying Glaciofluvial deposits (sand and gravel).

2.5.3. In October 2014 WSP undertook four trial pits and subsequent soakaway tests in order to confirm the geology and infiltration feasibility of the underlying sub soil. Further information is available with the Infiltration Report included in Appendix B however the relevant information is summarised below.

2.5.4. Lowestoft Formation deposits typically comprising of soft to firm brown slightly gravelly clay were encountered at all four trial pits. Other deposits including cobbles, gravels and chalk and flint were also encountered typical of Diamicton deposits. The base of the formation was not proven during the investigation with excavations reaching approximate depths of 3m BGL. The bedrock Lewes Nodular. Chalk Formation and Seaford Chalk Formation were not encountered during the investigation.

2.5.5. Ground water was not encountered within trial pits SK101, SK102 or SK104 however groundwater seepage was noted at SK103 at the base of the pit at 3.0m BGL after 20 minutes. Infiltration testing to BRE Digest 365 was undertaken however the results obtained from the soakaway tests indicate that low infiltration rates were achieved (no infiltration noted after two hours) and hence the ground is not considered suitable for infiltration drainage.

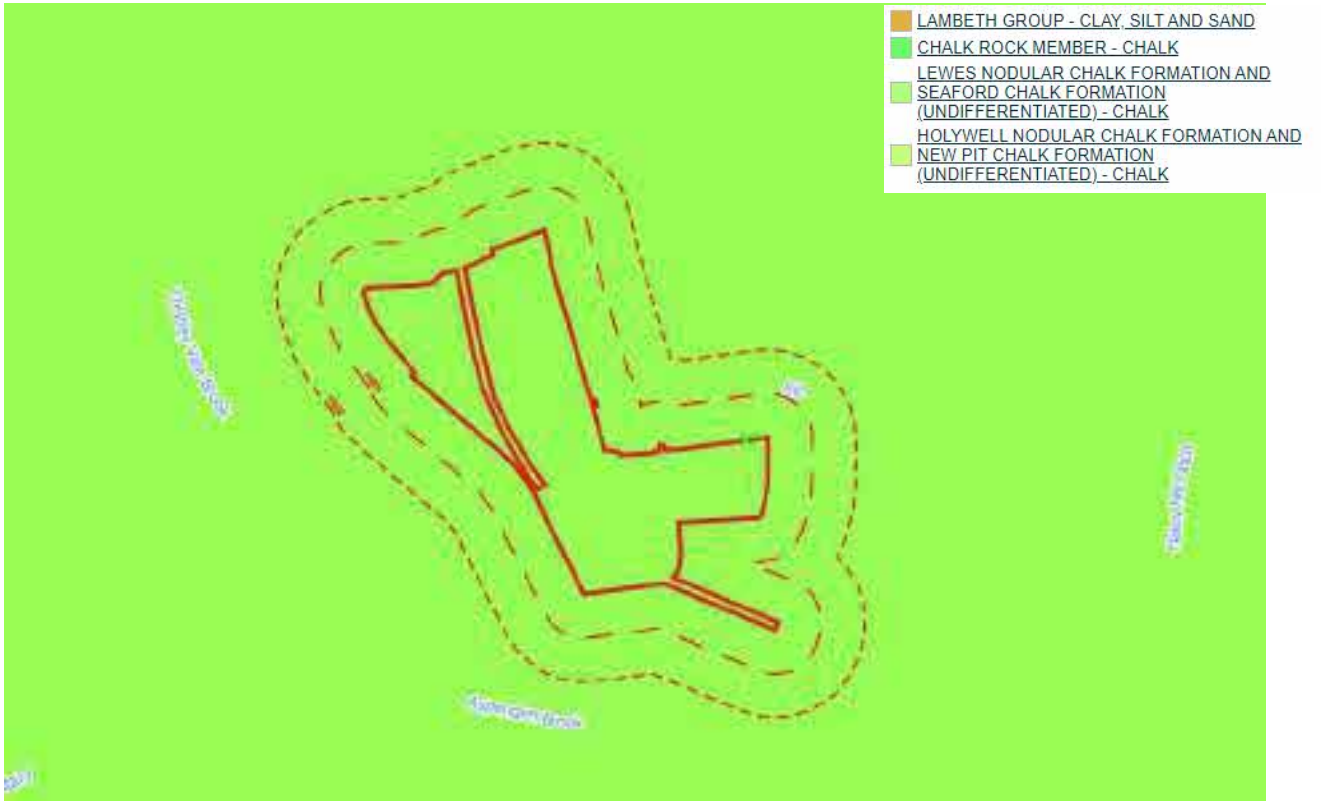


Figure 2 – Bedrock Geology

Figure 3 – Superficial Geology

3. THE PROPOSED DEVELOPMENT

3.1. SUMMARY

3.1.1. The Proposed Development seeks the approval of an outline planning application (with all matters reserved except for access comprising:

(i) Development of 350 dwellings, with up to 4,400 sqm of commercial and services floorspace (Use Class E and B8), and up to 500 sqm of retail floorspace (Use Classes E) and other associated works including drainage, access into the site from the A10 and Luynes Rise (but not access within the site), allotments, public open space and landscaping.

on land east of the A10, Buntingford, Hertfordshire, SG9 ('Buntingford West').

3.1.2. Please refer to Appendix D for full details of the Proposed Development including parameter plans.

3.2. VULNERABILITY CLASSIFICATION

3.2.1. As stated in the NPPF, a sequential risk-based approach to determine the suitability of land for development in flood risk areas should be applied at all stages of the planning process giving precedence to low flood risk areas wherever possible. The criteria for the Exception Test can be found in Table 2.

Table 1 - Exception Test Criteria

FLOOD RISK VULNERABILITY CLASSIFICATION		ESSENTIAL INFRASTRUCTURE	WATER COMPATIBLE	HIGHLY VULNERABLE	MORE VULNERABLE	LESS VULNERABLE
Flood zone	Zone 1	ü	ü	ü	ü	ü
	Zone 2	ü	ü	Exception Test Required	ü	ü
	Zone 3a	Exception Test Required	ü	û	Exception Test Required	ü
	Zone 3b	Exception Test Required	ü	û	û	û

ü Development is appropriate

û Development should not be permitted

3.2.2. In accordance with the NPPF (2021) and associated flood risk and coastal planning practice guidance (2014) (Table 2: Flood risk vulnerability classification) the proposed development usage of residential housing is classed as ‘More Vulnerable’.

3.2.3. The Site is located within Flood Zone 1 for planning, with respect to tidal and fluvial sources of flooding and therefore the development is considered appropriate in line with the requirements of the NPPF exception test need not be applied.

4. FLOOD HAZARD

4.1. SOURCES AND MECHANISMS OF FLOODING

4.1.1. Reference to gov.uk ‘Flood Map for Planning’ and ‘long term flood risk information’ maps (which makes use of EA data) is made where appropriate, along with reference to the HCC and EHDC documents referenced in Section 1.3 of this report.

4.1.2. Please refer to Appendix E for the relevant flood maps for the development.

4.2. FLUVIAL AND TIDAL FLOODING

4.2.1. Fluvial flooding is caused by rivers, watercourses or ditches overflowing. Tidal flooding is caused by elevated sea levels or overtopping by wave action.

4.2.2. Based on the Flood Map for Planning response from the EA and the online GOV.UK Flood Map for Planning, shown in Figure4, the Site is located in the majority in Flood Zone 1. A small area within the red line boundary associated with the access via the A10, is located within Flood Zone 2 relating to the River Rib. Flood Zone 1 is classified as land having a less than 0.1% annual probability of river (fluvial) or sea (tidal) flooding (1 in 1000-year return period event). Flood Zone 2 is classified as land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding.

4.2.3. Based on the information available, the probability of fluvial and tidal flooding is assessed as **Low.**

Figure 4 – Extract from the EA's Flood Map for Planning Dataset

4.3. GROUNDWATER FLOODING

4.3.1. Groundwater flooding occurs as a result of water rising up from underlying rocks, typically after long periods of sustained rainfall. It is most likely to occur in low-lying areas underlain by aquifers.

4.3.2. DEFRA's Magic Map service identifies the superficial geology of the Site to be designated as a Secondary (undifferentiated) Aquifer. The bedrock geology of the Site is designated as a Principal Aquifer. The EHDC SFRA notes that *"groundwater incidents tend to have been recorded where the underlying bedrock geology is classified as principal (layers of rock or drift deposits with high permeability and, therefore, provide a high level of water storage"*.

4.3.3. Mapping of the whole East Hertfordshire district has been provided showing the Areas Susceptible to Groundwater Flooding (AStGWF). The AStGWF is a strategic-scale map showing groundwater flood areas on a 1km square grid. An extract of this mapping is provided in Appendix E and Figure 5. The EHDC Mapping indicates that the southernmost half of the Proposed Development Site is located within an area assessed as <25% susceptible to groundwater flooding.

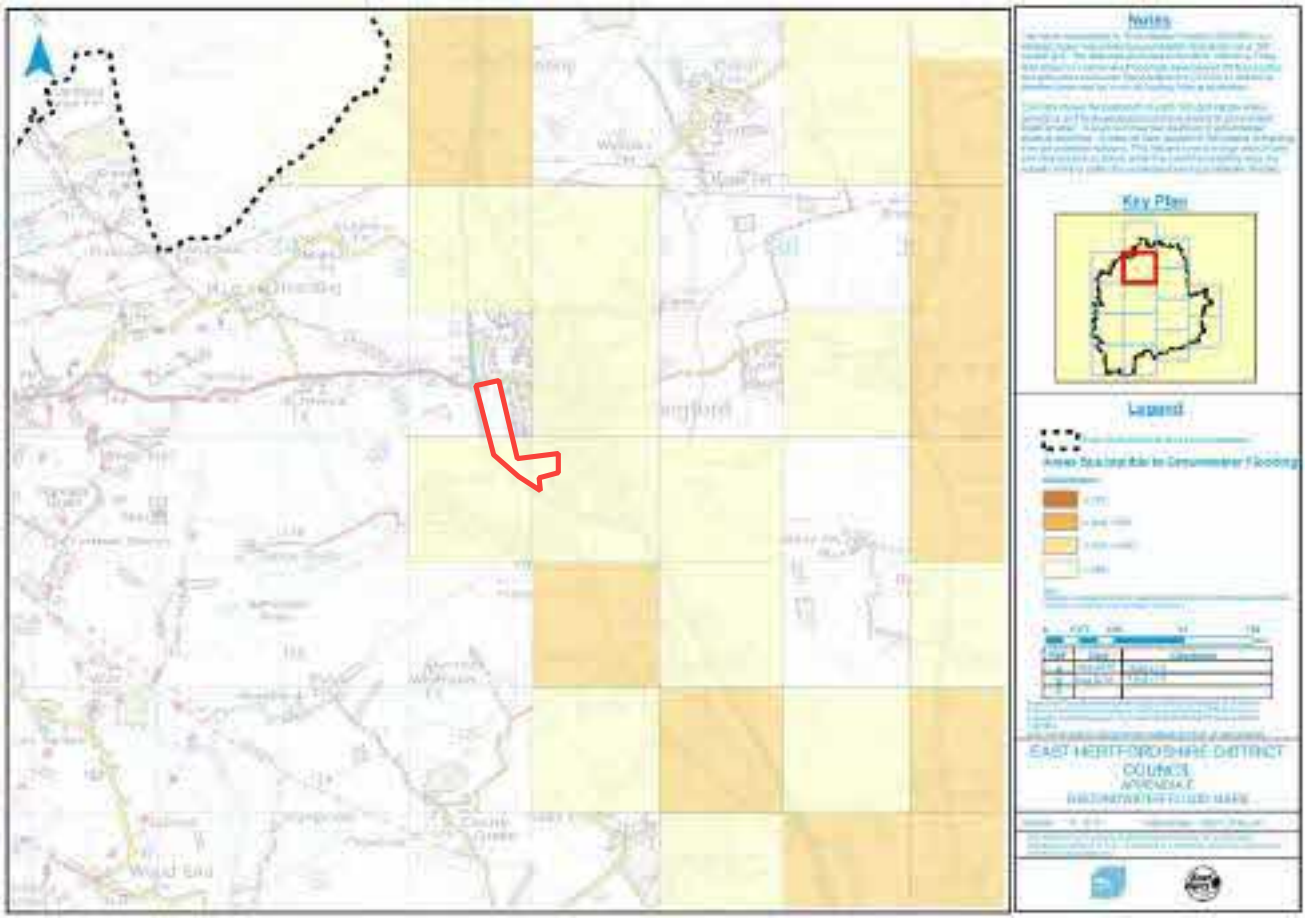


Figure 5 - Extract from EHDC Groundwater Flood Mapping "EHDC-SFRA_06"

4.3.4. Nonetheless, the Site has no recorded incidents of groundwater flooding (Refer to EHDC SFRA Table 5-3). Furthermore, no ground water was encountered within the trail pits with the exception of some seepage within the base trial pit SK103 which was 3m deep.

4.3.5. Based on the information available and the assessment undertaken, the probability of groundwater flooding impacting the Site is assessed as being **Low.**

4.4. SEWER FLOODING

4.4.1. Flooding from foul, surface water and combined sewers occurs when rainfall exceeds the capacity of the network or when there is an infrastructure failure.

4.4.2. Drainage in EHD is provided by Thames Water Utilities Ltd (Thames Water), who provide surface water, foul and combined sewer systems. The EHDC SFRA notes that *"modern sewer systems are designed to be separate surface water and foul water systems, typically accommodating up to 1 in*

30-year rainfall events. Since 1980, the Sewers for Adoption guidelines have meant that most new surface water sewers have been designed to have capacity for a rainfall event with a 1 in 30 chance of occurring in any given year."

4.4.3. Historical incidents of flooding are detailed by Thames Water through their DG5 register. This database records incidents of flooding relating to public foul, combined or surface water sewers and displays which properties suffered flooding. The SG9 postcode has 13 recorded flood incidents (Refer to EHDC SFRA Table 5-8).

4.4.4. There are no existing sewers located within the Site boundary. Based on the topography of the Site and surrounding areas, any flooding as a result of sewer overloading would flow away from the Proposed Development. Any new sewers for the development will be sized to cater for the 1 in 100 Year plus 40% climate change event.

4.4.5. Based on the information available the probability of sewer flooding impacting the Site can be assessed as **Low.**

4.5. SURFACE WATER FLOODING

4.5.1. Surface water flooding occurs when intense rainfall is unable to drain away by traditional means such as into drainage systems or infiltrating into the ground.

4.5.2. Based on the EHDC SFRA, the Site is not located within a Critical Drainage Area (CDA) or an area known to be at notable risk of surface water flooding. The EHDC SWMP provides mapping for 'Flooding Hotspots' within East Hertfordshire District. With reference to SWMP, the nearest hotspot is designated as Hotspot 1 'Buntingford' and relates to a surface water flow path along the B1038 and Monk's Walk 150m north of the Site. Figure 11 of the East Hertfordshire SWMP, an extract of which is provided in Figure 6, indicates that the Site is not located within the Hotspot.

4.5.3. There is an area adjacent to the eastern Site boundary that has a high risk of flooding, however as the ground level in this area is lower than the proposed development the surface water does not pose a risk to the proposed development.

4.5.4. Based on the GOV.UK's Long Term Flood Risk Map for Surface Water Flooding the Site is partially indicated to be at Low to Medium risk from surface water flooding along the north-eastern Site boundary to the rear of residential properties along Luynes Rise. The Environment Agency's Likelihood of Flooding from Surface Water Map indicates the following classifications:

- Very low risk = less than a 0.1% (1 in 1000 year) chance of flooding in any given year.
- Low risk = between a 0.1% (1 in 1000 year) and a 1% (1 in 100 year) chance of flooding in any given year.
- Medium risk = between 1% (1 in 100 year) and a 3.3% (1 in 30 year) chance of flooding in any given year.
- High risk = Greater than 3.3% (1 in 30 year) chance of flooding in any given year

4.5.5. Currently there is no formalised surface water drainage system at the proposed development due to its undeveloped status. The areas noted as at a Low-Medium risk of flooding represent localised low points in the vicinity of existing drainage ditches. The implementation of the drainage strategy detailed within this report will provide surface water storage up to the 1 in 100-year plus 40% climate change event and represents a significant betterment on the existing uncontrolled surface water run-

off. Therefore, it is assessed that the development is at Low risk of surface water flooding as appropriate measures will be included within the proposed drainage strategy to mitigate any residual surface water flooding.

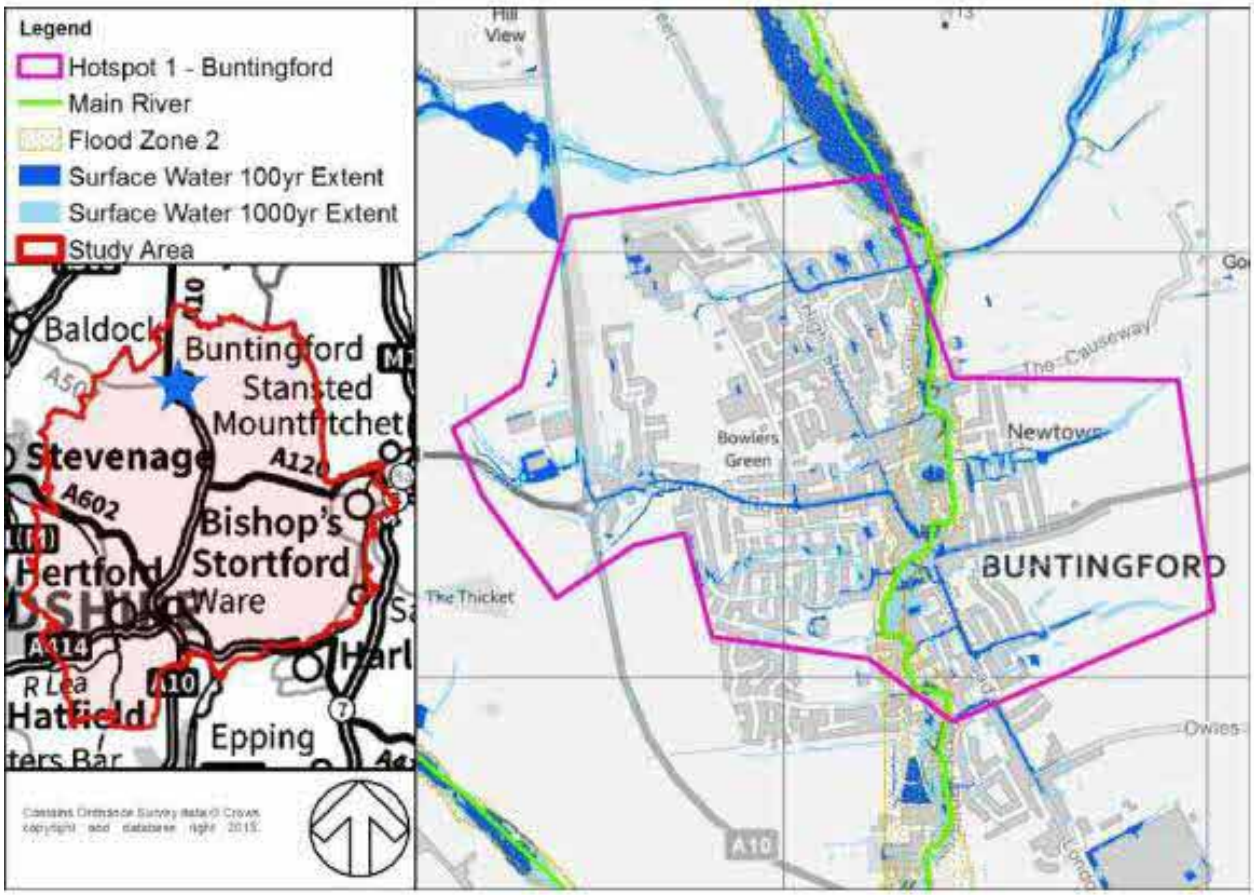


Figure 6 - Extract from East Hertfordshire SWMP 'Figure 11: Hotspot 1 – Buntingford – extents and baseline information'

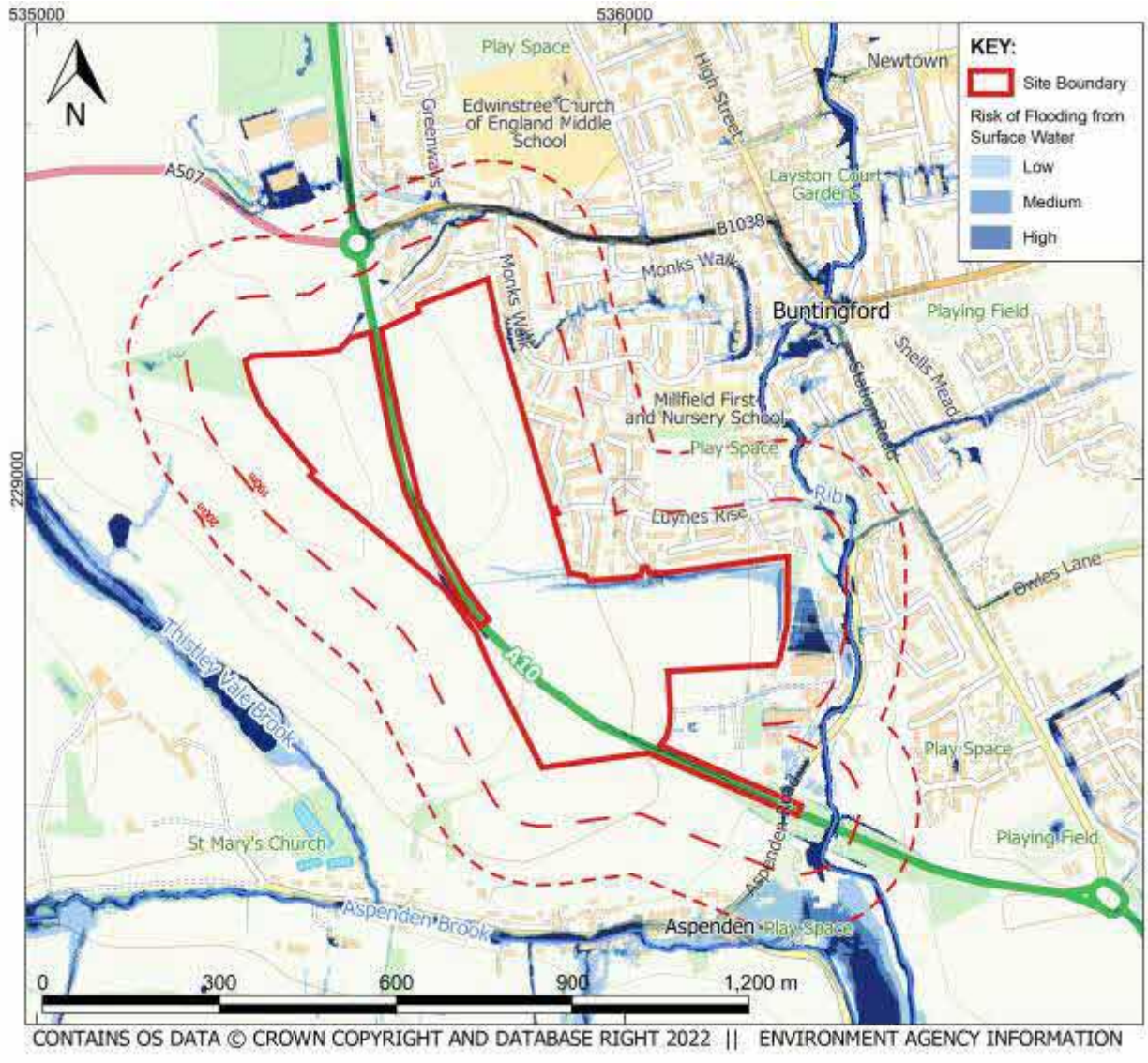


Figure 7 - Extract from gov.uk Long Term Flood Risk Mapping

4.6. ARTIFICIAL SOURCES OF FLOODING

4.6.1. Areas which lie within the maximum extent of flooding by an uncontrolled release of water from a reservoir are considered to be areas where lives could be threatened. Mapping provided by the EA's Flood Map for Planning indicates that the proposed development is not located within an area at risk of flooding from reservoirs (**Figure 8**).

4.6.2. Based on the information available and the assessment undertaken, the probability of reservoir flooding impacting the Site is assessed as being **Negligible.**

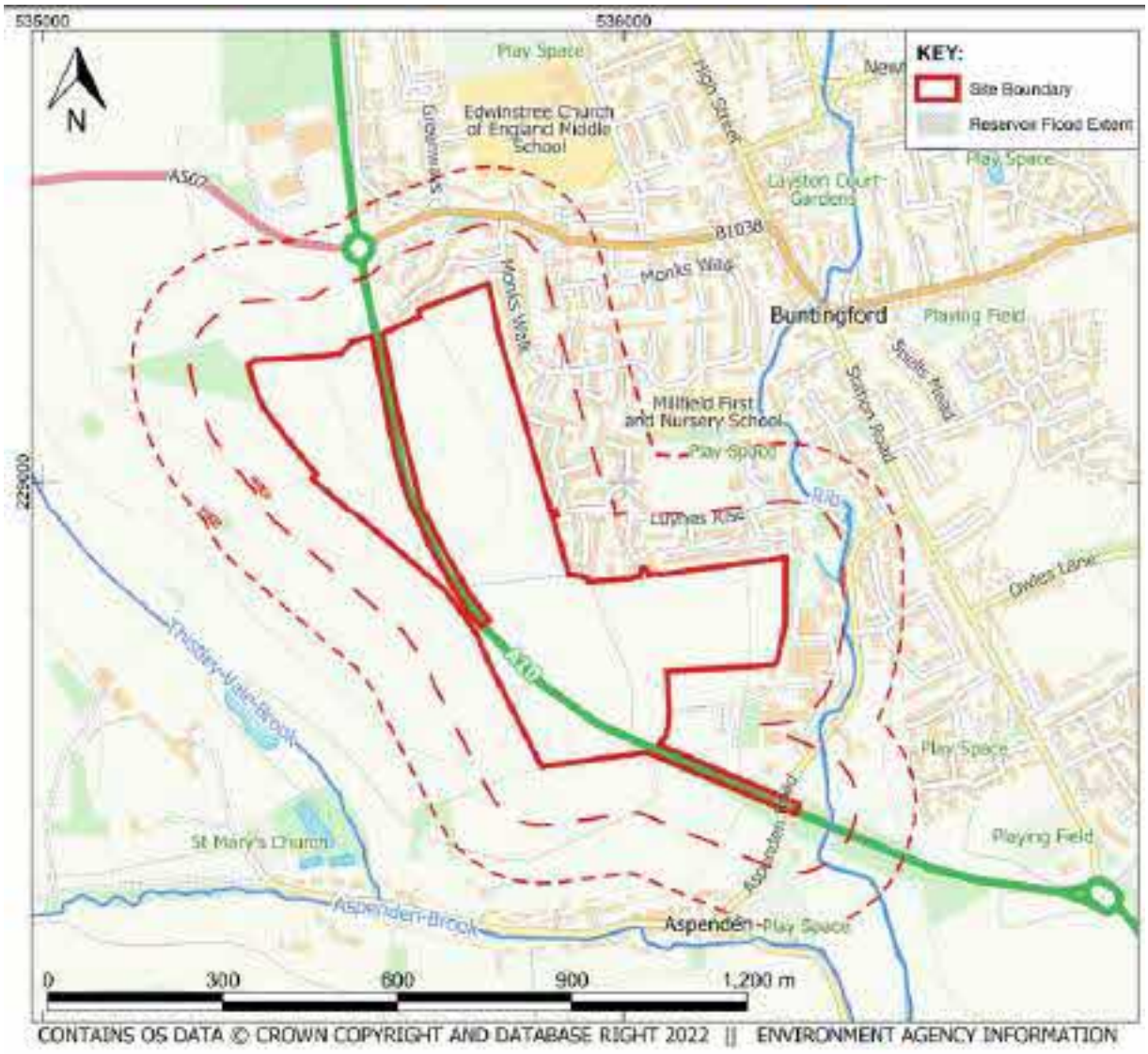


Figure 8 - GOV.UK's Long Term Flood Risk Map for Reservoir Flooding Extract

5. PLANNING POLICY AND GUIDANCE

5.1.1. This section of the report summaries local policy and guidance relevant to this Flood Risk Assessment and Outline Drainage Strategy for the Site.

5.2. NATIONAL PLANNING POLICY FRAMEWORK (2021)

5.2.1. The National Planning Policy Framework (NPPF) was published in February 2019 (updated in July 2021) with the aim of protecting the environment and to promote sustainable growth. There is an overarching presumption in favour of sustainable development that should be the basis of every plan and every decision.

5.2.2. The following paragraphs/policies within the NPPF are considered relevant to this assessment:

- Paragraph 159: Requires that "Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.";
- Paragraph 162: Explains that "the aim of the Sequential Test is to steer development to areas with the lowest probability of flooding"; and
- Paragraph 167: Explains that "When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere […];
- Paragraph 169: Recommends that "major development should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

    a) take account of advice from the lead local flood authority;
    b) have appropriate proposed minimum operational standards;
    c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
    d) where possible, provide multifunctional benefits".

5.3. LOCAL PLANNING POLICY

SUDS DESIGN GUIDE FOR HERTFORDSHIRE (AUGUST 2021)

5.3.1. This guidance is for developers involved in the design and development of SuDS in Hertfordshire. It promotes an integrated approach to SuDS and landscape design and establishes a set of local design criteria to help shape the development of SuDS in respect of the County's unique environmental context.

5.3.2. The SuDS Design Guide for Hertfordshire states that "We require that the Surface Water Drainage Strategy / FRA demonstrates the following as a minimum;

5.3.3. 1. **Runoff rates:** Peak discharge rates from Site will not increase as a result of the proposed development, up to a 1 in 100 chance in any year including an allowance for climate change storm event. We expect all applicants to achieve greenfield runoff rates for greenfield development Sites

and to aim to provide greenfield run-off rates for all brownfield Sites to reduce the impact of the development on the surface water drainage infrastructure.

5.3.4. 2. **Storage volumes:** Storage volumes for all events up to a 1 in 100 chance in any year including an allowance for climate change storm event will be provided on Site utilising above ground storage where practicable. The Site will not flood from surface water up to a 1 in 100-year chance in any year including an allowance for climate change event, OR surface water flooding will be safely contained on Site up to this event, ensuring that surface water runoff will not increase flood risk to the development or third parties. There should be no flooding within the Site for up to and including the 1 in 30 chance in any year rainfall event.

5.3.5. 3. **Sustainable drainage techniques:** Sustainable Drainage Systems (SuDS) such as blue roofs, attenuation basins, ponds, swales and permeable pavements will be used. SuDS are an approach to managing surface water run-off which seeks to mimic natural drainage systems and retain water on or near the Site as opposed to traditional drainage approaches which involve piping water off Site as quickly as possible. SuDS offer significant advantages over conventional piped drainage systems in reducing flood risk by attenuating the rate and quantity of surface water run-off from a Site, promoting groundwater recharge and biodiversity benefits, as well as improving water quality and amenity value."

EAST HERTS DISTRICT PLAN (2018)

Policy WAT1 Flood Risk Management

I. The functional floodplain will be protected from inappropriate development and where possible developed flood plain should be returned to Greenfield status with an enhanced level of biodiversity.

II. Development proposals should neither increase the likelihood or intensity of any form of flooding, nor increase the risk to people, property, crops or livestock from such events, both on Site and to neighbouring land or further downstream.

III. Development should take into account the impacts of climate change and should build in long term resilience against increased water levels. Therefore, appropriate distances and buffers between water courses and built development should be maintained in accordance with Environment Agency guidelines.

IV. In order to steer new development to areas with the lowest probability of flooding, the Sequential Test will be used. In exceptional circumstances, if developments are proposed which are required to pass the NPPF Exceptions Test, they will need to address flood resilient design and emergency planning by demonstrating that:

a. The development will remain safe and operational under flood conditions;

b. A strategy of either safe evacuation and/or safely remaining in the building is followed under flood conditions;

c. Key services will continue to be provided under flood conditions; and

d. Buildings are designed for quick recovery following a flood.

Policy WAT2 Source Protection Zones

In Source Protection Zones (SPZs), development proposals for any of the following uses will be required to submit an assessment of potential impacts and any mitigation measures required:

- incinerators
- waste transfer stations
- vehicle dismantlers
- metal recycling
- waste treatment facilities and all other non landfill waste management activities
- cemeteries
- discharge of foul sewage to ground
- cess pools
- waste Sites and underground storage of hazardous substances (i.e. petrol stations)
- new trade effluent discharges or stores
- storage of manure, slurry, sewage sludge and other farm waste.

Policy WAT3 Water Quality and the Water Environment

I. Development proposals will be required to preserve or enhance the water environment, ensuring improvements in surface water quality and the ecological value of watercourses and their margins and the protection of groundwater.

II. Unless there is clear justification for not doing so, an undeveloped buffer strip at least 8 metres wide should be maintained alongside all main rivers, and an appropriate buffer strip should be maintained at ordinary watercourses. Any development proposals should include an appropriate management scheme for buffer strips.

III. Opportunities for removal of culverts, river restoration and naturalisation should be considered as part of any development adjacent to a watercourse. Additional culverting and development of river corridors will be resisted.

Policy WAT5 Sustainable Drainage

I. Development must utilise the most sustainable forms of drainage systems in accordance with the SUDS hierarchy, unless there are practical engineering reasons for not doing so.

II. Development should aim to achieve Greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible.

III. Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation. The provision of balancing ponds as part of an area of public open space for recreation or wildlife should be designed to ensure the safety of other users of the

space. Where SUDs are provided as part of a development, applicants should detail how it will be maintained in the long term.

IV. Where practicable, SUDS should be designed to ensure the sustainable drainage networks have the additional capacity required to cope with infrequent adverse weather conditions and therefore reduce flood risk.

Policy WAT6 Wastewater Infrastructure

I. Development proposals must ensure that adequate wastewater infrastructure capacity is available in advance of the occupation of development.

II. Upgrade and expansion of existing, or provision of new, waste water treatment infrastructure will be supported provided that:

a. It utilises best available techniques, and provided that

b. It does not have an adverse effect on the integrity of Special Protection Areas, Ramsar Sites and Special Areas of Conservation either alone or in combination with other projects and plans, and

A strategy to meet relevant national and European environmental standards can be demonstrated.

6. CLIMATE CHANGE

6.1. BACKGROUND INFORMATION

6.1.1. As explained in the Climate Change Adaptation Sub-Committee Progress Report 2014, increased flood risk is the greatest threat to the UK from climate change. Models of the climate system suggest floods of the type experienced in England and Wales in autumn 2000, and between December 2013 and February 2014, have become more likely as a consequence of increased concentrations of greenhouse gases in the atmosphere.

6.1.2. More frequent short-duration, high intensity rainfall and more frequent periods of long-duration rainfall could be expected. Sea levels are also expected to continue to rise.

6.1.3. New EA guidance “Flood risk assessments: climate change allowances” issued in 2016 and updated on 15th February 2019 provides up to date information on expected changes in rainfall, river flows and sea level rise as a consequence of climate change.

6.1.4. A key change from the previous guidance is that the climate change allowances for peak river flows now are shown as variable on a regional basis; allowances are also now based on percentiles, whereby a percentile is a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level (e.g. a 50% percentile means that the allowance has 50% chances of not being exceeded).

6.1.5. Sea level allowances reflect the previous guidance and vary on a regional basis and for each epoch as shown in Table 3 of the EA guidance.

6.1.6. The EA have provided guidance to assess the impact of climate change on fluvial flooding. Technical assessment of climate change impacts on fluvial flooding appropriate for new developments depending on their scale and location (see following section).

6.1.7. For peak rainfall the EA Guidance provides an upper end and central allowance depending on epoch; the guidance recommends assessing both the central and upper end allowances to understand the range of possible impacts.

6.1.8. On 10th May 2022 the peak rainfall allowances in ‘Flood risk assessments: climate change allowances’ were updated so they reflect the latest projections in UKCP Local (2.2km) and subsequent research. Peak rainfall allowances are provided for management catchments rather than a single set of national allowances for England. Based on the EA’s Climate Change Allowances ‘Hydrology Data Explorer, the Site is located within the Upper Lee Management Catchment. The rainfall allowance for the Site is provided in Figure 9.

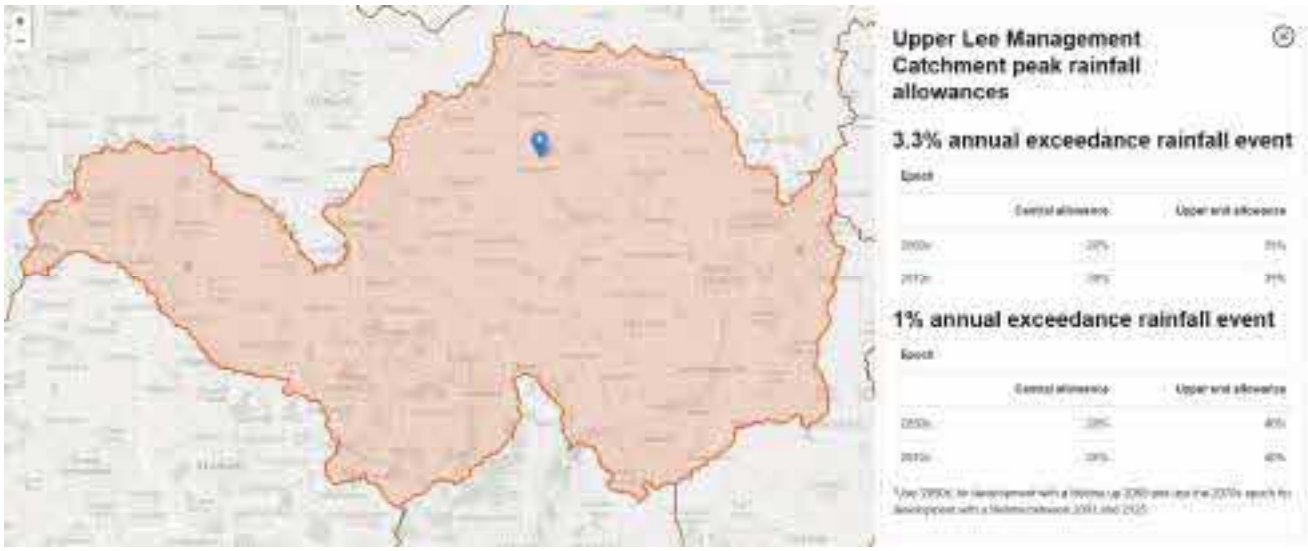


Figure 9 – Peak rainfall allowance for Upper Lee Management Catchment

6.2. DEVELOPMENT LIFESPAN

6.2.1. A typical lifespan for a residential development is 100 years. The EA's Climate Change Allowances 'Hydrology Data Explorer' mapping notes that the 2070s epoch should be used for a development with a lifetime between 2061 and 2125.

6.2.2. Based on this, the contingency peak rainfall allowances for climate change that are potentially applicable to this Site are as set out in Table 2 of the EA's "Flood risk assessments: climate change allowances" advice are:

- Upper End – 40% increase in peak rainfall by 2070s;
- Central – 25% increase in peak rainfall by 2070s.

6.2.3. When undertaking the drainage strategy, the surface water attenuation calculations will be assessed using the central and upper end estimates to prevent potential exceedance flows off Site.

6.3. IMPACT OF CLIMATE CHANGE ON THE PROPOSED DEVELOPMENT

6.3.1. Surface water runoff could in theory represent a risk to the Site, especially when the effects of climate change are considered. An outline DS has been produced as part of this study which takes into account the potential impact of climate change.

6.3.2. The ODS demonstrates that the surface water drainage network for the Site will be designed to accommodate runoff during all events up to and including the 100 year plus the upper end 40% climate change allowance. It also shows that for the 100 year plus 40% climate change allowance, surface water will be accommodated within the Site and therefore reduces flood risk off off-Site in line with best practice.

7. OUTLINE SURFACE WATER DRAINAGE STRATEGY

7.1. OVERVIEW

7.1.1. An Outline Surface Water Drainage Strategy is essential for any new development to ensure that surface water is managed effectively to mitigate on and off-Site surface water flood risks and ensure compliance with local and national policy and best practice.

7.1.2. This section of the report discusses the principles of the proposed Outline Surface Water Drainage Strategy with appropriate design calculations and drainage maintenance requirements provided thereafter. The general principles of the Outline Drainage Strategy and drainage calculation methodology for the Proposed Development are also discussed.

7.1.3. All proposed drainage will be designed in accordance with local policy, local SuDS guidance, national standards and best practice where applicable during detailed design stages. This Strategy identifies the principles of drainage management for the development and all agreements, permits and applications for connections to the public sewer network will be made post discharge of the Planning Conditions through engagement with Thames Water and other relevant stakeholders.

7.2. GENERAL COMMENTS

7.2.1. The risk to the Site from all sources of flooding has been demonstrated to be negligible to low, therefore, there are no Site-specific flood mitigation measures required on-Site apart from adhering to best practice measures such as:

- Ground levels should fall away from building entrances/thresholds in order to mitigate against surface water runoff entering the ground floor during extreme storm events; and
- Raised thresholds should be implemented where possible.

7.3. PROPOSED SURFACE WATER DISCHARGE METHOD AND SUDS STRATEGY

7.3.1. Best practice for the management of surface water, based on best practice and Building Regulations 2010 Part H (2015 Version) states that surface water runoff from a Site shall discharge to one of the following in order of priority:

- An adequate soakaway or some other adequate infiltration system;
- A watercourse; and
- Sewer.

7.3.2. The use of infiltration techniques at the Site is limited as Site investigation identified low infiltration rates. Furthermore the development is located within a groundwater source protection zone and therefore discharge to the groundwater is not considered to be an acceptable method of discharge for the Site.

7.3.3. In line with the SUDS hierarchy, the nearest watercourse to the proposed development is the River Rib, located approximate 120m east of the development at the nearest point. Surface Water discharge directly to the River Rib is not considered feasible because this would require significant pipe-laying through third party owned land.

7.3.4. It is therefore proposed to discharge surface water to the existing Thames Water surface water sewer network located within Peasmead. The local surface water sewer network discharges to the River Rib via an existing outfall downstream of the development.

7.3.5. The proposed surface water drainage concept is illustrated by WSP Drainage Strategy drawing 10537-WSP-XX-XX-DR-C-0001, included within Appendix F. It is proposed that surface water will be attenuated through open surface water detention basins, permeable paving and swales across the proposed development prior to discharge to the local surface water sewer network located within Peasmead. Surface water discharge will be restricted to the Qbar Greenfield rate as per the requirements of 'SuDS Design in Hertfordshire (2021)' guidance.

7.3.6. Permeable paving is proposed for incorporation across any non-adoptable roads and parking areas with a suggested 300mm sub-base. Permeable paving provides a volume of storage that will be considered at detailed design stage and is not considered within the total attenuation volume requirements at this stage. Permeable paving supports evaporation potential and form part of the suds treatment train prior to discharge to the storage basins. Permeable paving improves the filtration of silts, biodegradation of pollutants and retention of solids.

7.3.7. Roadside swales are proposed to create a green corridor through the centre of the development to collect surface water run-off from the carriageway and provide a level or surface water treatment. As infiltration is not suitable for the development, any swales would require underdraining with a perforated pipe connecting to main spine sewers throughout the development, conveying surface water to the detention basins. Surface water will be conveyed towards the swale via levels design as per the concept provided in the CIRIA SuDS Manual 2015 (**Figure 10**). Due to the fall in levels across the development, check dams should be provided where the gradient is greater than 3%.

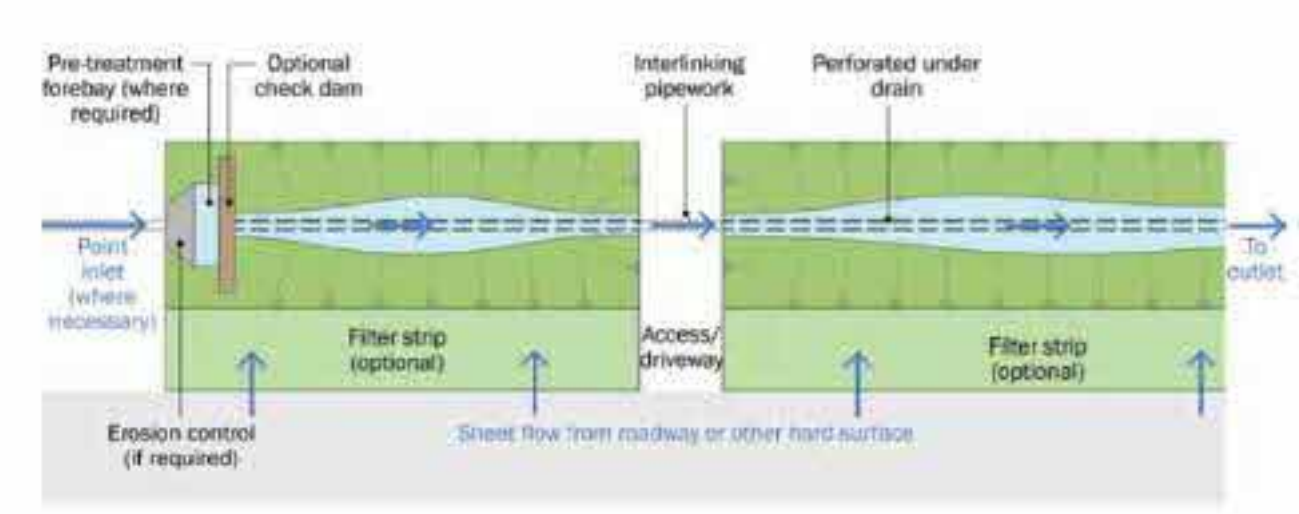


Figure 10 – Roadside Swale Detail (Image Courtesy of CIRIA SuDS Manual (2015) Figure 17.5)

7.3.8. The main surface water attenuation feature at the development will consist of two detention basins, referred to subsequently as the eastern and western basins. The basins will serve to provide

attractive water features with the additional benefit of the eastern benefit provided public open amenity space. The basins will have a over-deepened area with a permanent pool that will enhance biodiversity and also provide additional treatment for the capture of sediment. A typical basin is shown in **Figure 11**.

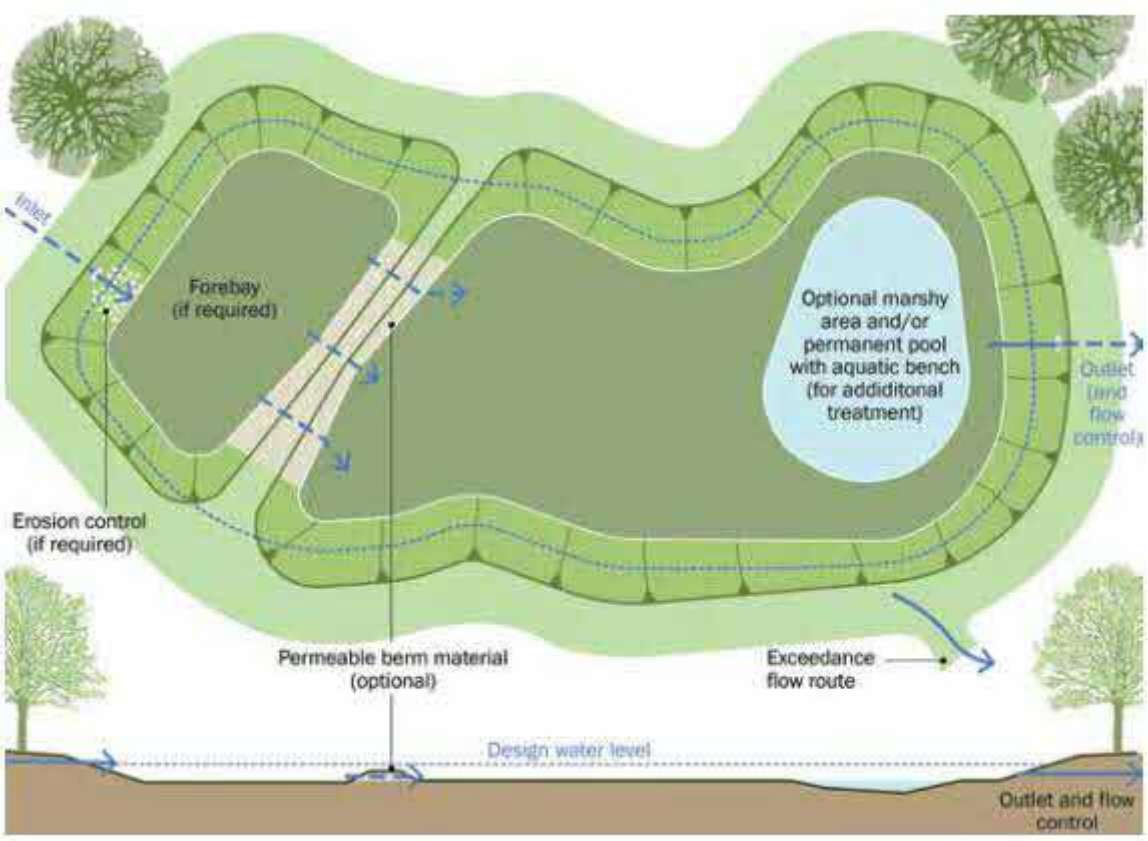


Figure 11 – Detention Basin (Image Courtesy of CIRIA SuDS Manual (2015) Figure 22.2)

7.3.9. Notably the Site has a significant topographical level change of around 20m falling from northwest to east, and consequently the proposed surface water detention basin at the eastern end of the Site is too low to discharge to the Peasmead sewer under gravity. It is therefore necessary to pump from the eastern detention basin to the Peasmead sewer at a restricted rate of 26 l/s. Gravity discharge will be maintained from the Western basin at 10.95 l/s, with flows limited by a vortex flow control such as a HydroBrake or similar.

7.3.10. A summary of the proposed discharge method in relation to the drainage hierarchy is provided in Table 2 below.

Table 2 - Drainage Hierarchy - Discharge Method Summary

Surface Water Discharge Method	Feasible (Y/N)	Proposed (Y/N)	Proposed Drainage Strategy and Reasons:
Store rainwater for later use	Y	N	Suitability of rainwater harvesting techniques will be assessed at the detailed design stage.

Use infiltration techniques, such as porous surface in non-clay areas	N	N	Inadequate geological conditions
Attenuate rainwater in ponds or open water features for gradual release	Y	Y	Detention basins and ponds are proposed to attenuate surface water to Qbar rate.
Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)	Y	N	Green/blue roofs are not suitable for pitched roof houses. Suitability of rain gardens will be assessed at the detailed design stage.
Attenuate rainwater by storying in tanks or sealed water features for gradual release	Y	N	N/A
Discharge rainwater direct to a watercourse	N	N	It is proposed to discharge to the surface water sewer within Peasmead that discharges to the River Rib downstream.
Discharge rainwater to a surface water sewer/drain	Y	Y	It is proposed to discharge to the surface water sewer within Peasmead that discharges to the River Rib downstream.
Discharge rainwater to the combined sewer	N	N	N/A

7.4. PROPOSED SURFACE WATER DISCHARGE RATES

Existing Surface Water Runoff Rates

7.4.1. The existing Site (28.95 ha) consists of undeveloped greenfield land. The proposals for the Site involve the introduction of 12.385 ha of positively drained land (Refer to WSP Catchment Plan 10537-WSP-XX-XX-DR-C-0005 with Appendix F).

7.4.2. Existing greenfield run-off rates have been calculated using the FEH method of calculating greenfield run-off using www.UKSUDS.com. An assessment of the greenfield runoff rates is tabulated in Table 1 below. Please find full greenfield runoff calculations in Appendix G.

7.4.3. www.UKSuDS.com guidance by HR Wallingford states that "*the greenfield run-off rate which is to be used for assessing the requirements for limiting discharge flow rates should be calculated for the whole development area (paved and pervious surfaces - houses, gardens, roads, and other open space) that is within the area served by the drainage network*" (https://www.uksuds.com/training-support/frequently-asked-questions). Therefore, the total area of developed land within the Site to inform the greenfield run-off rates has been taken as 12.385 ha.

Table 3 - Estimation of Greenfield Runoff Rates

Return Period	Flow (l/s)

Qbar	36.95
1 in 1 Year	31.41
1 in 30 Year	84.99
1 in 100 Year	117.88

7.4.4. Therefore, the existing Qbar greenfield discharge rate has been calculated as 36.95 l/s. It is proposed the Site will discharge at this rate in line with 'SuDS Design in Hertfordshire (2015) best practice guidance provided which negates the need to provide additional long-term storage and helps reduce the overall impact off Site to the downstream sewer network.

Thames Water Consultation

7.4.5. A pre-development enquiry to identify if capacity is available within the existing public sewer network for the discharge of surface water flows from the Site was submitted to Thames Water (TW) in May 2022.

7.4.6. TW confirmed that there are capacity concerns in the local surface water network to accommodate surface water flows from the Site. Correspondence with TW is appended in Appendix F. Thames Water will undertake hydraulic network capacity modelling post planning to determine whether any upgrade works will be required to the local sewer network as a result of the development.

7.4.7. TW are obligated to provide capacity and necessary upgrades works within 24 months of a Planning Application being approved to ensure the development can drain surface water. Thames Water indicated in their pre-development response that a typical timescale for a development of the magnitude of the proposed is 20 months.

SURFACE WATER MODELLING AND RESULTS

7.4.8. The proposed development has been modelled using Micro-Drainage to determine the required amount of attenuation to accommodate the 1:100 year + 40% climate change storm event. The results of this modelling are provided within Appendix G.

Western Storage Basin

7.4.9. The western basin has a contributing catchment of 3.75 ha relating to the residential area located to the west of the basin. The basin is proposed to have a storage depth of 0.9m plus 0.3m freeboard, and include a partial area of permanent standing water, approximately 0.5m deep to provide amenity benefit to the community, increased biodiversity and visual benefit. The catchment is taken to be 70% impermeable (2.625 ha). The western basin provides a storage volume of 2994m^3 and discharges at a restricted rate of 10 l/s to the surface water sewer in Peasmead via gravity. The storage basin has been sized to accommodate the 1 in 100 Year + 40% climate change event with side slopes of 1:3.

Eastern Basin

The eastern basin has a contributing catchment of 8.6 ha, which is taken to be 70% impermeable (6.02 ha). The basin is proposed to have a storage depth of 1.0m plus 0.3m freeboard, and include a partial area of permanent standing water, approximately 0.5m deep within an over deepened section of the pond. It is proposed to use the basin space as general amenity with water resistant

planting. The eastern basin provides a storage volume of 4957m^3 to accommodate for the 1 in 100 year +40% climate change event.

7.4.10. The eastern basin invert level is approximately 5m lower than the public surface water sewer located within Peasmead, therefore a pumped discharge is proposed to convey the surface water to the local surface water sewer network at a rate of 26 l/s.

7.4.11. A sediment forebay is proposed to be installed at the basin inlets for the western and eastern basins based on CIRIA suds manual C365 guidance. The sediment forebay allows sediment build-up to be easily monitored and concentrates any required sediment removal activities within a small area, thereby minimising potential damage to the rest of the pond or wetland. The plan area of the sedimentation bay should be at least 10% of the total basin area and could consist of a separate basin or be formed by building an earth berm, stone-or rock-filled gabion or rip-rap across the upstream portion of the basin.

WATER QUALITY CONTROL

7.4.12. The proposed permeable paving and wetland attenuation basin are to provide levels of surface water pre-treatment prior to discharge. These devices will provide sufficient stages of pre-treatment to satisfy Section 26 of the CIRIA C753 SuDS Manual. This is proven in the calculations below.

7.4.13. It has been assumed that the adoptable road running through the development will experience more than 300 traffic movements per day and that these roads will drain to the on-Site basins. Table 26.2 of the CIRIA C753 SuDS notes that pollution hazard levels for all roads except low traffic roads and trunk roads/motorways are as follows:

- TSS is 0.7;
- Metals is 0.6;
- Hydrocarbons is 0.7.

7.4.14. It is anticipated that the Site will have three levels of treatment which consists of a sediment forebay, the wetland attenuation basin itself, and where feasible permeable paving. It cannot however be guaranteed that some areas of the roads will pass through permeable paving. Table 26.3 – "*Indicative SuDS mitigation indices for discharges to surface waters"* shows that a sediment forebay (detention basin) and wetland are able to provide treatment to the following levels:

- Detention Basin TSS at 0.5 + 0.5(Wetland at 0.8) = 0.9
- Detention Basin Metals at 0.5 + 0.5(Wetland at 0.8) = 0.9
- Detention Basin Hydrocarbons at 0.6 + 0.5(Wetland at 0.8) = 1.0

7.4.15. Each of the above is beyond the level of pollutants expected from the proposed usage. Therefore, the use of just an attenuation basin and sediment forebay is an adequate level of pre-treatment for the Site. This assessment is subject to further detailed design.

8. OUTLINE FOUL WATER DRAINAGE STRATEGY

8.1.1. Given the Sites undeveloped greenfield nature, it is assumed that no existing formal foul drainage exists within the Site boundary. Based on Thames Water asset records, the nearest foul sewers are located within Luynes Rise.

8.1.2. It is therefore proposed to discharge foul flows from the development to the local public foul sewer network via two new connections. The northern portion of the proposed development will discharge to the existing TW manhole 8906. A peak foul flow of 10.63 l/s has been calculated from this catchment based on Codes for Adoption guidance. The southern portion of the Site will discharge to TW MH 0802.

8.1.3. Foul water in the majority is proposed to discharge via gravity. The southern-most portion of the Site is located too low to discharge via gravity to the public sewer network in Peasmead and will be pumped at a reduced rate of 0.94 l/s based on Codes for Adoption (2021) guidance stating that the design flow rate of pump units in foul pumping stations serving less than 500 dwellings should be at least half the incoming peak design flow rate (1.87 l/s).

8.1.4. A pre-development enquiry to identify if capacity is available within the existing public sewer network for the discharge of foul water flows from the Site, along with proposed points of connection and discharge rates has been submitted to Thames Water (TW) in May 2022. TW confirmed that there are capacity concerns with the local foul sewer network. TW are obligated to provide capacity and necessary upgrades works within 24 months of a Planning Application being approved to ensure the development can drain foul water. Thames Water indicated in their pre-development response that a typical timescale for a development of the magnitude of the proposed is 20 months.

8.1.5. It is understood that there are currently upgrade works planned to the Wastewater Treatment Works to the south-east of the development Site under LPA 3/22/0696/CPO to account for existing capacity concerns in the local network not related to the development. Within the pre-development enquiry response, Thames Water stated that "*Thames Water have commenced a process capacity study for Buntingford Sewage Treatment Works to better understand the impact of this development. There are upgrades planned at Buntingford STW due to complete in 2023, but it is not yet clear whether this will alleviate the impact of this development."* Any further upgrade works to the pumping station will be confirmed by TW after the completion of the capacity modelling in relation to the proposed development.

8.1.6. To prevent any internal flooding as a result of overloaded public sewers, non-return valves will be utilised to prevent sewer flooding entering the Site.

8.1.7. The private foul drainage network will be further developed during detailed design stages.

9. DRAINAGE MAINTENANCE AND MANAGEMENT STRATEGY

9.1. INTRODUCTION

9.1.1. The Drainage Maintenance and Management Strategy (Table 8) has been prepared by WSP and builds on information provided within the SuDS Manual; it is expected that the maintenance for the entire scheme will be under the management of specialist maintenance management company, in which a suitably qualified maintenance specialist will undertake the work for the entire development.

9.2. DRAINAGE MAINTENANCE AND MANAGEMENT STRATEGY

Table 4 - Drainage Maintenance and Management Strategy

Drainage Feature	Regular Maintenance	Occasional Maintenance	Monitoring
Drainage Channels / Gullies	Inspections will be frequent and regular, depending on local conditions, but at least annually by Site management. Inspections will include gratings; covers including their locking bolts; sumps and sump buckets; exposed concrete surround and adjacent paving. Channels will be flushed with water or high-pressure jetting (no boiling water or cleaning agent will be used). All silt buckets and sumps will be cleaned out replaced back into the units ensuring they are correctly fitted.	All channel surfaces and joints will be checked and repaired as necessary.	Inspected every 6 months or after large storm.
GRP Attenuation Tank / Blue Roofs	Inspection chambers will be checked every 6 months for the accumulation of debris and silt and cleaned as necessary. Remove debris from the catchment surface where it may cause risk to performance (monthly).		Inspect every 6 months or after large storm.
Soft Landscaped, Green/Blue Roofs	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes, integrity of waterproofing and structural stability. Inspect drain inlets to ensure unrestricted runoff from the drainage layer. Remove debris and litter to prevent clogging of inlet drains and inference with plant growth.	Replace dead plants as required Remove invasive and nuisance vegetation including weeds.	Inspected every 6 months or after large storm.
Rainwater Harvesting Systems	Inspection of the tank for debris and sediment build-up. Cleaning of tank inlets and outlets, gutters, withdrawal devices and	Cleaning and/or replacement of any filters	Inspect every 3 months or after large storm.

	roof drain filters of silts and other debris.		
Manholes / Inspection Chambers / Catchpits	Chambers will be checked every 6 months for the accumulation of debris and silt and cleaned as necessary.		Inspect every 6 months or after large storm.
Flow Control Chambers	Inspected every 3 months or as needed if problems occur.		Inspect every 3 months or after large storm.
Swales	Litter and debris removal and grass cutting. Inspect and manage vegetation coverage and remove nuisance plans. Inspect inlets and outlets for overflow and blockages. Inspect infiltration for ponding.	Reseed areas of poor vegetation growth. Alter plant types to better suite conditions	Monthly maintenance to be reduced as required.
Filter Strip	Removal of litter and debris. Mowing to retain grass length of 75mm – 150mm across the main treatment surface. Inspect filter strip for evidence of erosion, poor vegetation growth, compaction, ponding or sedimentation. Inspect silt accumulation rates and establish appropriate removal frequencies.	Occasional removal of sediments if deposits exceed 25mm. Reseed areas of poor vegetation growth. Alter plant types to better suite conditions.	Monthly monitoring, to be reduced to every 6 months when required.

10. OFFSITE EFFECTS

10.1.1. The proposed development will significantly reduce the rate of surface water discharge leaving the Site for representative rainfall events up to 1% annual probability including a climate change allowance, in accordance with the NPPF.

10.1.2. The Outline Drainage Strategy demonstrates that the drainage network of the Site will be designed to accommodate runoff during all events up to and including the 100-year return period plus 40% climate change allowance rainfall event and reduce the discharge rate from the Site when compared to the existing Site. As such, the Proposed Development will not have a negative impact on surface water flooding offsite.

11. RESIDUAL FLOOD RISK

11.1.1. The ODS demonstrates that the drainage network at the Site is designed to accommodate runoff during all events up to and including the 100-year return period plus a climate change allowance preventing potential exceedance flows off-Site, including additional freeboard allowances within the storage basins.

12. CONCLUSIONS

12.1.1. The Site is shown in the EA Flood Maps as being located predominantly within Flood Zone 1, which based on the NPPF, is classified as having a 'low' probability of tidal and fluvial flooding. Other potential sources of flooding have been investigated and the probability of flooding has also been assessed as low to negligible.

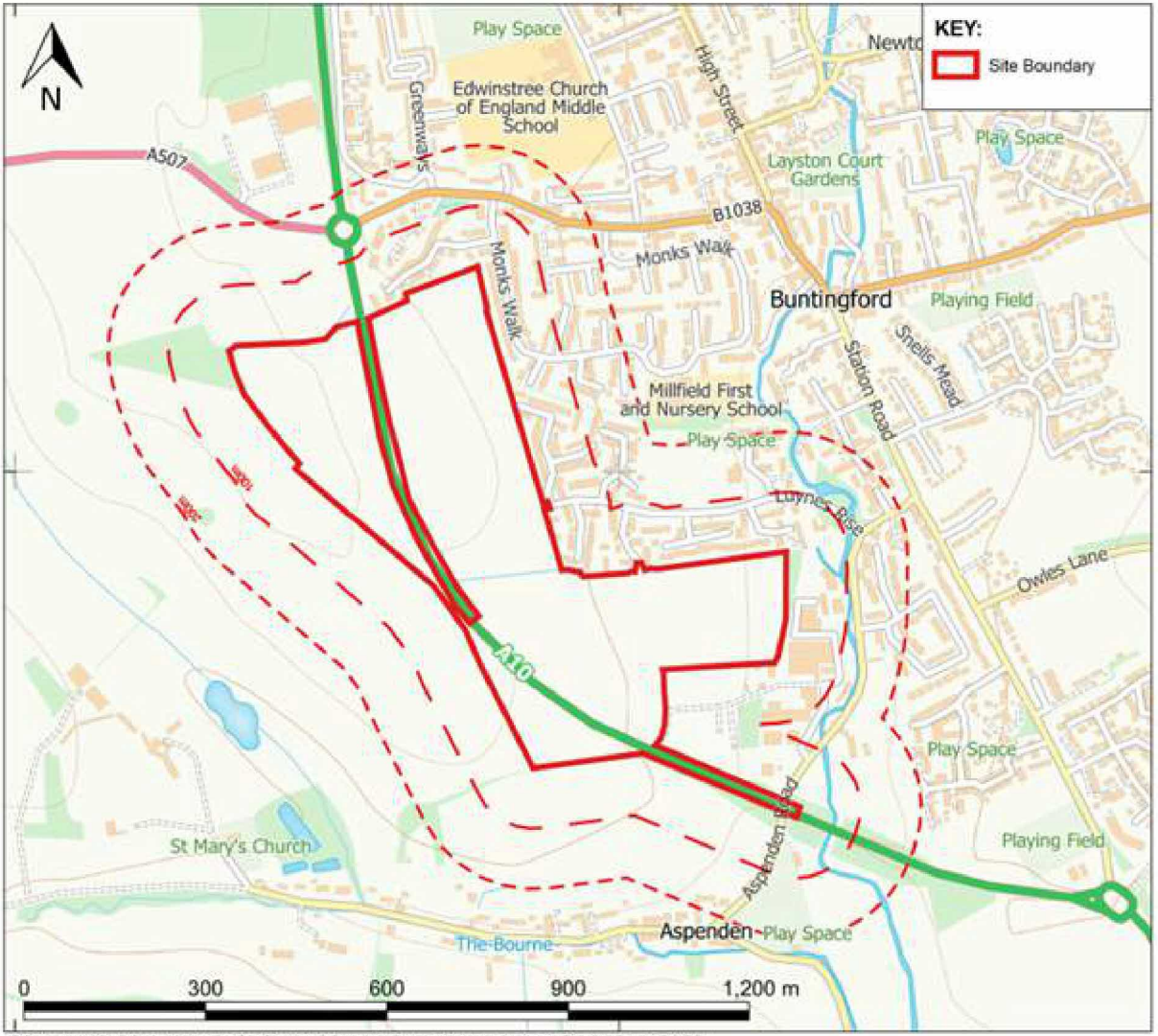
12.1.2. The Drainage Strategy has been developed to manage surface water runoff within the proposed development, taking into account potential climate change impact with the overall aim to reduce the rate of surface water run-off from the proposed building and limit the impact on the public sewer network in line with policy and best practice.

12.1.3. The Proposed Development will mimic the existing greenfield runoff rate and limit surface water flows to the Qbar Greenfield rate for all storm events up to and including the 1 in 100 year plus 40% climate change allowance storm event. Storage is to be provided via detention basins and swales, with permeable paving proposed to form part of the SuDS Management Train.

12.1.4. The proposed development has been designed in accordance with the relevant planning policy detailed in Section 5 of this report.

Appendix A

SITE LOCATION PLAN AND TOPOGRAPHICAL SURVEY



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LAYOUT 1
A10 BUNTINGFORD BYPASS
LIMIT OF SITE AS DEPICTED ON THE ORDNANCE SURVEY'S PUBLISHED DIGITAL MAP
OVERGROWN AREA
INSIDE OF HEDGEROW
ARABLE FARM FIELD
FOOTBRIDGE OVER RAILWAY
INDICATIVE ONLY
Note : Levels adjacent to kerb lines refer to channel not top of kerb.
THE LEVEL VALUES ON THIS PLAN ARE TO ORDNANCE SURVEY DATUM BASED ON GPS OBSERVATIONS DIRECTLY ADJUSTED TO THE OS ACTIVE NETWORK.
THE GRID IS THE OS NATIONAL GRID.
THIS SURVEY HAS BEEN CARRIED OUT COMMENSURATE TO A PLOTTED SCALE OF 1:200 @ A1

DRG NO: PP/2999-2/BUNTINGFORDGS/2014/F(LAYOUT1 OF 3)

LEGEND

A	AREA
CATV	CABLE TV SERVICE COVER
CF	CELLAR FLAP
CP	COAL PLATE
E	ELECTRICITY SUPPLY
FH	FIRE HYDRANT
IC	INSPECTION CHAMBER
KL	LOWERED KERB FOR ACCESS
LP	LAMP POST
MH	MANHOLE
NP	ROAD NAME PLATE
PL	PAVEMENT LIGHT
RS	ROAD SIGN
STN	SURVEY STATION
T	BT SERVICE BOX
TCB	TELEPHONE CALL BOX
TL	TRAFFIC LIGHTS
TP	TELEGRAPH POLE
UP	STEP ARROW
DN	RAMP ARROW

(D) DEAD OR (P) POLLARDED TREE

DECIDUOUS TREE (INDIVIDUALLY SHOWN)

EVERGREEN TREE (INDIVIDUALLY SHOWN)

TREES (DECIDUOUS) - PART OF A GROUP OF TREES

2999-2BUNTINGFORDGS2014F.dwg

REV	DRG. AMENDMENTS	BY	DATE

WATTSDOWN LIMITED
KNEBWORTH LODGE
PARK LANE
KNEBWORTH. HERTFORDSHIRE
SG3 6PP

BUNTINGFORD GARDEN SUBURB
A10 BUNTINGFORD
HERTFORDSHIRE
TOPOGRAPHICAL SURVEY

PROSPAPLANS LIMITED
CHARTERED LAND SURVEYORS
CENTRAL OFFICE
RAILWAY LODGE, YARROW LANE
NORTH ELMHAM
NORFOLK NR20 5LA
T: +44 (0) 1362 668504
E: INFO@PROSPAPLANS.COM
W: WWW.PROSPAPLANS.COM
RICS
Regulated by RICS

SCALE: 1:1250 @ A2

DATE: APRIL 2014

DRAWN BY: R. WELTON

CHECKED BY: A. WHITEHOUSE

DRG NO: PP/2999-2/BUNTINGFORDGS/2014/F(LAYOUT1 OF 3)

DRG NO: PP/2999-2/BUNTINGFORDSG/2014/F(LAYOUT2 OF 3)

LEGEND

A	AREA
CATV	CABLE TV SERVICE COVER
CF	CELLAR FLAP
CP	COAL PLATE
E	ELECTRICITY SUPPLY
FH	FIRE HYDRANT
IC	INSPECTION CHAMBER
KL	LOWERED KERB FOR ACCESS
LP	LAMP POST
MH	MANHOLE
NP	ROAD NAME PLATE
PL	PAVEMENT LIGHT
RS	ROAD SIGN
STN	SURVEY STATION
T	BT SERVICE BOX
TCB	TELEPHONE CALL BOX
TL	TRAFFIC LIGHTS
TP	TELEGRAPH POLE
UP	STEP ARROW
DN	RAMP ARROW

(D) DEAD OR (P) POLLARDED TREE

DECIDUOUS TREE (INDIVIDUALLY SHOWN)

EVERGREEN TREE (INDIVIDUALLY SHOWN)

TREES (DECIDUOUS) - PART OF A GROUP OF TREES

2999-2BUNTINGFORDGS2014F.dwg

INDICATIVE ONLY

Note : Levels adjacent to kerb lines refer to channel not top of kerb.

THE LEVEL VALUES ON THIS PLAN ARE TO ORDNANCE SURVEY DATUM BASED ON GPS OBSERVATIONS DIRECTLY ADJUSTED TO THE OS ACTIVE NETWORK.

THE GRID IS THE OS NATIONAL GRID.

THIS SURVEY HAS BEEN CARRIED OUT COMMENSURATE TO A PLOTTED SCALE OF 1:200 @ A1

REV	DRG. AMENDMENTS	BY	DATE

WATTSDOWN LIMITED

KNEBWORTH LODGE
PARK LANE
KNEBWORTH, HERTFORDSHIRE
SG3 6PP

BUNTINGFORD GARDEN SUBURB

A10 BUNTINGFORD
HERTFORDSHIRE
TOPOGRAPHICAL SURVEY

PROSPAPLANS LIMITED
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RICS Regulated by RICS

SCALE: 1:1250 @ A2

DATE: APRIL 2014

DRAWN BY:	CHECKED BY:
R. WELTON	A. WHITEHOUSE

DRG NO: PP/2999-2/BUNTINGFORDSG/2014/F(LAYOUT2 OF 3)

LAYOUT 2

535500 535600 535700 535800

228900N 228800N 228700N 228600N

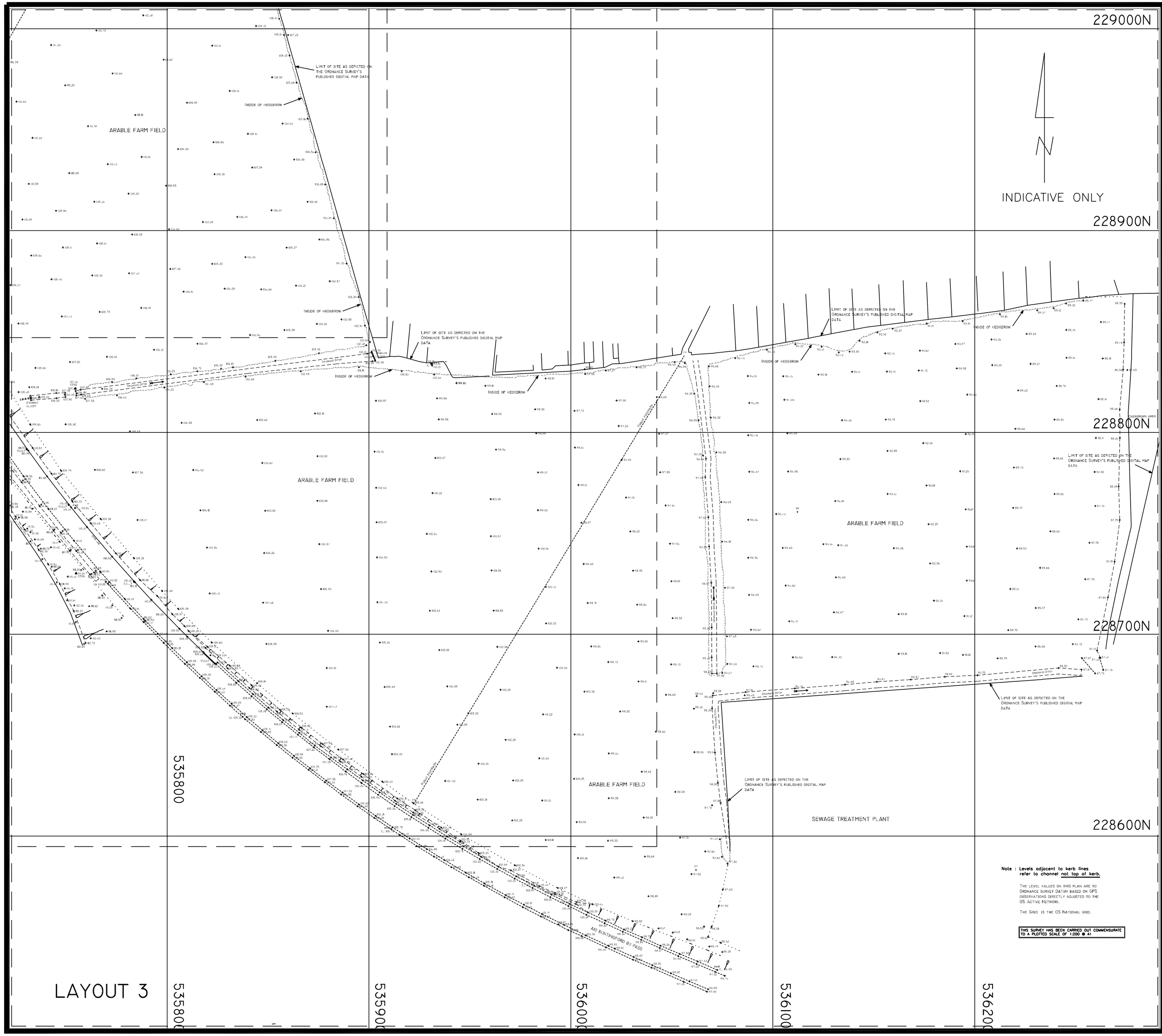
ARABLE FARM FIELD

FOOTBRIDGE OVER HIGHWAY

A10 BUNTINGFORD BY-PASS

LIMIT OF SITE AS DEPICTED ON THE ORDNANCE SURVEY'S PUBLISHED DIGITAL MAP DATA

INSIDE OF HEDGEROW



DRG NO: PP/2999-2/BUNTINGFORDGS/2014/F(LAYOUT3 OF 3)

LEGEND

A	AREA
CATV	CABLE TV SERVICE COVER
CF	CELLAR FLAP
CP	COAL PLATE
E	ELECTRICITY SUPPLY
FH	FIRE HYDRANT
IC	INSPECTION CHAMBER
KL	LOWERED KERB FOR ACCESS
LP	LAMP POST
MH	MANHOLE
NP	ROAD NAME PLATE
PL	PAVEMENT LIGHT
RS	ROAD SIGN
STN	SURVEY STATION
T	BT SERVICE BOX
TCB	TELEPHONE CALL BOX
TL	TRAFFIC LIGHTS
TP	TELEGRAPH POLE
UP	STEP ARROW
DN	RAMP ARROW

(D) DEAD OR (P) POLLARDED TREE

DECIDUOUS TREE (INDIVIDUALLY SHOWN)

EVERGREEN TREE (INDIVIDUALLY SHOWN)

TREES (DECIDUOUS) - PART OF A GROUP OF TREES

2999-2BUNTINGFORDGS2014F.dwg

REV	DRG. AMENDMENTS	BY	DATE

WATTSDOWN LIMITED

KNEBWORTH LODGE
PARK LANE
KNEBWORTH, HERTFORDSHIRE
SG3 6PP

BUNTINGFORD GARDEN SUBURB
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RICS
Regulated by RICS

SCALE: 1:1250 @ A2

DATE: APRIL 2014

DRAWN BY:	CHECKED BY:
R. WELTON	A. WHITEHOUSE

DRG NO: PP/2999-2/BUNTINGFORDGS/2014/F(LAYOUT3 OF 3)

Appendix B

INFILTRATION TESTING

Our ref: 70007498

17th November 2014

Ian Dimbylow
WSP UK Ltd
Unit 9
The Chase
John Tate Road
Hertford
SG13 7NN

WSP UK Ltd
Unit 9, The Chase
John Tate Road
Foxholes Business Park
Hertford
SG13 7NN

Tel: +44 (0)19 9252 6000
Fax: +44 (0)19 9252 6001
www.wspgroup.co.uk

For the attention of: Ian Dimbylow

Dear Ian

Land at West Buntingford – Infiltration Testing

WSP UK Ltd was instructed by Bovis Homes Ltd to undertake infiltration testing at the above site to inform the planned drainage strategy for the site. The proposed development area is adjacent to the A10 and on the western edge of Buntingford. A Site Location Plan is presented within the enclosures to this document as Figure 1 and an Exploratory Hole Plan is presented as Figure 2.

Methodology
Four trial pits were excavated and four subsequent soakaway tests were undertaken within these pits from 23rd to 24th October 2014. The number and location of the pits were specified by the drainage consultants within WSP UK Ltd.

The soakaways were conducted as detailed within BRE Digest 365 'Soakaway Design'.

Geology
WSP reviewed the BGS geological map of the area and identified that the underlying soil comprised the Lowestoft Formation beneath which is the Lewes Nodular Chalk Formation and the Seaford Chalk Formation.

During the investigation Made Ground was encountered within SK102 and SK103 located in the central area of the site comprising slightly sandy slightly gravelly clay with rare red brick fragments to a maximum depth of 0.29m below ground level (bgl).

Locations SK101 and SK104 located in the north and east of the site encountered topsoil to depths ranging from 0.25m to 0.37m bgl and comprised slightly sandy slightly gravelly clay with rare rootlets and gravels of fine to medium flint and chalk.

All locations encountered the Lowestoft Formation which typically comprised a soft to firm brown slightly gravelly clay with fine to medium flint to a maximum depth of 1.3m bgl. Beneath which was a firm light grey mottled brown slightly sandy gravelly clay with rare cobbles and rare lenses of dark orange fine sand. Gravels were fine to coarse chalk and flint. The base of the formation was not proven during the investigation and reached a maximum depth of 3m bgl.

Within SK104 lenses of dark orange fine sand were not encountered. An orangish brown slightly sandy gravelly clay with chalk and flints was noted from 0.68m to 1.20m bgl with a firm dark brown/grey clay noted in the southern part of the trial pit.

The Lewes Nodular Chalk Formation and Seaford Chalk Formation were not encountered during the investigation.

A groundwater seepage was noted at SK103 at the base of the pit at 3.0m bgl after 20 minutes.

Soakaways
Four pits were used as soakaways (SK101 to SK104) and were filled with water. The water level was monitored for a time period of up to two hours.

For all soakaways (SK101 to SK104) the tests were undertaken within the Lowestoft Formation, no infiltration was noted during the monitoring time period (2 hours). BRE Digest 365 'Soakaway Design' states that the infiltration should be calculated using the time taken for the test to drain from 25% to 75% empty. After 2 hours the water did not reach the 25% empty marker (i.e. the test was yet to commence) and therefore the test could not be completed.

Bulk samples were collected from all horizons where a soakaway was conducted for laboratory analysis (particle size distribution). A summary based on the laboratory results is provided below:

Location	Depth (m bgl)	Summary
SK101	2.50 - 2.85	Slightly sandy slightly gravelly clay
SK102	2.50 - 3.00	Slightly sandy slightly gravelly clay
SK103	2.50 – 3.00	Slightly sandy slightly gravelly clay with occasional cobbles
SK104	2.50 – 2.80	Slightly sandy slightly gravelly clay

Summary Table

Soakaway	Infiltration Depth (mm)	Infiltration rate
SK101	0.10	Insufficient infiltration
SK102	0.01	Insufficient infiltration
SK103	0.01	Insufficient infiltration
SK104	0.00	Insufficient infiltration

Summary and Conclusion
The results obtained from the soakaway tests indicate that infiltration cannot be achieved from the Lowestoft Formation across the site. The poor infiltration encountered across the site is supported by field observations which confirm high clay content.

Closure
I trust the above meets your requirements if you would like any further information please contact me.

Yours sincerely
For **WSP UK Ltd**

[redacted]

Alice Waylett
Geo-Environmental Consultant

Enc. Site Location Plan
Exploratory Hole Location Plan
Exploratory Hole Records
Laboratory Certificates

Contains Ordnance Survey data © Crown copyright and database right 2014.

WSP

TITLE:

Land at West Buntingford
Site Location Plan

FIGURE No:

70007498 - Figure 1

Z:\#Projects\70000000\70007498 - Land at West Buntingford\Soakaways\(9) Drawings\Figure 2 - Test Locations.dwg

SK104

SK101

SK102

SK103

Monks Walk

El Sub Sta

Monks Walk

Millfield First and Nursery School

Play Area

Community Centre

Community Centre

Path

Path (um)

Path (um)

Path (um)

Ward Bdy

OAK END

CHURCHILL CLOSE

MEADOW VIEW

PEARMEAD

KNIGHTS CLOSE

LUYNES RISE

BARLEY CROFT

MILL CLOSE

Issues

Almshouse

St Richard of Chichester Church

Sub Sta

Factory

Sewage Works

Pumping Station

El Sub Sta

Pond

Pond

FB

CR

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NOT TO SCALE

WSP

TITLE:

Land at West Buntingford

Soakaway Testing

Exploratory Hole Plan

FIGURE No:

70007498 - Figure 2

WSP UK Ltd
Unit 9, The Chase, John Tate Road,
Hertford, SG13 7NN
Telephone: 01992 526000

TRIAL PIT LOG

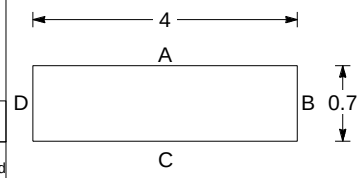
Project	Job No
Land at West Buntingford	70007498

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.25) 0.25	Dark brown slightly gravelly CLAY with rare rootlets. Gravel is fine to medium sub-angular to sub-rounded flint and sub-rounded chalk. (TOPSOIL)		TS	
							(0.65) 0.90	Soft to firm brown slightly sandy slightly gravelly CLAY with rare rootlets. Gravel is fine to medium sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)		LOFT	
							(0.40) 1.30	Soft to firm brown slightly sandy gravelly CLAY. The clay was encountered as friable. Gravel is fine to coarse sub-rounded chalk and sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)		LOFT	
							(0.70) 2.00	Firm brown mottled grey slightly gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)		LOFT	
2.50-2.85	BLK						(0.85) 2.85	Firm light grey gravelly CLAY with rare cobbles of flint and chalk and rare lenses of dark orange fine sand. Gravel is fine to coarse sub-rounded chalk and sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)		LOFT	
								2.80 m bgl Clay recovered as blocky material.			
								2.85m bgl END OF HOLE			

General Remarks
No visual or olfactory evidence of contamination.
No groundwater encountered.
Trial pit used for Soakaways.

Shoring/Support:
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
4.00m	Alice Waylett	Bovis Homes Ltd	1 of 1

Width	Ground Level (m AOD)	Co-Ordinates (NGR)	Date	Trial Hole No.
0.70m		E 0 N 0	23-10-14 23-10-14	SK101

Orientation	Method/Plant Used	Contractor	Scale
degrees from north	JCB 3Cx	Llynch	1:33.3

08 WSP TP LOG LS 2 PHOTO 28-10-14_AJW_SK LOGS_ LAND AT WEST BUNTINGFORD_V1.1.GPJ WSPETEMPLATE1.03.GDT 17/11/14

WSP UK Ltd
Unit 9, The Chase, John Tate Road,
Hertford, SG13 7NN
Telephone: 01992 526000

TRIAL PIT LOG

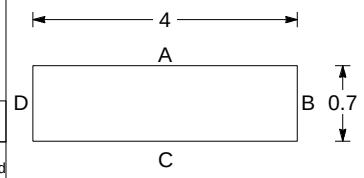
Project	Job No
Land at West Buntingford	70007498

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.29) 0.29	Dark brown slightly sandy slightly gravelly CLAY with rare rootlets and fine brick. Gravel is fine to medium sub-angular to sub-rounded flint and fine sub-rounded chalk. (MADE GROUND)		MG	
							(0.41) 0.70	Soft to firm brown slightly sandy slightly gravelly CLAY with rare rootlets. The clay was encountered as friable. Gravel is fine to medium sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)		LOFT	
2.50-3.00	BLK						(2.30)	Firm light grey mottled brown gravelly CLAY with rare cobbles of chalk and flint and rare lenses of dark orange fine sand. Gravel is fine to coarse sub-angular to sub-rounded flint and sub-rounded chalk. (LOWESTOFT FORMATION)		LOFT	
							3.00	2.90 m bgl Clay recovered as blocky material.			
								3m bgl END OF HOLE			

General Remarks
No visual or olfactory evidence of contamination.
No groundwater encountered.
Trial pit used for Soakaways.

Shoring/Support:
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
4.00m	Alice Waylett	Bovis Homes Ltd	1 of 1

Width	Ground Level (m AOD)	Co-Ordinates (NGR)	Date	Trial Hole No.
0.70m		E 0 N 0	23-10-14 23-10-14	

Orientation	Method/Plant Used	Contractor	Scale	
degrees from north	JCB 3Cx	Llynch	1:33.3	**SK102**

08 WSP TP LOG LS 2 PHOTO 28-10-14_AJW_SK LOGS_ LAND AT WEST BUNTINGFORD_V1.1.GPJ WSPETEMPLATE1.03.GDT 17/11/14

WSP UK Ltd
Unit 9, The Chase, John Tate Road,
Hertford, SG13 7NN
Telephone: 01992 526000

TRIAL PIT LOG

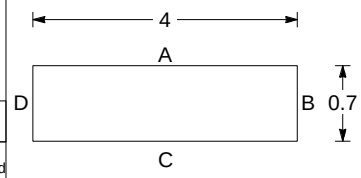
Project	Job No
Land at West Buntingford	70007498

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.28) 0.28	Dark brown slightly sandy slightly gravelly CLAY with frequent rootlets and rare fine brick. Gravel is fine to medium sub-angular to sub-rounded flint and fine sub-rounded chalk. (MADE GROUND)		MG	
							0.50	Soft to firm brown slightly sandy slightly gravelly CLAY with rare rootlets. Gravel is fine to medium sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)		LOFT	
2.50-3.00	BLK				1		(2.50)	Firm light grey mottled brown slightly sandy gravelly CLAY with occasional cobbles of flint and chalk and rare lenses of dark orange fine sand. The clay was encountered as friable. Gravel is fine to coarse sub-angular to sub-rounded flint and sub-rounded chalk. (LOWESTOFT FORMATION)		LOFT	
							3.00	2.90 m bgl Clay recovered as blocky material.			
								3m bgl END OF HOLE			

General Remarks
No visual or olfactory evidence of contamination.
Slight seepage at the base of the pit after 20 minutes.
Trial pit used for Soakaways.

Shoring/Support:
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
4.00m	Alice Waylett	Bovis Homes Ltd	1 of 1

Width	Ground Level (m AOD)	Co-Ordinates (NGR)	Date	Trial Hole No.
0.70m		E 0 N 0	23-10-14 23-10-14	SK103

Orientation	Method/Plant Used	Contractor	Scale
degrees from north	JCB 3Cx	Llynch	1:33.3

08 WSP TP LOG LS 2 PHOTO 28-10-14_AJW_SK LOGS_ LAND AT WEST BUNTINGFORD_V1.1.GPJ WSPETEMPLATE1.03.GDT 17/11/14

WSP UK Ltd
Unit 9, The Chase, John Tate Road,
Hertford, SG13 7NN
Telephone: 01992 526000

TRIAL PIT LOG

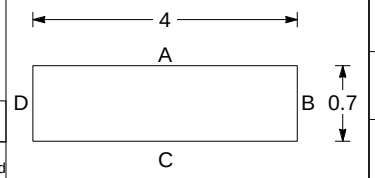
Project	Job No
Land at West Buntingford	70007498

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.37) 0.37	Dark brown slightly gravelly CLAY with rare rootlets. Gravel is fine to medium sub-angular chalk and sub-rounded chalk. (TOPSOIL)		TS	
							(0.31) 0.68	Soft to firm light brown slightly gravelly CLAY with rare rootlets. The clay was encountered as friable. Gravel is fine to medium sub-angular flint. (LOWESTOFT FORMATION)		LOFT	
							(0.52) 1.20	Firm orangish brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded flint and sub-rounded chalk. (LOWESTOFT FORMATION) 0.68 - 1.00 m bgl In the southern face of the trial pit the clay becomes firm and dark brown in colour.		LOFT	
2.50-2.80	BLK						(1.60) 2.80	Firm light grey mottled brown gravelly CLAY with rare cobbles of chalk and flint. Gravel is fine to coarse sub-angular to sub-rounded flint and sub-rounded chalk. (LOWESTOFT FORMATION) 2.70 m bgl Clay recovered as blocky material.		LOFT	
								2.8 m bgl END OF HOLE			

General Remarks
No visual or olfactory evidence of contamination.
No groundwater encountered.
Trial pit used for Soakaways.
Slight pit collapse.

Shoring/Support:
Stability: Moderate to Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length: 4.00m	Logged By: Alice Waylett	Client: Bovis Homes Ltd	Sheet: 1 of 1
Width: 0.70m	Ground Level (m AOD)	Co-Ordinates (NGR): E 0 N 0	Date: 24-10-14 / 24-10-14
Orientation: degrees from north	Method/Plant Used: JCB 3Cx	Contractor: Llynch	Scale: 1:33.3

Trial Hole No.

SK104

08 WSP TP LOG LS 2 PHOTO 28-10-14_AJW_SK LOGS_ LAND AT WEST BUNTINGFORD_V1.1.GPJ WSPETEMPLATE1.03.GDT 17/11/14

ALcontrol Laboratories

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Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: mkt@alcontrol.com
Website: www.alcontrol.com

WSP Environmental
Unit 9, The Chase
John Tate Road
Foxholes Business Park
Hertford
SG13 7NN

Attention: Alice Waylett

CERTIFICATE OF ANALYSIS

Date:	07 November 2014
Customer:	H_WSP_HER
Sample Delivery Group (SDG):	141028-17
Your Reference:	Buntingford - Soakways
Location:	Land at West Buntingford
Report No:	291065

We received 4 samples on Tuesday October 28, 2014 and 4 of these samples were scheduled for analysis which was completed on Friday November 07, 2014. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:

Sonia McWhan

Operations Manager

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Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No.

CERTIFICATE OF ANALYSIS

SDG:	141028-17	**Location:**	Land at West Buntingford	**Order Number:**	70007498-GE1
Job:	H_WSP_HER-163	**Customer:**	WSP Environmental	**Report Number:**	291065
Client Reference:	Buntingford - Soakways	**Attention:**	Alice Waylett	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
10268879	SK101	BLK	2.50 - 2.85	23/10/2014
10268881	SK102	BLK	2.50 - 3.00	23/10/2014
10268884	SK103	BLK	2.50 - 3.00	23/10/2014
10268887	SK104	BLK	2.50 - 2.80	24/10/2014

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	141028-17	**Location:**	Land at West Buntingford	**Order Number:**	70007498-GE1
Job:	H_WSP_HER-163	**Customer:**	WSP Environmental	**Report Number:**	291065
Client Reference:	Buntingford - Soakways	**Attention:**	Alice Waylett	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			10268879	10268881	10268884	10268887
Lab Sample No(s)						
Customer Sample Reference			SK101	SK102	SK103	SK104
AGS Reference			BLK	BLK	BLK	BLK
Depth (m)			2.50 - 2.85	2.50 - 3.00	2.50 - 3.00	2.50 - 2.80
Container			Geolabs container	Geolabs container	Geolabs container	Geolabs container
Geotechnical Testing*	All	NDPs: 0 Tests: 4	X	X	X	X

ALcontrol Laboratories

Validated

CERTIFICATE OF ANALYSIS

SDG:	141028-17	**Location:**	Land at West Buntingford	**Order Number:**	70007498-GE1
Job:	H_WSP_HER-163	**Customer:**	WSP Environmental	**Report Number:**	291065
Client Reference:	Buntingford - Soakways	**Attention:**	Alice Waylett	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	SK101	SK102	SK103	SK104		
			Depth (m)	2.50 - 2.85	2.50 - 3.00	2.50 - 3.00	2.50 - 2.80		
			Sample Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils		
			Date Sampled	23/10/2014	23/10/2014	23/10/2014	24/10/2014		
			Sample Time	.	.	.	.		
			Date Received	28/10/2014	28/10/2014	28/10/2014	28/10/2014		
			SDG Ref	141028-17	141028-17	141028-17	141028-17		
			Lab Sample No.(s)	10268879	10268881	10268884	10268887		
			AGS Reference	BLK	BLK	BLK	BLK		
PSD Wet/Dry sieve*	-	SUB		See Attached	See Attached	See Attached	See Attached		

CERTIFICATE OF ANALYSIS

SDG:	141028-17	**Location:**	Land at West Buntingford	**Order Number:**	70007498-GE1
Job:	H_WSP_HER-163	**Customer:**	WSP Environmental	**Report Number:**	291065
Client Reference:	Buntingford - Soakways	**Attention:**	Alice Waylett	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
SUB		Subcontracted Test		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	141028-17	**Location:**	Land at West Buntingford	**Order Number:**	70007498-GE1
Job:	H_WSP_HER-163	**Customer:**	WSP Environmental	**Report Number:**	291065
Client Reference:	Buntingford - Soakways	**Attention:**	Alice Waylett	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	10268879	10268881	10268884	10268887
Customer Sample Ref.	SK101	SK102	SK103	SK104
AGS Ref.	BLK	BLK	BLK	BLK
Depth	2.50 - 2.85	2.50 - 3.00	2.50 - 3.00	2.50 - 2.80
Type	GEOTECH	GEOTECH	GEOTECH	GEOTECH
Geotechnical Testing*	07-Nov-2014	07-Nov-2014	07-Nov-2014	07-Nov-2014

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 24928

Client's Reference: **SDG 141028-17 po 196152**

Report Date: **06-11-2014**

Client **ALcontrol Laboratories**
Hawarden Business Park
Manor Road
Flintshire
CH5 3US

Contract Title: **Land at West Buntingford**

For the attention of: **Alcontrol GSTL**

Date Received: **29-10-2014**

Date Commenced: **29-10-2014**

Date Completed: **06-11-2014**

Test Description	Qty
PSD-Wet Sieve/Dry Sieve 1377 : 1990 Part 2 : 9.2 - * UKAS	4

Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
# - denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Approved Signatories:
Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - D V Edwards (Managing Director)
Emma Williams (Office Manager) - Paul Evans (Quality/Technical Manager)

GEO Site & Testing Services Ltd
Unit 4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@geo.uk.com geo.uk.com

Test Report: **Particle Size Distribution Test**

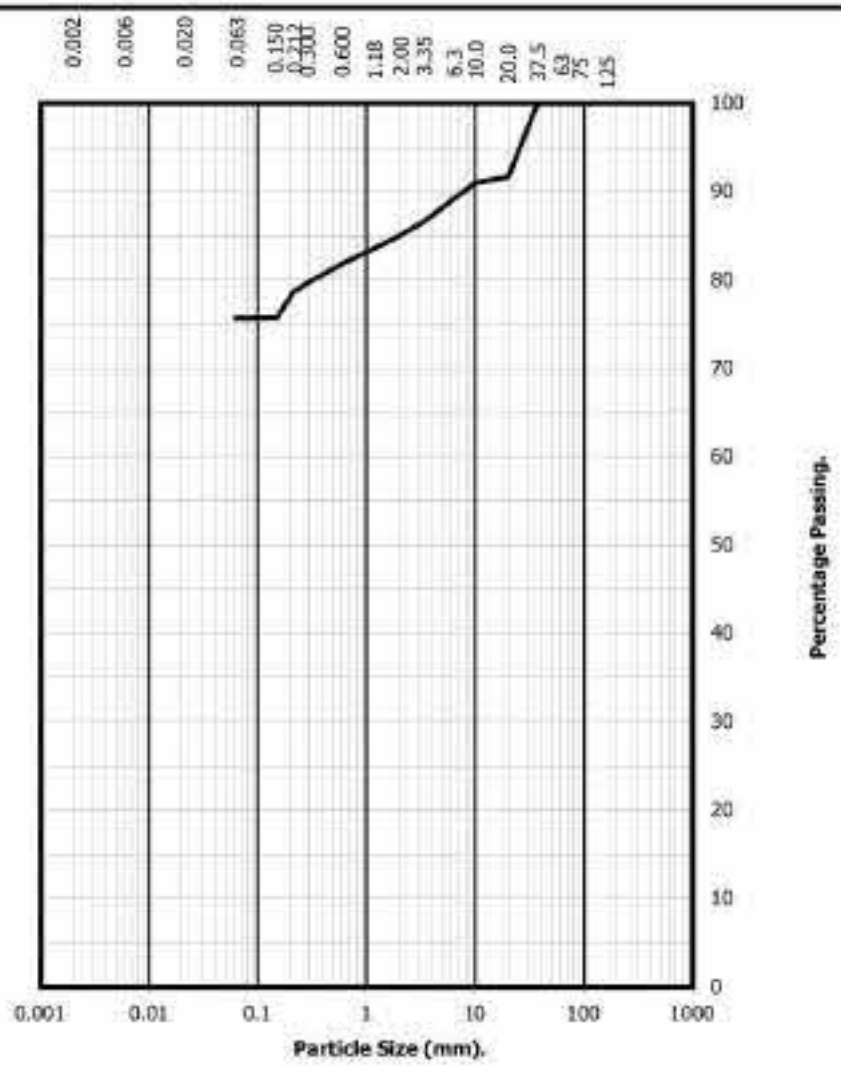
BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref:	**SDG 141028-17**
Location:	**Land at West Buntingford**
Contract Number:	**24928**
Hole Number:	**SK101**
Sample Number:	**N/A**
Depth from (m):	**2.50**
Depth to (m):	**2.85**
Description:	**Brown slightly sandy chalky fine to medium gravelly silty CLAY.**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	92
10	91
6.3	89
3.35	87
2.00	85
1.18	84
0.60	82
0.300	80
0.212	79
0.150	76
0.063	76

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	76	**9**	**15**	**0**	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)

Date: 6.11.14

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report: **Particle Size Distribution Test**

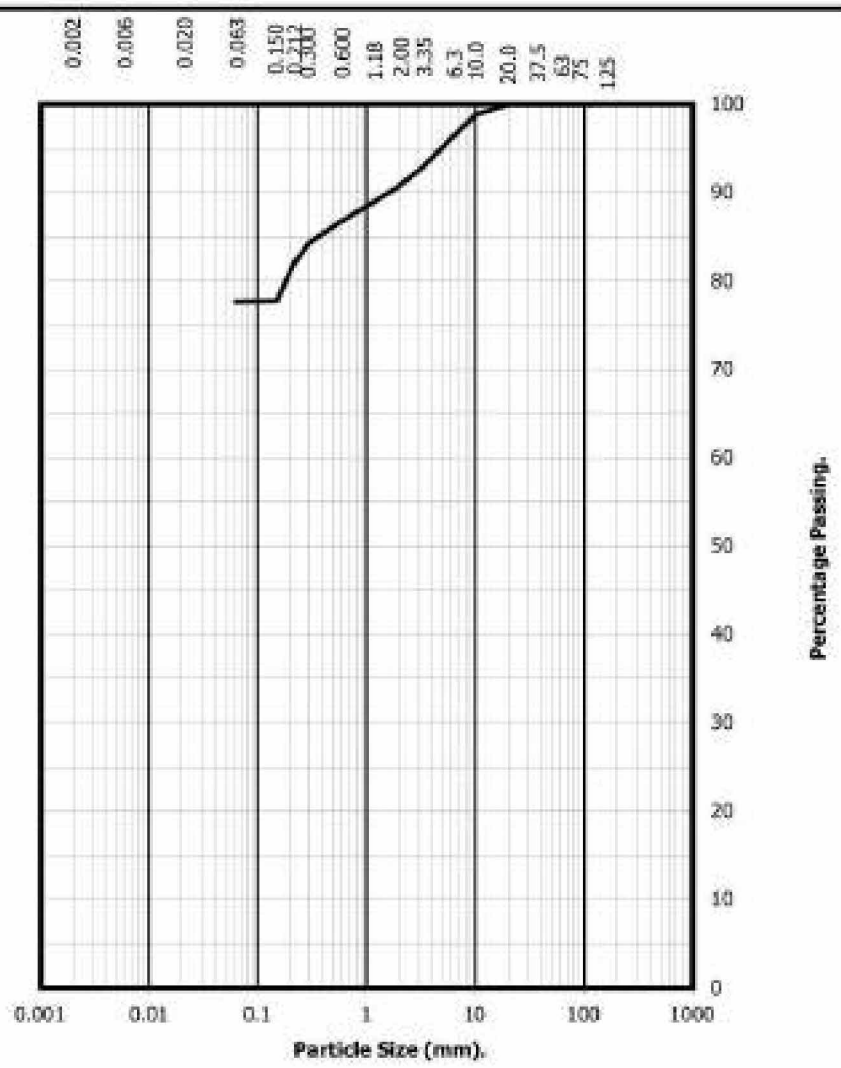
BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref:	**SDG 141028-17**
Location:	**Land at West Buntingford**
Contract Number:	**24928**
Hole Number:	**SK102**
Sample Number:	**N/A**
Depth from (m):	**2.50**
Depth to (m):	**3.00**
Description:	**Brown slightly fine gravelly chalky sandy silty CLAY.**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	96
3.35	93
2.00	91
1.18	89
0.60	87
0.300	84
0.212	82
0.150	78
0.063	78

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	78	**13**	**9**	**0**	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

GSTL
GEO SITE & TESTING SERVICES LTD

Authorised By:
Ben Sharp (Contracts Manager)

[redacted]

Date: 6.11.14

UKAS TESTING 2788

Test Report: **Particle Size Distribution Test**

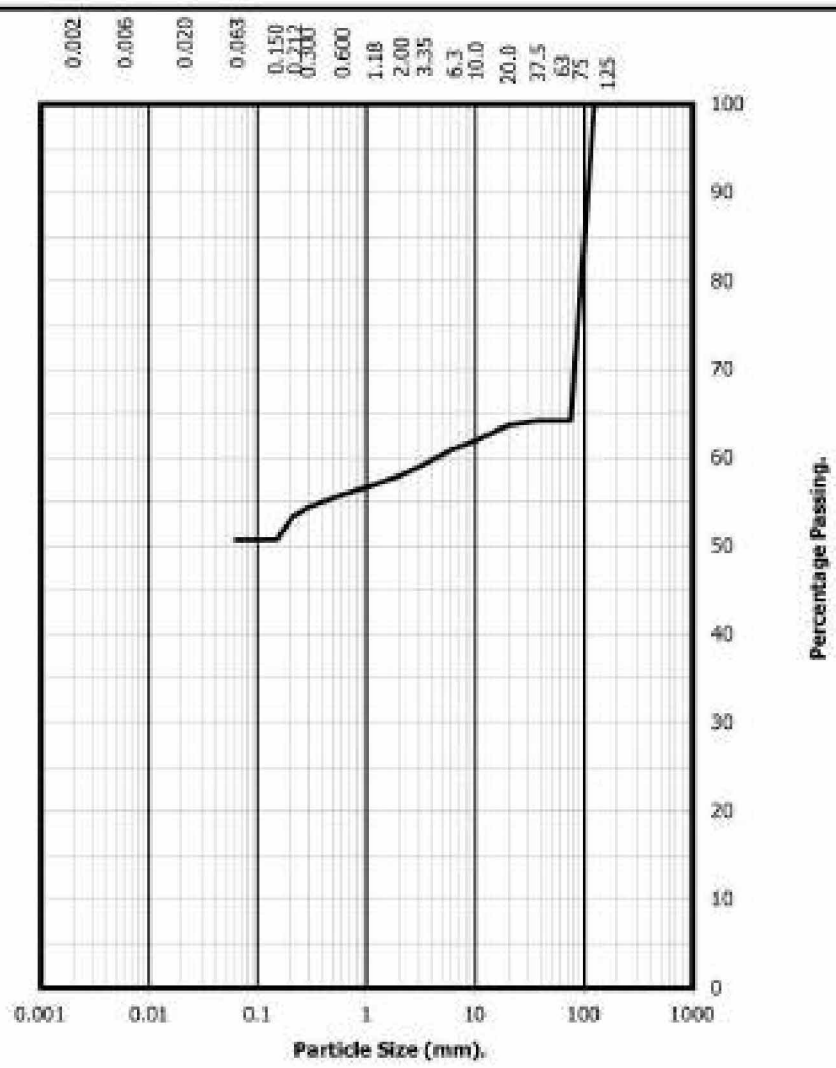
BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref:	**SDG 141028-17**
Location:	**Land at West Buntingford**
Contract Number:	**24928**
Hole Number:	**SK103**
Sample Number:	**N/A**
Depth from (m):	**2.50**
Depth to (m):	**3.00**
Description:	**Brown slightly sandy chalky fine to coarse gravelly silty CLAY with one cobble**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	64
63	64
37.5	64
20	64
10	62
6.3	61
3.35	59
2.00	58
1.18	57
0.60	56
0.300	54
0.212	53
0.150	51
0.063	51

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	51	**7**	**6**	**36**	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)

[redacted]

Date: 6.11.14

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report: **Particle Size Distribution Test**

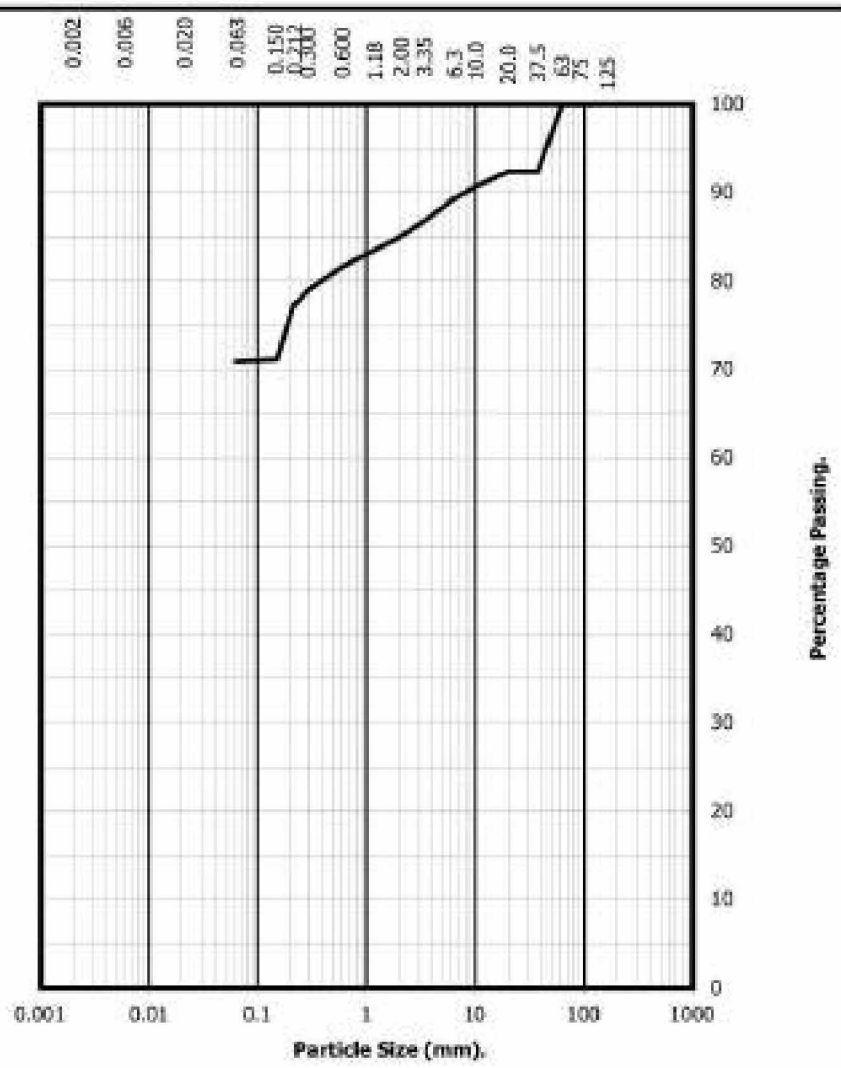
BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref:	**SDG 141028-17**
Location:	**Land at West Buntingford**
Contract Number:	**24928**
Hole Number:	**SK104**
Sample Number:	**N/A**
Depth from (m):	**2.50**
Depth to (m):	**2.80**
Description:	**Brown sandy chalky fine to coarse gravelly silty CLAY.**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	92
20	92
10	91
6.3	89
3.35	87
2.00	85
1.18	84
0.60	82
0.300	79
0.212	77
0.150	71
0.063	71

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	71	**14**	**15**	**0**	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

GSTL
GEO SITE & TESTING SERVICES LTD

Authorised By:
Ben Sharp (Contracts Manager)

[redacted]

Date: 6.11.14

UKAS TESTING 2788

SDG:	141028-17	**Location:**	Land at West Buntingford	**Order Number:**	70007498-GE1
Job:	H_WSP_HER-163	**Customer:**	WSP Environmental	**Report Number:**	291065
Client Reference:	Buntingford - Soakways	**Attention:**	Alice Waylett	**Superseded Report:**	

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analy for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NI BRE method, VOC TICS and SVOC TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge f 30 days after analysis is completed (e-mailed) for all sample types unless the sample is on testing. The prepared soil sub sample that is analysed for asbestos will be retai period of 6 months after the analysis date. All bulk samples will be retained for a pe months after the analysis date. All samples received and not scheduled will be dis one month after the date of receipt unless we are instructed to the contrary. Once t period has expired, a storage charge will be applied for each month or part thereof client cancels the request for sample storage. ALcontrol Laboratories reserve charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinan are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in hou presence of asbestos fibres and asbestos containing material by our documented method TM048 based on HSG 248 (2005), which is accredited to ISO17025. asbestos fibre type is not found this will be reported as “Not detected”. If no asbe types are found all will be reported as “Not detected” and the sub sample analysed to be clear of asbestos. If an asbestos fibre type is found it will be reported as det each fibre type found). Testing can be carried out on asbestos positive samples to Health and Safety considerations, may be replaced by alternative tests or reporte Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or s present in the volatile sample, the integrity of the data may be compromised. flagged up as an invalid VOC on the test schedule and the result marked as d the test certificate.

8. If appropriate preserved bottles are not received preservation will take place However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not correcte content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the r of which is monitored and reported. For EPH, MO, PAH, GRO and VOC result is not surrogate corrected, but a percentage recovery is quoted. Acceptable most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitativ the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenc and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to th being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as t performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from ground, as long as these materials constitute the major part of the sample. Ot granular material such as concrete, gravel and brick are not accredited if they com major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5 -C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system also detect other compounds such as chlorinated solvents, and this may lead t high result with respect to hydrocarbons only. It is not possible to specifically iden non-hydrocarbons, as standards are not routinely run for any other compou more definitive identification, volatiles by GCMS should be utilised.

Sample Deviations

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from sup materials which have been examined to determine the presence of asbestos fi Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homo sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbesto
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix C

LOCAL AUTHORITY CONSULTATION

Miss Bryony Bennet

WSP
WSP HOUSE
70 CHANCERY LANE
LONDON
WC2A 1AF

Wastewater pre-planning
Our ref DS6088886

23 May 2022

Pre-planning enquiry: Capacity concerns

Dear Miss Bennet

Thank you for providing information on your development at **LAND AT BUNTINGFORD WEST, PEASMEAD, BUNTINGFORD, HERTFORDSHIRE, SG9 9SF.**

Development comprising 400 residential units and a secondary school. Foul water discharging by gravity into MH ref. 8906 (262 units) and by pump into MH. Ref. 0802 (138 units) at max rate of 1.15l/s. Surface water discharging by pump into MH0804 at max. rate of 35.86l/s.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Sewer Capacity Assessment results:

We've assessed your **foul water and surface water** proposals and concluded that our sewerage network will not have enough capacity to accommodate foul water and surface water flows from proposed development. It will therefore be necessary for us to undertake investigations into the impact of the development by means of hydraulic impact study to determine possible connection points on the existing system, or what upgrades to the existing network are required before the site can be connected to it. This work is done at our cost.

Once we've begun modelling, we may need to contact you to discuss changing the connection point for capacity reasons. Please note that we'll pay the cost of covering any extra distance if the connection needs to be made at a point further away than the nearest practicable point of at least the same diameter.

How long could modelling and reinforcement take?

Typical timescales for a development of your size are:

Modelling: 8 months
Design: 6 months
Construction: 6 months
Total: 20 months

If the time you're likely to take from planning and construction through to first occupancy is longer than this, we'll be able to carry out the necessary upgrades in time for your development. If it's shorter, please contact me on the number below to discuss the timing of our activities.

What do you need to tell us before we start modelling?

We will only carry out modelling once we're confident that your development will proceed. In order to have this confidence, we'll need to know that you **own the land and have either outline or full planning permission**. Please email this information to us as soon as you have it.

If the modelling shows we need to carry out reinforcement work, then before we start construction we'll need you to supply us with notification that you've confirmed your F10 – Notification of construction project - submission to the Health and Safety Executive.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

1. store rainwater for later use.
2. use infiltration techniques where possible.
3. attenuate rainwater in ponds or open water features for gradual release.
4. attenuate rainwater by storing in tanks or sealed water features for gradual release.
5. discharge rainwater direct to a watercourse.
6. discharge rainwater to a surface water sewer/drain.
7. discharge rainwater to the combined sewer.
8. discharge rainwater to the foul sewer

Where connection to the public sewerage network is still required to manage surface water flows we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

Please see the attached 'Planning your wastewater' leaflet for additional information.

Sewage Treatment Plant Capacity Assessment:

Thames Water have commenced a process capacity study for Buntingford Sewage Treatment Works to better understand the impact of this development. There are upgrades planned at Buntingford STW due to complete in 2023, but it is not yet clear whether this will alleviate the impact of this development.

What do I need to do next?

If you've satisfied the points above, then you should compare your own timeline with the typical timescales we've suggested for our activities. If the time you're likely to take from planning and

construction through to first occupancy is **more** than the total time we're likely to take, we'll be able to carry out the necessary upgrades in time for your development.

If it's **less** than this, you might want to ask us to start modelling earlier – in which case we'll require you to underwrite the cost, as noted above.

If you've any further questions, please contact me on 077476 47276.

Yours sincerely

Artur Jaroma

Thames Water

Asset Location Search

Thames Water Property Searches
12 Vastern Road
READING
RG1 8DB

ATKINS CHECKED
HD

Search address supplied Peasmead, BUNTINGFORD

Your reference LM 25819
Our reference ALS/ALS Standard/2013_2474942

Search date 23 May 2013

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0845 070 9148
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search

Search address supplied: Peasmead, BUNTINGFORD,

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0845 070 9148
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search

Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

TL3528NE
TL3529SE
TL3628SW
TL3628NW
TL3628SE
TL3628NE

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.

Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0845 070 9148
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search

The following quartiles have not been printed as they are out of Thames' water catchment area. For details of the assets requested please contact the water company indicated below:

TL3528NE	Affinity Water
TL3529SE	Affinity Water
TL3628SW	Affinity Water
TL3628NW	Affinity Water
TL3628SE	Affinity Water
TL3628NE	Affinity Water

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ
Tel: 0845 7823333

For your guidance:

Assets other than vested water mains may be shown on the plan, for information only.

If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0845 070 9148
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

Should you require any further information regarding budget estimates, diversions or stopping up notices then please contact:

DevCon Team
Asset Investment
Thames Water
Maple Lodge STW
Denham Way
Rickmansworth
Hertfordshire
WD3 9SQ

Tel: 01923 898 072
Email: devcon.team@thameswater.co.uk

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0845 070 9148
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

Thames Water Utilities Ltd

Property Searches
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Slough SL1 4WW

DX 151280 Slough 13

T 0845 070 9148
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search Sewer Map - ALS/ALS Standard/2013_2474942

TL3528NE

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 535750,228750

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8904	105.47	101.07
8903	105.51	100.67
8905	104.93	100.85
8906	104.81	100.47
8901	105.7	101.19
8902	105.64	100.77
9905	102.98	99.05
9904	102.97	99.47
9906	102.82	98.59
9903	102.9	98.9
9801	101.41	100.02
9802	101.37	99.74
9901	101.97	99.68
9902	101.98	99.31
9908	100.92	97.24
9907	100.74	96.63
9909	100.16	97.88
9910	100.06	97.16
9803	98.43	97.07
-	-	-
9912	99.24	96.2

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Asset Location Search Sewer Map - ALS/ALS Standard/2013_2474942

TL3529SE

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 535750,229250

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
741A	n/a	n/a
731A	n/a	n/a
8004	105.62	101.14
9006	100.45	99.3
8005	105.67	101.67
9004	99.64	98.16
9003	99.17	98.16
9005	99.49	98.44
9001	103.48	102.33
8003	104.45	101.37
8001	104.57	101.98
8002	106.14	103.82
8151	106.93	105.84
9152	n/a	n/a
9151	100.81	99.81
8150	103.67	101.57
8102	n/a	n/a
8101	104.49	102.69
9150	100.25	98.5
9101	98.42	96.62
8253	104.35	103
8252	104.16	103.26
8006	105.8	101.45
9002	103.73	102.65
9007	101.75	100.45
8451	100.74	99.19
8401	100.82	99.32
8402	100.48	98.88
831A	n/a	n/a
831B	n/a	n/a
841B	n/a	n/a
8350	n/a	n/a
8452	99.9	98.75
8403	99.82	98.22
8351	n/a	n/a
9350	n/a	n/a
941A	n/a	n/a
9351	97.3	95.95
941B	n/a	n/a
941C	n/a	n/a
9251	99.15	97.3
9250	100.51	98.46
9201	n/a	n/a
8201	100.88	99.03
8251	n/a	n/a
9255	100.11	99.41
9253	99.83	98.73
9254	99.9	98.9
9252	99.38	97.73
821A	n/a	n/a
9256	97.96	96.88
921B	n/a	n/a
8250	101.32	100.62
921C	n/a	n/a
921A	n/a	n/a
931B	n/a	n/a
931A	n/a	n/a
731B	n/a	n/a
9301	99.69	98.49
9353	99.69	98.29
9302	98.12	96.92
9352	98.13	96.73
841D	n/a	n/a
841C	n/a	n/a
8450	n/a	100.25
7454	101.29	99.79
7453	102.05	100.58
7406	n/a	n/a
8406	101.06	100.06
7401	101.51	100.61
8407	n/a	n/a
7455	n/a	n/a
7405	n/a	n/a
7452	102.15	100.6
7407	n/a	n/a
7404	102.45	100.3
7456	n/a	n/a
7450	n/a	n/a
7403	103.89	102.13
7451	102.94	101.81
7402	105.12	103.42
6453	106.11	104.41
541C	111.25	109.58
541B	111	109.05
541A	110.85	108.79
5353	n/a	n/a
5358	n/a	n/a
5301	n/a	n/a
5356	110.36	107.38
5302	110.27	107.54
6451	107.23	105.88

Manhole Reference	Manhole Cover Level	Manhole Invert Level
6455	n/a	n/a
6401	n/a	n/a
6452	105.85	104.55
6454	n/a	n/a
6402	n/a	n/a

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Asset Location Search Sewer Map - ALS/ALS Standard/2013_2474942

TL3628SW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 536250,228250

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
0203	87.13	85.06
1202	86	83.83
1203	86.48	84.05
0202	86.95	84.66
0201	87.17	84.51
1201	85.63	83.69
2203	84.88	83.48
2301	84.65	83.35
2302	84.68	83.26
2303	84.66	83.13
2401	84.53	82.92
-	-	-
2402	83.62	82.67

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Asset Location Search Sewer Map - ALS/ALS Standard/2013_2474942

TL3628NW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 536250,228750

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 536250,228750

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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
2910	90.44	88.73
2908	90.39	88.44
2903	89.82	87.62
2904	89.73	87.02
2802	89.28	87.18
2907	90.14	88.14
2911	90.07	88.49
2801	89.23	86.66
2916	n/a	n/a
2909	89.49	87.42
2912	89.47	87.66
2913	89.41	87.58
2905	88.33	86.44
2906	88.34	86.09
2917	89.52	84.97
2914	89.51	87.36
2915	88.32	86.94
3904	n/a	n/a
3863	n/a	n/a
3861	87.7	84.6
4950	90.61	89.31
4951	91.01	90.17
491C	n/a	n/a
0901	99.41	95.35
0803	98.85	95.3
0905	98.89	94.89
0904	98.48	94.69
0902	98.69	95.12
0803	98.85	95.3
0903	98.65	94.64
0913	98.12	96.48
0801	97.97	95.15
0804	97.48	95.52
0802	97.36	95.26
0912	96.32	93.57
0910	95.92	93.05
0911	95.91	92.5
1902	94.02	90.09
1901	93.96	89.63
1801	94.32	90.69
1802	94.2	89.95
1804	92.75	90.52
1903	92.1	89.17
1904	92.03	88.66
1803	92.15	90.98
2902	90.82	88.3
291A	n/a	n/a
291B	n/a	n/a
2901	90.83	87.8
3650	85.85	83.85
3601	85.88	83.73
2603	n/a	n/a
3655	n/a	n/a
3603	85.99	84.56
3651	86.27	84.44
3652	85.57	n/a
2602	n/a	n/a
3656	n/a	n/a
3701	86.04	84.15
4750	87.71	86.54
3702	86.68	n/a
4701	87.53	86.26
3751	n/a	n/a
471B	n/a	n/a
3851	87.52	86.83
3860	n/a	n/a
3850	88.26	87.52
2804	87.95	85.71
2805	88.01	85.41
3857	86.5	84.16
3866	n/a	n/a
3856	86.5	84.93
3862	88.01	85.11
3864	n/a	n/a
3865	n/a	n/a
2803	89.02	87.02
4953	91.65	90.3
4956	93.2	92.2
4901	92.96	89.95
4957	92.91	91.93
491A	n/a	n/a
491B	n/a	n/a
3501	85.09	83.4
3550	85.47	84.13
3502	85.49	83.59

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Asset Location Search Sewer Map - ALS/ALS Standard/2013_2474942

TL3628SE

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 536750,228250

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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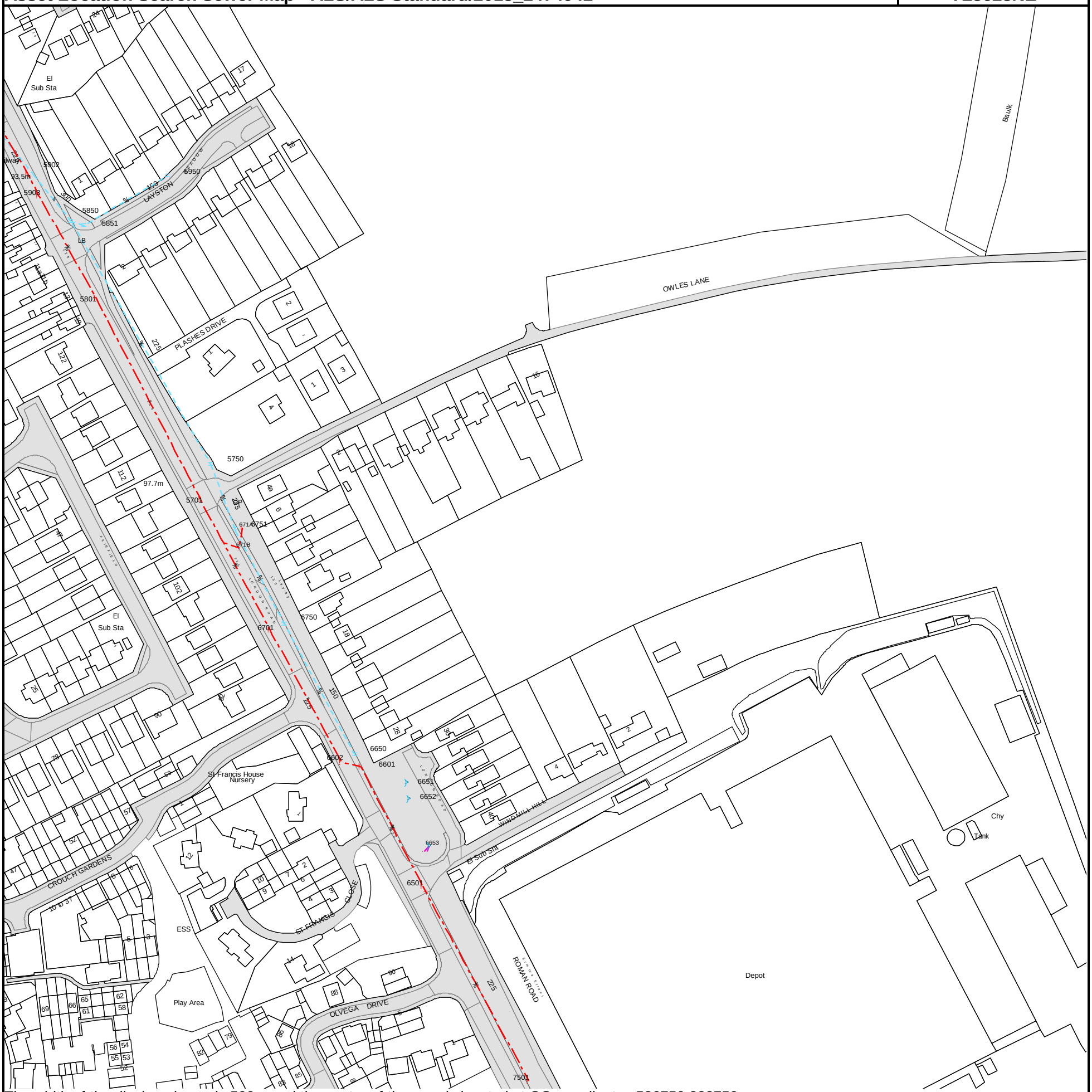
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9101	n/a	n/a
9001	n/a	n/a
-	-	-
9002	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search Sewer Map - ALS/ALS Standard/2013_2474942

TL3628NE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 536750,228750

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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
7501	103.86	102.13
6501	103.91	101.21
6653	n/a	101.54
6652	n/a	103.82
6651	n/a	103.75
6601	102.73	100.18
6602	102.5	99.62
6650	102.64	101.57
6701	100.5	97.73
6750	100.52	99.65
671B	n/a	n/a
6751	98.89	98
671A	n/a	n/a
5701	98.11	95.79
5750	98.18	96.82
5801	95.16	92.87
5851	94.72	93.74
5850	94.33	93.53
5903	93.79	91.6
5950	97.17	n/a
-	-	-
5902	93.59	91.46

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ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrialsources toa treatmentworks.

Surface Water: A sewer designed to convey surface water (e.g. rain water fromroofs,yardsandcarparks) toriversorwatercourses.

Combined: A sewer designed to convey both waste water and surface water fromdomesticandindustrialsources toa treatmentworks.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent isa fittingas the functionofaventis toreleaseexcessgas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: Ahydrobrakelimits the flowpassingdownstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surfacewatersewerindicates that thepipedischargesintoastreamorriver.

Outfall

Undefined End

Inlet

Other Symbols

Symbolsusedonmapswhichdonot fallunderothergeneralcategories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not OperatedorMaintainedbyThamesWater)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1)Alllevelsassociatedwith theplansare to OrdnanceDatumNewlyn.

2)Allmeasurementson theplansaremetric.

3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5)'na'or'0'onamanholelevelindicates thatdataisunavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a memberofProperty Insighton0845 070 9148.

Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

Bennett, Bryony

[redacted]

Dear HCC Flood and Water Management Team,

Are you able to advise on the below query? We are looking to discuss the proposed principles of the development drainage strategy in advance of the planning application for the development.

Kind regards,

Bryony Bennett
Engineer
MEng GMICE

T +44 (0)2031 169 270
WSP House, 70 Chancery Lane, London, WC2A 1AF

wsp.com

[redacted]

Dear Flood and Water management,

We would like a pre-application discussion about a development site in Buntingford, near the A10, please let us know who, as the LLFA, we can discuss the proposed principles of the surface water drainage strategy with.

Kind regards,
Kate Mackay

Kate Mackay
Associate Director
BE (Hons), MICE CEng, MCIWEM C.WEM

DD: +44 (0) 20 3116 6168
M: +44 (0) 7 90900 7587

WSP House,
70 Chancery Lane,
London,
WC2A 1AF

wsp.com

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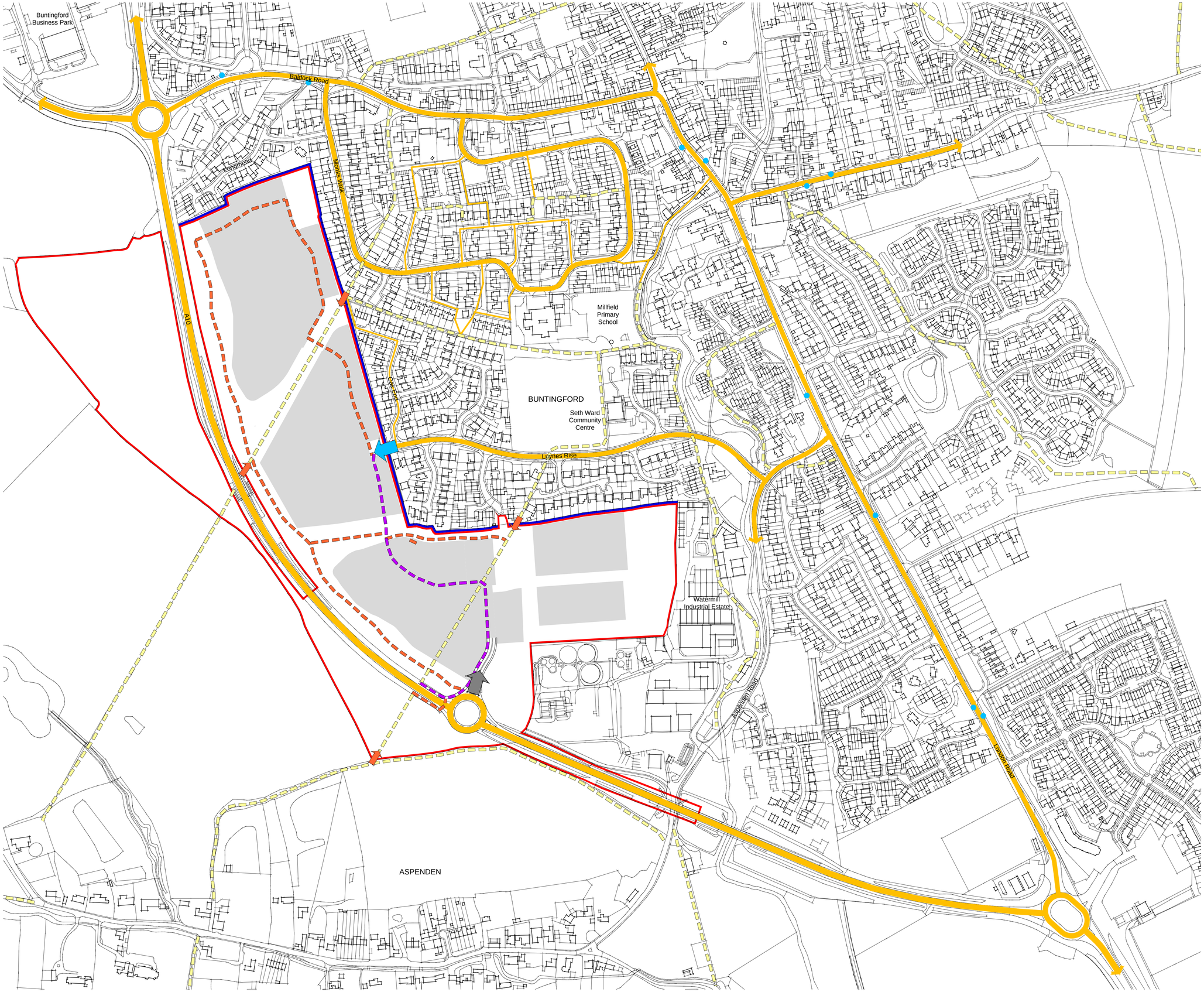
Appendix D

DEVELOPMENT PROPOSALS



NOTES

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0 50 100 150 200m

N

KEY

- Application boundary
- Land under the control of the applicant
- Proposed vehicular, pedestrian and cycle access from A10
- Proposed bus link, pedestrian and cycle access from Luynes Rise
- Proposed pedestrian point of access
- Proposed footway cycleway
- Proposed recreational route
- Existing Public Right of Way
- Existing bus stop
- Selected existing off site route

NOTE

All proposed streets and routes are indicative alignments and subject to future approvals

rev	date	description	drn	chk
P05	13/06/2023	Proposed primary street omitted; key amended.	JMG	KMN
P04	08/06/2023	Roundabout added	CTH	KMN
P03	26/05/2023	Title block and key amended.	JMG	KMN
P02	19/05/2023	A10 access amended; minor amendments	JMG	KMN
P01	21/04/2023	First issue.	JMG	KMN

masterplanning
environmental assessment
landscape design
urban design
ecology
architecture
arboriculture

FPCR Environment and Design Ltd
Lockington Hall
Lockington
Derby
DE74 2RH

t: 01509 672772
e: mail@fpcr.co.uk
w: www.fpcr.co.uk

client
Countryside Partnerships and Vistry Homes

project
Buntingford West,
Buntingford, Hertfordshire

drawing title
PARAMETERS PLAN 2:
ACCESS & MOVEMENT

scale	drn	chk	date created
1:2500 @ A1	JMG	KMN	April 2023

project number	status	issue
10537	S3	P05

document number
10537-FPCR-XX-XX-DR-A-1004

Project Code – Originator – Zone – Level – Type – Role – Drawing Number

File: L:\10500\10537\ARCH\Drawings\10537-FPCR-XX-XX-DR-A-1004-P05_ParametersPlan2Access.vwx

NOTES

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0 50 100 150 200m

N

KEY

- Application boundary
- Land under the control of the applicant
- Existing trees and planting
- Amenity green space, parks and gardens 1.37ha
- Natural / semi-natural greenspace 5.93ha
- Allotments 0.28ha
- Children's Equipped Play Area 0.22ha
- Retained agricultural land 6.38ha
- Ecological enhancement area 1.22ha
- Total 15.40ha
- Indicative attenuation feature
- Indicative acoustic fence on bund with proposed planting

Dwellings	Average occupancy	People
350	2.32	812

	Area per 1000 people	Site requirement	Site provision	Difference between provision & requirement
Children's play and provision for young people	0.25	0.20	0.22	+0.02
Amenity green space, parks and gardens	1.40	1.14	1.37	+0.23
Natural / semi-natural greenspace	3.20	2.60	5.93	+3.33
Allotments	0.30	0.24	0.28	+0.04
Total		4.18	7.80	+3.62

rev	date	description	drn	chk
P03	14/06/2023	Proposed roundabout added; key amended.	JMG	KMN
P02	26/05/2023	Title block amended; table amended.	JMG	KMN
P01	19/05/2023	First issue.	JMG	KMN

masterplanning
environmental assessment
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client
Countryside Partnerships and Vistry Homes

project
Buntingford West,
Buntingford, Hertfordshire

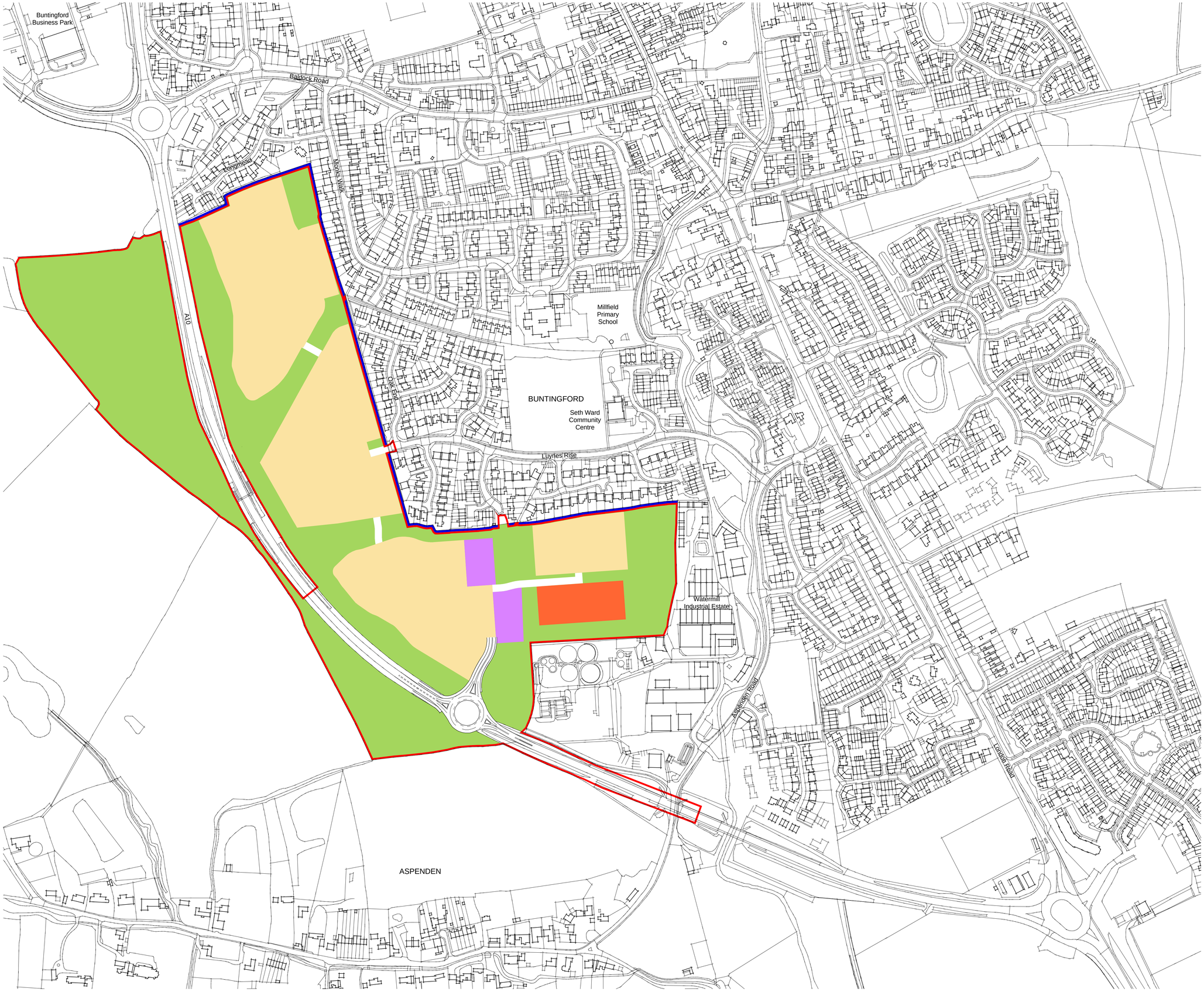
drawing title
PLAN SHOWING PUBLIC OPEN SPACE

scale	drn	chk	date created
1:2500 @ A1	JMG	KMN	April 2023

project number	status	issue
10537	S3	P03

document number
10537-FPCR-XX-XX-DR-A-1007
Project Code - Originator - Zone - Level - Type - Role - Drawing Number

File: L:\10500\10537\ARCH\Drawings\10537-FPCR-XX-XX-DR-A-1007-P03_POS.vwx



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0 50 100 150 200m

N

KEY

- Application boundary
- Land under the control of the applicant
- Residential 10.35ha
  Up to 350 dwellings
- Employment 0.66ha
  Use Classes E and B8
- Local Centre 0.55ha
  Use Class E
- Green Infrastructure 15.50ha
  Includes drainage features, children's equipped play areas, allotments, retained agricultural land, ecological enhancement area, footpaths, cycleways and recreational routes within green infrastructure

rev	date	description	drn	chk
P04	08/06/2023	Roundabout added	CTH	KMN
P03	26/05/2023	Title block and key amended; minor amendments.	JMG	KMN
P02	19/05/2023	A10 access amended.	JMG	KMN
P01	21/04/2023	First issue.	JMG	KMN

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PARAMETERS PLAN 1:
LAND USE

scale	drn	chk	date created
1:2500 @ A1	JMG	KMN	April 2023

project number	status	issue
10537	S3	P04

document number
10537-FPCR-XX-XX-DR-A-1003
Project Code - Originator - Zone - Level - Type - Role - Drawing Number

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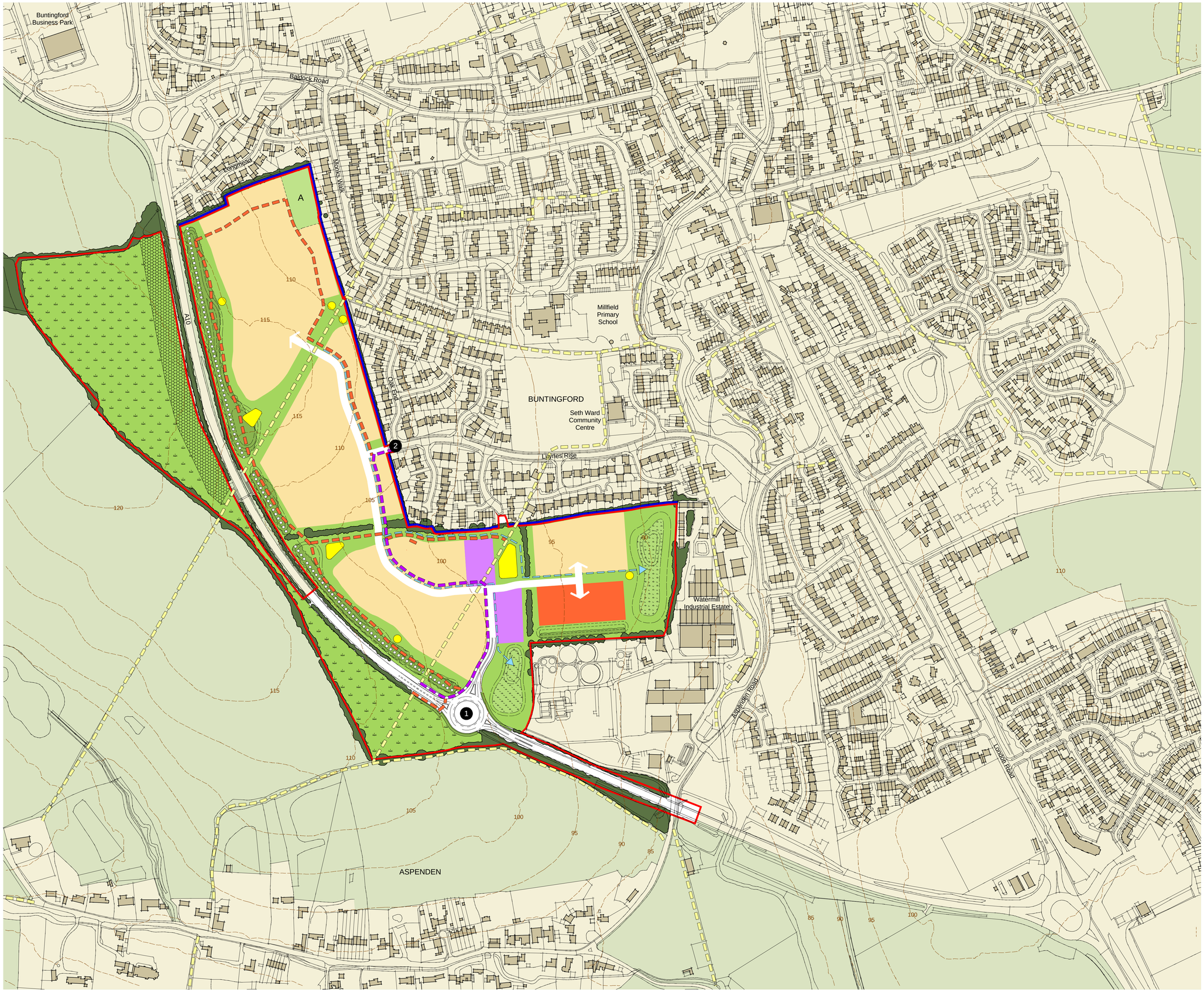

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0 50 100 150 200m

N

KEY

- Application boundary
- Land under the control of the applicant
- Residential
  - Up to 350 dwellings at approx. 35 dwellings per hectare average
- Employment
  - Use Classes E and B8
- Local Centre
  - Use Class E
- Children's Equipped Play Area
- A — Allotments
- Recreational Route
- Footway Cycleway
- Existing Public Right of Way
- Indicative Acoustic Fence on Bund with Proposed Planting
- Indicative Attenuation Feature
- Potential Swale
- Retained agricultural land
- Ecological enhancement area
- 1 — Proposed vehicular, pedestrian and cycle access from A10
- 2 — Proposed bus link, pedestrian and cycle access from Luynes Rise

rev	date	description	drn	chk
P05	08/06/2023	Access updated	CTH	KMN
P04	06/06/2023	Roundabout added	CTH	KMN
P03	26/05/2023	Title block and key amended.	JMG	KMN
P02	19/05/2023	A10 access amended; minor amendments.	JMG	KMN
P01	21/04/2023	First issue.	JMG	KMN

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drawing title
DEVELOPMENT FRAMEWORK PLAN

scale	drn	chk	date created
1:2500 @ A1	JMG	KMN	April 2023

project number	status	issue
10537	S3	P05

document number
10537-FPCR-XX-XX-DR-A-1002
Project Code – Originator – Zone – Level – Type – Role – Drawing Number

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