



Flood Risk Assessment and Surface Water Drainage Strategy for Planning

Prepared for:

Mr Rajesh Parmar

Location:

22 Staford Road
Ruislip
HA4 6PJ

January 2021

Our reference:

90235-Parmar-StafordRd



Document Issue Record

Location:	22 Stafford Road, Ruislip, HA4 6PJ				
Application:	Erection of a single residential dwelling				
Prepared for:	Mr Rajesh Parmar				
Title:	Flood Risk Assessment and Surface Water Drainage Strategy for Planning				
Project No.:	90235	Date:	8 th January 2021	Issue No.:	1
Written By:	A. Rousou, BSc (Hons);	Checked By:	E. Jeffery, MSci (Hons) P.S. Gander	Authorised By:	E. Bouet, BSc (Hons)

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Commercial in Confidence

1. Introduction

- 1.1. This Flood Risk Assessment and Surface Water Drainage Strategy has been prepared by Unda Consulting Limited on behalf of Mr Rajesh Parmar, in support of a planning application for a residential development at the site at 22 Stafford Road, Ruislip, HA4 6PJ. This report assesses the flood risk and surface water drainage strategy for the proposed development.
- 1.2. The proposed planning application is for the erection of a single residential dwelling. Post development the newly introduced built footprint will cover approximately 66m².
- 1.3. In order to mitigate flood risk posed by post development runoff, adequate control measures will be required within the site. This will ensure that surface water runoff is dealt with at source and the flood risk off site is not increased.

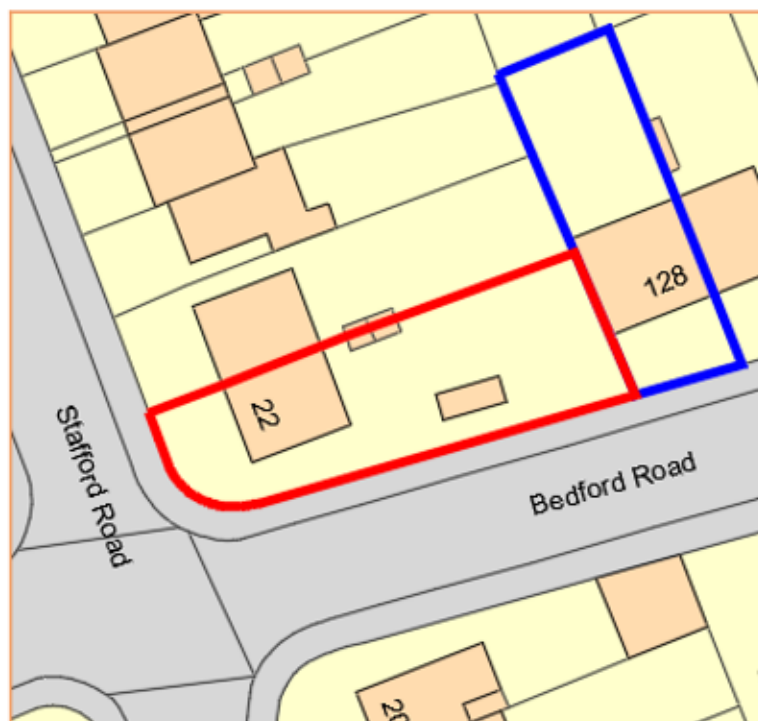


Figure 1: Site location plan (Source: Mr R Parmar)

2. Existing Site:

- 2.1. The proposed development site currently contains a dwelling with the rest of the area a garden. The overall plot is approximately 338m². However, the area where the new dwelling will be set has an area of approximately 154m².

Topography:

- 2.2. Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LiDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LiDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to +0.15m every 1m. This dataset is derived from a combination of the full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LiDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 1.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.
- 2.3. The site slopes from the north west to south east with topographic levels ranging between approximately 38.76mAOD and 39.27mAOD.

Existing Ground Conditions:

- 2.4. The bedrock geology taken from BGS records is London Clay Formation – clay, silt and sand.
- 2.5. No superficial geological deposits are recorded.
- 2.6. The soil type taken from the UK soils website is relatively deep soils of Prequaternary Marine/ Estuarine Sand and Silt, with a clayey loam to silty loam soil texture.
- 2.7. The published Environment Agency Groundwater Vulnerability map shows the site is not located within an area classified as a Groundwater Source Protection Zone.

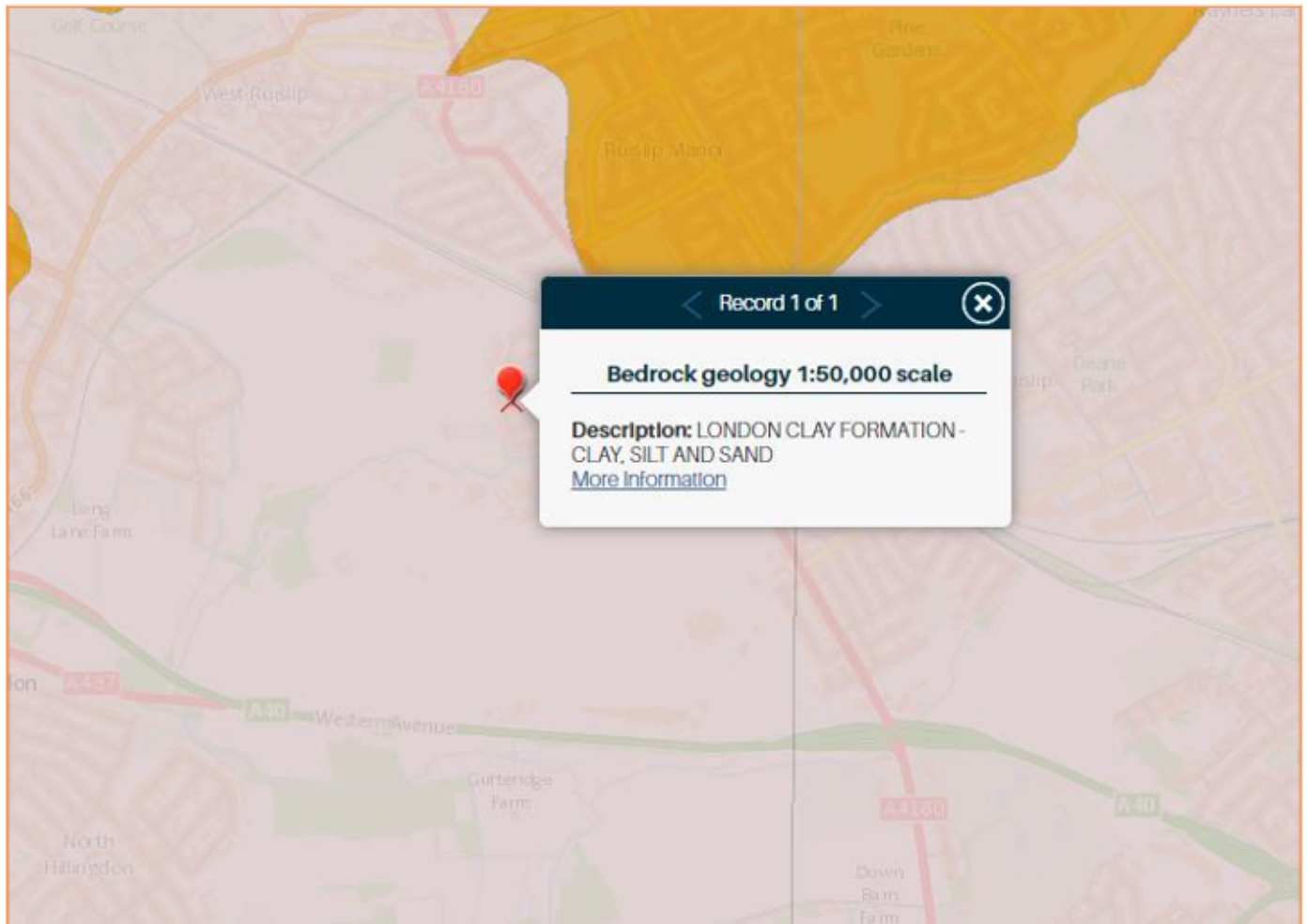


Figure 2: BGS Bedrock Geology (Source: BGS)

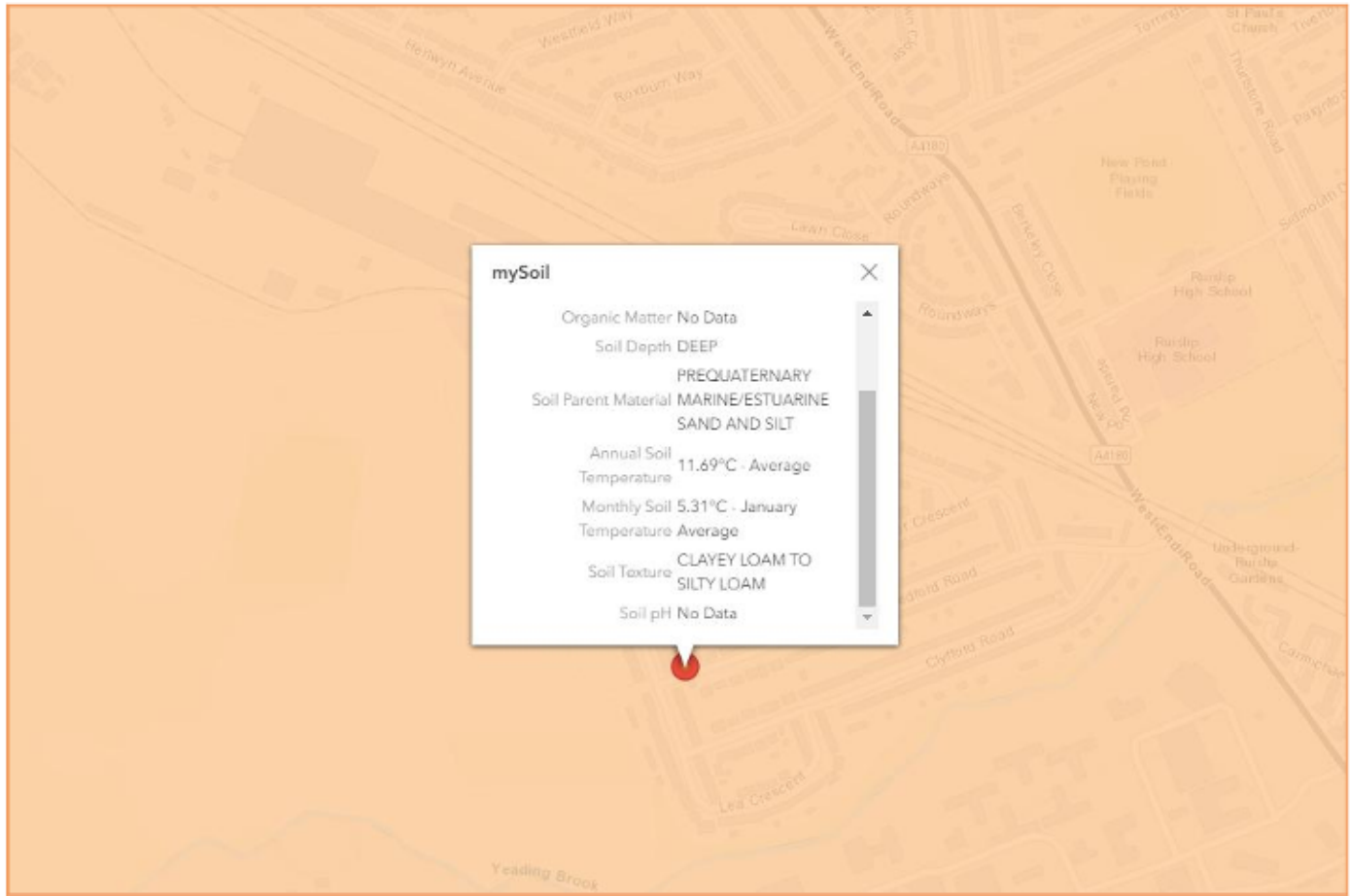


Figure 3: Soil Map (Source: UK Soils, BGS)

Nearby Watercourses / Drainage Features:

- 2.8. The closest watercourse to the site is the Yeadling Brook which is classified as an Environment Agency 'Main River' approximately 210m to the south of the site. There are no drains / ditches located on site.

Existing Drainage:

- 2.9. Asset location sewer records have been obtained from Thames Water Ltd. These records indicate that there is a foul sewer beneath Bedford Road. Surface water generated within the existing site boundary currently discharges at an uncontrolled rate. It is assumed surface water generated within the site currently discharges to ground, or flows overground to the drains / enters the sewer system.

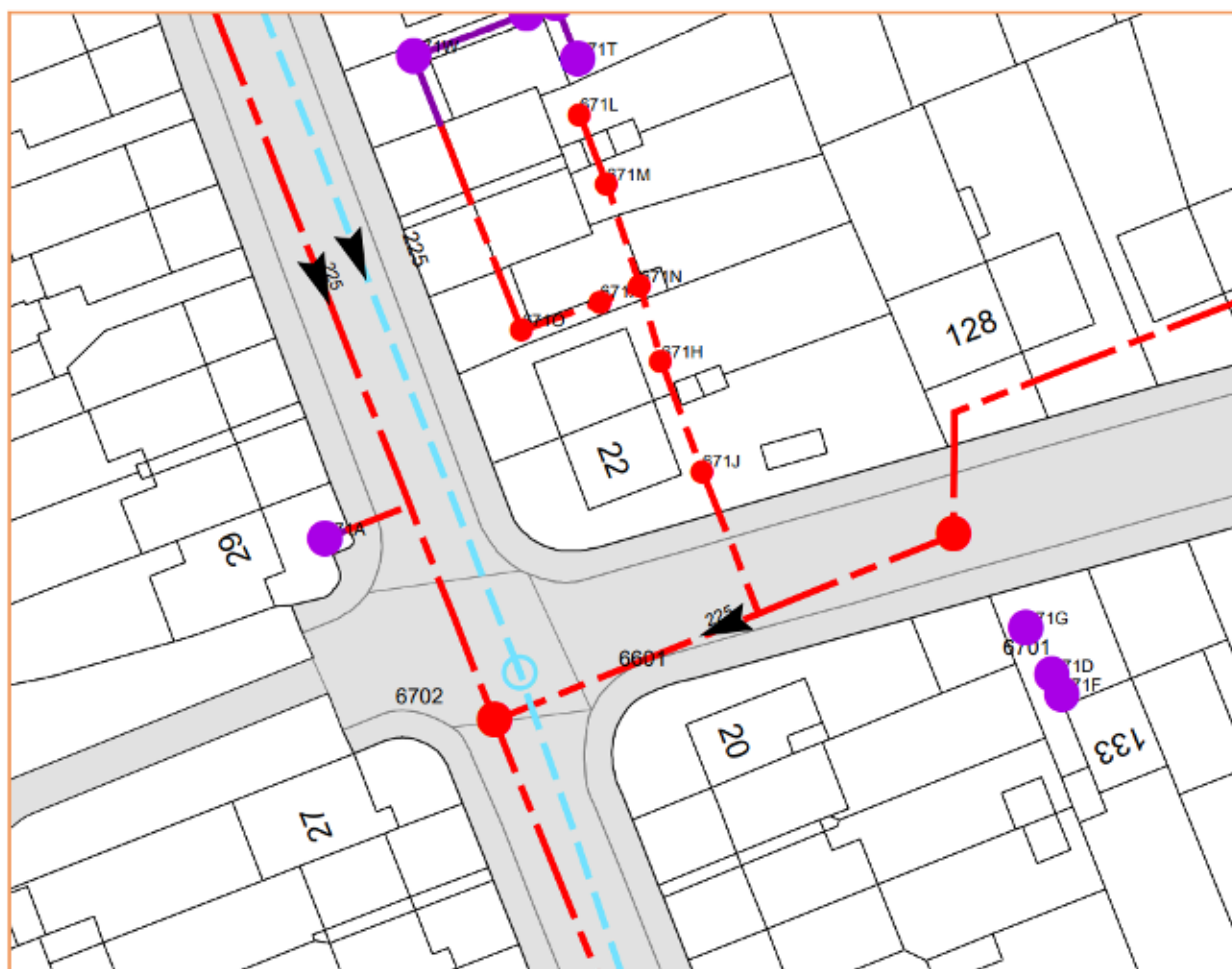


Figure 4: Asset Location Search Sewer Map (Source: Thames Water Ltd)

3. Development Proposals:

Proposed Development:

- 3.1 The proposed planning application is for the erection of a single residential dwelling. Post development the newly introduced built footprint will cover approximately 66m².

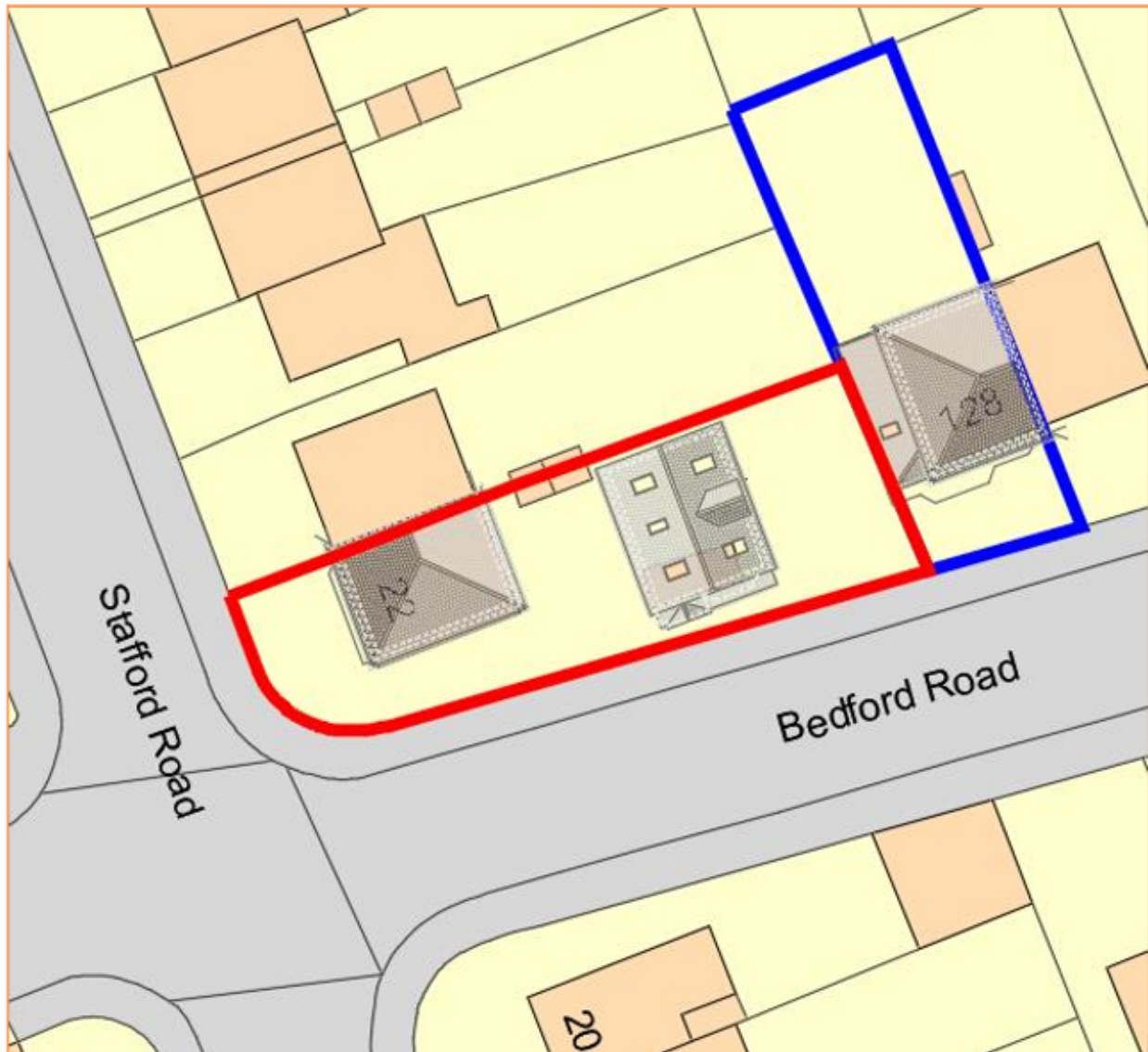


Figure 5: Proposed site layout plan (Source: Mr R Parmar)

4. Flood Risk Assessment:

Flood Zones:

- 4.1. Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's website.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

- 4.2. The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

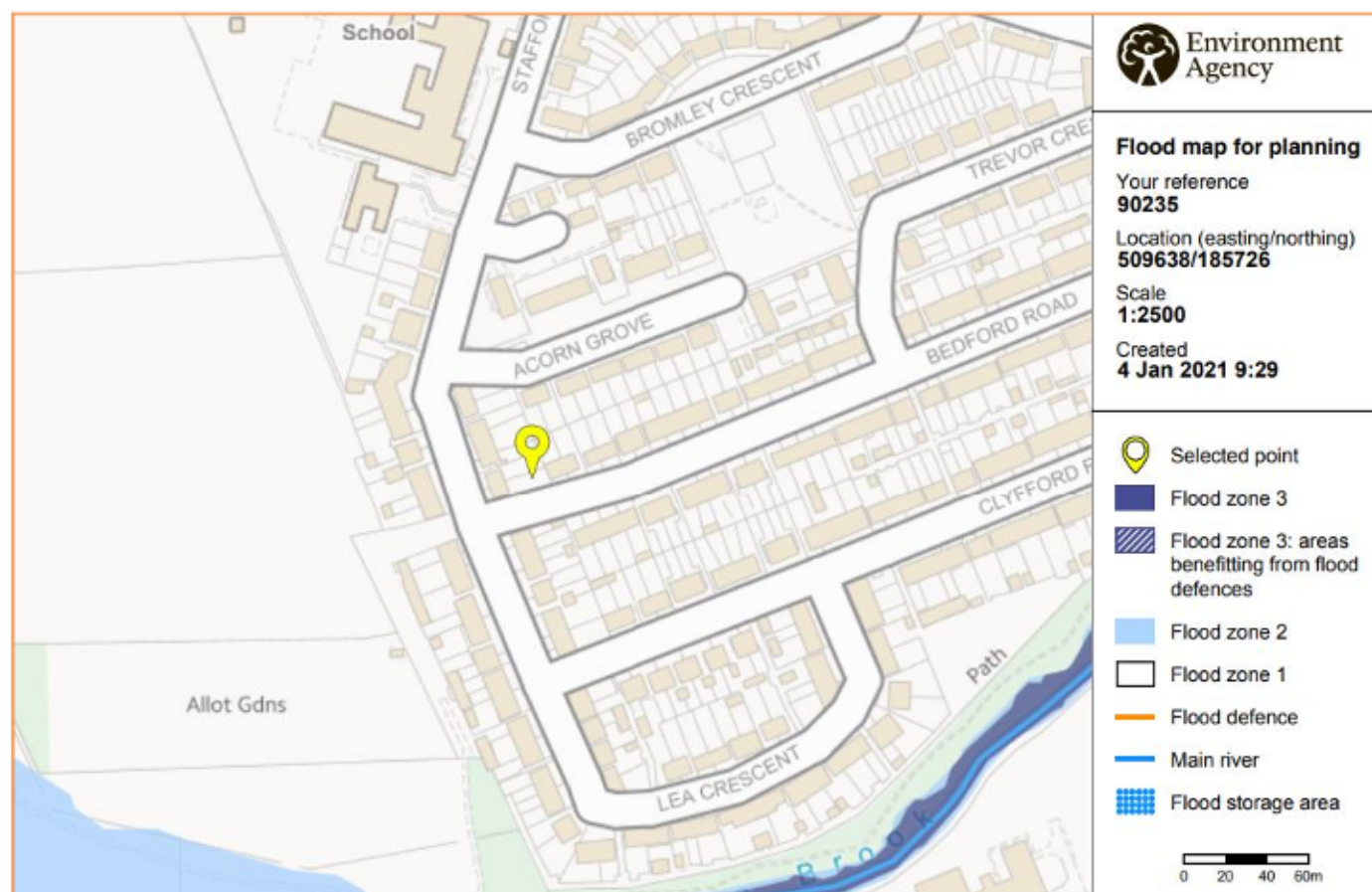


Figure 6: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

- 4.3. The site is located entirely within Flood Zone 1 (Low Probability) which means it is defined as land having less than a 1:1000 annual probability of fluvial or tidal flooding.

Fluvial:

- 4.4. Due to the site topography and distance to the nearest watercourse, the risk of fluvial flooding is considered to be very low.

Tidal:

- 4.5. Due to the site topography and distance to the nearest coast/ tidal watercourse, the risk of tidal flooding is considered to be very low.

Historical Flooding:

- 4.6. The site is partially located within the EA's historic flood extent from 1959 where the channel capacity was exceeded.

Pluvial:

- 4.7. Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.
- 4.8. In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used are considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.
- 4.9. The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):
- 1:30 (3.3%)
 - 1:100 (1%)
 - 1:1000 (0.1%)
- 4.10. The mapping below shows the Risk of Flooding from Surface Water with the map centred on the site. Please note that the EA to not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.
- 4.11. The EA Risk of Flooding from Surface Water Map suggests that the site itself lies within an area of "Very Low" risk of flooding from surface water.

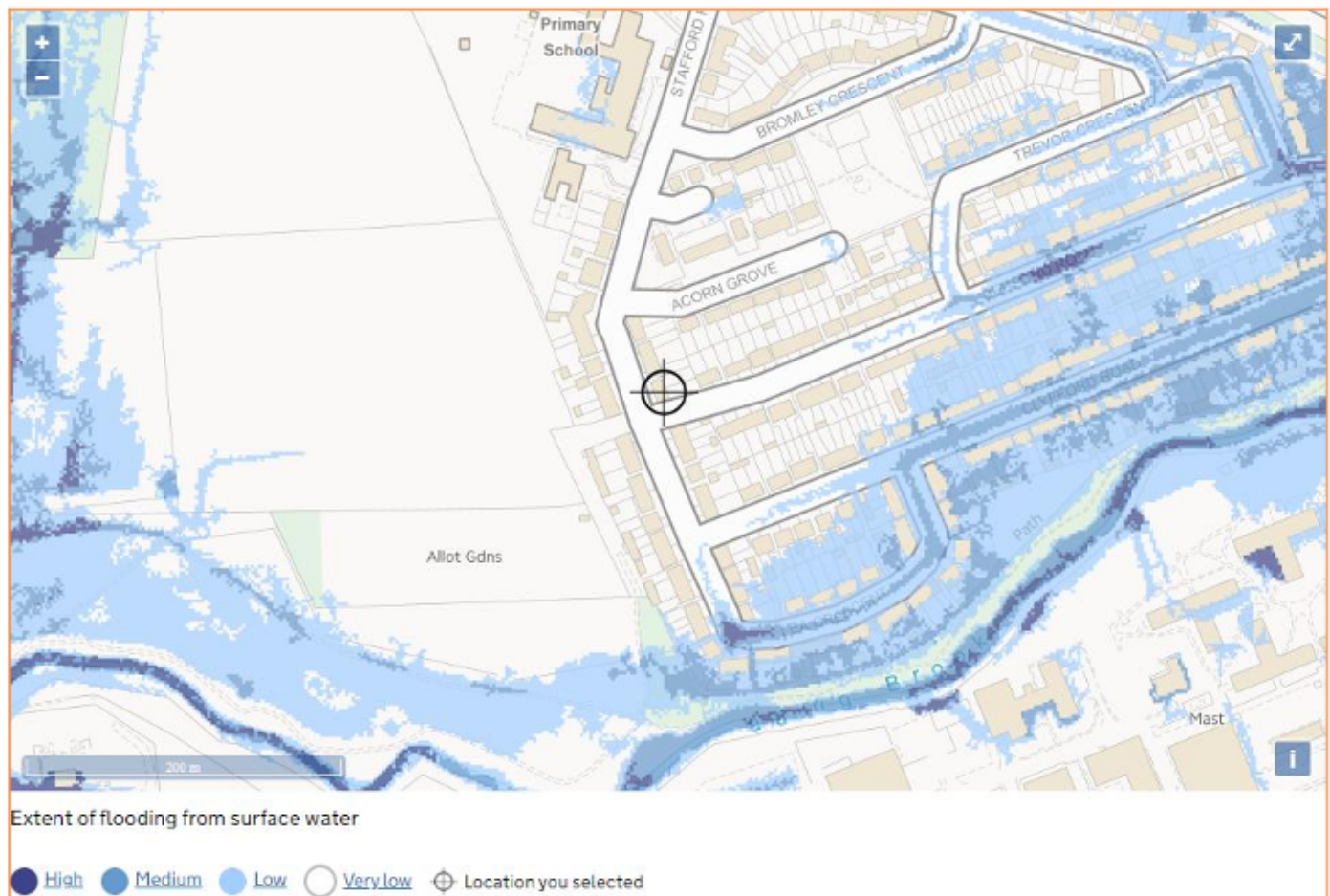


Figure 7: Extract from Environment Agency RoFSW map (Source: EA)

4.12. The West London SFRA Strategic Flood Risk Assessment identifies the site as within a "critical drainage area".



Figure 8: Extract from West London SFRA Strategic Flood Risk Assessment Critical Drainage Area mapping.

Groundwater:

- 4.13. Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.
- 4.14. Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.
- 4.15. No information has been provided to suggest that the site has flooded from this source previously.

Sewer:

- 4.16. Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

- 4.17. All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.
- 4.18. No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

Other Sources:

- 4.19. The EA Risk of Flooding from Reservoirs Map suggests that the site lies outside the "Maximum extent of flooding" from reservoir failure. The EA also advise on their website that reservoir flooding is extremely unlikely. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. These inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial flooding to occur.
- 4.20. No further information has been provided to suggest the site is susceptible to from the failure of reservoirs, canals or other artificial infrastructure from the risk of flooding.

Vulnerability to flooding:

- 4.21. The NPPF classifies property usage by vulnerability to flooding. The existing site usage is classified as "more vulnerable" throughout, as it is currently a dwelling with the rest of the area a garden. Post development, the site will remain "more vulnerable", as the application is for the construction of a single dwelling.
- 4.22. Accordingly, it is considered that the vulnerability of the site as a whole will not increase post development.

- 5.7. It is therefore proposed to discharge runoff from the site via a Hydro-Brake at a rate of 0.1 l/s. As this is the total flow generated by the section of the plot dedicated for development.

Cellular Storage:

- 5.8. The total roof area of the house is 66m².
- 5.9. In Order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the new impermeable surfaces (66m²) gives a value of 73m². Therefore, all drainage calculations within this assessment have been made based on a total impermeable area of 73m².
- 5.10. MicroDrainage software has been used to estimate the cellular size requirement to provide adequate surface water run-off management (see Appendix).
- 5.11. Preliminary calculations indicate that sufficient storage required to attenuate runoff from the proposed impermeable areas (73m²) arising from the critical 1:100 year + 40% climate change event can be provided within cellular storage of dimensions 13m² x 0.36m deep x 0.95 (voids). Refer to appendix.
- 5.12. Preliminary calculations indicate that 4.45m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 40% climate change event. A Hydro-Brake would be proposed as the outlet control, restricting the maximum flow rate to 0.1 l/s. This system will be a gravity connection into Manhole 6601 beneath Stafford Road.
- 5.13. All preliminary surface water drainage calculations have been undertaken using MicroDrainage software. Refer to the appendix.

Water Quality:

- 5.14. Water quality has been assessed in line with the Simple Index approach from Chapter 26 of CIRIA C753 The SuDS Manual:
- Step 1 – Allocate suitable pollution hazard indices for the proposed land use.
Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.
- 5.15. Runoff from roof areas is considered to be uncontaminated and does not warrant any form of treatment process to improve water quality. Nevertheless, it is suggested to include debris / sediment traps on any new drainage.

Design Exceedance:

- 5.16. Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. In the event of the drainage system failure, the runoff flow can be managed through detailing the new external levels to direct water away from structures.

Adoption and Maintenance:

- 5.17. It is proposed that all SuDS facilities will be maintained privately by the end user.
- 5.18. A draft Maintenance Schedule is outlined in the Table below.

Cellular storage:

- 5.19. It is not envisaged that silt build up within the Cellular storage systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits and inspection chambers on a regular basis. Notwithstanding this, a suitable maintenance regime for the systems will comprise of routine inspection and silt removal (as necessary). Inspection should be undertaken using CCTV equipment. Camera access can be gained via inspection chambers.
- 5.20. Silt removal can be achieved by jetting. Jetting should be undertaken in accordance with current jetting guidelines, in particular the Code of Practice for Sewer Jetting published by The Water Research Centre. Jetting at 150bar at 300l/min should be more than adequate in removing any build-up of material within the tank.
- 5.21. A standard jet head with rear facing nozzles should be used. The head should be fed to the far end of the inspection chamber, activated and retracted. As the nozzle is removed, debris will be swept back into the inspection chamber where it can then be removed with the use of a standard gully sucker. This method will ensure the effective removal of gross solids (carrier

bags, cans, leaf litter etc.) from the system. Whilst 100% removal cannot be guaranteed, it has been shown that this jetting method will also remove an element of finer material which would otherwise be 'lost' within the system.

Pipework and Catchpits:

- 5.22. It is not envisaged that silt build up within the pipework systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits on a regular basis. Notwithstanding this, a suitable maintenance regime for the systems will comprise of routine inspection (every three months) and silt removal (as necessary).

Hydro-Brake:

- 5.23. The Hydro-Brake should be maintained in strict accordance with the manufacturer's instructions.

Drainage Element	Maintenance Requirement	Frequency
Gutters & Downpipes	Inspect and remove silt/ debris	To be inspected every three months and silt/ debris removed as necessary.
Catchpits and Inspection Chambers	Inspect and remove silt	To be inspected every three months and silt/ debris removed as necessary. Flow control to be checked for blockages.
Cellular Storage	Inspect and remove debris	CCTV inspection following first storm event. Monthly CCTV inspections for first 3 months. 6 monthly CCTV inspections thereafter. Jetting to remove silt as necessary.
Flow Controls	Inspected for blockage and blockage / debris build up removed	Every six months

Table 3: Suggested Maintenance Regime for Elements of the Drainage Infrastructure

Note: In addition to the above maintenance requirements, it is recommended that all drainage elements are inspected:

- Following the first storm event
- Monthly for the first 3 months following commissioning.

6. Flood Risk Mitigation:

Physical Design Measures:

- 6.1. The site is shown to be entirely within Flood Zone 1 on the EA Flood Map for planning (Rivers and the Sea), and is identified to be at "Very Low" Risk of Flooding from Surface Water.
- 6.2. The West London Strategic Flood Risk Assessment identifies the site as within a "*critical drainage area*".

Safe Escape:

- 6.3. The NPPF requires a route of safe escape for all residents and uses to be provided from residential properties in Flood Zone 3. Safe escape is usually defined as being through slow-moving flood water no deeper than 25cm.
- 6.4. The dwelling is located within Flood Zone 1 as well as within an area at "Very Low" risk of surface water flooding.

Fluvial floodplain storage:

- 6.5. The site is situated in Flood Zone 1 when using the Environment Agency Flood Map for Planning (Rivers and Sea). No fluvial floodwater would be displaced by the proposed development.

7. Discussion and Conclusions:

- 7.1. This Flood Risk Assessment and Surface Water Drainage Strategy has been prepared by Unda Consulting Limited on behalf of Mr Rajesh Parmar, in support of a planning application for a residential development at the site at 22 Stafford Road, Ruislip, HA4 6PJ. This report assesses the flood risk and surface water drainage strategy for the proposed development.
- 7.2. The proposed planning application is for the erection of a single residential dwelling. Post development the newly introduced built footprint will cover approximately 66m².
- 7.3. The site slopes from the north west to south east with topographic levels ranging between approximately 38.76mAOD and 39.27mAOD.
- 7.4. The bedrock geology taken from BGS records is London Clay Formation – clay, silt and sand.
- 7.5. The soil type taken from the UK soils website is relatively deep soils of Prequaternary Marine/ Estuarine Sand and Silt, with a clayey loam to silty loam soil texture.
- 7.6. The site is located entirely within Flood Zone 1 (Low Probability) which means it is defined as land having less than a 1:1000 annual probability of fluvial or tidal flooding.
- 7.7. Due to the site topography and distance to the nearest watercourse, the risk of fluvial flooding is considered to be very low. Due to the site topography and distance to the nearest coast/ tidal watercourse, the risk of tidal flooding is considered to be very low.
- 7.8. The EA Risk of Flooding from Surface Water Map suggests that the site itself lies within an area of "Very Low" risk of flooding from surface water.
- 7.9. The West London Strategic Flood Risk Assessment identifies the site as within a "critical drainage area".
- 7.10. No information has been provided to suggest that the site is susceptible to sewer surcharge or groundwater flooding.
- 7.11. The site is shown to be located over London Clay Formation bedrock, with no superficial deposits, and as such it is proposed to drain the site to sewer.
- 7.12. Existing greenfield runoff rates for the total site have been calculated as 0.0 l/s for the 1:1 annual runoff event, 0.1 l/s for the 1:30 year event and 0.1 l/s for the 1:100 year event. Refer to calculations in Appendix.
- 7.13. It is therefore proposed to discharge the site via a Hydro-Brake at a rate of 0.1 l/s.
- 7.14. The total roof area of the house is 66m².
- 7.15. In Order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the new impermeable surfaces (66m²) gives a value of 73m². Therefore, all drainage calculations within this assessment have been made based on a total impermeable area of 73m².
- 7.16. MicroDrainage software has been used to estimate the cellular size requirement to provide adequate surface water run-off management (see Appendix).
- 7.17. Preliminary calculations indicate that sufficient storage required to attenuate runoff from the proposed impermeable areas (73m²) arising from the critical 1:100 year + 40% climate change event can be provided within cellular storage of dimensions 13m² x 0.36m deep x 0.95 (voids). Refer to appendix.
- 7.18. Preliminary calculations indicate that 4.45m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 40% climate change event. A Hydro-Brake would be proposed as the outlet control, restricting the maximum flow rate to 0.1 l/s. This system will be a gravity connect into Manhole 6601beneath Stafford Road.
- 7.19. All preliminary surface water drainage calculations have been undertaken using MicroDrainage software. Refer to the appendix.
- 7.20. Water quality has been assessed in line with the Simple Index approach from Chapter 26 of CIRIA C753 The SuDS Manual. Runoff from roof areas is considered to be uncontaminated and does not warrant any form of treatment process to improve water quality. Nevertheless, it is suggested to include debris / sediment traps on any new drainage.

- 7.21. It is proposed that all SuDS facilities will be maintained privately by the end user. A draft Maintenance Schedule is outlined within the report.
- 7.22. Should the onsite drainage system fail under extreme rainfall events or blockage, the runoff flow can be managed through detailing the new external levels to direct water away from structures.
- 7.23. This drainage strategy has been undertaken in accordance with the principles set out in NPPF. We can conclude that providing the development adheres to the conditions advised above, the said development proposals can be accommodated without increasing flood risk within the locality in accordance with objectives set by Central Government and the EA.

Unda Consulting Limited

January 2021

8. Appendix

Plans by others:

- Location and block plan;
- Proposed site plan.

Water Authority:

- Thames Water Asset Search.

MicroDrainage Calculations:

- ICP SUDS Rural Runoff Calculations;
- Cellular Storage Calculations.

Plans:

- Drainage Layout.



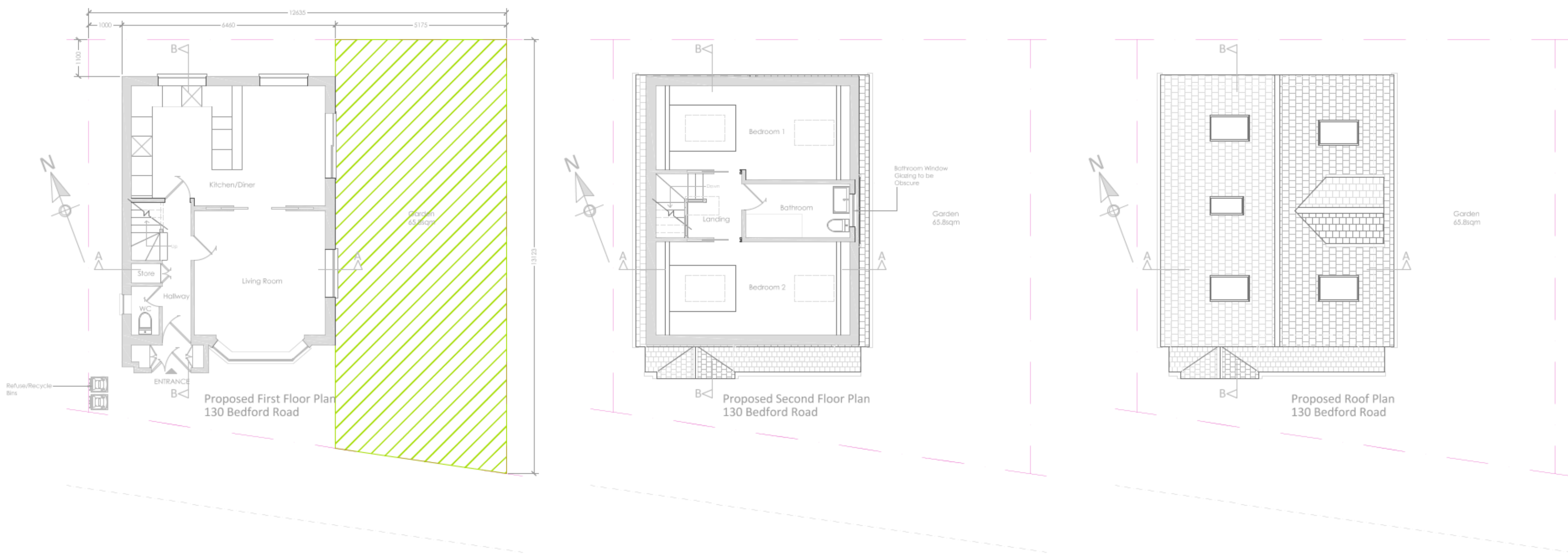
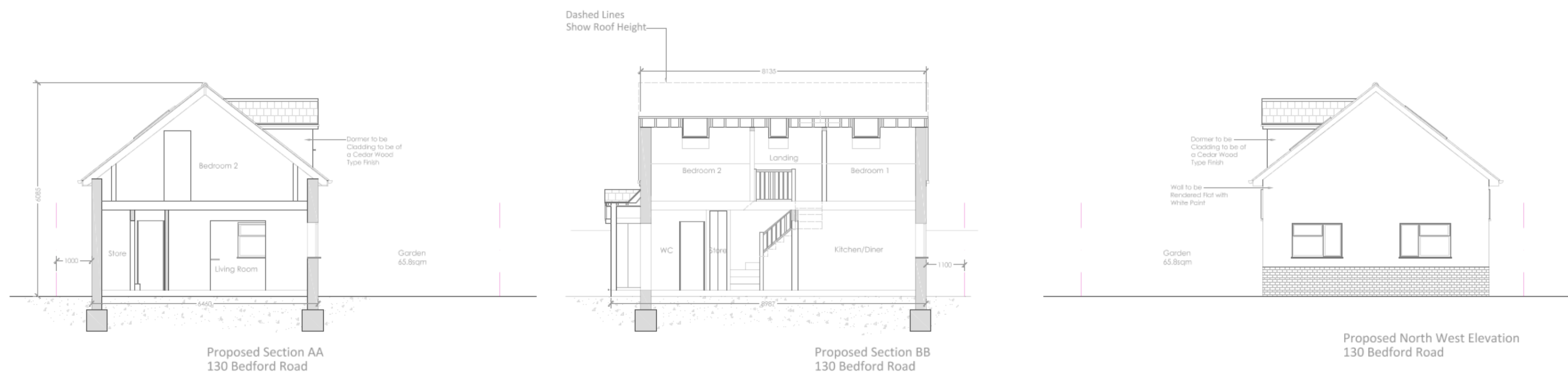
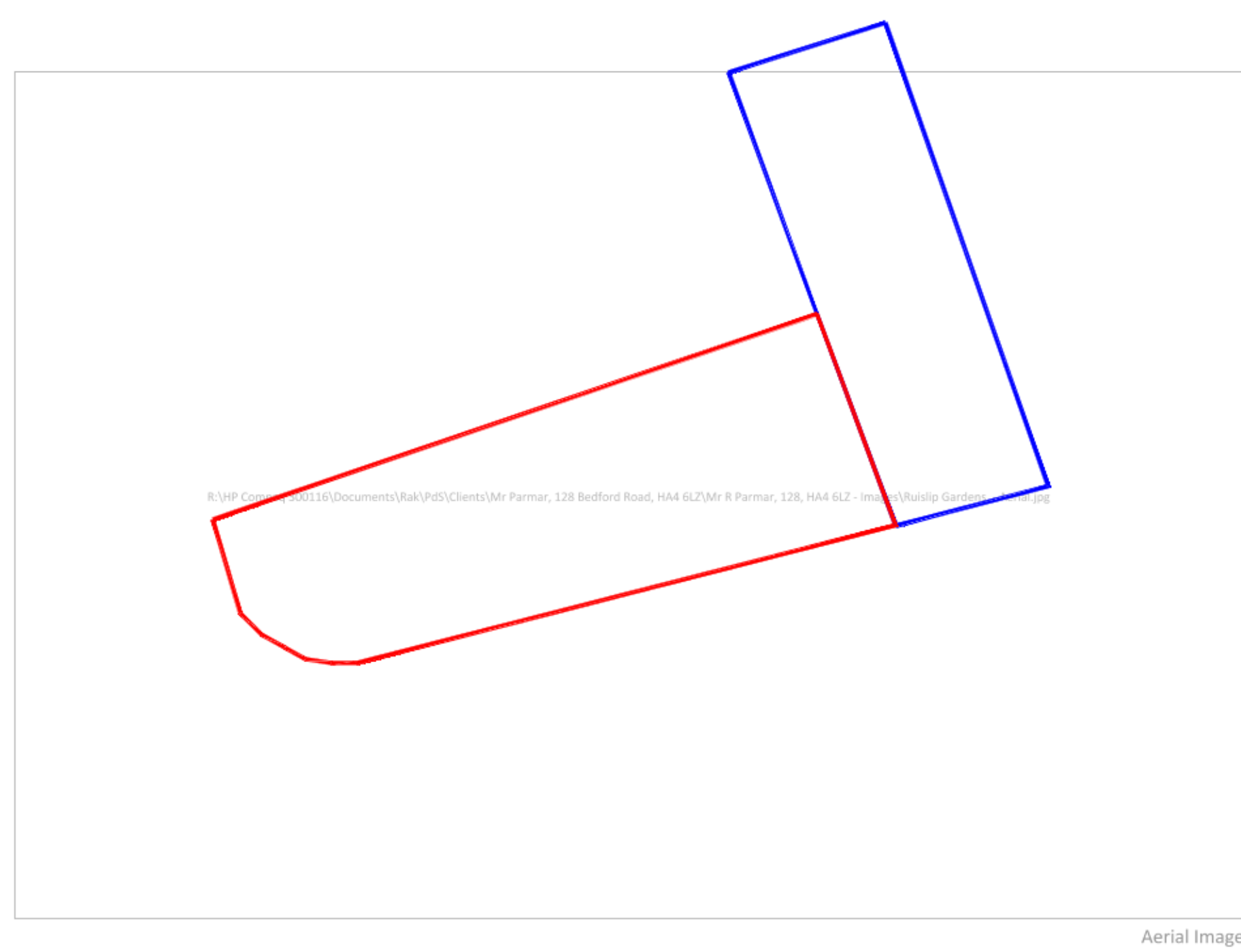
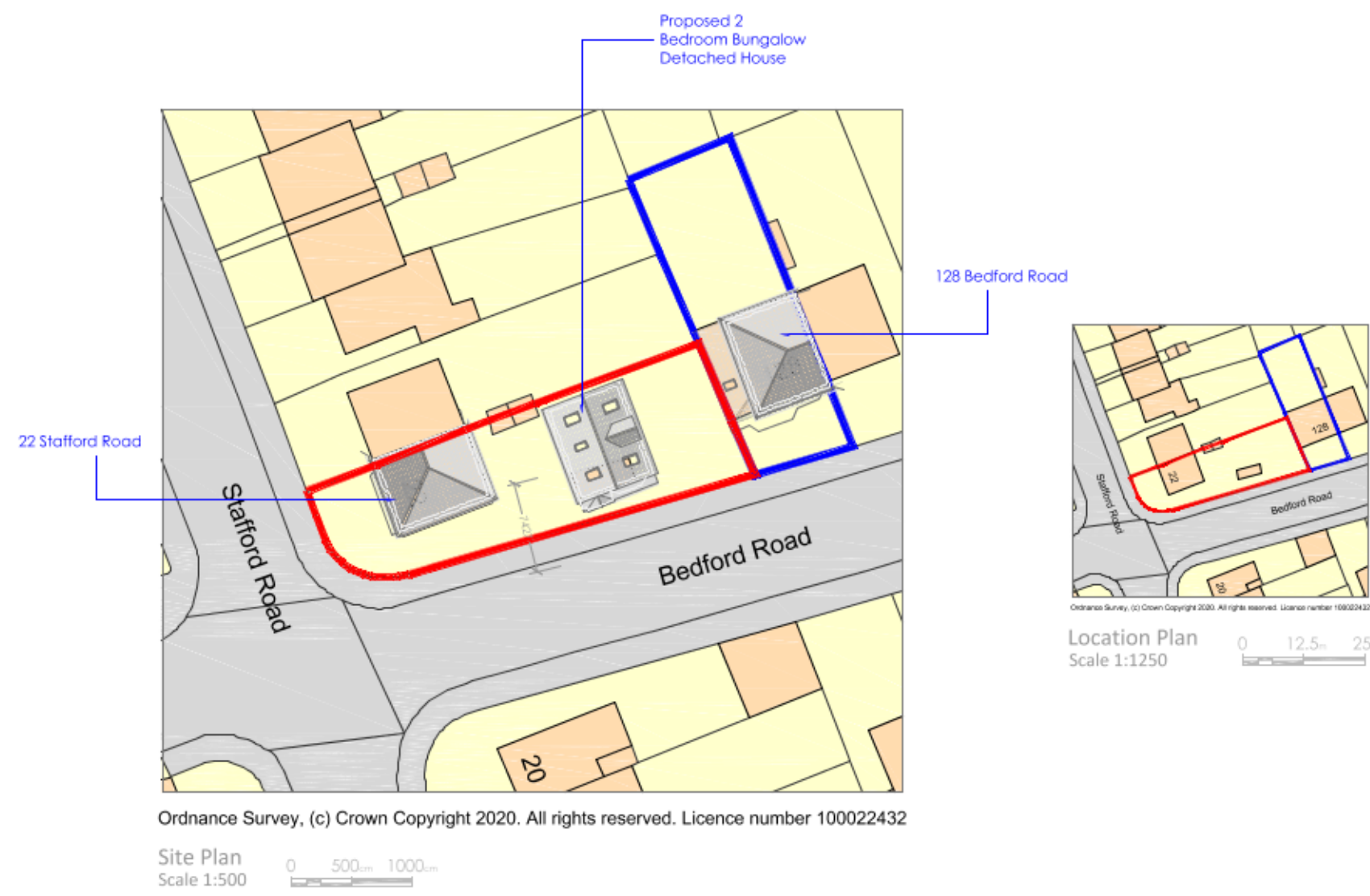
Notes

Do not scale dimensions direct from this drawing, except for the Local Authority Planning Officers.

All setting out and constructional dimensions should be carefully checked on site before commencement of work.

This Drawing is Provided Solely for the Flood Risk Assessment

Revisions



Architect/Client
Mr R Parmar

Address :
22 Stafford Road
Ruislip Gardens
Middlesex
HA4 6PJ

Project title :
New 2 Bedroom Detached
Bungalow (Chalet Style) Situated in
the Rear Garden of 22 Stafford Road,
HA4 6PJ

Drawing title :
Existing & Proposed Plans,
Sections & Elevations

Scale: A0 @ 1:100 or as shown

Drawn By : RP **Checked By :**

Date: 12/11/2020

Job N°: CBP-001 **Drawing N°:** 001 **Rev:** 0

Status: Flood Risk Assessment

Scale Bar : 0 100 200

Asset location search



Property Searches

Unda Consulting Limited
Southpoint
GATWICK
RH11 0PR

Search address supplied 22
Stafford Road
Ruislip
HA4 6PJ

Your reference 90235

Our reference ALS/ALS Standard/2021_4331497

Search date 4 January 2021

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0845 070 9148

Search address supplied: 22, Stafford Road, Ruislip, HA4 6PJ

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

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.

With regard to the fresh water supply, this site falls within the boundary of another water company. For more information, please redirect your enquiry to the following address:

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ
Tel: 0345 3572401

Asset location search



Property Searches

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

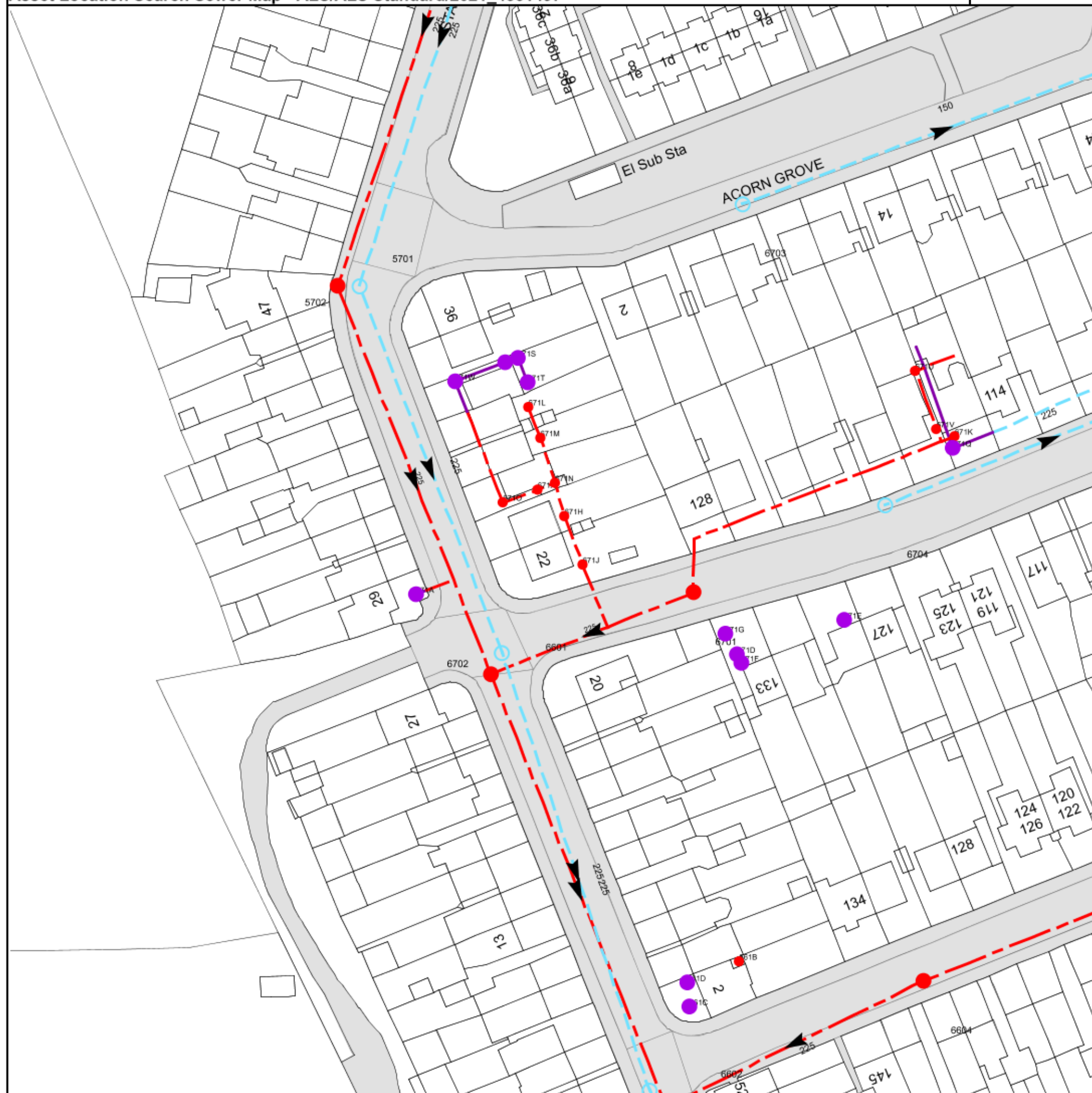
Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

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



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 509624,185722

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 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
5701	40.32	37.06
5702	40.32	37.68
571A	n/a	n/a
671W	n/a	n/a
6601	38.6	35.06
6702	38.69	36.51
671O	n/a	n/a
671R	n/a	n/a
671S	n/a	n/a
671T	n/a	n/a
671L	n/a	n/a
671X	n/a	n/a
671M	n/a	n/a
671N	n/a	n/a
671H	n/a	n/a
671J	n/a	n/a
6701	38.27	35.39
671G	n/a	n/a
671D	n/a	n/a
671F	n/a	n/a
6703	38.99	38.07
671E	n/a	n/a
6704	37.96	36.18
671Q	n/a	n/a
671K	n/a	n/a
671V	n/a	n/a
671U	n/a	n/a
6603	36.6	35.07
661C	n/a	n/a
661D	n/a	n/a
6604	36.28	32.67
661B	n/a	n/a
7602	36.16	35.19
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.		



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 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' on a manhole level indicates that data is unavailable.

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
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

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

	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 surface water sewer indicates that the pipe discharges into a stream or river.

	Outfall
	Undefined End
	Inlet

Other Symbols

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

	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 Operated or Maintained by Thames Water)

	Foul Sewer		Surface Water Sewer
	Combined Sewer		Gully
	Culverted Watercourse		Proposed
			Abandoned Sewer

- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. 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 member of Property Insight on 0845 070 9148.

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 14 days from due 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. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. 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'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. 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 not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

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 0121 345 1000 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	Cheque
Call 0845 070 9148 quoting your invoice number starting CBA or ADS / OSS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number	Made payable to ' Thames Water Utilities Ltd ' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13

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

Unda Consulting Ltd		Page 1
Southpoint Old Brighton Road Gatwick RH11 0PR	Stafford Road Ruislip Greenfield Runoff	
Date 05/01/2021 File CELLULAR STORAGE.SRCX	Designed by AR Checked by EB	
Innovyze	Source Control 2017.1.2	

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 686 Urban 0.000
Area (ha) 0.015 Soil 0.300 Region Number Region 6

Results l/s

QBAR Rural 0.0
QBAR Urban 0.0

Q100 years 0.1

Q1 year 0.0
Q30 years 0.1
Q100 years 0.1

Unda Consulting Ltd		Page 2
Southpoint Old Brighton Road Gatwick RH11 0PR	Stafford Road Ruislip Cellular Storage	
Date 08/01/2021 File CELLULAR STORAGE.SRCX	Designed by AR Checked by PSG	
Innovyze	Source Control 2017.1.2	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
1440 min Winter	38.163	0.263	0.0	0.1	0.1	3.2	Flood Risk
2160 min Winter	38.108	0.208	0.0	0.1	0.1	2.6	Flood Risk
2880 min Winter	38.058	0.158	0.0	0.1	0.1	2.0	Flood Risk
4320 min Winter	37.971	0.071	0.0	0.1	0.1	0.9	Flood Risk
5760 min Winter	37.939	0.039	0.0	0.1	0.1	0.5	O K
7200 min Winter	37.931	0.031	0.0	0.1	0.1	0.4	O K
8640 min Winter	37.925	0.025	0.0	0.1	0.1	0.3	O K
10080 min Winter	37.922	0.022	0.0	0.0	0.0	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
1440 min Winter	4.839	0.0	7.8	996
2160 min Winter	3.490	0.0	8.4	1428
2880 min Winter	2.766	0.0	8.9	1848
4320 min Winter	1.989	0.0	9.6	2468
5760 min Winter	1.573	0.0	10.1	3008
7200 min Winter	1.311	0.0	10.6	3744
8640 min Winter	1.129	0.0	10.9	4416
10080 min Winter	0.994	0.0	11.2	5136

Unda Consulting Ltd		Page 3
Southpoint Old Brighton Road Gatwick RH11 0PR	Stafford Road Ruislip Cellular Storage	
Date 08/01/2021 File CELLULAR STORAGE.SRCX	Designed by AR Checked by PSG	
Innovyze	Source Control 2017.1.2	

Rainfall Details

Rainfall Model	FSR	Ratio R	0.400	Cv (Winter)	0.840
Return Period (years)	100	Summer Storms	Yes	Shortest Storm (mins)	15
Region	England and Wales	Winter Storms	Yes	Longest Storm (mins)	10080
M5-60 (mm)	20.000	Cv (Summer)	0.750	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.008

Time (mins)	Area (ha)
From: To:	

0	4	0.008
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Unda Consulting Ltd		Page 4
Southpoint Old Brighton Road Gatwick RH11 0PR	Stafford Road Ruislip Cellular Storage	
Date 08/01/2021 File CELLULAR STORAGE.SRCX	Designed by AR Checked by PSG	
Innovyze	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 38.260

Cellular Storage Structure

Invert Level (m) 37.900 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	13.0	13.0	0.360	13.0	13.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0017-1000-0360-1000	Sump Available	Yes
Design Head (m)	0.360	Diameter (mm)	17
Design Flow (l/s)	0.1	Invert Level (m)	37.900
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	75
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.360	0.1	Kick-Flo®	0.151	0.1
Flush-Flo™	0.072	0.1	Mean Flow over Head Range	-	0.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.1	0.800	0.1	2.000	0.2	4.000	0.3	7.000	0.4
0.200	0.1	1.000	0.2	2.200	0.2	4.500	0.3	7.500	0.4
0.300	0.1	1.200	0.2	2.400	0.2	5.000	0.3	8.000	0.4
0.400	0.1	1.400	0.2	2.600	0.2	5.500	0.3	8.500	0.4
0.500	0.1	1.600	0.2	3.000	0.2	6.000	0.3	9.000	0.4
0.600	0.1	1.800	0.2	3.500	0.3	6.500	0.4	9.500	0.4

Roof Area

 Proposed Cellular Storage

Proposed Downpipes

Proposed Surface Water Pipework

--- Thames Surface Water Pipework

Thames Surface Water Manhole

Proposed Hydro-Brake

Design Exceedance Route

Notes:

1. [

1. Discharge of surface water cellular storage. Preliminary calculations indicate that sufficient storage required to attenuate runoff arising from the proposed increase in impermeable areas, during the critical 1 in 100 year + 40% Climate Change event, can be provided within cellular storage of dimensions 13m² x 0.36 deep x 0.95 (voids).

Client:

Mr Rajesh Parmear

Site Address:

22 Stafford Road,
Ruislip,
HA4 6PJ

Job Reference:

90235-Parmar-StaffordRd

Drawing Number:

90235-01

Designed by:	Drawn by:	Checked by:
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AR	AR	PSG
----	----	-----

Scale:

1:100@A2

Old Brighton Road
Gatwick
RH11 0PR