SYNTEGRA CONSULTING

26 Washington Road SW13 9BH

Flood Risk Assessment & Drainage Strategy

Ref: 23-12617

QUALITY STANDARDS CONTROL

The signatories below verify that this document has been prepared in accordance with our quality control requirements. These procedures do not affect the content and views expressed by the originator.

This document must only be treated as a draft unless it has been signed by the originators and approved by a director.

Revision	-
Date	09/02/2024
Prepared by	A. Norris
Checked by	A.Norris
Authorised by	A. Norris

LIMITATIONS

Syntegra Consulting Ltd ("SC") has prepared this report for the sole use of the client in accordance with the agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by SC.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by SC has not been independently verified by SC, unless otherwise stated in the report.

The methodology adopted and the sources of information used by SC in providing its services are outlined in this report. The work described in this report was undertaken in February 2024 and is based on the conditions encountered and the information available during the said period of time. The scope of this report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

SC disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to SC's attention after the date of the report.

Certain statements made in the report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. SC specifically does not guarantee or warrant any estimate or projections contained in this report.

Costs may vary outside the ranges quoted. Whilst cost estimates are provided for individual issues in this report these are based upon information at the time which can be incomplete. Cost estimates for such issues may therefore vary from those provided. Where costs are supplied, these estimates should be considered in aggregate only. No reliance should be made in relation to any division of aggregate costs, including in relation to any issue, site or other subdivision.

No allowance has been made for changes in prices or exchange rates or changes in any other conditions which may result in price fluctuations in the future. Where assessments of works or costs necessary to achieve compliance have been made, these are based upon measures which, in SC's experience, could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a pro-active and reasonable approach by site management.

Forecast cost estimates do not include such costs associated with any negotiations, appeals or other non-technical actions associated with the agreement on measures to meet the requirements of the authorities, nor are potential business loss and interruption costs considered that may be incurred as part of any technical measures.

Copyright

CONTENTS

APPENDICES

1 INTRODUCTION

Syntegra have been appointed to undertake a Flood Risk Assessment (FRA) and Drainage Strategy in support of an outline planning application at 26 Washington Road SW13 9BH.

The report provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk along with an assessment of existing drainage and potential for suds improvements.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, we shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Syntegra Consulting Ltd.

Reference Material

The Report has been prepared using the following documents for guidance:

- Sewers for Adoption
- Environment Agency Mapping
- CIRIA Suds Manual
- Local Authority Strategic Flood Risk Assessment (SFRA)
- British Geological society Mapping

This report has been prepared in accordance with the instructions of our client, for their sole and specific use.

Scope of report

The assessment has been undertaken in accordance with the standing advice and requirements of the and the Local Authority and Environment Agency for Flood Risk Assessments as outlined in the Communities and Local Governments Technical Guidance to the National Planning Policy Framework (NPPF).

The assessment has:

- Considered the procedures of the National Planning Policy Guidance and Local Authority Guidance.
- Considered the Local Authority SFRA
- Considered the site constraints
- Investigated all potential risks of current or future flooding to the site
- Considered the impact the development may have elsewhere with regards to flood risk

- Considered design proposals to mitigate any potential risk of flooding determined to be present
- Developed the drainage philosophy.
- Make recommendations as to how surface water drainage features are to be operated and maintained.

2 EXISTING SITE AND TOPOGRAPHY

The site is located within a residential area with access from Washington Road forming the southern boundary. The site is occupied by an existing property in a poor state of repair structurally requiring demolition and reconstruction.

Geological mapping data and survey of the site confirms the soils within the site to comprise of the London clay formation.

Topographically the site is relatively level. The location of the site can be seen in Appendix A.

Figure 1: Site Location Plan

3 EXISTING DRAINAGE AND SITE INVESTIGATIONS

3.1 Existing Drainage

The site is currently developed. From review of site information it is noted that existing drainage is present on site for residential use.

3.2 Existing Watercourses

No Watercourses are identified within proximity to the development site. The nearest watercourse is the River Thames located circa 800m west, north and east of the site.

4 DEVELOPMENT DESCRIPTION

The proposal comprises of the demolition and construction of a single replacement dwelling.

The layout can be seen in Appendix A.

5 NATIONAL PLANNING POLICY FRAMEWORK

In March 2012 the Department of Communities and Local Government published the National Planning Policy Framework document (NPPF 2021) which provides guidance on how flood risk should be assessed during the planning and development process. This document was recently revised again in December 2023. The main Framework is supplemented by a technical guidance document ("Planning Practice Guidance" - PPG) which advises specifically with respect to flooding. The most critical aspects are extracted below.

Section 173 of the NPPF 2023 advises that when determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

Flood Zones (Table 1)

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)

Flood Risk Vulnerability Classification (Table 2)

As per Annex 3 of the NPPF 2023 the Flood vulnerability classification is set out as follows:

ESSENTIAL INFRASTRUCTURE

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; and water treatment works that need to remain operational in times of flood.
- Wind turbines.
- Solar farms

HIGHLY VULNERABLE

- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure'.)

MORE VULNERABLE

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

LESS VULNERABLE

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution;
- non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.

- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
- Car parks.

WATER-COMPATIBLE DEVELOPMENT

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Flood Zone and Flood Risk Vulnerability Compatibility (Table 3)

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

Key:

✓ Development is appropriate

X Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;

- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

- † In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
- * In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:
  - remain operational and safe for users in times of flood;
  - result in no net loss of floodplain storage;
  - not impede water flows and not increase flood risk elsewhere.

6 DEVELOPMENT AND FLOOD RISK

6.1 Environment Agency Flood Data

To assess the NPPF flood risk classification for the site, the first step was to inspect the Environment Agency web based flood mapping data for flooding from rivers and seas, surface water and reservoirs. The rivers and sea flood map is used to inform planning of a sites Flood Zone(s), however the surface water and reservoir flood maps available from the Flood Warning Information Service should also be used to identify other flood risks.

From the Environment Agency flooding from rivers and seas map, it can be seen that the site is within flood zone 3 with risk of flooding from the River Thames.

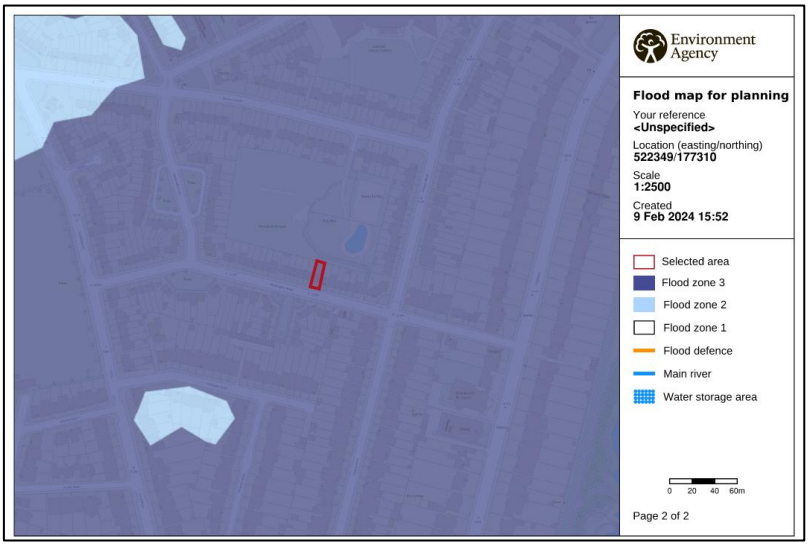


Figure 2- Environment Agency flood Risk Map

6.2 Site Specific Flood Zone Compatibility

As the site is proposed for residential use, the proposals are as follows:

Residential uses are classified as ‘More Vulnerable’ development.

The site is located within Flood Zone 3 and is currently developed with a residential property which is acceptable for more vulnerable development subject to the application of the exception test (Refer to Table 3 for the Flood Zone compatibility table taken from NPPF technical guidance).

6.3 Risk of Surface Water Flooding to the Site

Surface water sewers are at risk of surcharging during extreme rainfall events with flooding occurring principally from manholes and gullies. Surcharging sewers can result in overland flow which, if originating at a higher elevation than a development the sewers could potentially pose a flood risk.

The UK Government Provides long term flood risk assessment via a flood warning informatics service. Much of this information was previously available from the Environment Agency maps, however this new service offers more detailed site-specific information to the public.

Flooding to the site from surface water is indicated in Figure 3 it can be seen that there is a low risk of surface water flooding to the site with flood risk confined to the main highway and rear playing fields.

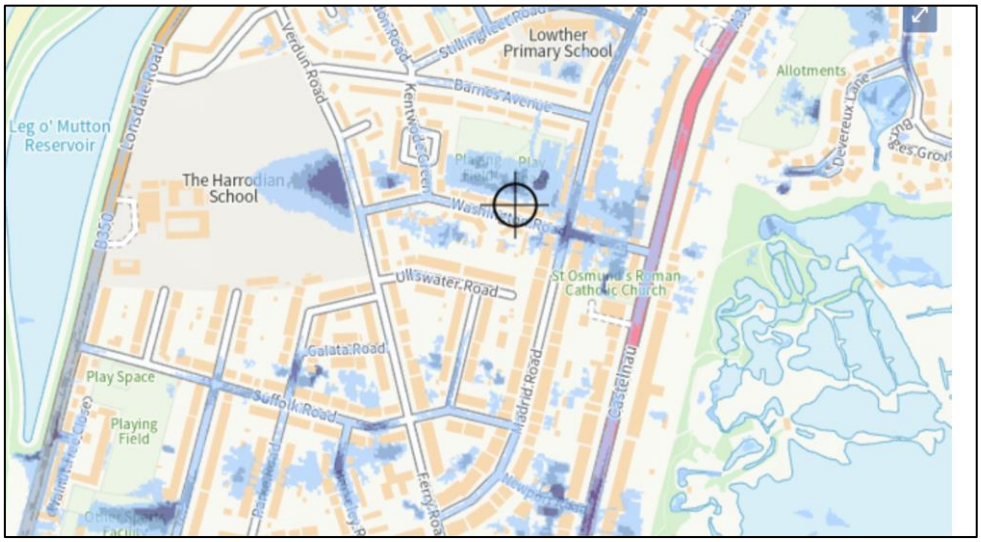


Figure 3: Flooding from Surface Water (Environment Agency).

6.4 Fluvial

As described above the Environment Agency flood maps identify the area to be in a high risk flooding area from watercourses in this area.

The site is protected by flood defences providing a level of protection above the 1 in 1000 year event. The EA's Thames Estuary 2100 Plan (TE2100) was updated in 2016 and covers the Thames estuary from Teddington in the west to the mouth of the estuary at Shoeburyness and Sheerness. It provides a plan for improving the tidal flood defence system for the period to 2100 so that current standards of flood protection are maintained or improved taking account of sea level rise. This plan is of relevance to the site, due to the significant level of dependence on the Thames Defences for flood protection.

Given the sites proximity to the watercourse sufficient warning would be available in a breach scenario. The SFRA mapping indicates various breach scenarios and times to inundation. The site is within a medium risk of breach inundation.

6.5 Flooding from Reservoirs, Canals and Artificial Sources

Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly, and essential safety work is carried out.

The site is located outside of any areas susceptible to reservoir flooding and is not in proximity to any canals. The site is therefore classified as at low risk of flooding from these sources.

6.6 Groundwater

Groundwater flooding is caused by the natural emergence of water at surface level originating from underlying permeable sediments or rocks (aquifers). The groundwater may emerge as one or more-point discharges (springs) over an extended area. Groundwater flooding tends to be more persistent than other sources of flooding, typically lasting for weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises, however it can cause considerable damage to property, especially in urban areas.

The site is not identified to be in an area susceptible to ground water emergence and therefore the risk is considered low.

6.7 Pluvial

The site levels slope towards the existing highway. It is considered that any runoff from adjacent land would be unlikely to enter the site due to topography and existing positive drainage systems from residential properties. There is therefore a low risk of flooding from properties to the development.

6.8 Public Sewers or Highway Drainage Flooding

Any additional flows to be discharged to the public sewer network will be subject to an impact assessment however it is not envisaged that an increase in surface water flow rates would be seen to the public sewer network as a result of the proposals and as a result of the requirement for SuDS systems to be implemented on all developments.

7 SEQUENTIAL AND EXCEPTION TEST

The existing property is in a poor state of disrepair, it is therefore a requirement for this to be demolished and rebuilt. Sequentially the site is already developed with an existing residential property and the replacement will be of similar footprint. The site is within the defended flood zone and the proposals are considered appropriate.

8 MITIGATION

8.1 Fluvial / Tidal / Reservoir Flood Mitigation

The proposed building is within an area designated as flood zone 3 but is defended. Therefore the risk of flooding is low due to the defences.

As the site lies within Flood Zone 3 certain mitigative techniques will need to be employed with regards to the structure.

The Environment Agency specify requirements to ensure the risk to people and property from fluvial inundation would be acceptable, in this instance it will be necessary to prepare an emergency flood plan to be produced and agreed with the local planning authority.

Appropriate flood resilient and flood resistant construction techniques may be considered as appropriate to further protect the dwellings/structures from the impacts of flood water. The use of temporary resistance measures is considered appropriate for existing properties,

Flood resilience measures aim to reduce the consequences of flooding and ensure that buildings can be swiftly returned to normal use following a flood event. This includes interior design to reduce damage caused by flooding by for example:

- Electrical circuitry installed at higher level with power cables being carried down from the ceiling not up from the floor level; and
- Water resistant materials for floors, walls and fixtures.

The ground floor units should adopt a water resistance strategy. A water resistance strategy should be utilised up to a flood depth of 600mm using techniques as per recommendations within Improving the Flood Performance of New Buildings – Flood Resilient Construction (2007), as follows:

- Provide flood gates or removable flood barriers for all doors to be closed or installed before the onset of flooding.

Well sign posted flood kits will need to be provided at all floors to ensure that site users trapped by the onset of flooding have provisions and lighting to keep them safe while they await rescue. Information regarding flood kits and flood plans can be found in the Environment Agency document Preparing for a Flood: Practical Advice on What to do to Protect You and Your Property.

The majority of Richmond is defended from flood risk by the use of flood alleviation structures which offer protection up to and including the 1 in 1000 year event. The presence of the defences means that the probability of flood risk is low but the consequences of a breach or overtop are high. In order to mitigate residual risk and ensure safe access, egress and evacuation (occupants leaving a building unassisted) should flood defences be overwhelmed, it is necessary to consider the requirement for a 'place of safety' as an integral part of the development.

The site is covered by the Environment Agency's early flood warning services and as such the development can receive flood warnings through registration with the Environment Agency. Flood warnings would be received when flooding is expected and if a flood warning is received immediate action should be taken.

Considering the Flood Zone 3 classification, it would be prudent for the site to follow up with the recommendations the Environment Agency have: Fill in a personal flood plan for the site, potentially adapt designs to reduce flood damage, listen to local radio and television for flood warnings in the area, and contact the Floodline on 0345 988 1188 if necessary.

8.2 Groundwater Flooding Mitigation

Groundwater flooding tends to be more persistent than other sources of flooding and typically lasts for weeks or months rather than hours or days. Generally, groundwater flooding does not pose a significant risk to life due to the slow rate at which the water level rises; however, it can cause considerable damage to property. Finished floor levels for the development should be set above the highest groundwater level.

As per the Environment Agency's online mapping service, there has been no record of groundwater flooding in this area, it is not considered that any increased risk would be presented as part of the development. No mitigation measures are deemed necessary.

8.3 Mitigation of Surface Water Flooding to the Site

The Environment Agency Surface Water flood map for the area indicates that the development is in a low risk of surface water flooding. Appropriate SUDS drainage systems shall be implemented to ensure runoff Is managed. Therefore, risk of flooding to the site from surface water flooding is considered low.

8.4 Mitigation of Surface Water Flooding from the Site

Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity to convey flows, along with managing a 1 in 100 year storm effectively on site. The proposed development will incorporate SuDS systems as required to reduce runoff and mitigate flood risk to the site and external receptors

Assuming that the proposed drainage system is designed to provide adequate capacity, and that the private and adopted sewers will be maintained by their adopted authority, it can be assumed risk of flood from blockage or overloading is minimal.

9 SUDS ASSESSMENT

9.1 SuDS Design Philosophy

The CIRIA SuDS manual outlines the design philosophy for drainage for developments and states that SuDS design should, as much as possible, be based around the following:

- Using surface water run-off as a resource
- Harvesting and managing rainwater close to where it falls
- Managing run-off at the surface
- Allowing rainwater to soak into the ground
- Promoting evapotranspiration
- Slowing and storing run-off on the surface
- Reducing contamination of run-off through pollution prevention and filtering out pollutants
- Treating run-off to reduce the risk of urban contaminants causing environmental pollution.

Most sites will incorporate multiple solutions and their suitability is assessed based on an ascending scale of sustainability with associated amenity and environmental benefits as below:

Suds technique	Flood Reduction	Pollution Reduction	Landscape a & wildlife benefit

Most Sustainable

Least Sustainable

Living Roofs	✓	✓	✓
Basins and ponds -constructed wetlands -balancing ponds -detention basins -retention ponds	✓	✓	✓
Filter Strips and Swales	✓	✓	✓
Infiltration devices -soakaways -Infiltration trenches and basins	✓	✓	✓
Permeable surfaces and filter drains -Gravelled area -Solid paving blocks -Porous paving	✓	✓	
Tanked systems -Oversized pipe/tanks -Storm Cells	✓		

9.2 Infiltration Devices

Infiltration testing has not yet been undertaken. Based upon BGS records and site surveys the potential for infiltration is likely to be poor given the underlying clay geology in addition the proximity to existing trees, and other properties prevents sufficient space for infiltration systems to be used effectively and therefore these are not proposed.

9.3 Permeable Hard Standing

Permeable paving is appropriate for use with access and parking areas for attenuation.

9.4 Rainwater harvesting

Not considered sustainable for single residential properties.

9.5 Sedum/Green Roofs

Use of green roofs is not feasible given the pitched roof designs.

9.6 End of pipe solutions.

End of pipe solutions shall be implemented to reduce runoff as appropriate.

10 SURFACE WATER DRAINAGE STRATEGY

The final design of the storm water network needs to be in accordance with requirements set by the Environment Agency and LLFA.

The local Authority expects all developments to take advantage of any suitable opportunities to reduce surface water runoff.

Developers should utilise SuDS on all developments unless there are practical reasons for not doing so. Therefore, it is expected to see suitable consideration given to using sustainable measures in line with the following drainage hierarchy:

- Store rainwater for later use
- Use infiltration techniques, such as porous surfaces in non-clay areas
- Attenuate rainwater in ponds or open water features for gradual release
- Attenuate rainwater by storing in tanks or sealed water features for gradual release.
- Discharge rainwater direct to a watercourse
- Discharge rainwater to a surface water sewer / drain
- Discharge rainwater to the combined sewer

The proposed development will increase the impermeable area of the site, as such it is necessary to mitigate the potential increased runoff rates as part of the development through the use of appropriate SUDS systems.

An appraisal of SUDS options above concludes that the most appropriate method of discharge is through attenuation.

The site can be considered brownfield. The impermeable area of the site will be largely unchanged. Greenfield runoff rates have been calculated and are indicated below:

Return Period	Greenfield Runoff Rate l/s
Qbar	0.1
1 in 1	0.1
1 in 30	0.1
1 in 100	0.2

Existing discharge rates are calculated based upon the existing impermeable area of 0.08Ha as follows:

Return Period	Existing Runoff Rate l/s
1 in 1	1.3
1 in 30	3.3
1 in 100	4.3

The proposed site layout is constrained by space and proximity to other properties; therefore Suds systems need to take into account these constraints. Based upon the proposed layout it is proposed to route all runoff to a cellular attenuation system within the rear of the site, with outfall to the existing public sewer via the existing drainage connection on site.

It is proposed that discharge rates will be controlled and reduced as far as possible in line with London Plan guidance. Based upon calculations, It is proposed that runoff from the site will be controlled with a flow control device with an orifice of 20mm to reduce flows to 0.6l/s during the 1 in 100 +40%

The proposed attenuation system will utilise permeable paving as storage with outfall to the public sewer using existing connections where possible. The proposed discharge rates have been simulated and are presented below for varying storm events.

Return Period	Proposed discharge Rate l/s
1 in 1	0.2
1 in 30	0.4

1 in 100	0.5
1 in 100 +40%	0.6

The above options demonstrate a viable drainage strategy for the site that utilises SUDS systems to convey surface water, treat and attenuate.

10.1 Foul Drainage

Foul Drainage shall be conveyed to the existing public sewer via existing connections where feasible.

11 MANAGEMENT & MAINTENANCE

All drainage will be required to be maintained by the contractor during construction, following which the post construction phase maintenance would apply as per manufacturer recommendations.

The proposed drainage system for the site adopts a series of SuDS measures to control the rate of storm water discharge and the quality of the water in line with current practice.

Responsibility of maintenance will lie with the client and an appropriate management company is to be appointed to oversee future maintenance.

11.1 Overview of Maintenance

All drainage systems, whether piped systems or SuDS systems require regular maintenance. The maintenance of the SuDS system should be included alongside other regular maintenance tasks. The table below gives an overview of typical maintenance tasks and the frequency with which they need to be undertaken.

Activity	Indicative frequency	Typical tasks
Routine/regular maintenance	Monthly to annually (for normal care of SuDS)	Litter picking Inspection of inlets, outlets and control structures
Occasional maintenance	Annually up to 25 years (dependent on the design)	Silt control around components Vegetation management around components Suction sweeping of permeable paving Silt removal from catchpits, soakaways and cellular storage
Remedial maintenance	As required (tasks to repair problems due to damage or vandalism)	Inlet/outlet repair Erosion repairs Reinstatement of edgings Reinstatement following pollution Removal of silt build up

11.2 Typical maintenance tasks and frequency for SUDs drainage

The required maintenance for each of the elements that make up the SuDS systems, is scheduled below. The following guidance is based on CIRIA C753 – The SuDS Manual.

O & M activity	SuDS component																	
	Pond/wetland	Detention basin	Infiltration basin	Silt traps and catchpits	Soakaway	Infiltration trench	Filter trench	Modular storage	Pervious pavement	Swale/bioretention/green roofs	Filter strip	Sand filter	Pre-treatment systems	Perforated ring soakaways	Bio retention areas	Rain gardens	Oil interceptors	Flow control devices
Regular maintenance																		
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter/debris removal	■	■	■	□	□	■	■	□	■	■	■	■	■	■	■	■	□	□
Grass cutting	■	■	■	□	□	■	■	□	□	■	■	□	□		■		□	□
Weed/invasive plant control	□	□	□			□	□		□	□	□	□	□		□	■		
Shrub management	□	□	□						□	□	□		□		□	■		
Shoreline vegetation management	■	□											□					
Aquatic vegetation management	■	□											□					
Sediment management (*)	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■
Vegetation/plant replacement	□	□	□							□	□		□		□	□		
Vacuum sweeping and brushing										■								
Structure rehabilitation/repair	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

Infiltration surface reconditioning			□		□	□	□		□	□	□	□		□	□	□		

■ Will be required

□ May be required

* Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

11.3 Pipes (Including Oversized) & Manholes

Pipes are intended to be the main conveyance across the development. They are intended to be dry except for during rainfall events. These have been designed to be self-cleansing where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

Access for maintenance is provided through access chambers, manholes, rodding plates and rodding eyes.

Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk. Maintenance responsibility for the pipes should be placed with Landowner.

Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, as run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection should be provided as post construction CCTV survey.	N/A
	Inspect for evidence of poor operation via water level in chambers. If required take remedial action.	3-monthly, 48 hours after large storms.
Occasional maintenance	Check and remove large vegetation growth near pipe runs.	6 monthly
Remedial actions	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

11.4 Flow Control Devices – Hydro Brake, Orifice Plates

Maintenance to be undertaken according to manufacturer's specification. As a general guide, this should include the following:

Maintenance Schedule	Required Action	Typical Frequency
Routine Maintenance	Inspection	Quarterly
	Litter / debris removal	Monthly or as required
Occasional Maintenance	Sediment removal	6 monthly
Remedial Maintenance	Repair (as a result of damage or vandalism)	As required

11.5 Permeable Pavements

Permeable surfaces including permeable block paving, porous asphalt, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc. Permeable block paving and porous asphalt can be cleaned by suction brushing. It is proposed that the access and parking areas will be constructed utilising permeable paving techniques to mimic the natural process of water percolating into the underlying strata.

Regular inspection and maintenance is important for the effective operation of the pervious pavement. Maintenance responsibility for the pavement and its surrounding area should be placed with Landowner via a management company.

Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, as run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action.	3-monthly, 48 hours after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	Annually.
	Monitor inspection chambers.	Annually.
Regular maintenance\inspection	Brushing and vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of

		clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphosates applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure. This could include replacement of the jointing and bedding material. The upper geotextiles layer may also need replacing if clogged and Terram 1000 has a life span of 25 years.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)

12 CONCLUSION

The report is based on current available information and preliminary discussions.

The assessment has been undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).

The assessment has:

- Investigated all reasonably foreseeable potential risks of flooding to the site,
- Considered the impact the development may have elsewhere with regards to flooding
- Considered outline design proposals to mitigate any potential risk of flooding determined to be present.

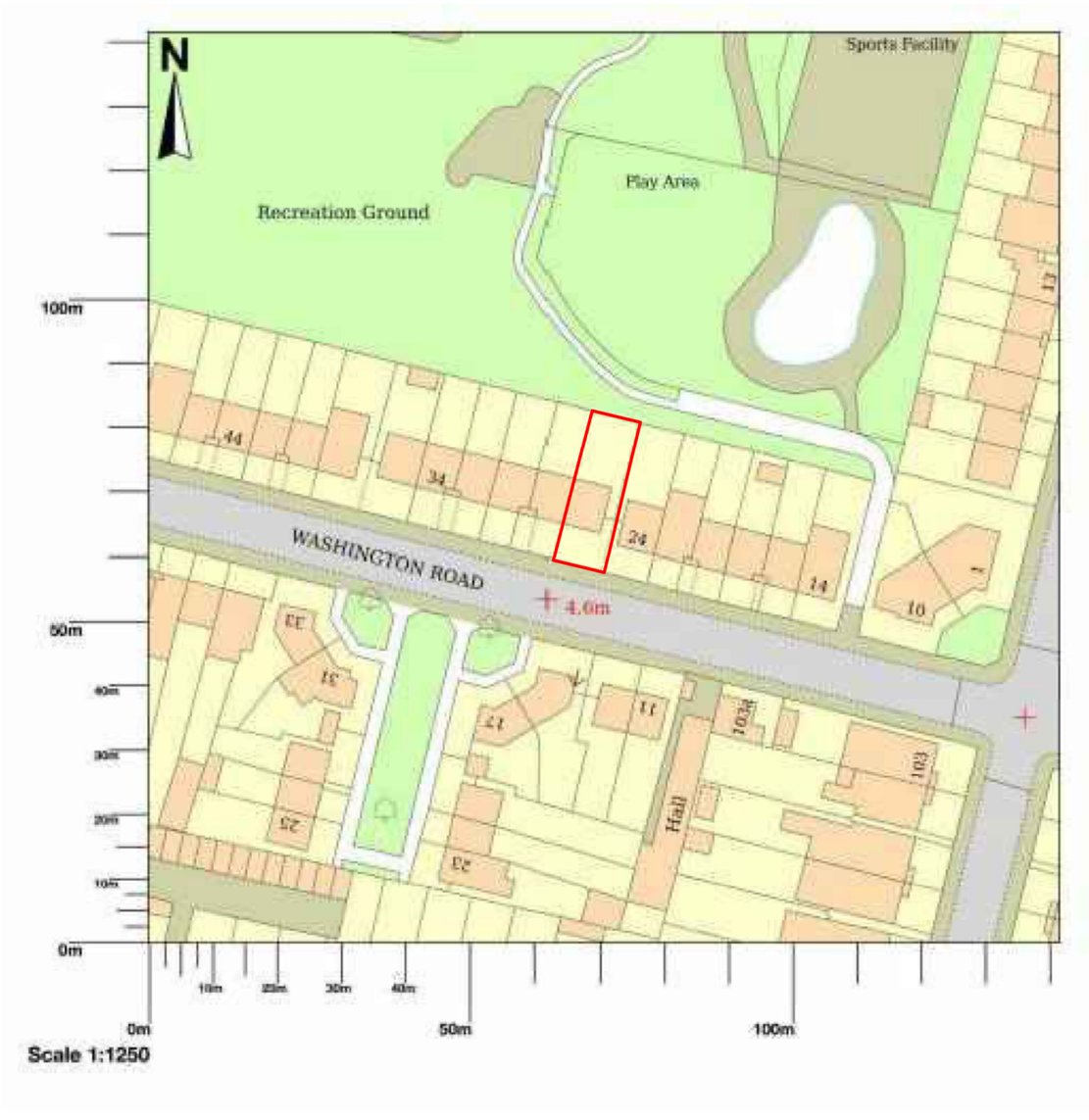
The report concludes that:

- The site is located within Flood Zone 3 and protected by the presence of flood defences up to the 1 in 1000 year event.

- The SFRA highlights that the site is not within an area susceptible to groundwater flooding.
- Appropriate flood resilient and resistant construction techniques shall be implemented to mitigate against residual risk due to breach.
- There have been no recorded flooding events at the site. The site has not been subject to any historical flood events.
- The Environment Agency Surface Water flood map for the area indicates a low risk of flooding from surface water.
- The proposed development will attenuate runoff through the use of permeable paving with discharge rates reduced to better than existing.
- Providing the principles set out within the report are followed and developed at detailed design stage, the site can be considered to have a low probability of suffering from any form of flooding and not increasing the probability of flood risk to other properties within the local catchment area.

APPENDIX A –Site location and existing layout

0 5 10 15 20 30 40 50 60
SCALE 1:1250



CHP Consultants Ltd

The Studio, Warren Close, SS6 7BD

Client
P. Killing

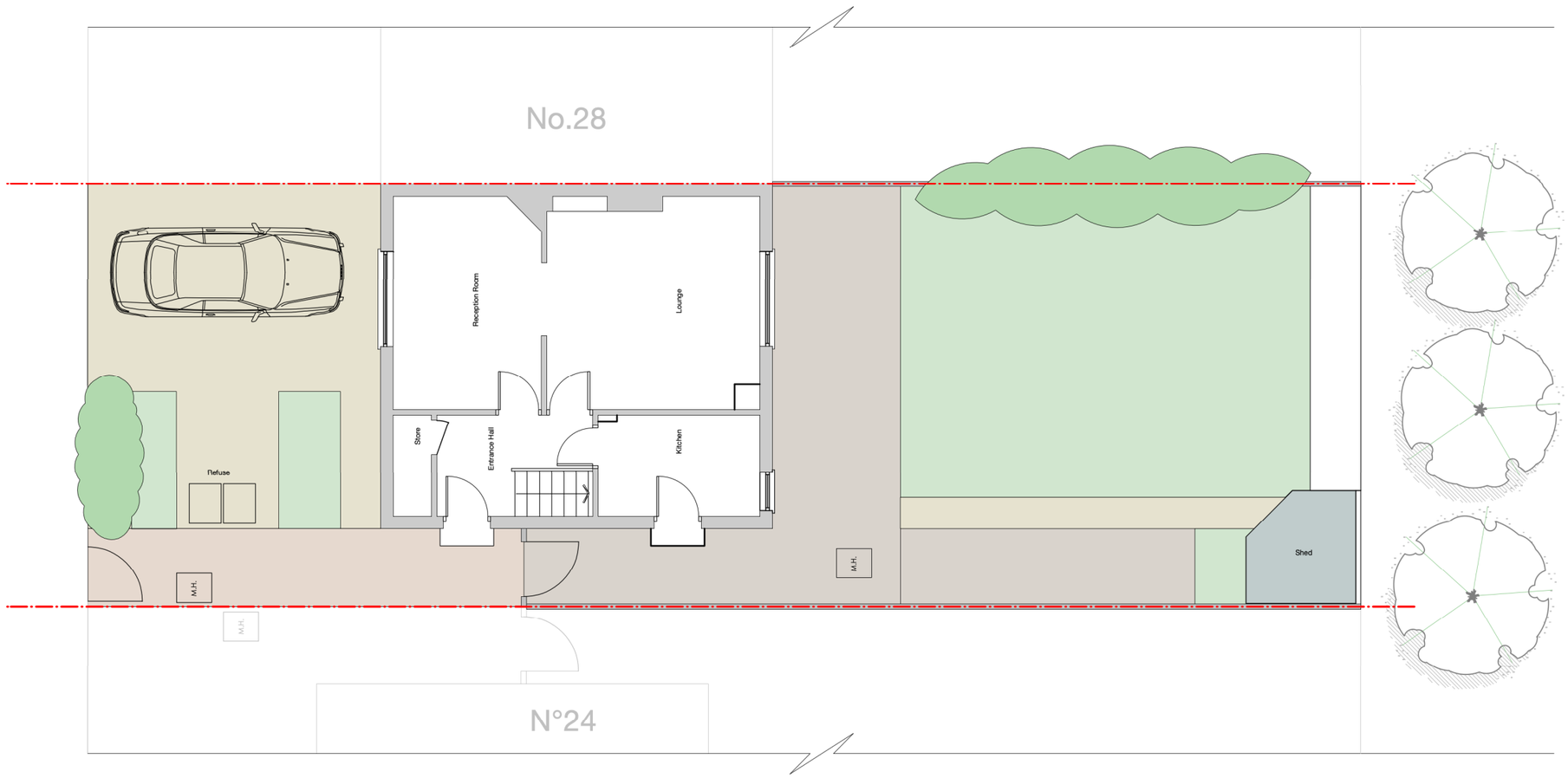
Project
26 Washington Road, London, SW13 9BH

Status
-

Drawing
OS Map

Drawing Number	Revision	Scale	Page size
127 - FP - 001		1:1250	A3

0 0.5 1 1.5 2 3 4 5
SCALE 1:100



CHP Consultants Ltd

The Studio, Warren Close, SS6 7BD

Client
P. Killing

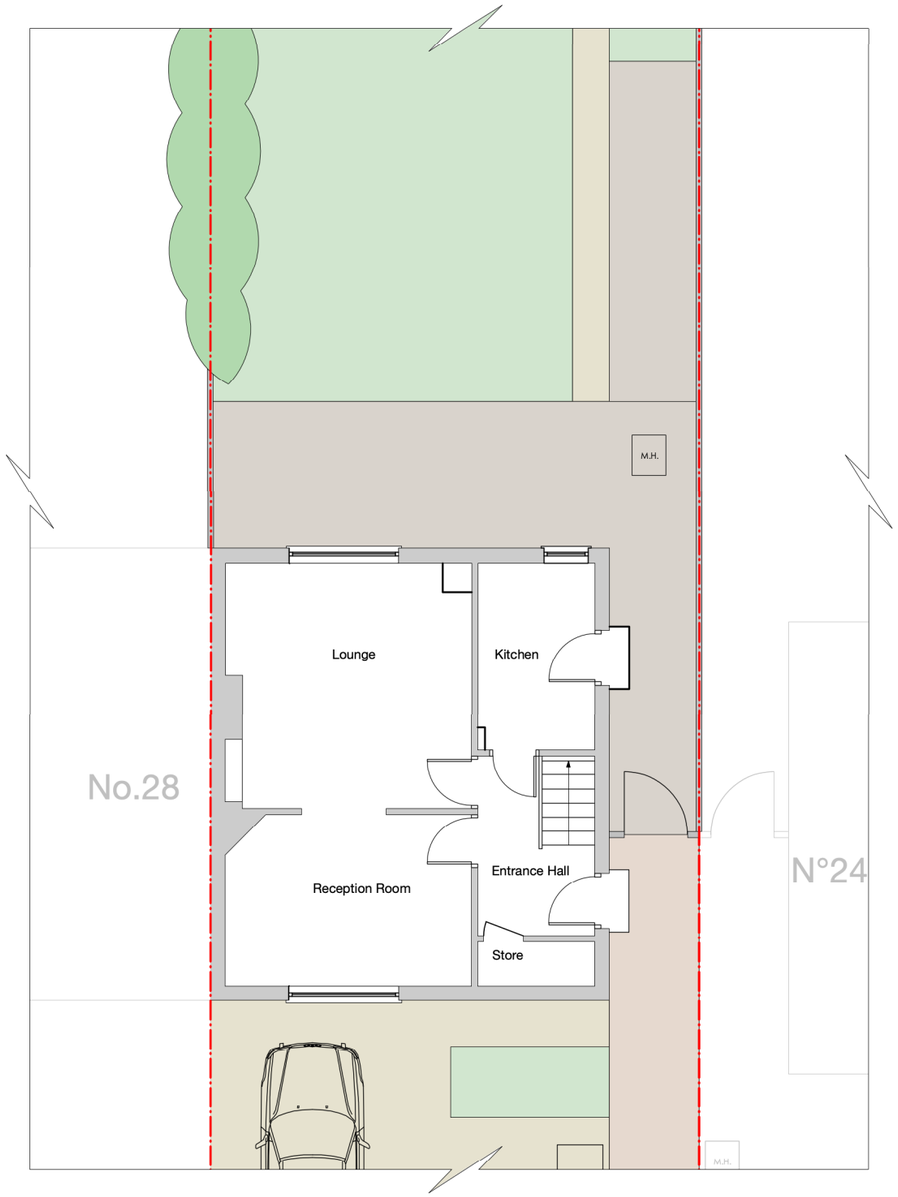
Project
26 Washington Road, London, SW13 9BH

Status
-

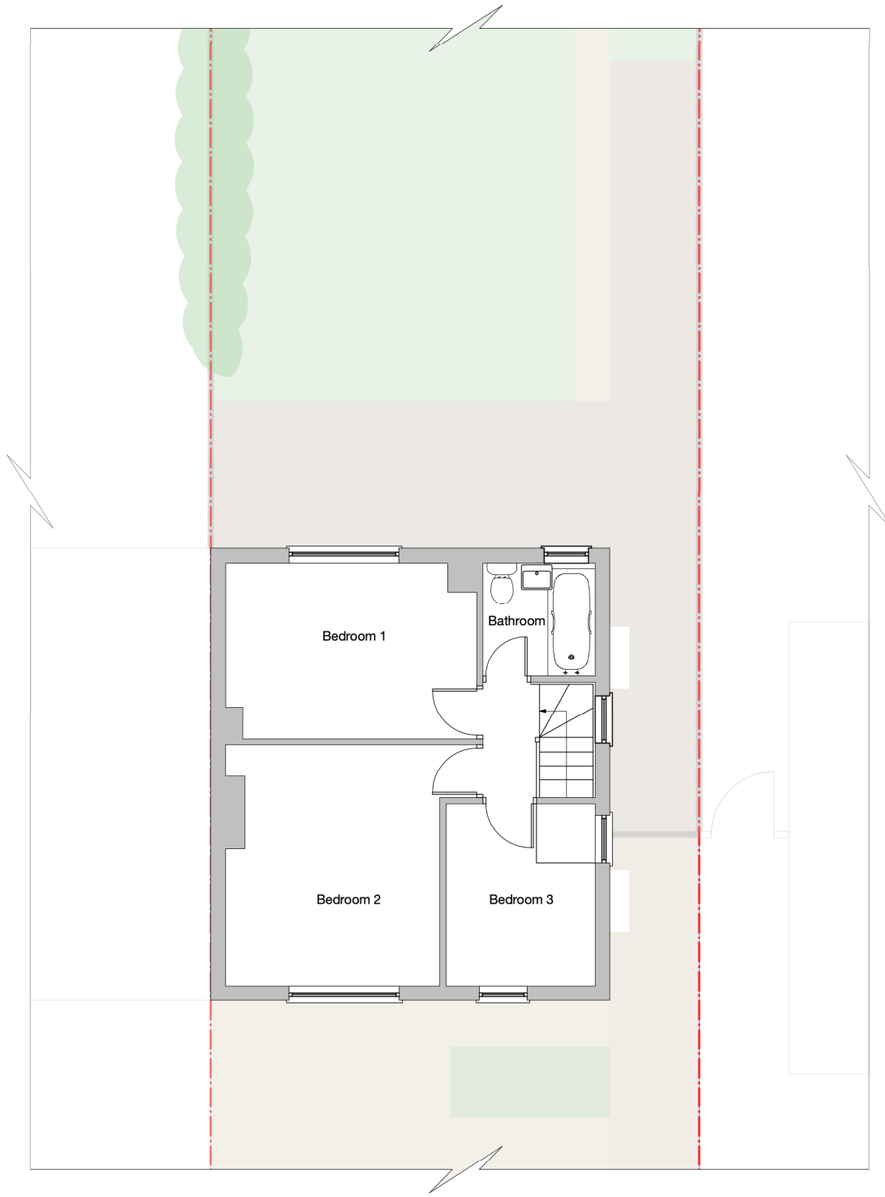
Drawing
Existing Block Plan

Drawing Number	Revision	Scale	Page size
127 - FP - 002		1:100	A3

0 0.5 1 1.5 2 3 4 5
SCALE 1:100



Existing Ground Floor Plan



Existing First Floor Plan

CHP Consultants Ltd

The Studio, Warren Close, SS6 7BD

Client
P. Killing

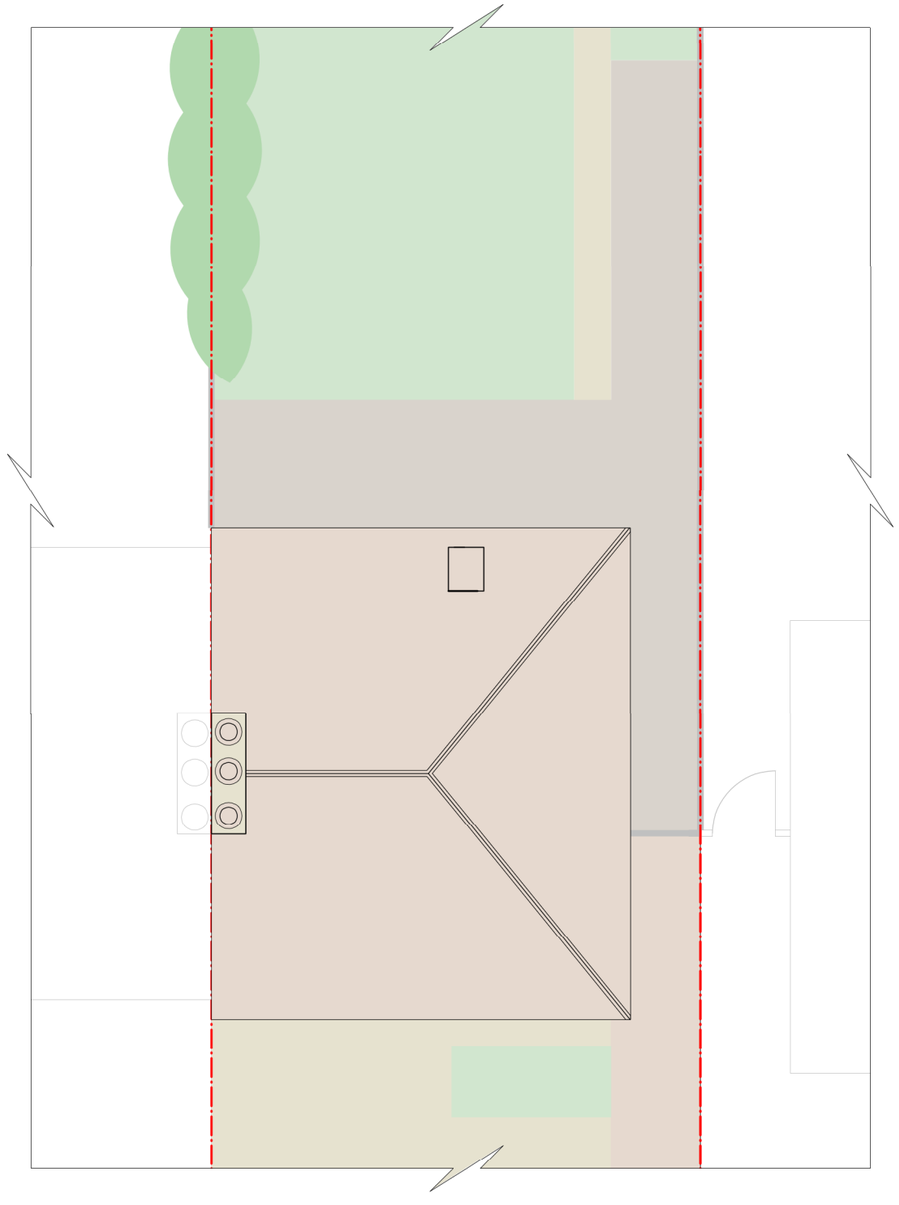
Project
26 Washington Road, London, SW13 9BH

Status
-

Drawing
Existing Plans

Drawing Number	Revision	Scale	Page size
127 - FP - 003		1:100	A3

0 0.5 1 1.5 2 3 4 5
SCALE 1:100



Existing Roof Plan

CHP Consultants Ltd

The Studio, Warren Close, SS6 7BD

Client
P. Killing

Project
26 Washington Road, London, SW13 9BH

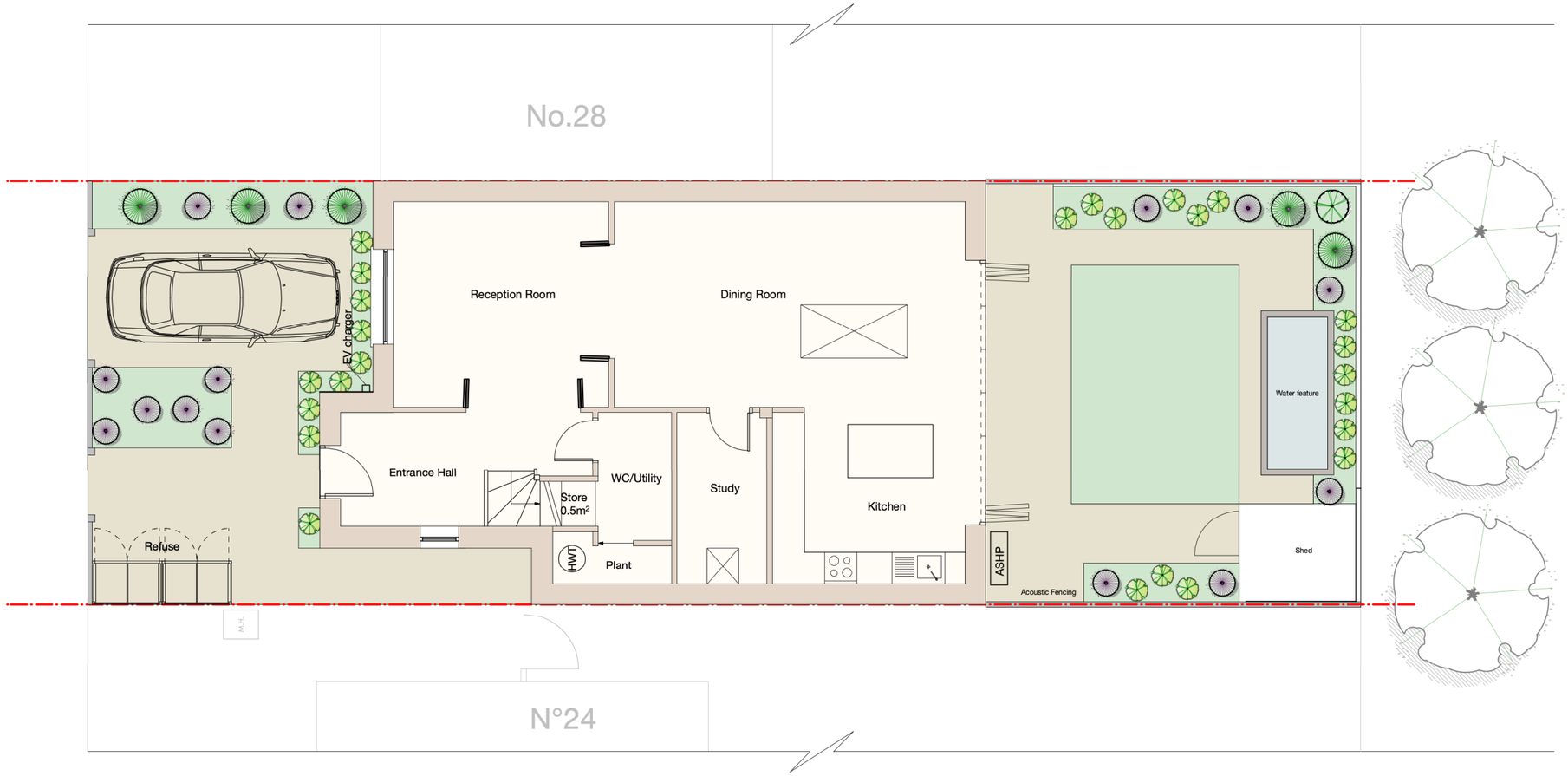
Status
-

Drawing
Existing Plans

Drawing Number	Revision	Scale	Page size
127 - FP - 004		1:100	A3

APPENDIX B – Proposed Layout

0 0.5 1 1.5 2 3 4 5
SCALE 1:100



CHP Consultants Ltd

The Studio, Warren Close, SS6 7BD

Client
P. Killing

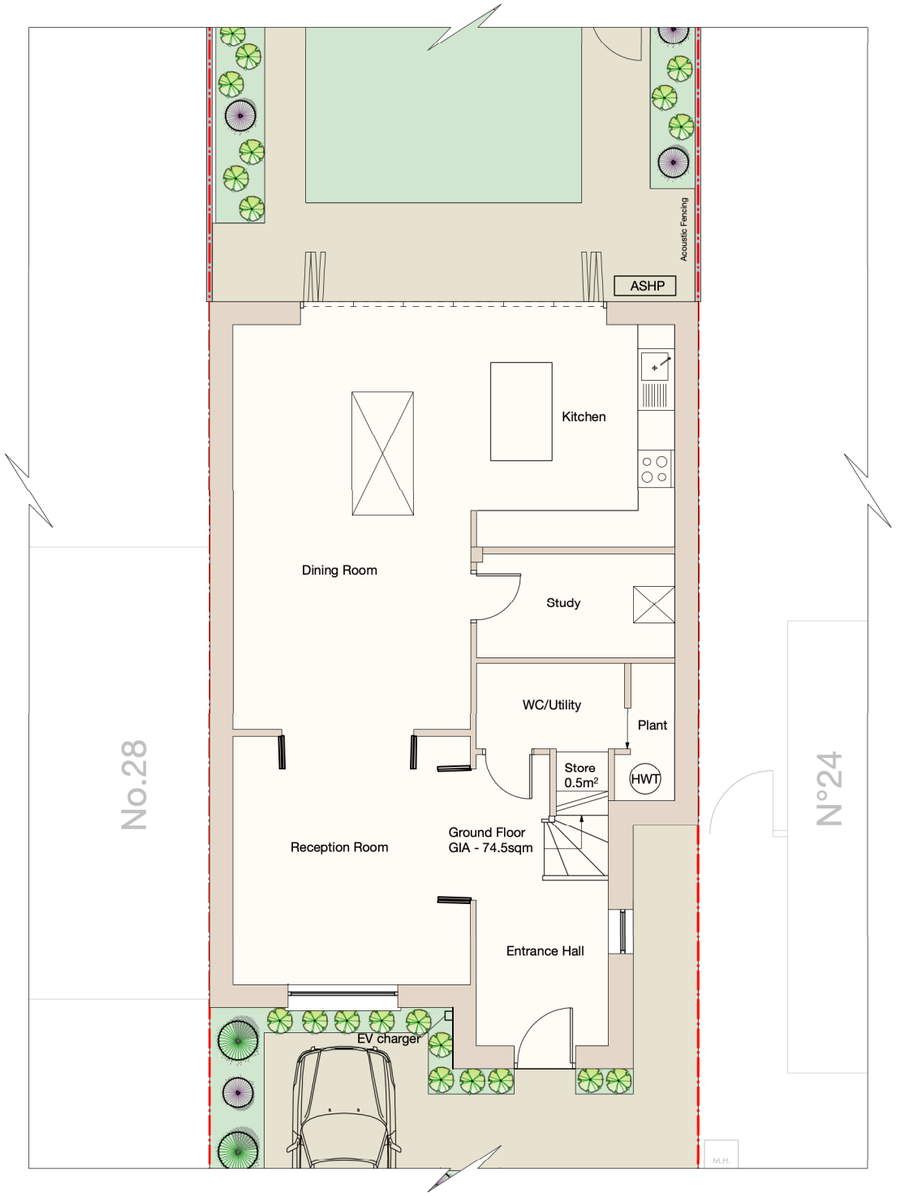
Project
26 Washington Road, London, SW13 9BH

Status
-

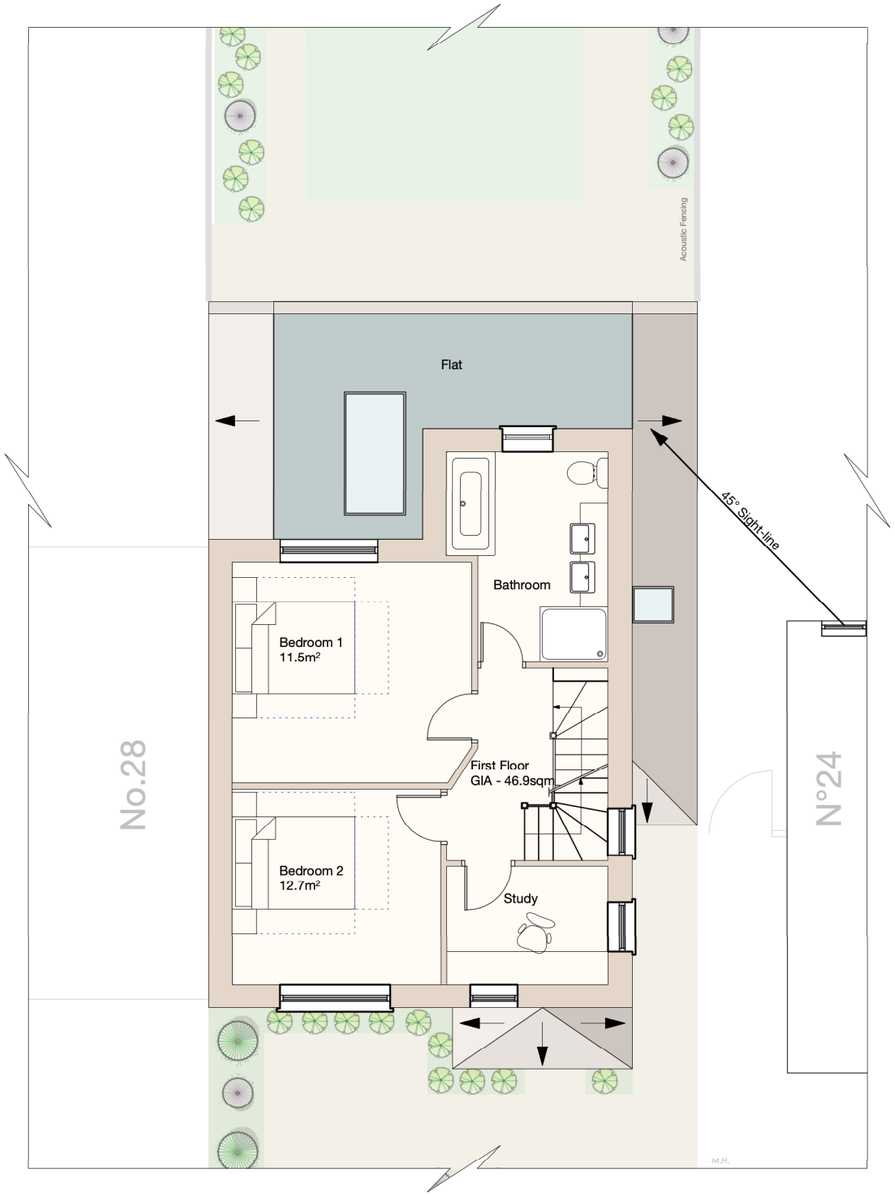
Drawing
Proposed Block Plan

Drawing Number	Revision	Scale	Page size
127 - FP - 006		1:100	A3

0 0.5 1 1.5 2 3 4 5
SCALE 1:100



Proposed Ground Floor Plan



Proposed First Floor Plan

CHP Consultants Ltd

The Studio, Warren Close, SS6 7BD

Client
P. Killing

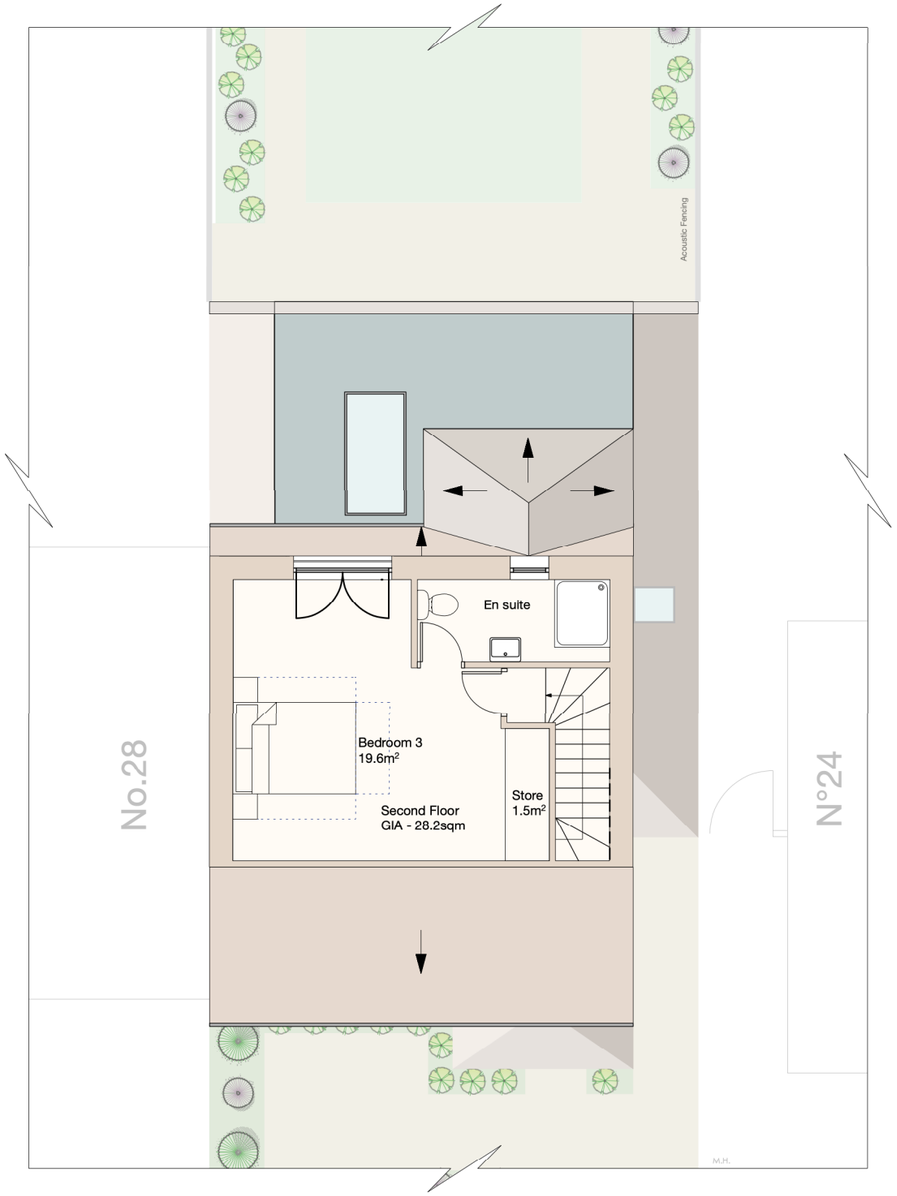
Project
26 Washington Road, London, SW13 9BH

Status
-

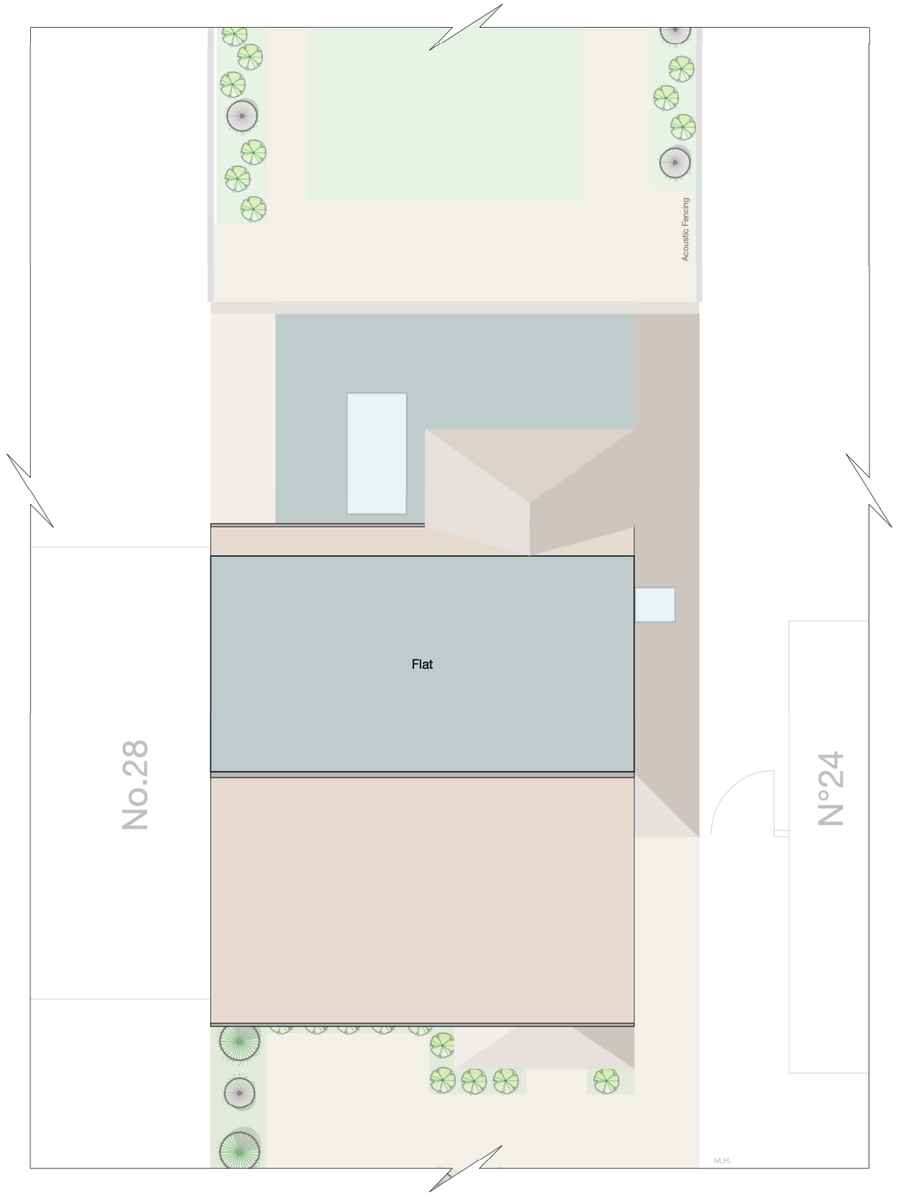
Drawing
Proposed Plans

Drawing Number	Revision	Scale	Page size
127 - FP - 007		1:100	A3

0 0.5 1 1.5 2 3 4 5
SCALE 1:100



Proposed Second Floor Plan



Proposed Roof Plan

CHP Consultants Ltd

The Studio, Warren Close, SS6 7BD

Client
P. Killing

Project
26 Washington Road, London, SW13 9BH

Status
-

Drawing
Proposed Plans

Drawing Number	Revision	Scale	Page size
127 - FP - 008		1:100	A3

APPENDIX C – Flood Mapping

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**522349/177310**	**9 Feb 2024 15:52**

Your selected location is in flood zone 3
– an area with a high probability of flooding.

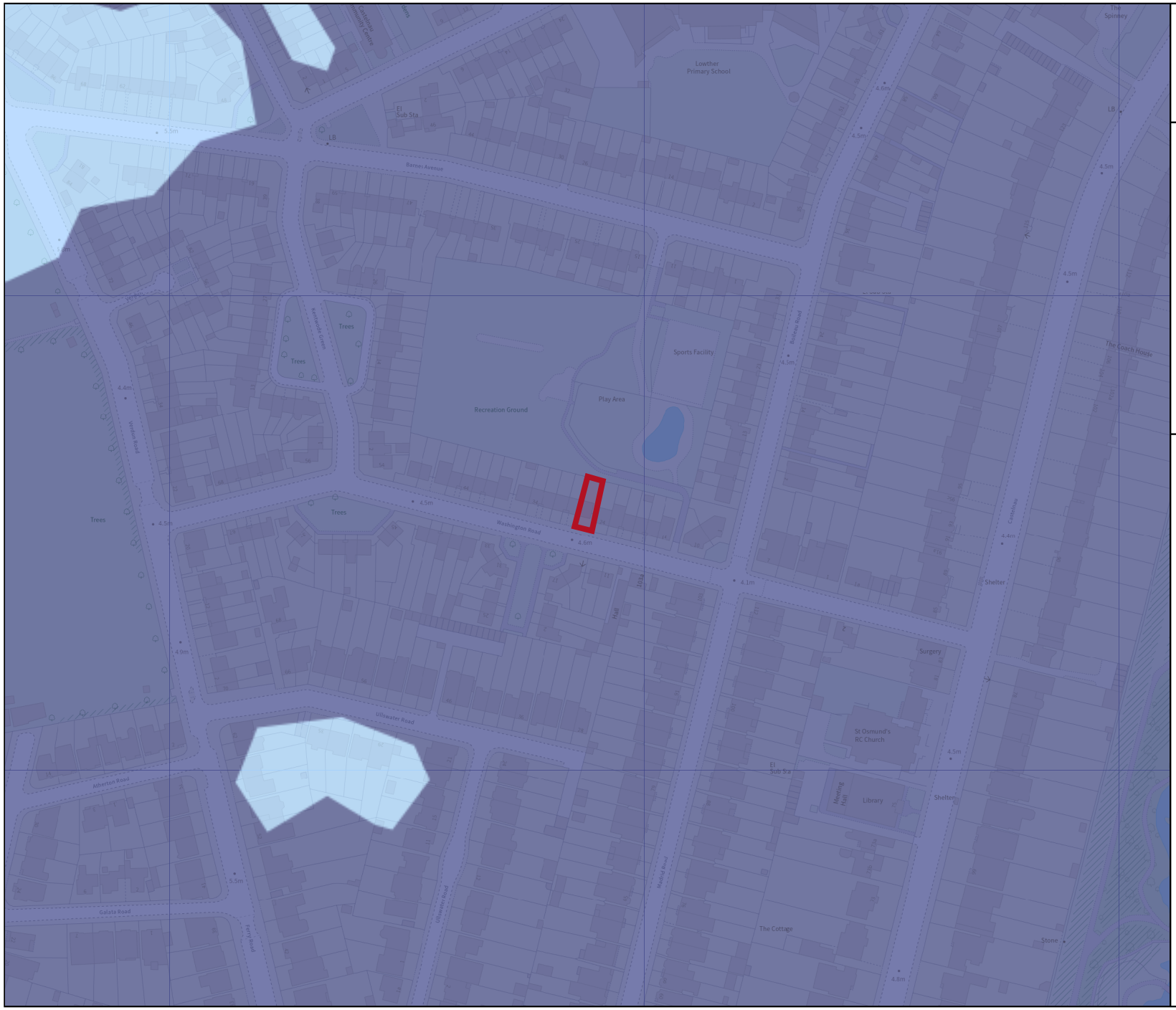
This means:

- you may need to complete a flood risk assessment for development in this area
- you should ask the Environment Agency about the level of flood protection at your location and request a Flood Defence Breach Hazard Map (You can email the Environment Agency at: enquiries@environment-agency.gov.uk)
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (find out more at www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
522349/177310

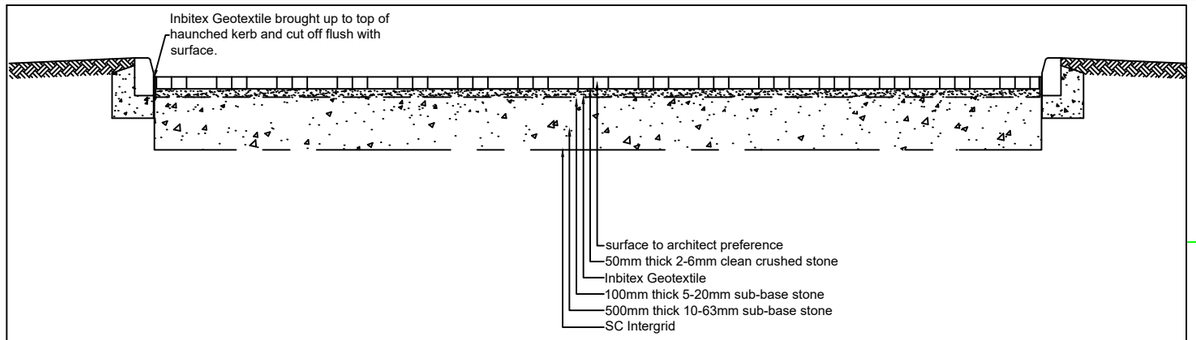
Scale
1:2500

Created
9 Feb 2024 15:52

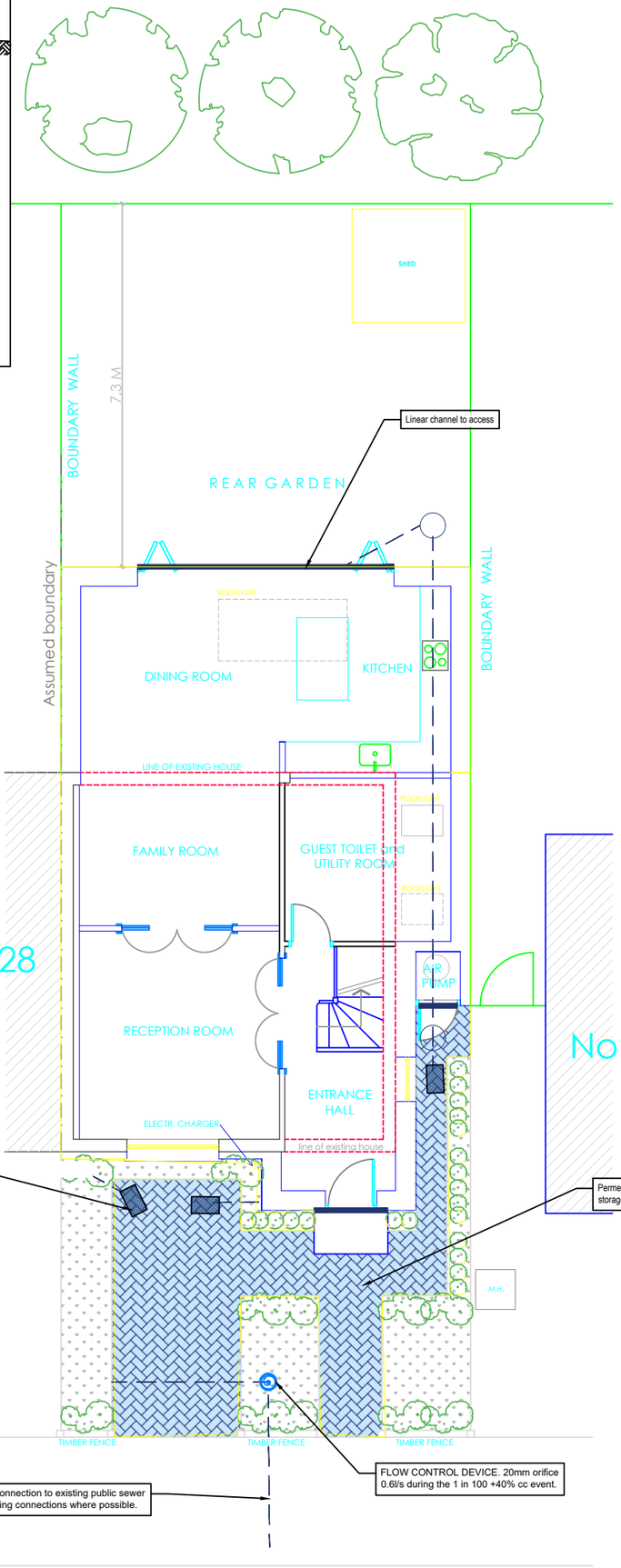
- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

APPENDIX D – Drainage Strategy Plan



TYPICAL SECTION THROUGH FORMPAVE AQUAFLOW ATTENUATION SYSTEM



DO NOT SCALE DRAWING -
IF IN DOUBT, ASK

GENERAL
1. Do not scale from drawing.
2. All dimensions are in metres, unless stated otherwise.
3. This drawing to be read & printed in colour.
4. This drawing to be read in conjunction with other contract drawings.

CONSTRUCTION
1. Works shall comply with the current Department of Transport Specification for Highway Works.
2. Filling of voids formed by site clearance operations shall be measured under Series 600 of the Specification.
3. Contractor is to ensure that all voids are to be filled with granular sub base material Type 1.
4. All hard material broken out under the Contract is to be disposed of to contractor's tip.

CDM (RISKS & HAZARDS)
1. Prior to commencement of construction the contractor is to liaise with all relevant statutory undertakers and protect / divert apparatus and to protect the workforce during the works. Any damage caused to the apparatus to be the responsibility of the contractor.
2. Contractor to undertake their own statutory plant checks on site prior to the commencement of excavation exercise.
3. The contractor is to make sure that any excavation should be adequately covered at night to protect both public and wildlife from becoming trapped.
4. Appropriate health and safety measures should be adhered to while working in close proximity to the existing overhead power lines.

DISCLAIMERS
1. The information contained in this drawing is based on a combination of OS and survey data provided by others and we shall not be liable for any inaccuracies or deficiencies.

permeable paving as attenuation

Flow Control device

Rev	Drawn	App'd	Date	Revision Description

Issue: PRELIMINARY

SYNTEGRA CONSULTING
Syntegra House, 63 Milford Road, Reading, RG1 8LG
Tel: 0118 4028520
mail@syntegragroup.com www.syntegragroup.com

Client: -

Project: 26 Washington Road

Title: DRAINAGE STRATEGY

Scale: 1:100 @ A1	Drawn By: AN
Date: Jan 2024	Checked By: AK

Drg. No. 23-12617-6001 Rev. -