



**Client: Mid Kent Homes Ltd**  
Flood Risk and Sustainable Drainage  
Assessment for the Proposed  
Development at Ace House, Sevenoaks  
Road, Pratt's Bottom

**March 2023**

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# 1 Scope of Appraisal

Herrington Consulting has been commissioned by **Mid Kent Homes Ltd** to prepare a Flood Risk and Sustainable Drainage Assessment for the proposed development at **Ace House, Rosa Villas, Sevenoaks Road, Pratt's Bottom, Orpington, BR6 7SF.**

This appraisal has been undertaken in accordance with the requirements of the National Planning Policy Framework (2023) and the National Planning Practice Guidance Suite (August 2022) that has been published by the Department for Communities and Local Government. The *Flood Risk and Coastal Change* planning practice guidance included within the Suite represents the most contemporary technical guidance on preparing FRAs. In addition, reference has also been made to Local Planning Policy.

To ensure that due account is taken of industry best practice, this FRA has been carried out in line with the CIRIA Report C624 'Development and flood risk - guidance for the construction industry'

A Flood Risk Assessment (FRA) appraises the risk of flooding to development at a site-specific scale and recommends appropriate mitigation measures to reduce the impact of flooding to both the site and the surrounding area. New development has the potential to increase the risk of flooding to neighbouring sites and properties through increased surface water runoff and as such, an assessment of the proposed site drainage can help to accurately quantify the runoff rates, flow pathways and the potential for infiltration at the site.

## 2 Background Information

### 2.1 Site Location and Existing Use

The site is located at Ordnance Survey (OS) coordinates 547249, 62704 off Sevenoaks Road in Pratt's Bottom, Orpington. The site covers an area of approximately 543m<sup>2</sup> and currently comprises a two-storey building, containing two offices and six flats (two on the ground floor and four on the first floor). The location of the site, in relation to the surrounding area, is shown in Figure 2.1 below.

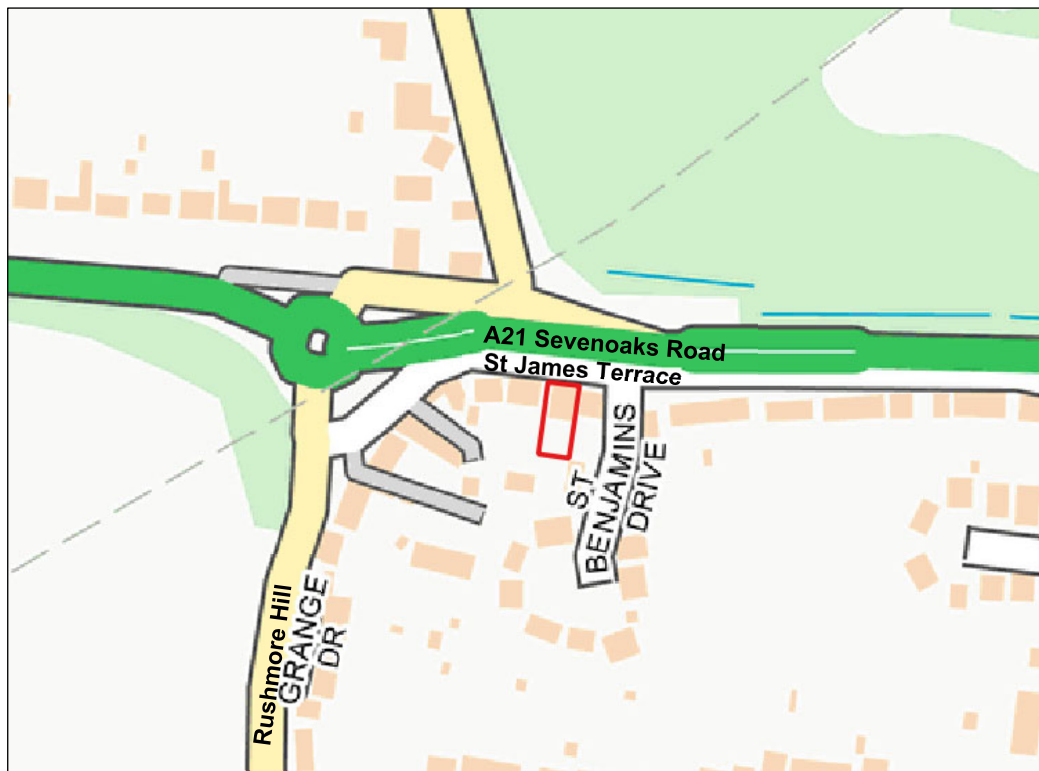


Figure 2.1 – Location map (contains Ordnance Survey data © Crown copyright and database right 2024).

### 2.2 Proposed Development

The development proposals comprise the construction of an additional dwelling at ground floor level to the rear of the existing building (Figure 2.2). Further drawings of the proposed scheme are included in Appendix A.1 of this report.

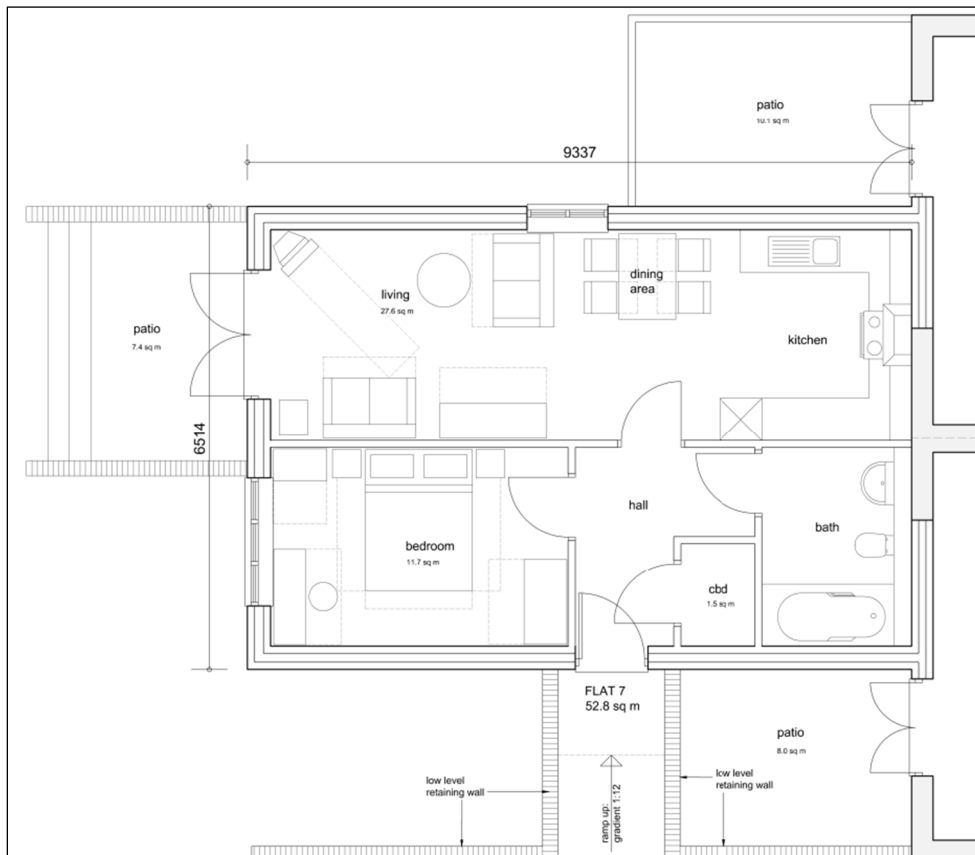


Figure 2.2 – Top image: Proposed site layout. Bottom image: Proposed ground floor.

## 2.3 Planning Policy and Context

For any new development situated within Flood Zones 2 and 3 of a main river or the sea, or for sites greater than 1ha in size, the National Planning Policy Framework (NPPF, 2023) requires a detailed FRA to be undertaken. Inspection of the Environment Agency's (EA) 'Flood Map for Planning' shows that the site is located within Flood Zone 1 and is smaller than 1ha in size. Consequently, a FRA would not typically be required.

Notwithstanding this, in certain circumstances the Local Planning Authority (LPA) can request that a FRA is submitted if the development site is thought to be at risk of flooding from other sources, such as surface water runoff, overland flow and groundwater flooding. In this case, the site is located in an area at risk of flooding from surface water and therefore, a FRA has been prepared as part of the planning application.

In addition to the above, the general requirement for all new development is to ensure that the runoff is managed sustainably, and that the development does not increase the risk of flooding at the site, or within the surrounding area. In the case of brownfield sites, drainage proposals are typically measured against the existing performance of the site, although it is preferable (where practicable) to provide runoff characteristics that are similar to greenfield behaviour.

The Non-statutory Technical Standards for Sustainable Drainage Systems (NTSS) specify criteria to ensure sustainable drainage is included within developments classified as 'major' as set out in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010). It is, however, recognised that SuDS should be designed to ensure that the maintenance and operation requirements are economically proportionate.

In this instance, the proposed development is for the construction of a single residential unit with a total floor space less than 1000m<sup>2</sup>. As a result, the proposals are not classified as 'major' development and therefore, the NTSS will not apply. Nevertheless, the NPPF states that sustainable drainage systems should be considered where feasible and therefore, the opportunities to include SuDS have been considered.

## 2.4 Site Specific Information

Information from a wide range of sources has been referenced to appraise the true risk of flooding at this location. This section summarises the additional information collected as part of this FRA.

**Information contained within the SFRA** – The London Borough of Bromley Council SFRA (2017) contains detailed mapping showing historic flood records for a wide range of sources. This document has been referenced as part of this site-specific FRA.

**Information on localised flooding contained within the SWMP** – A Surface Water Management Plan (SWMP) is a study to understand the risk of flooding that arises from local surface water flooding, which is defined by the Flood and Water Management Act 2010 as flooding from surface runoff, groundwater, and ordinary watercourses. Such a document has been prepared for London

Borough of Bromley Council SFRA (2011) and has therefore been referenced as part of this site-specific FRA.

**Information provided by Thames Water** – Thames Water has provided the results of an asset location search for the site and their response is included in Appendix A.2.

**Site specific topographic surveys** – A site-specific topographic survey has not been undertaken at this stage; however, inspection of aerial height data (LiDAR) shows that the land levels at the front of the site are 99.90m AODN, increasing towards the rear of the site to approximately 100.59m AODN.

**Geology** – Reference to the British Geological Survey (BGS) map shows that the underlying solid geology in the location of the subject site is Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated – chalk). Overlying this are superficial deposits of Head (clay, silt, sand and gravel).

**Historic flooding** – Information provided by the SFRA, SWMP and the EA's Historic Flood Map GIS data shows that there are no recorded incidents of flooding at the site or immediate surrounding area.

**Existing Flood Risk Management Measures** – There are no formal flood defence structures that provide protection to the development site.

## **2.5 Climate Change**

The global climate is constantly changing but it is widely recognised that we are now entering a period of accelerating change. Over the last few decades there have been numerous studies into the impact of potential future changes in the climate and there is now an increasing body of scientific evidence which supports the fact that the global climate is changing as a result of human activity. Past, present and future emissions of greenhouse gases are expected to cause significant global climate change during this century.

The nature of climate change at a regional level will vary. For the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall, and more frequent periods of long-duration rainfall (of the type responsible for the recent UK flooding), could be expected.

These effects will tend to increase the size of flood zones associated with rivers and the amount of flooding experienced from other inland sources. Consequently, the following section of this report takes into consideration the impacts of climate change and references the most contemporary guidance that is applicable to the development site.

### **Planning Horizon**

To ensure that any recommended mitigation measures are sustainable and effective throughout the lifetime of the development, it is necessary to base the appraisal on climate change predictions that are commensurate with the planning horizon for the proposed development. The NPPF and

supporting Planning Practice Guidance Suite (2022) state that residential development should be considered for a minimum of 100 years, but that the lifetime of a non-residential development depends on the characteristics of the development. The development that is the subject of this assessment is classified as residential and therefore, a design life of 100 years has been assumed.

**Potential Changes in Climate**

Recognising that the impact of climate change will vary across the UK, the allowances were updated in May 2022 to show the anticipated changes to peak rainfall across a series of management catchments. The proposed development site is located in the **Darent and Cray Management Catchment**, as defined by the ‘Peak Rainfall Allowance’ maps, hosted by the Department for Environment, Food and Rural Affairs. Guidance provided by the EA states that this mapping should be used for site-scale applications (e.g. drainage design), in small catchments (less than 5km<sup>2</sup>), or urbanised drainage catchments. For large rural catchments, the peak river flow allowances should be used.

The development site lies within an urbanised drainage catchment and therefore, the Peak Rainfall Allowances for the Darent and Cray Management Catchment should be applied.

For each Management Catchment, a range of climate change allowances are provided for two time epochs and for each epoch, there are two climate change allowances defined. These represent different levels of statistical confidence in the possible scenarios on which they are calculated. The two levels are as follows:

- Central: based on the 50<sup>th</sup> percentile
- Upper End: based on the 90<sup>th</sup> percentile

The EA has provided guidance regarding the application of the climate change allowances and how they should be applied in the planning process. The range of allowances for the Management Catchment in which the development site is located are shown in Table 2.1 below.

Management Catchment Name	Annual exceedance probability	Allowance Category	2050s	2070s
Darent and Cray	3.3 %	Central	20%	20%
		Upper End	35%	35%
	1 %	Central	20%	25%
		Upper End	45%	40%

*Table 2.1 – Recommended peak rainfall intensity allowances for each epoch for the Darent and Cray Management Catchment.*

For a development with a design life of 100 years the 'Upper End' climate change allowance is recommended to assesses whether:

- there is no increase in flood risk elsewhere, and;
- the development will be safe from surface water flooding.

EA guidance states that in locations such as this where the allowance for the 2050s epoch is higher than that for the 2070s epoch, and the development has a lifetime beyond 2061, the higher of the two allowances should be used. Consequently, from Table 2.1 above, it can be seen that the recommended climate change allowance for this site is a 45% increase in peak rainfall.

### 3 Potential Sources of Flooding

The main sources of flooding have been assessed as part of this appraisal. The specific issues relating to each one and its impact on this development are discussed below. Table 3.1 at the end of this section summarises the risks associated with each of the sources of flooding.

#### 3.1 Flooding from Rivers, Ordinary or Man-Made Watercourses

Inspection of OS mapping identifies that there are no watercourses nearby and the site is not located within an area identified by the EA's 'Flood Map for Planning' as being at risk of flooding from a main river. Consequently, the risk of flooding to the site from rivers is considered to be *low*.

#### 3.2 Flooding from the Sea

The site is located a significant distance inland and is elevated above predicted extreme tide levels. Consequently, the risk of flooding from this source is considered to be *low*.

#### 3.3 Flooding from Surface Water

Surface water, or overland flooding, typically occurs in natural valley bottoms as normally dry areas become covered in flowing water and in low spots where water may pond. This mechanism of flooding can occur almost anywhere but is likely to be of particular concern in any topographical low spot, or where the pathway for runoff is restricted by terrain or man-made obstructions.

The EA's 'Flood Risk from Surface Water' map (Figure 3.1) shows the development site is located in an area classified as having a 'low' risk of surface water flooding, with the adjacent road being at 'medium' and 'high' risk.

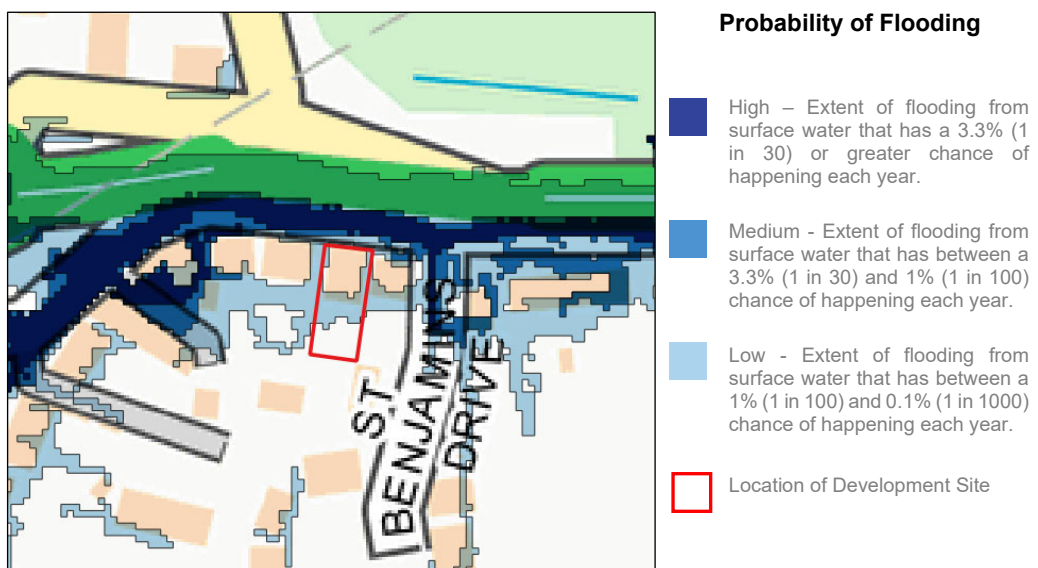


Figure 3.1 – EA's 'Flood Risk from Surface Water' map (© Environment Agency).



When Figure 3.1 is interrogated further, the site is shown to be located outside both the 1 in 30 and 1 in 100 year return period event. Notwithstanding this, it is also necessary to consider the impact of climate change over the lifetime of the proposed development (refer to Section 2.5). Whilst the map presented in Figure 3.1 does not include an allowance for climate change, it does include an exceedance event, i.e., the 1 in 1000 year rainfall event. To gain a better understanding of the magnitude of the 1 in 1000 year return period when compared to the design rainfall event, rainfall data has been obtained from the Flood Estimation Handbook Web service. This data includes rainfall depths for a range of return periods and durations which have been calculated from the Depth-Duration-Frequency model. This shows that the 1 in 1000 year rainfall event is approximately 53% larger than the 1 in 100 year rainfall event for rainfall durations of up to 24 hours.

As it is only necessary to consider a 45% increase in peak rainfall intensity to account for climate change, the results of the 'low' likelihood of occurrence event is considered to overestimate the risk of flooding at the site. Nevertheless, in the absence of any other data, this extreme scenario has been considered further to appraise the likely impact climate change could have over the lifetime of the proposed development. Under this scenario, the area of proposed development is shown to flood to between 0.15-0.30m.

Inspection of the wider area shows that there are three potential flood mechanisms, see Figure 3.2:

1. Surface water flow path to the east of the site, water flows from the south to the north.
2. Surface water flow path to the west of the site, water flows from the south to the north.
3. Surface water runoff from Sevenoaks Road (A21) and St James Terrace.

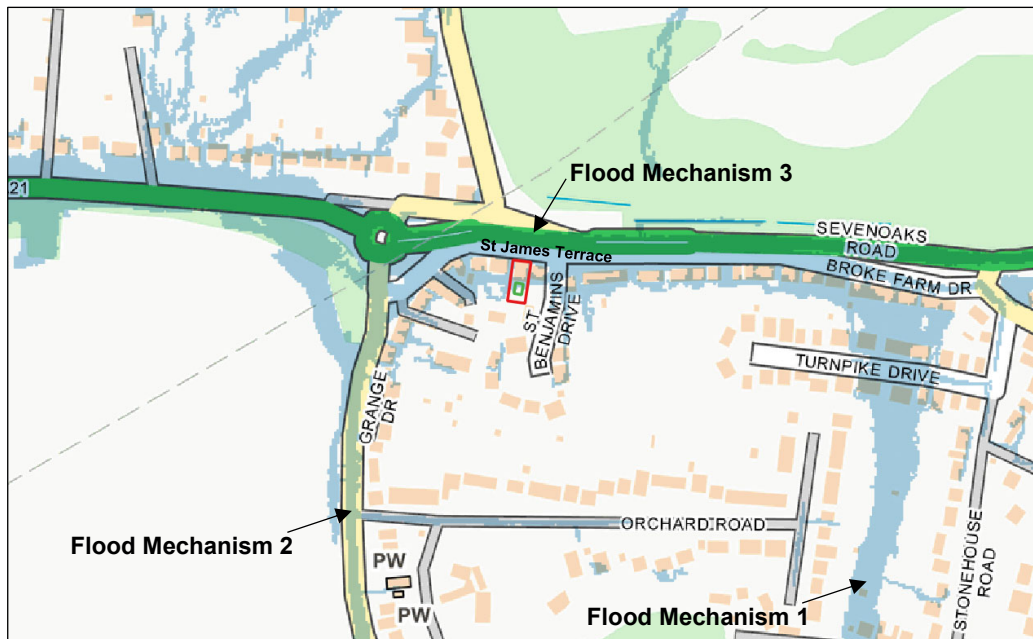
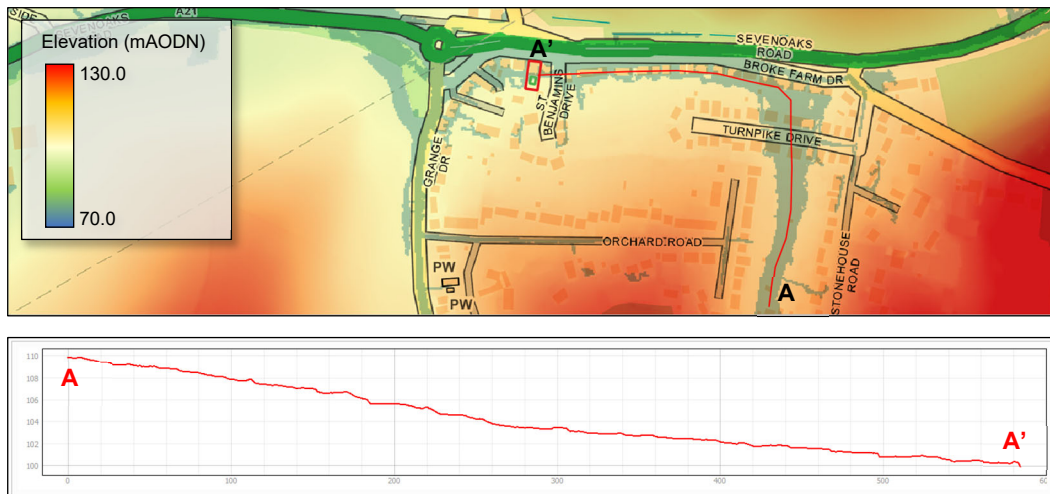


Figure 3.2 – Surface water extent under the 1 in 1000 year return period showing the three flood mechanisms. Site boundary delineated in red, area of proposed development delineated in green. (© contains Ordnance Survey data © Crown copyright and database right 2024).

**Flood mechanism 1 – Surface water flow path to the east of the site**

When considering flood mechanism 1, water is shown to flow from south to the north, following the natural topography, before reaching Broke Farm Drive and flowing west towards the site, as shown in Figure 3.3. Further interrogation of the EA's Surface Water maps indicate that the depth of water flowing overland is relatively shallow, i.e. between 0.15-0.30m.

However, there are multiple large gardens and boundary fences along the flow path before water is shown to reach the site. As identified in Section 2.3, the geology in this area is Chalk which is considered to be permeable and as such, a significant volume of water is expected to infiltrate into the ground. Any remaining water is likely to be restricted from continuing to flow overland due to the presence of boundary fences and walls. As such, it is considered extremely unlikely that the site could be subject to flooding from this mechanism. It is only in the extremely unlikely event that the ground was to be saturated and the events discussed within this report were to be exceeded that there is the potential for surface water to reach the rear of the property. The volume of water is likely to be restricted to surface water runoff from the immediate surrounding area. Nevertheless, a precautionary approach has been adopted and mitigation measures have been proposed to be included (refer to Section 4).



*Figure 3.3 – Aerial height data and cross-section showing the direction which the surface water flow path to the east of the site (i.e., flood mechanism 1) will flow under the 1 in 1000 year return period event. (© Environment Agency).*

**Flood mechanism 2 – Surface water flow path to the west of the site**

When considering flood mechanism 2, water is shown to flow north along Rushmore Hill following the natural topography of the land. However, there are drainage kerbs for approximately 350m along this stretch of road, as well as numerous small and large highway drains which would intercept any water before reaching the site, see Figure 3.4.



*Figure 3.4 – Satellite imagery showing the drainage kerbs and highway drains along Rushmore Hill.*

In addition, Figure 3.2 shows the flow path to continue to follow the natural topography, flowing through properties containing boundary fences and gardens on permeable geology, which would ultimately contain the water within each individual garden and infiltrate into the permeable geology. Consequently, it is unlikely that surface water would reach the site from flood mechanism 2 under an extreme rainfall event.

**Flood mechanism 3 – Surface water runoff from Sevenoaks Road (A21) and St James Terrace**

The final potential flood mechanism is water flowing south along Sevenoaks Road (A21) and St James Terrace towards the site. The depth of flooding in the adjacent roads is shown to be 0.15-0.30m, although there localised areas within St James Terrace where depths could reach 0.30-0.60m. Similar to the previous flood mechanism, review of satellite imagery shows highway drains within both Sevenoaks Road (A21) and St James Terrace which would intercept a large volume of

water and direct water from the site. It is only if the drainage network was to become blocked or overwhelmed that water could accumulate within the adjacent roads.

Further inspection of aerial height data of St James Terrace (Figure 3.5) shows the lowest point is within the centre of the road, with a gradual increase towards the proposed development. As such, water is likely to accumulate within the road. In addition, the kerb height along the road is approximately 0.20m which would provide additional protection. As the proposals are for an extension to the rear of the existing property, on higher ground, it is therefore concluded that water from the adjacent road is unlikely to encroach onto the site.

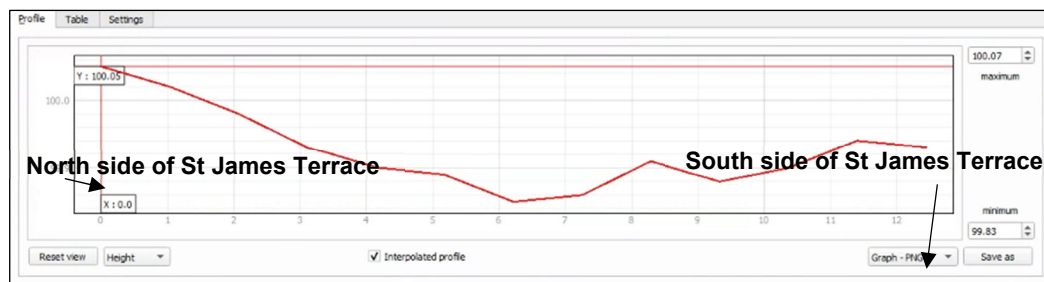


Figure 3.5 – Cross-section of aerial height data for St James Terrace.

Taking all of the above into consideration, it is concluded that the EA's mapping is overestimating the risk of flooding from surface water to the proposed development. It has been demonstrated that the likelihood of water reaching the rear of the existing property where the development is proposed, is extremely low, even if the impacts of climate change are taken into account.

Nevertheless, it is acknowledged that there remains a residual risk of water potentially reaching the site. Consequently, flood mitigation measures are recommended to be included within the scheme design (refer to Section 4).

### 3.4 Flooding from Groundwater

Water levels below the ground rise during wet winter months, and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land, as well as reactivating flow in 'bournes' (streams that only flow for part of the year).

The underlying geology in this area is Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated – chalk). This type of geology is typically permeable and therefore, can be associated with groundwater emergence. However, inspection of groundwater emergence provided as part of the Defra Groundwater Flood Scoping Study (May 2004), which shows that no groundwater flooding events were recorded near the site during the very wet periods of 2000/01 or 2002/03. The mapping also identifies that the site itself is not located within an area where groundwater emergence is predicted.

In addition, inspection of nearby borehole data shows the resting water level is 38.43m below the surface. As such, groundwater would have to rise by over 38m before emerging at the surface. Furthermore, the SFRA and SWMP contain no records of groundwater flooding at the site or

immediate surrounding area. As the site is for a ground floor development and does not include any sub-terranean elements, the risk of flooding from this source is considered to be *low*.

### 3.5 Flooding from Sewers

In urban areas, rainwater is typically drained into surface water sewers or sewers containing both surface and wastewater known as “combined sewers”. Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked, or has inadequate capacity; this will continue until the water drains away.

Inspection of the asset location mapping provided by Thames Water (Figure 3.6) identifies that the sewers in this area are foul only.

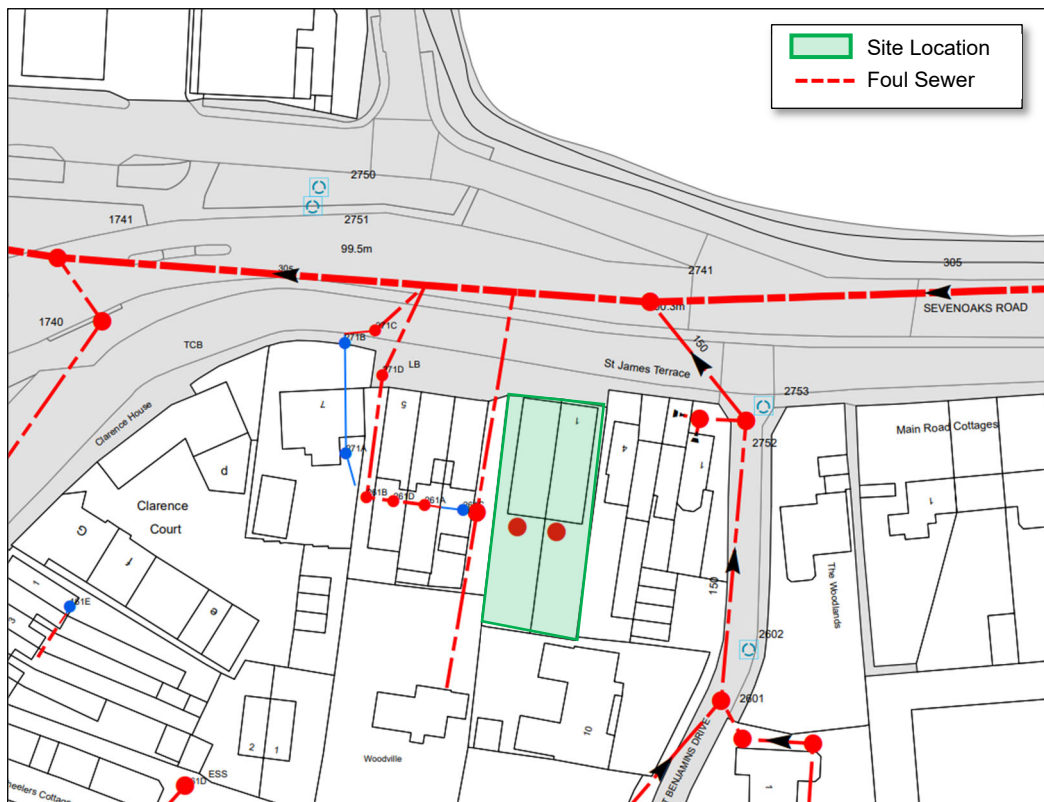


Figure 3.6 - Asset location mapping provided by Thames Water (a full scale copy can be found in Appendix A.2).

The mapping further shows a foul sewer adjacent to the site. However, on further inspection, the foul sewer only seems to drain one property and therefore, the volumes of water discharged into this section of the public sewer network are considered to be *low*.

Nevertheless, if water was to exit the sewer network, i.e. as a result of a blockage or exceedance of capacity, inspection of aerial height data indicates that land levels at this location fall towards the west, away from the proposed development. Taking all of the above into consideration and the fact that there are no recorded incidents of sewer flooding at the site or immediate surrounding area within the SFRA, the risk of flooding from this source is considered to be *low*.



It is worth noting from Figure 3.6 above that there are two manholes onsite. Typically, the sewerage undertaker requires a minimum easement of 3m between the outermost edge of the pipe and any permanent structure. Therefore, it is recommended that the sewerage undertaker is contacted to confirm any requirements and obtain consent for any works within 3m of the sewers such as a build over agreement. .

### 3.6 Flooding from Reservoirs, Canals and Other Artificial Sources

Non-natural or artificial sources of flooding can include reservoirs, canals, and lakes, where water is retained above natural ground level. In addition, operational and redundant industrial processes including mining, quarrying, sand and/or gravel extraction, may also increase the depth of floodwater in areas adjacent to these features.

The potential effects of flood risk management infrastructure and other structures also needs to be considered. For example, reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

Inspection of the OS mapping for the area shows that there are no artificial sources of flooding within close proximity to the site. In addition, the EA's 'Flood Risk from Reservoirs' map shows that the site is not within an area considered to be at risk of flooding from reservoirs. Consequently, the risk of flooding is considered to be *low*.

### 3.7 Summary of Flood Risk

A summary of the overall risk of flooding from each source is provided in Table 3.1 below.

Source of Flooding	Initial Level of Risk	Appraisal method applied at the initial flood risk assessment stage
Rivers, Ordinary and Man-Made Watercourses	Low	OS mapping and the EA's 'Flood Map for Planning'
Sea	Low	OS mapping and the EA's 'Flood Map for Planning'
Surface Water	Low*	EA's 'Flood Risk from Surface Water' map, aerial height data, OS mapping and satellite imagery
Groundwater	Low	Defra Groundwater Flood Scoping Study, site-specific geological data, aerial height data, OS mapping, historic records contained within the SFRA and SWMP, and BGS Borehole survey records
Sewers	Low	Aerial height data, OS mapping, asset location data provided by Thames Water and historic sewer records contained within the SFRA
Reservoirs, Canals and Other Artificial Sources	Low	OS mapping and EA's 'Flood Risk from Reservoirs' map

Table 3.1 – Summary of flood sources and risks. \*With precautionary mitigation measures

From the analysis above, it can be seen that **the risk of flooding to the site from all sources is low**. Notwithstanding this, to ensure that the development meets the requirements of the NPPF, the following section of the report recommends mitigation measures, where appropriate, to ensure the risk of flooding offsite does not increase as a result of the proposals.

## 4 Flood Mitigation Measures

The analysis conducted in Section 3.3 has concluded that it is unlikely that surface water will encroach onto the site under an extreme rainfall event, even if the impacts of climate change are taken into account. Nevertheless, there is a residual risk of surface water potentially reaching the rear of the site, either by changes to the existing boundary fences and walls, or as a result of the ground becoming saturated. Therefore, a precautionary approach has been adopted whereby the finished floor levels of the proposed ground floor flat are raised 400mm above existing ground level. As water is expected to continue to flow away from the site, this is considered to provide a sufficiently high freeboard for a residual risk scenario.

Furthermore, it is recommended that flood resilience and resistance measures are incorporated into the design of the buildings. The two possible alternatives are:

*Flood Resistance* or 'dry proofing', where flood water is prevented from entering the building. For example, using flood barriers across doorways and airbricks, or raising floor levels. These measures are considered appropriate for 'more vulnerable' development where recovery from internal flooding is not considered to be practical.

*Flood Resilience* or 'wet proofing', accepts that flood water will enter the building and allows for this situation through careful internal design for example raising electrical sockets and fitting tiled floors. The finishes and services are such that the building can quickly be returned to use after the flood. Such measures are generally only considered appropriate for some 'less vulnerable' uses and where the use of an existing building is to be changed and it can be demonstrated that no other measure is practicable.

Details of flood resilience and flood resistance construction techniques can be found in the document '*Improving the Flood Performance of New Buildings; Flood Resilient Construction*', which can be downloaded from [www.gov.uk](http://www.gov.uk).

A Code of Practice (CoP) for Property Flood Resilience (PFR) has been put in place to provide a standardised approach for the delivery and management of PFR. Further information on the CoP and guidance on how to make a property more flood resilient can be accessed, and downloaded, from the Construction Industry Research and Information Association (CIRIA) Website:

[https://www.ciria.org/Resources/Free\\_publications/CoP\\_for\\_PFR\\_resource.aspx](https://www.ciria.org/Resources/Free_publications/CoP_for_PFR_resource.aspx)

Whilst this report has demonstrated that the risk of surface water flooding to the site is low, the EA's 'Flood Risk from Surface Water' map (Figure 3.1) suggests that flooding could occur in the surrounding area and within the access road following an extreme weather event. Therefore, residents of the proposed dwelling are advised to monitor the Met Office's Weather Warnings to provide forewarning of weather conditions which could result in surface water flooding:



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[www.metoffice.gov.uk/weather/uk/uk\\_forecast\\_warnings.html](http://www.metoffice.gov.uk/weather/uk/uk_forecast_warnings.html)

In addition to managing the risk of flooding to the development site, it is also necessary to ensure that the proposals do not increase the risk of flooding elsewhere. The general requirement for all new development is to ensure that the runoff is managed sustainably, and that the development does not increase the risk of flooding at the site, or within the surrounding area. In addition, the NPPF states that sustainable drainage systems should be incorporated in areas at risk of flooding and therefore, use of SuDS has been considered with the aim of minimising the risk of flooding both on and off site.

A range of typical SuDS that can be used to improve the environmental impact of a development is listed in Table 4.1 below along with the relative benefits of each feature and the appropriateness for the subject site.

<b>SuDS</b>	<b>Description</b>	<b>Constraints/Comments</b>	<b>Appropriate for site?</b>
<b>Rainwater Harvesting Systems</b>	Collecting of rainwater and storing for reuse on site, e.g., in form of water butts	No known constraints	Yes
<b>Green Roofs</b>	Provide landscaping and planting at roof level to reduce surface water runoff rates	Potentially suitable roof design	Yes
<b>Infiltration Systems</b>	Allow water to percolate into the ground at a controlled rate via natural infiltration	Infiltration rates would need to be confirmed	Potentially
<b>Filter Strips</b>	Wide, gently sloping, densely planted areas promoting sedimentation and filtration	Insufficient space on site	No
<b>Filter Drains</b>	Trenches infilled with stone/gravel providing attenuation, sedimentation and filtration	Insufficient space on site	No
<b>Swales</b>	Broad, shallow channels that convey and store runoff, and allow infiltration	Insufficient space on site	No
<b>Bioretention Systems / Rain Gardens</b>	A shallow landscaped depression allowing runoff to pond temporarily on the surface or planters/tree crates designed specifically to intercept and store stormwater	No known constraints for planters	Yes
<b>Pervious Surfacing</b>	Runoff is allowed to soak into structural paving and stored, potentially being allowed to infiltrate	Insufficient space on site	No
<b>Attenuation Storage Tanks</b>	Large, below ground voided spaces, which can be used to temporarily store storm water	Potentially space in the garden. Further calculations would be required to determine dimensions and feasibility	Potentially
<b>Detention Basins</b>	A landscaped depression for attenuation with a restricted runoff	Insufficient space on site	No
<b>Ponds and Wetlands</b>	A permanent pool of water which can be used for attenuation and controlled outflows by water levels	Insufficient space on site	No

*Table 4.1 – Suitability of SuDS.*

From Table 4.1, it can be seen that due to the nature of the development there is opportunity to include SuDS within the scheme. As such, it is recommended that the opportunity to include SuDS into the scheme design is explored further as part of a detailed design. In this case, it has been identified that there may be the option to include planters, a green roof and/or attenuation tank within the garden to the rear. The primary aim of specifying SuDS would be to reduce the rate of discharge from the site where possible and ensure there is no increase in risk of flooding offsite as a result of the development in accordance with the principles promoted by the NPPF.

## 5 Conclusions and Recommendations

The overarching objective of this report is to appraise the risk of flooding at Ace House, Sevenoaks Road, Pratt's Bottom to ensure that the proposals for development are acceptable in this location and that the risk of flooding offsite will not increase as a result of the development. This report has therefore been prepared to appraise the risk of flooding from all sources and to provide a sustainable solution for managing the surface water runoff discharged from the development site, in accordance with the NPPF.

The risk of flooding has been considered for a wide range of sources and it has been identified that the risk to the proposed development is *low*. Nevertheless, there is a residual risk of surface water potentially reaching the rear of the existing building, where the extension is proposed to be located. Consequently, a precautionary approach has been adopted whereby finished floor levels are raised 400mm above the existing ground level. In addition, due to the nature of the proposed development the opportunity to incorporate flood resistance and resilience measures into the design should be explored further where possible.

As the proposals would increase the hardstanding area, it is recommended that SuDS are incorporated into the scheme design to minimise the impact that the building could have with respect to surface water runoff. Section 4 has identified that there is opportunity to include some SuDS features and therefore, this should be explored further as part of the detailed design.

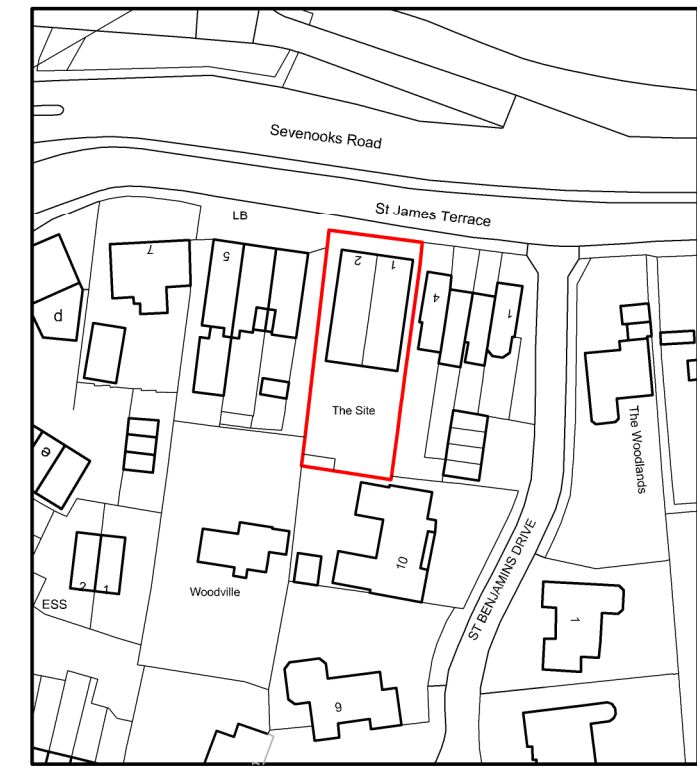
In conclusion, by incorporating the mitigation measures outlined in Section 4, the proposals will meet the requirements of the NPPF and local planning policy.

## **6 Appendices**

**Appendix A.1 – Drawings**

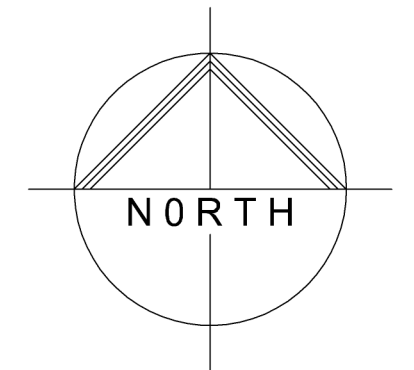
**Appendix A.2 – Thames Water Asset Location Data**

## **Appendix A.1 – Drawings**

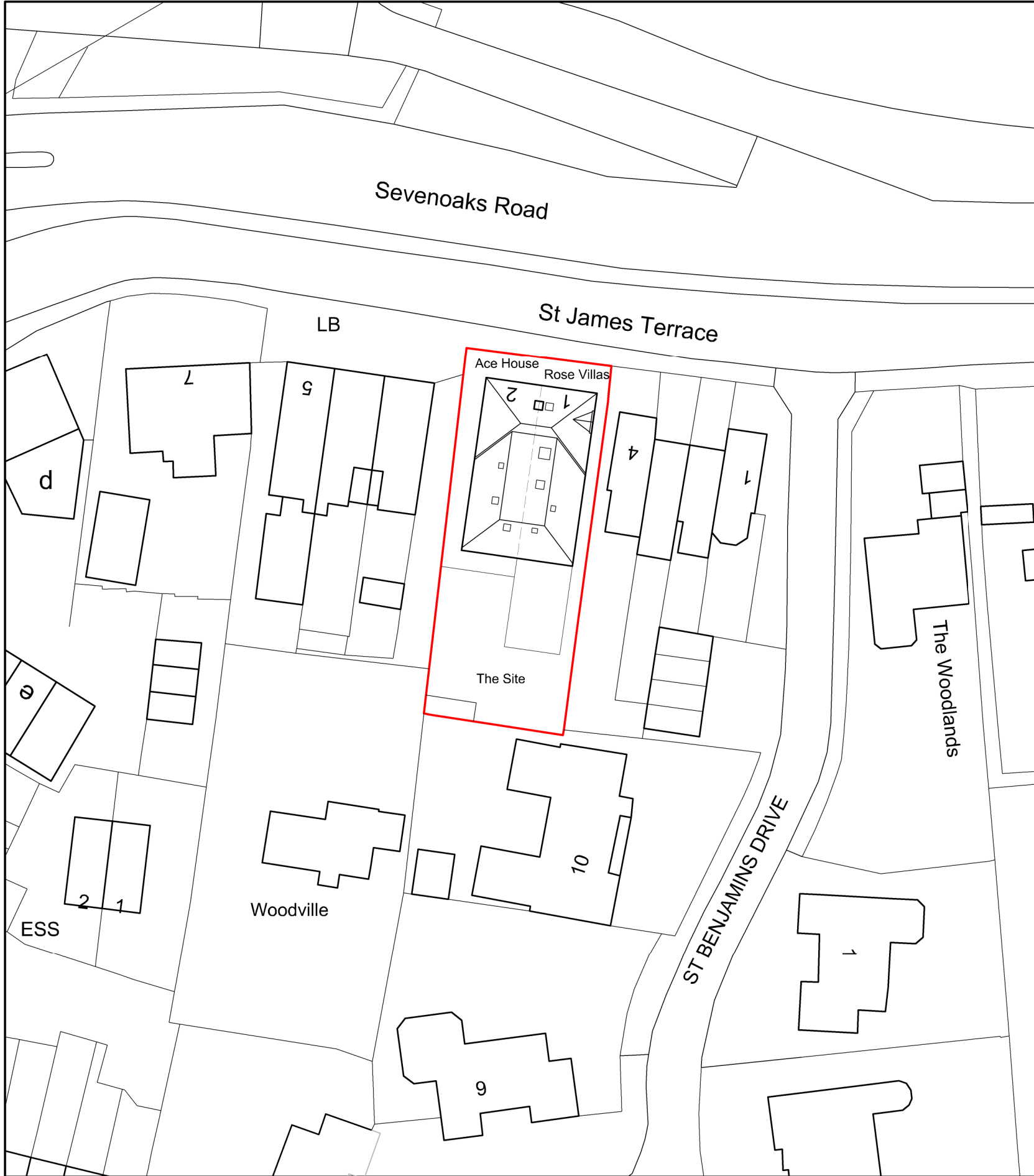


### Site location plan

scale 1:1250  
 0m 10 20 30 40 50m  
 Scale 1:1250

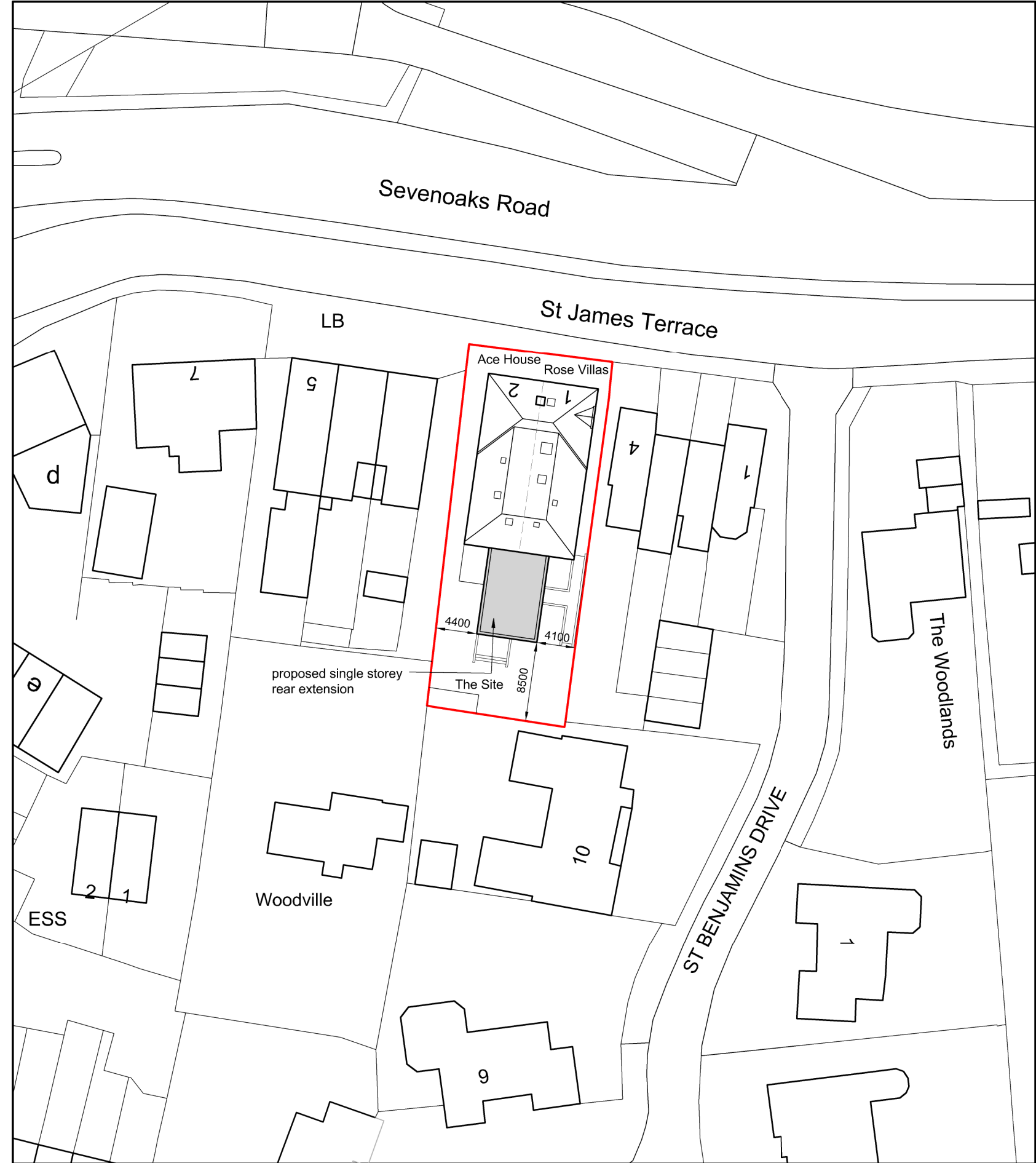


Project Address: proposed development at: <b>Rose Villas &amp; Ace House</b> Sevenoaks Road Pratts Bottom BR6 7SF	
Drawing Title: existing block plan proposed block plan site location plan	
Scale: as stated @ A2	Date: January 2024
Drawing Number: <b>SR/696/BP-01</b>	Revision: <b>A:</b>
Client Mr D Harris	
Nigel Bradbury Designs Office Suite B, Willow Walk Business Centre Starts Hill Road, Farnborough, Kent, BR6 7AA Telephone: 01689 852609 e.mail: nigel@nigelbradburydesigns.co.uk	
18.03.2024	Revision A: access ramp added
Drawing Status: Issued for planning Date: 08.02.2023	
© Copyright Nigel Bradbury Designs	



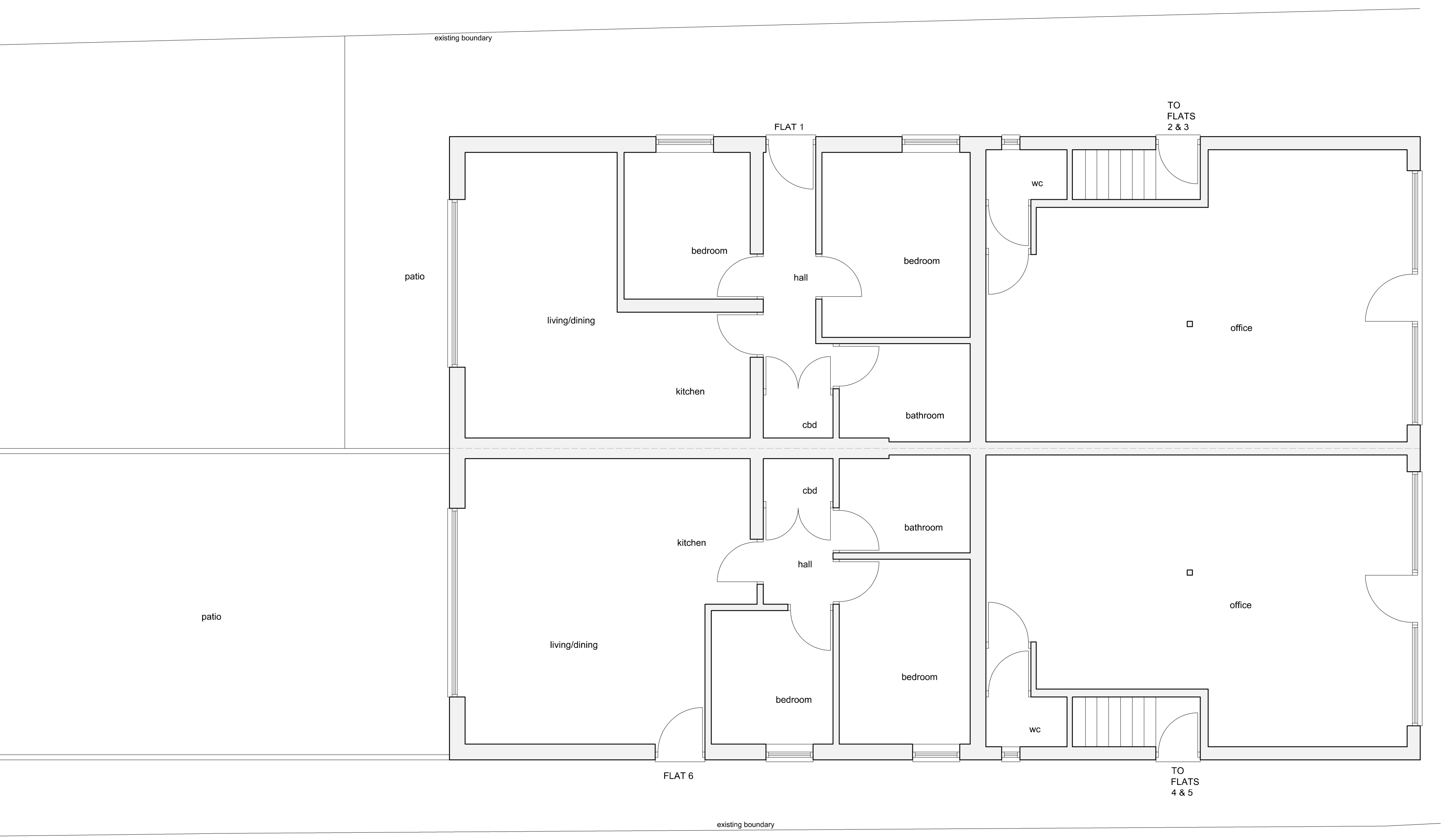
### Existing block plan

scale 1:500  
 0m 5 10 15 20m  
 Scale 1:500

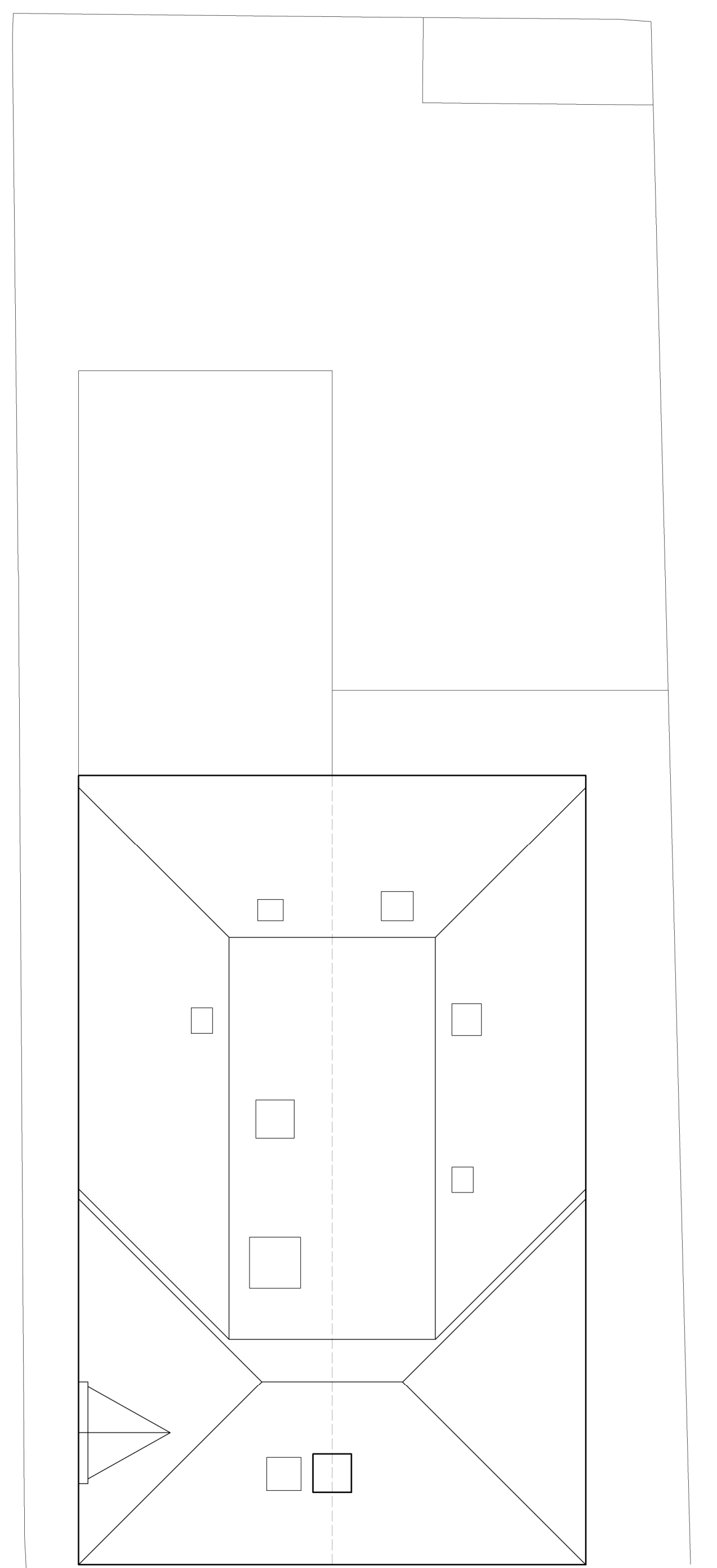


### Proposed block plan

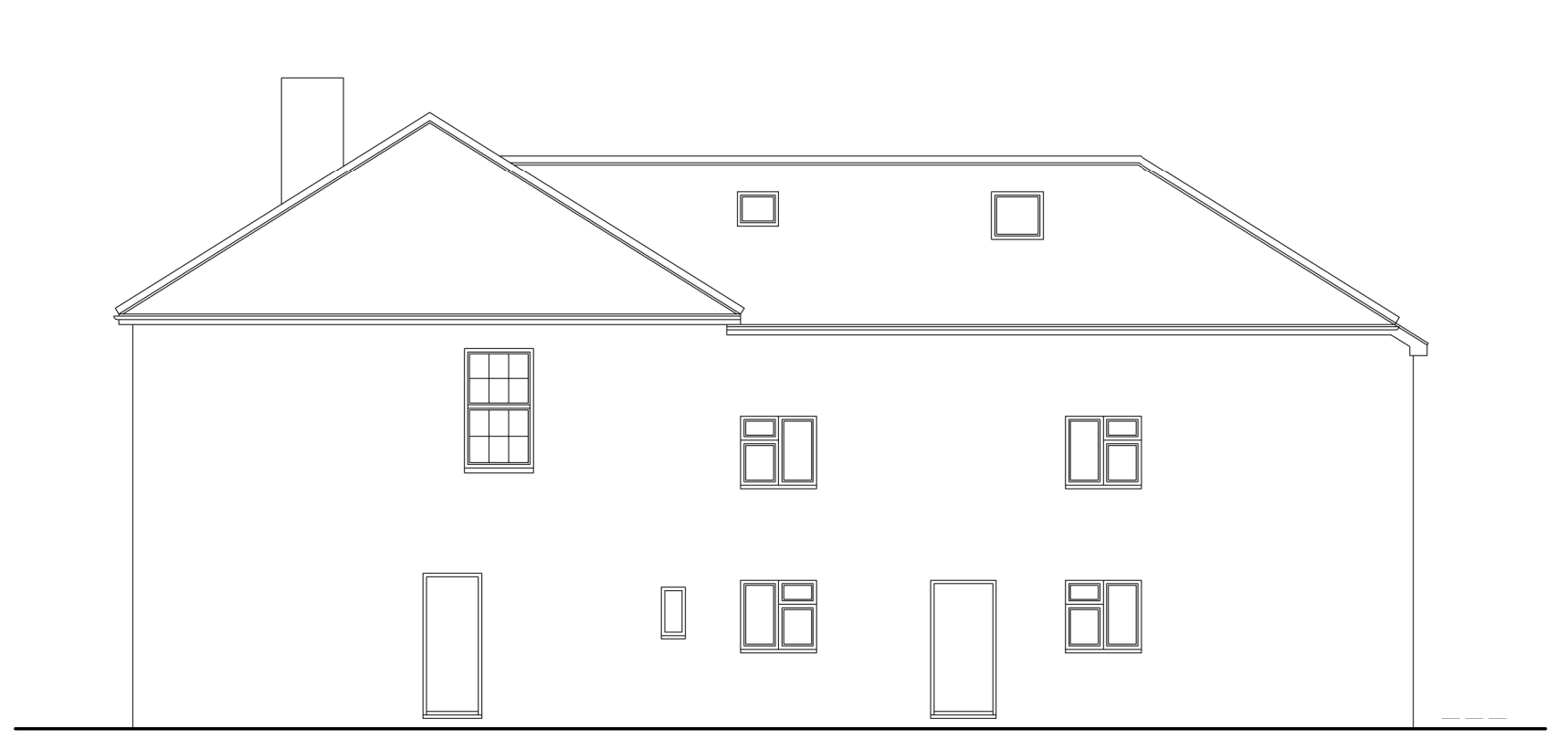
scale 1:500  
 0m 5 10 15 20m  
 Scale 1:500



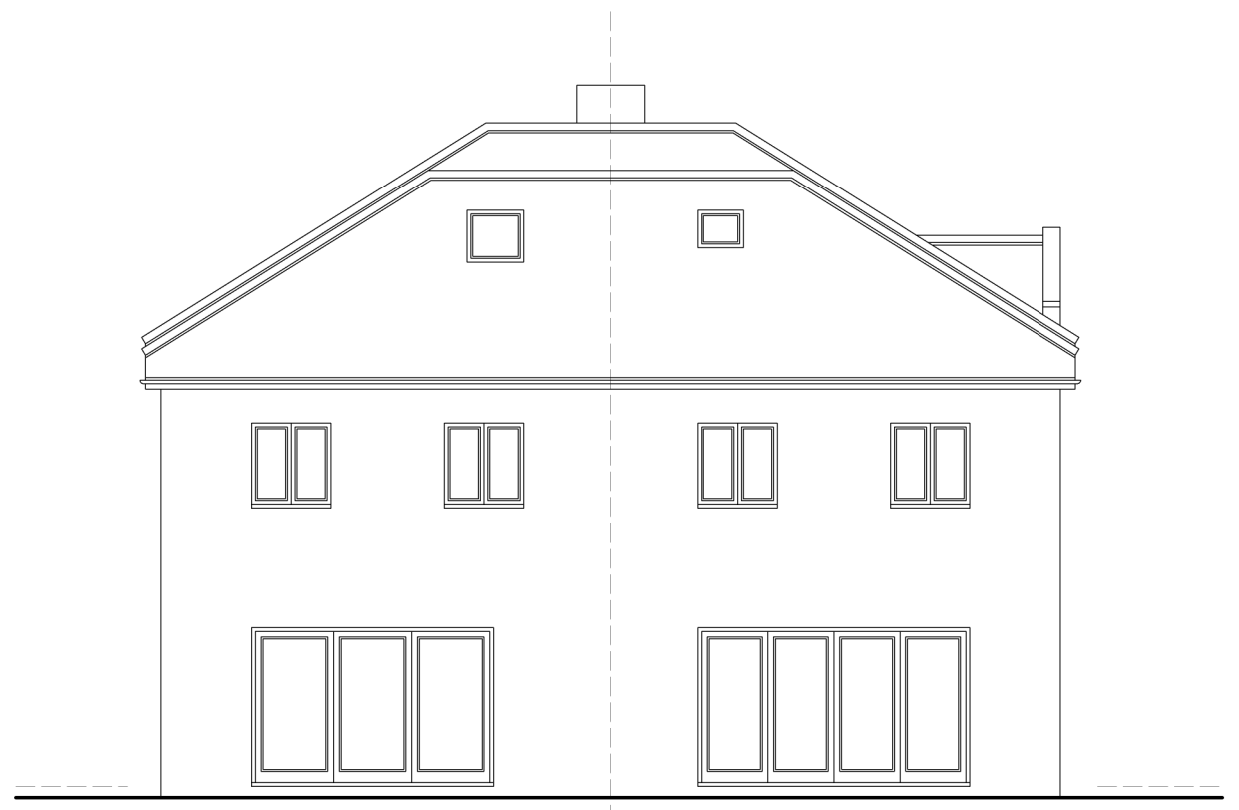
Existing ground floor layout



Existing roof plan



Existing side elevation

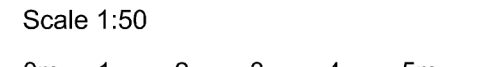
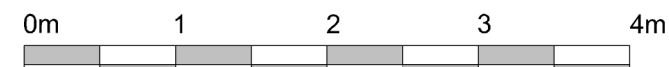


Existing rear elevation



Existing side elevation

NOTE  
Drawings prepared from information provided by the client



Project Address:  
**proposed development at:  
Rose Villas & Ace House  
Sevenoaks Road  
Pratts Bottom BR6 7SF**

Drawing Title:  
**existing ground floor layout  
existing elevations  
existing roof plan**

Scale: 1:50 @ A1 Date: March 2024

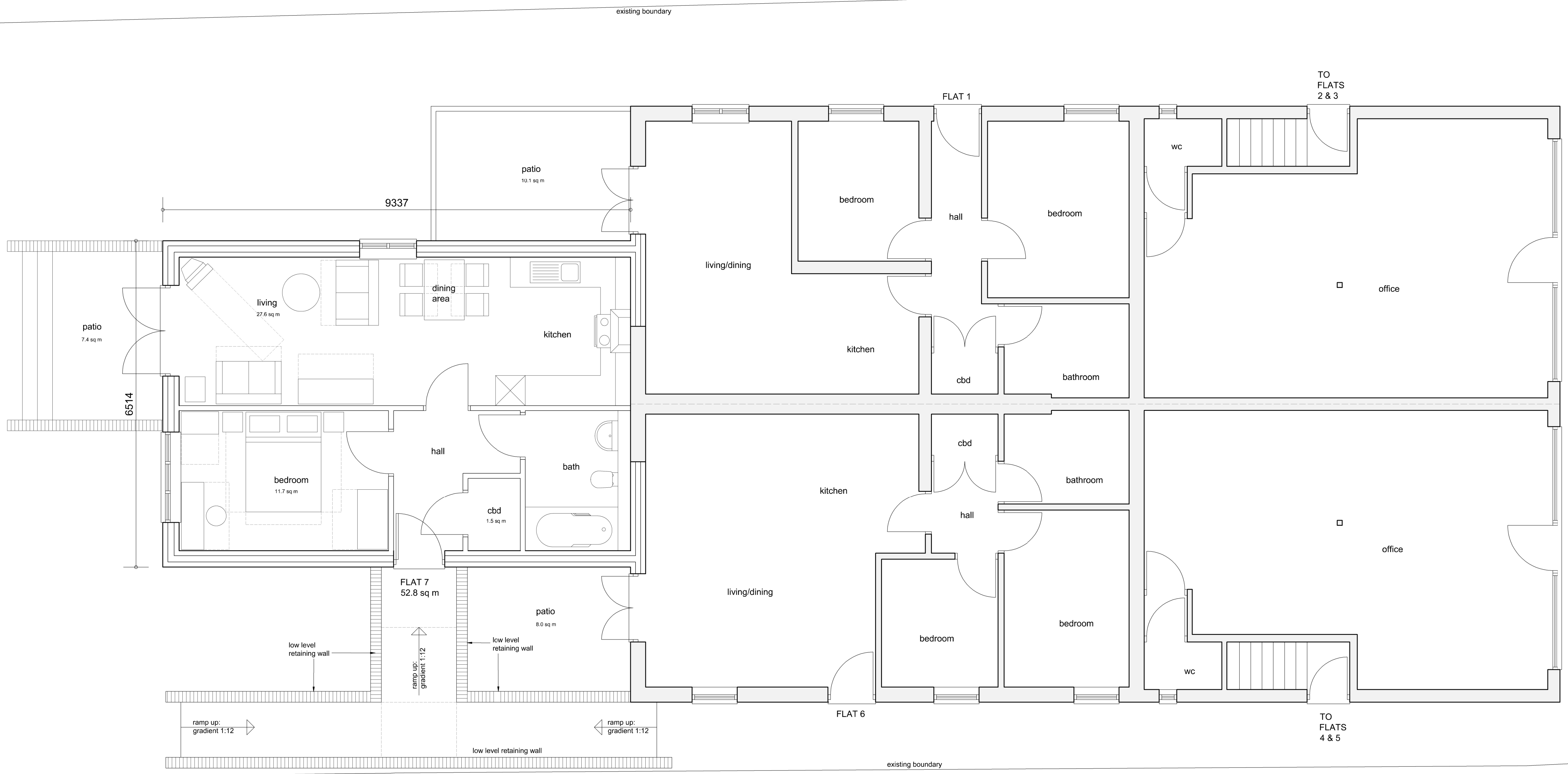
Drawing Number: SR/696/PD-10 Revision:

Client: Mr D Harris

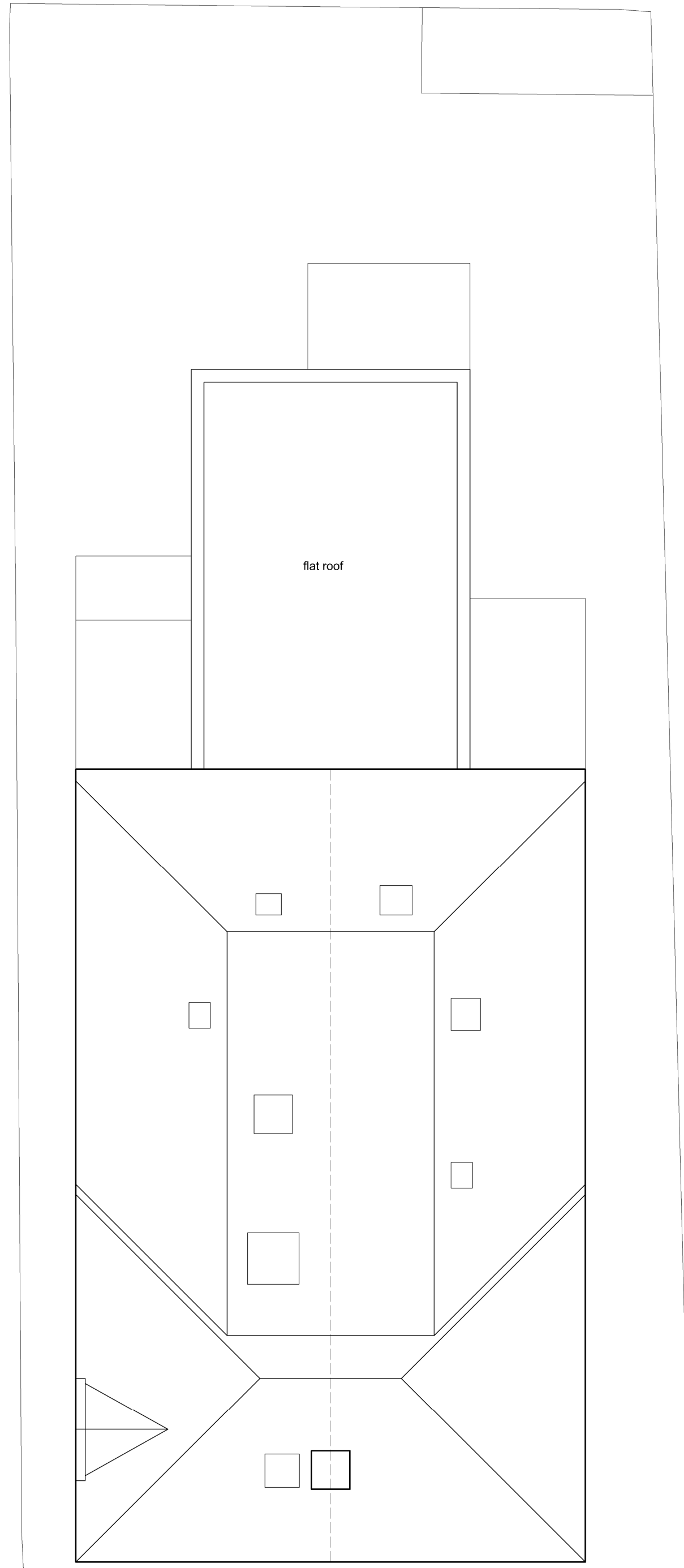
Nigel Bradbury Designs  
Office Suite B, Willow Walk Business Centre  
Stants Hill Road, Farnborough, Kent, BR6 7AA  
Telephone: 01689 852609  
e-mail: nigel@nigelbradburydesigns.co.uk



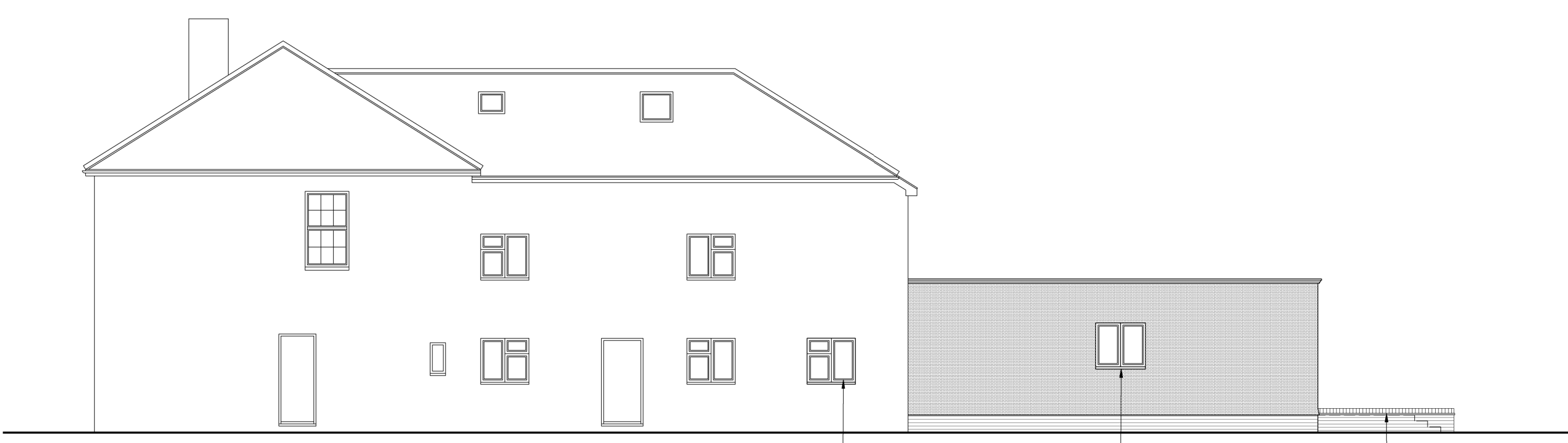




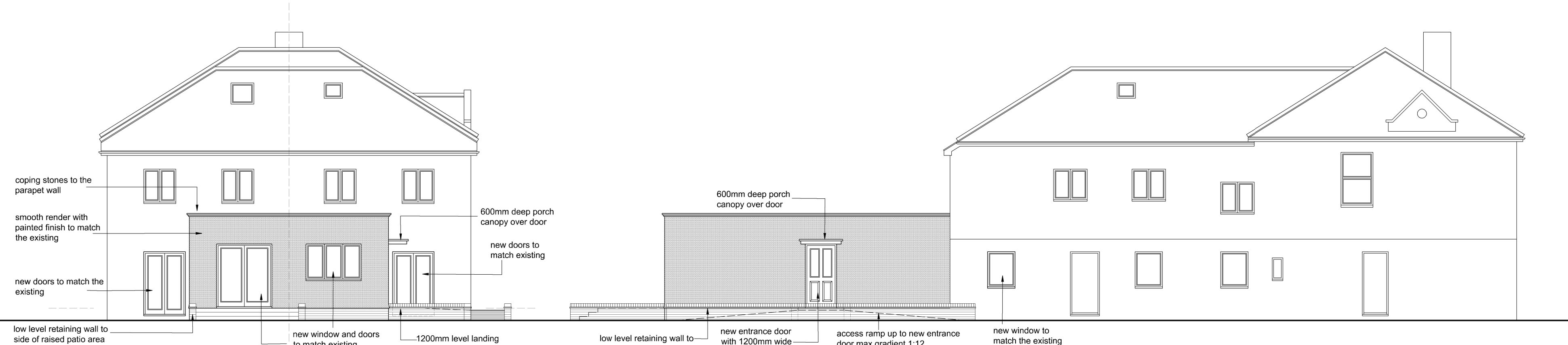
Proposed ground floor layout



Proposed roof plan

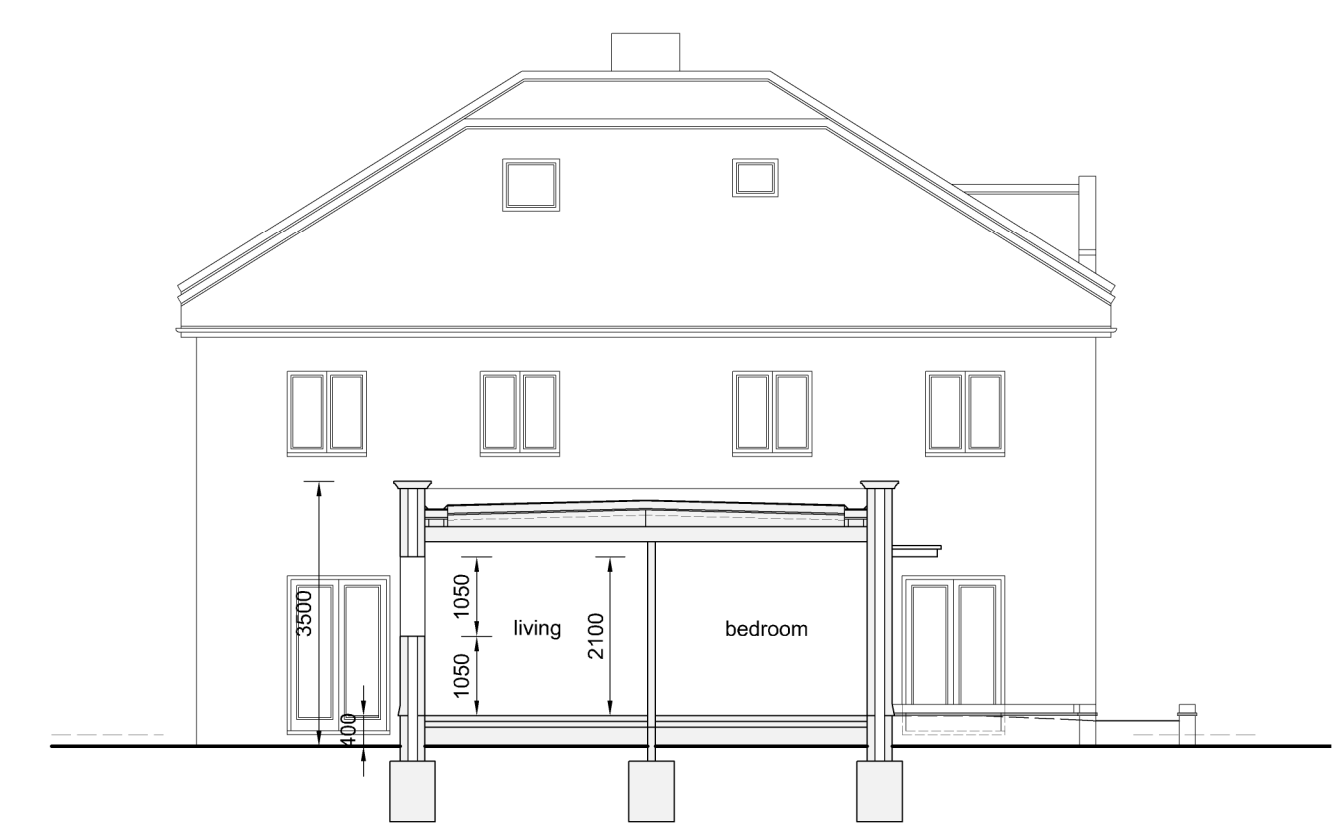


Proposed side elevation



Proposed rear elevation

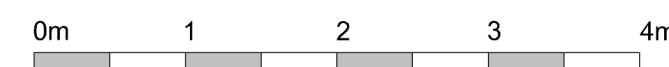
Proposed side elevation



Outline Section:

NOTE:  
proposed finished floor level to be minimum 400mm above ground level as part of flood resilient construction

NOTE  
Drawings prepared from information provided by the client



Scale 1:50



Scale 1:100

Project Address:  
**proposed development at:  
Rose Villas & Ace House  
Sevenoaks Road  
Pratts Bottom BR6 7SF**

Drawing Title:  
**proposed ground floor layout  
proposed elevations  
proposed roof plan & section**

Scale:  
**1:100 @ A1**

Date:  
**March 2024**

Drawing Number:  
**SR/696/PD-11**

Revision:

Client  
**Mr D Harris**

**Nigel Bradbury Designs**  
Office Suite 8, Willow Walk Business Centre  
Starts Hill Road, Farnborough, Kent, BR6 7AA  
Telephone: 01689 852609  
e-mail: nigel@nigelbradburydesigns.co.uk

Drawing Status: issued for planning Date: 18.03.2024

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## **Appendix A.2 – Thames Water Asset Location Data**

# Asset Location Search



# Property Searches

Herrington Consulting Limited  
Barham Business Park  
Unit 6 Elham Valley Road  
CANTERBURY  
CT4 6DQ

**Search address supplied** Rosa Villas  
Ace House  
Sevenoaks Road  
Pratts Bottom  
Orpington  
BR6 7SF

**Your reference** 3965/HA

**Our reference** ALS/ALS Standard/2024\_4957524

**Search date** 14 March 2024

## Notification of Price Changes

From 1<sup>st</sup> April 2024 Thames Water Property Searches will be increasing the prices of its CON29DW Residential and Commercial searches along with the Asset Location Search. Costs will rise in line with RPI as per previous years, which is set at 6%.

Customers will be emailed with the new prices by February 28<sup>th</sup> 2024.

Any orders received with a higher payment prior to the 1<sup>st</sup> April 2024 will be non-refundable. For further details on the price increase please visit our website at [www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk).



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



[searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)  
[www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)



0800 009 4540

**Search address supplied:** Rosa Villas, Ace House, Sevenoaks Road, Pratts Bottom, Orpington, BR6 7SF

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 0800 009 4540, or use the address below:

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

Email: [searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)

Web: [www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)

## Waste Water Services

**Please provide a copy extract from the public sewer map.**

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.**

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and



pressure test to be carried out for a fee.

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.

## 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, budget estimates, diversions, 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

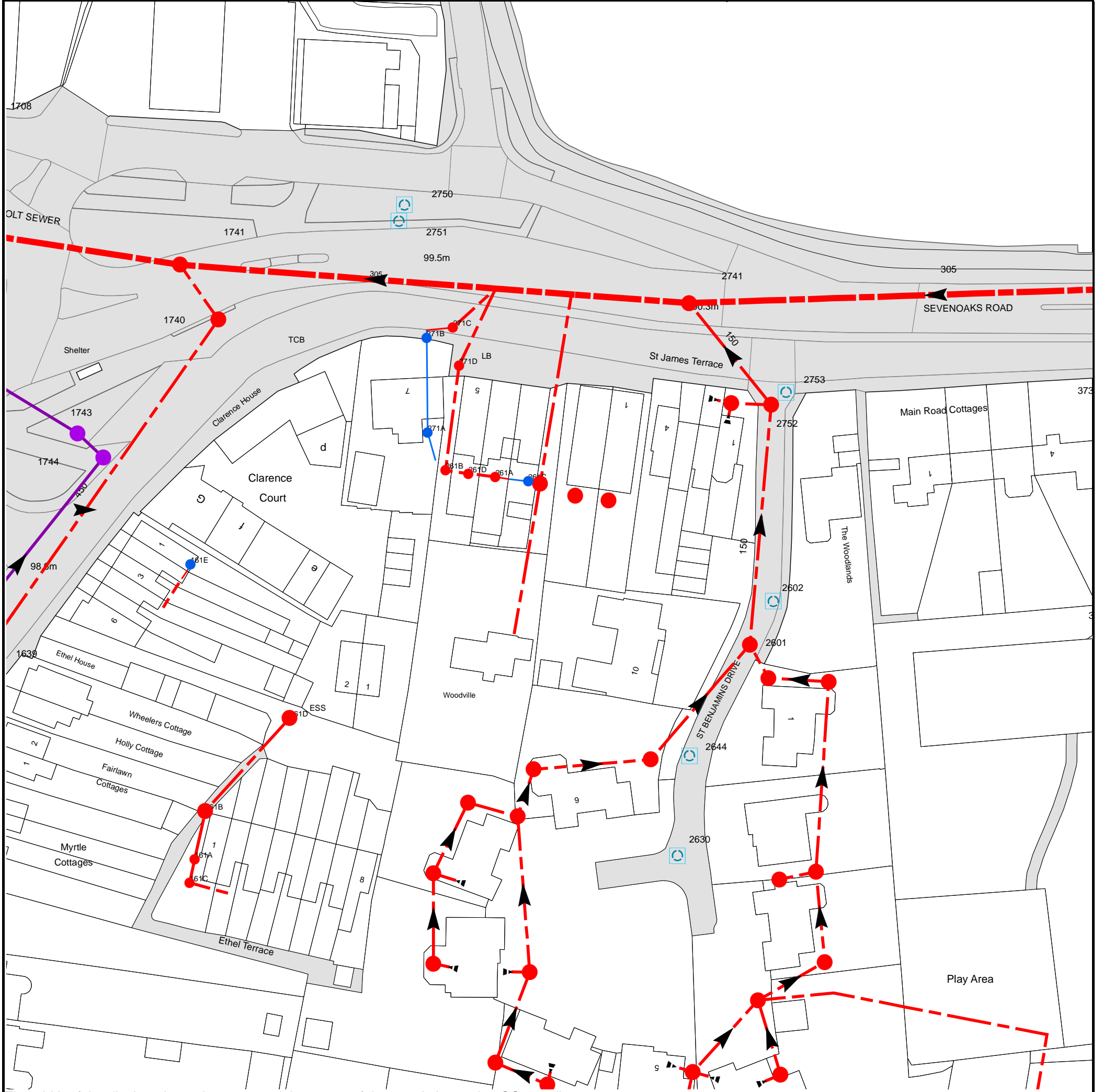
Tel: 0800 009 3921  
Email: [developer.services@thameswater.co.uk](mailto:developer.services@thameswater.co.uk)

### 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: 0800 009 3921  
Email: [developer.services@thameswater.co.uk](mailto:developer.services@thameswater.co.uk)



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 547237,162685

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.

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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
2616	52.58	51.5
2611	51	49.71
2645	n/a	n/a
2509	54.15	53.35
2646	n/a	n/a
2647	n/a	n/a
2610	51	49.34
2630	52.21	50.46
2644	51.49	50
2501	54.87	54
2601	50.7	48.85
2609	54.37	53.54
2605	51.13	49.55
2602	50.43	48.8
2620	52.15	51.55
2507	55.15	53.91
2607	52.3	51.35
2608	53.35	52.55
2606	51.25	50.19
261C	n/a	n/a
261A	n/a	n/a
261D	n/a	n/a
261B	n/a	n/a
271A	n/a	n/a
2752	49.82	47.8
2757	49.71	48.43
2753	49.8	48.6
271D	n/a	n/a
271B	n/a	n/a
271C	n/a	n/a
1740	n/a	n/a
2741	100.66	97.56
2751	n/a	n/a
2750	n/a	n/a
2508	54	53.29
2615	52.35	51.75
161C	n/a	n/a
2614	51.15	50.55
161A	n/a	n/a
2612	51.15	49.9
161B	n/a	n/a
2613	50.7	50.1
161D	n/a	n/a
161E	n/a	n/a
1744	n/a	n/a
1743	n/a	n/a
1741	98.8	95.37
















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 Key

## Public Sewer Types (Operated and maintained by Thames Water)

-  **Foul Sewer:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
-  **Surface Water Sewer:** A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
-  **Combined Sewer:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
-  Storm Sewer
-  Sludge Sewer
-  Foul Trunk Sewer
-  Surface Trunk Sewer
-  Combined Trunk Sewer
-  Foul Rising Main
-  Surface Water Rising Main
-  Combined Rising Main
-  Vacuum
-  Thames Water Proposed
-  Vent Pipe
-  Gallery

## Other Sewer Types (Not operated and maintained by Thames Water)

-  Sewer
-  Culverted Watercourse
-  Proposed
-  Decommissioned Sewer
-  Content of this drainage network is currently unknown
-  Ownership of this drainage network is currently unknown

### Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

## Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

-  Air Valve
-  Meter
-  Dam Chase
-  Vent
-  Fitting

## Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

-  Ancillary
-  Drop Pipe
-  Control Valve
-  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 surface water sewer indicates that the pipe discharges into a stream or river.

-  Inlet
-  Outfall
-  Undefined End




## Other Symbols

Symbols used on maps which do not fall under other general categories.





-  Change of Characteristic Indicator
-  Public / Private Pumping Station
-  Invert Level
-  Summit

## Areas

Lines denoting areas of underground surveys, etc.

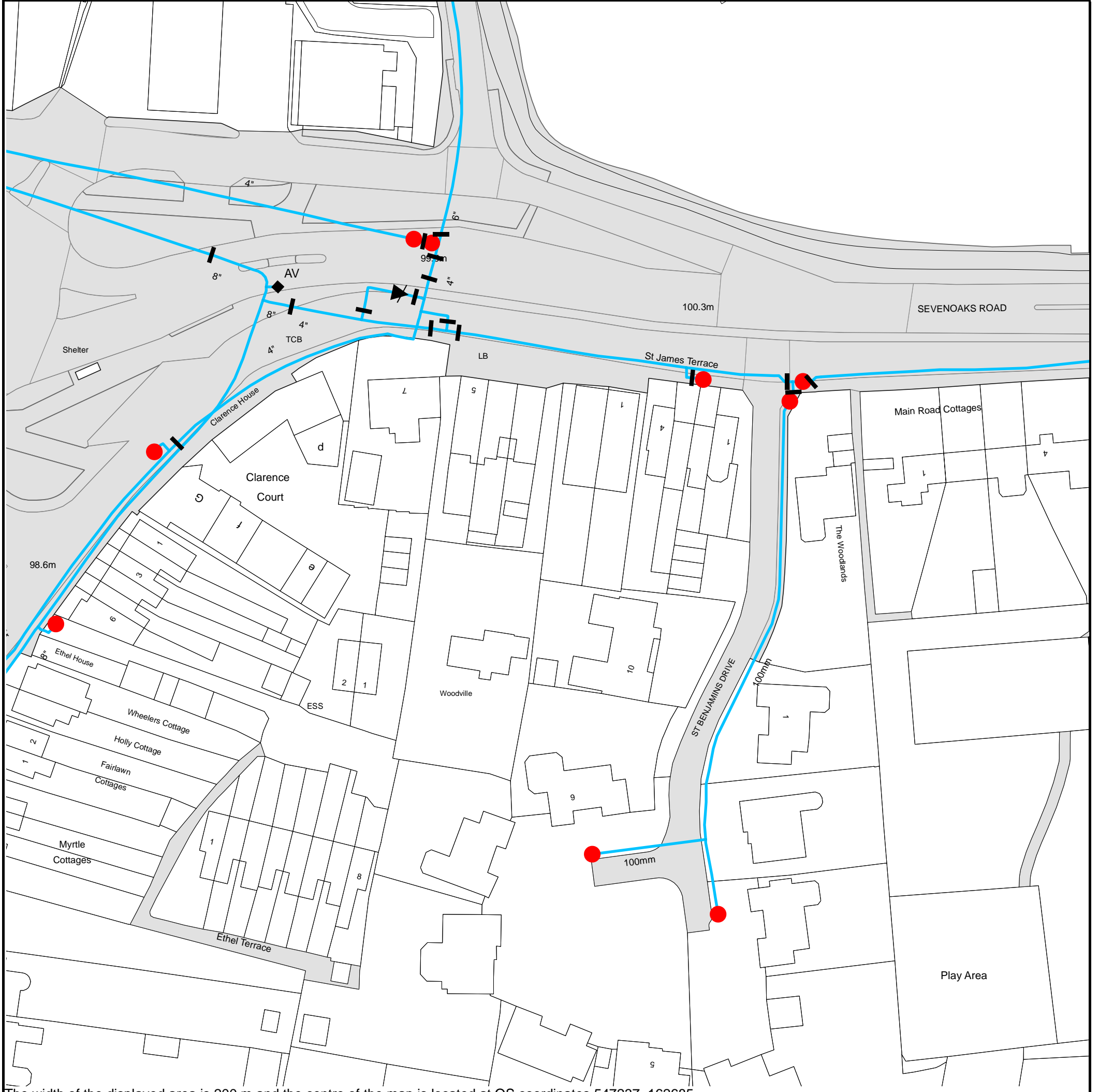
-  Agreement
-  Chamber
-  Operational Site

## Ducts or Crossings

-  Casement
  -  Conduit Bridge
  -  Subway
  -  Tunnel
- Ducts may contain high voltage cables. Please check with Thames Water.

5) 'na' or 'of' on a manhole indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. 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, please contact Property Searches on 0800 009 4540.



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 547237, 162685.








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.

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.



# Asset Location Search - Water Key

## Water Pipes (Operated & Maintained by Thames Water)

-  **Distribution Main:** The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
-  **Trunk Main:** A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
-  **Supply Main:** A supply main indicates that the water main is used as a supply for a single property or group of properties.
-  **Fire Main:** Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
-  **Metered Pipe:** A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
-  **Transmission Tunnel:** A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
-  **Proposed Main:** A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

## Valves

-  General Purpose Valve
-  Air Valve
-  Pressure Control Valve
-  Customer Valve

## Hydrants

-  Single Hydrant

## Meters

-  Meter

## End Items



Symbol indicating what happens at the end of a water main.

-  Blank Flange
-  Capped End
-  Emptying Pit
-  Undefined End
-  Manifold
-  Customer Supply
-  Fire Supply



## Operational Sites

-  Booster Station
-  Other
-  Other (Proposed)
-  Pumping Station
-  Service Reservoir
-  Shaft Inspection
-  Treatment Works
-  Unknown
-  Water Tower

## Other Symbols

-  Data Logger
-  **Casement:** Ducts may contain high voltage cables. Please check with Thames Water.

## Other Water Pipes (Not Operated or Maintained by Thames Water)

-  **Other Water Company Main:** Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
-  **Private Main:** Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

## Payment Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting [www.tpos.co.uk](http://www.tpos.co.uk) or by sending an email to [admin@tpos.co.uk](mailto:admin@tpos.co.uk).

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

### Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking
Please Call <b>0800 009 4540</b> quoting your invoice number starting CBA or ADS	Account number <b>90478703</b> Sort code <b>60-00-01</b> A remittance advice must be sent to: <b>Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.</b> or email <a href="mailto:ps.billing@thameswater.co.uk">ps.billing@thameswater.co.uk</a>	By calling your bank and quoting: Account number <b>90478703</b> Sort code <b>60-00-01</b> and your invoice number

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.