elliottwood

Avalon House

Flood Risk Assessment and Sustainable Drainage Strategy

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Engineering a Better Society

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Document Control

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1. Executive Summary

Elliott Wood Partnership have prepared this Flood Risk Assessment and Sustainable Drainage Strategy report to support the full planning application for the proposed redevelopment at Avalon House, London, TW9 2JY, located within the London Borough of Richmond-upon-Thames (LBRUT).

The existing development comprises a three-storey commercial office building known as 'Avalon House' constructed in the early 2000's and accommodates 3,076m^2 (GIA) of Commercial (Class E) floorspace. The building is a multi-tenanted office building, with a shared central reception and core facilities accessed from the primary pedestrian entrance from Lower Mortlake Road. The site benefits from access to a shared internal vehicular road, which also provides access to the residential properties to the south, known as Tersha Street accessed from a driveway to Lower Mortlake Road.

The development proposals are to remove the existing roof and erection of a roof extension at fourth floor and rear extensions to floors ground - four to accommodate additional commercial floorspace (Class E), provision of rear and rooftop terraced amenity spaces, alterations to the ground floor entrance, recladding and remodelling of the façade, landscaping improvements to the rear carparking area, provision of end of journey and cycle parking facilities, associated building servicing and sustainability improvements, and other associated works.

This report demonstrates that the proposed development is at low risk of flooding from all potential sources, and that it can be occupied safely in the unlikely event of a peak flood event. It is considered that the information provided within this report satisfies the requirements of the National Planning Policy Framework (NPPF) 2023 and local policy.

It is proposed to attenuate surface water run-off from the development area within the extent of works boundary to a peak discharge rate of 8.37l/s for all storm events up to an including the 1-in-100 years event plus 40% climate change. The peak discharge rate provides a greater than 63.7% reduction for all modelled storm events, including the 1-in1-year return period.

The development will achieve this by utilising permeable surfacing with a porous sub-base within the vehicular entrance road and car parking bays, with a below ground geo-cellular attenuation tank within the vehicular access area to the parking bays. The surface water flow rate from the geo-cellular attenuation tank is restricted via a vortex flow control device, and the permeable paving is restricted via an orifice plate. The vortex flow control device has a peak discharge flow rate of 4 l/s, and the orifice plate has a peak discharge flow rate of 4 l/s. The flow restrictors incorporated within the blue roofs restrict discharge flow rate to 0.37 l/s for all blue roofed areas.

It is proposed to utilise the existing 225mm diameter connection to the Thames Water combined sewer beneath Tersha Street. This proposed connection will be subject to Thames Water's approval. Thames Water have confirmed that there is sufficient capacity in the existing network to serve the proposed development.

There are also several areas of proposed soft landscaping included within the scheme. It is anticipated that these areas of soft landscaping will not require positive drainage and will not require drainage connections for irrigation purposes. The proposed SuDS strategy draws on the CIRIA Four Pillars of SuDS by controlling and treating surface water runoff at source.

2. Introduction

Elliott Wood Partnership have prepared this Flood Risk Assessment (FRA) and Sustainable Drainage Strategy report to support the full planning application for the proposed redevelopment at Avalon House, London, TW9 2JY, located within the London Borough of Richmond-upon-Thames (LBRUT).

This report will assess the risk of flooding to the site and review the impact the proposed development will have with regards to flood risk to surrounding properties. This is in line with the requirements of the National Planning Policy Framework (NPPF) 2023.

The Flood Risk Mechanisms being considered as part of this Flood Risk Assessment (FRA) are as follows:

1. Rivers and Sea
2. Overland Flow
3. Groundwater
4. Flooding from Artificial Waterbodies
5. Infrastructure Failure / Sewer Flooding

Additionally, this report will explain the approach taken with regards to the below ground drainage strategy. It will evaluate the selection of SuDS devices and highlights how the drainage disposal hierarchy has been followed, in accordance with the GOV.UK Sustainable Drainage Systems: Non-statutory Technical Standards, London Local Plan 2021, and The London Borough of Richmond-upon-Thames (LBRUT) Local Plan (2018).

3. Site Context

3.1 Site Location

The site is located on the southern side of Lower Mortlake Road, on the corner of the junction with Tersha street. The full site address is Avalon House, 72 Lower Mortlake Road, Richmond upon Thames, London, TW9 2JY, and the site centre OS national grid reference is 518521 E, 175440 N. The total site boundary is 3,067m^2 (0.31ha), however, the extent of works area is 2,011m^2 (0.21ha).

The area surrounding the site consists of predominantly residential properties with green expansive land consisting of Kew Gardens, the Old Deer Park Sports Ground, Royal Mid-Surrey Gold Club and Richmond Athletic Associations to the north of the site

The closest train station to the site is North Sheen located approximately 0.6km east of the site, and the closest London underground tube station to the site is Kew Gardens located approximately 1.43km north-east of the site. The nearest watercourse to the site is the River Thames, which runs approximately 1.32km north-west of the site. The site is bound from the north by Lower Mortlake Road, to the east by Eminence House, to the west by Tersha Street, and to the south by residential properties.

The Lead Local Flood Authority (LLFA), responsible for all flood risk matters that do not relate directly to designated Main Rivers is the LBRUT. The Environment Agency (EA) are responsible for flood risk related to the nearby watercourses. The Statutory Sewerage Undertaker for the area is Thames Water (TW).

Figure 1: *Site location*

3.2 Existing Development

The site comprises a three-storey commercial office building known as 'Avalon House' constructed in the early 2000's and accommodates 3,076m² (GIA) of Commercial (Class E) floorspace.

The building comprises of ground and first floor as brick/stone massing, the existing third flood and large roof extents are clad in a grey metal. To the rear the roof has a dormer which is where the current plant is located. The 'entrance' bay is expressed with a semicircular extrusion which pops up and creates a useable meeting space at fourth floor.

The building is a multi-tenanted office building, with a shared central reception and core facilities accessed from the primary pedestrian entrance from Lower Mortlake Road.

The site benefits from access to a shared internal vehicular road, which also provides access to the residential properties to the south, known as Tersha Street accessed from a driveway to Lower Mortlake Road. This road provides access to two car parks with a combined 33 spaces to the rear of the building, with a larger 23 space car park directly adjacent to the south of the building, and a smaller 10 space car park to the west of Tersha Street. A small area with capacity for three visitor car parking spaces is also provided to the west of Tersha Street closer to the vehicular entrance point.

There are currently some external cycle lockers located to the rear of the building which can accommodate ten bicycles. There is one shower within the core space, with no dedicated end of journey facilities. An external substation is located within the eastern boundary of the site.

***Figure 2**: Existing Development (Front Elevation)*

3.3 Existing Site Topography

A topographical and measured building survey of the site was undertaken by Greenhatch Group in March 2023; this can be found in **Appendix A.**

The topographical survey highlights that levels towards the front of the building generally fall away from the structure and towards the public highway. The ground floor finished floor level for the existing structure is +6.71m AOD with the entrance level to the building being +6.70m AOD. Levels towards the rear of the building are relatively flat, with levels varying between +6.20m AOD and +6.90m AOD. Within the existing car parking area towards the rear of the building, levels fall towards existing surface water road gullies located at low points within the car park.

3.4 Underlying Site Geology and Hydrology

3.4.1 Geology

An intrusive site-specific ground investigation is yet to be completed on site. However, according to British Geological Survey (BGS) mapping, the site's bedrock geology is made up of clay, silt and sand which forms part of the London Clay Formation. BGS maps also suggest that the site is underlain by superficial deposits of sands and gravels, referred to as Kempton Park Gravel Members.

Available BGS borehole data in close vicinity of the site (approx. 50m east) appear to validate these anticipated ground conditions. From available borehole records (designated TQ17NE355 on the BGS GeoIndex maps) suggest that the expected ground conditions to be:

Down to 1.0m - Made Ground
1.0m to 7.5m – Flood Plain Gravel
7.5m to 10.0m – London Clay

3.4.2 Hydrology

From available BGS borehole records (designated TQ17NE355 on the BGS GeoIndex maps), it suggests that groundwater was encountered at a depth of 5.5mbgl which rose to a standing water level of 5.2mbgl. A site-specific ground investigation will still be required to confirm the depth of the exact groundwater below levels on site.

3.5 Critical Drainage Area

A Critical Drainage Area (CDA) is a specific area of significant flood risk, characterised by the amount of surface runoff that drains into the area, the topography, hydraulic conditions of the pathway (e.g., sewer, river system), and the receptors (people, properties, and infrastructure) that may be affected. The site is located within a CDA as defined by the LBRUT – Strategic Flood Risk Assessment Interactive Maps.

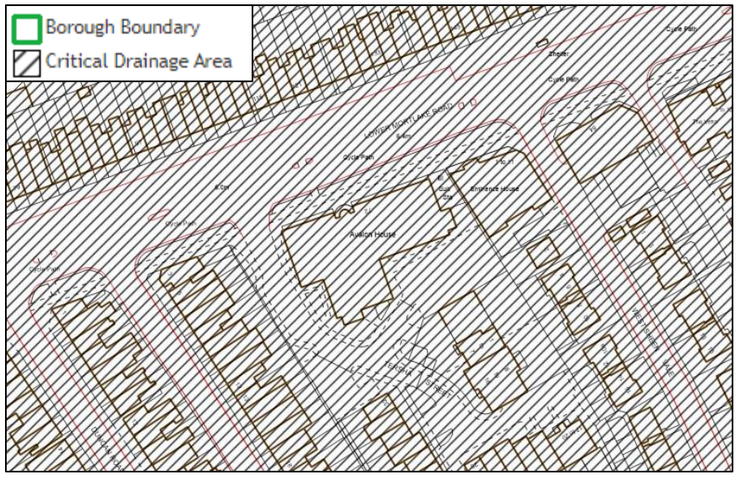

***Figure 3**: Extract from LBRUT SFRA Interactive Map – Fluvial and Tidal Flood Risk Map*

4. Existing Drainage

4.1 Thames Water Public Sewer

Thames Water is the principal sewerage provider for the area. A copy of the Thames Water asset maps is included within **Appendix B**. These show that the area is served by a network of foul and surface water sewers beneath Tersha Street and Lower Mortlake Road.

The sewer records show that there is a 300mm diameter foul water sewer beneath Lower Mortlake Road. They also show two surface water sewers (300mm and 450mm in diameter) beneath Lower Mortlake Road.

Beneath Tersha Street is a 225mm foul water sewer running northbound towards Lower Mortlake Road. A below ground CCTV drainage survey undertaken by Go Drainage Services Ltd. suggest that there is also a 100mm surface water sewer beneath Tersha Street serving residential properties to the south of Avalon House, alongside highway stormwater run-off. Conversations with Thames Water regarding the ownership of this surface water sewer beneath Tersha Street are ongoing.

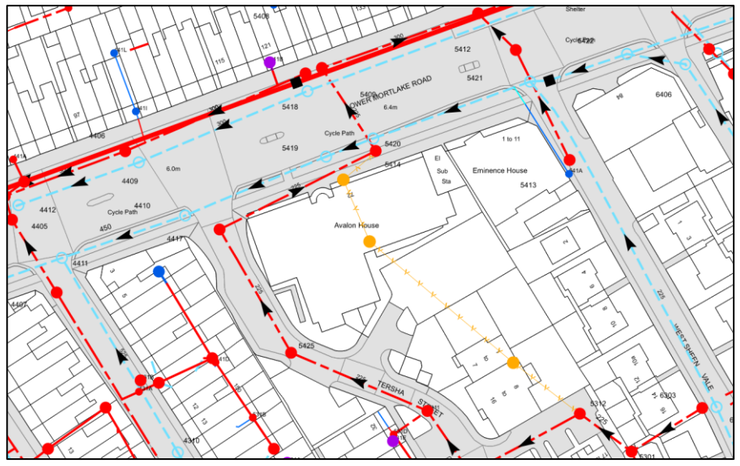

***Figure 4**: Extract from Thames Water Asset Records – Sewer Map*

4.2 Private Drainage

A below ground CCTV drainage survey was undertaken by Go Drainage Services Ltd. in April 2024. The full below ground drainage CCTV report produced by GO Drainage Services Ltd. can be found in **Appendix C**.

The CCTV survey shows the existing site to be served by a separate foul and surface water below ground drainage network which eventually discharges to the public foul and surface water public sewers respectively, beneath Tersha Street.

5. Existing Surface Water Run-off Rate

The surface water run-off rates for the existing site have been calculated using the Modified Rational Method equation below (based on CIRIA C697) and are shown in Table 1:

Q = 2.78C.i.A

Where Q = Existing peak runoff (l/s), C = non-dimensional runoff coefficient=1.0, I = Rainfall intensity (see table 1) and A = total catchment area being drained = 0.21ha

***Table 1**: Existing Surface Water Run-off Rates*

Return Period	Rainfall Intensity (mm/hr)	Existing Run-off Rates (l/s)
1 in 1 year	31.7	18.1
1 in 30 years	79.9	45.5
1 in 100 years	101.9	58.0
1 in 100 years + 40% Climate Change	142.6	81.2

Note that the rainfall intensities used in the above calculations have been based on average rainfall intensities for a 15-minute storm using the Wallingford Procedure. The existing run-off rates have been calculated assuming there are no current flow restrictions on surface water runoff leaving the site.

The calculations of the existing surface water runoff from the brownfield site can be found in **Appendix D.**

6. Proposed Development

6.1 Development Proposals

The development proposals are for the following works:

- Removing the existing roof, bringing the façade up one full storey, and constructing a sensitive roof extension at fourth floor in a pitched roof form.
- Extensions to the rear including a small two storey infill at the south-western corner of the building, along with an extension to the stair core to provide access to a roof terrace at third floor.
- Improvements to the ground floor to create a better front door and improve wayfinding to the building's lobby/reception space for the commercial offices above.
- Selected works to improve the primary façade including new windows at third floor, with a remodelled façade above in materials and finishes that complement the immediate vicinity.
- Provision of landscaped terrace spaces to floors two, three and four at the building's southern elevation.
- Comprehensive landscaping improvements to the rear car parking area including provision of new EV charging points, enhanced planting, permeable paving, and other SUDS improvements.
- Provision of end of journey facilities including a new dedicated external cycling parking area with PVs above.
- Associated building servicing and overall sustainability improvements.

Proposed floor plans and elevations can be found in **Appendix E**.

***Figure 5**: Proposed Development (Front Elevation)*

7. Flood Risk Assessment

7.1 Planning and Flood Risk Management Policy

7.1.1 Flood Risk Management Policy Summary

This FRA will assess the risk of flooding to the site and review the impact the proposed development will have with regards to flood risk to the surrounding properties. It is important to assess the flood risk posed to the development of this site from all sources of flooding, in accordance with National Planning Policy Framework 2023 (NPPF) requirements. The Flood Risk Mechanisms being considered as part of this Flood Risk Assessment (FRA) are as follows:

1) Rivers and Sea
2) Overland Flow
3) Groundwater
4) Flooding from Artificial Waterbodies
5) Infrastructure Failure / Sewer Flooding

This Flood Risk Assessment has been written in accordance with GOV.uk guidelines and the National Planning Policy Framework (NPPF). The following documents have been reviewed in preparation of this flood risk assessment:

- London Borough of Richmond-upon-Thames Strategic Flood Risk Assessment (SFRA)
- London Borough of Richmond-upon-Thames Surface Water Management Plan (SWMP)
- London Borough of Richmond-upon-Thames Preliminary Flood Risk Assessment (PFRA)
- London Borough of Richmond-upon-Thames Local Plan (2018)
- London Borough of Richmond-upon-Thames Local Plan – Draft for Consultation (2023)
- The London Plan (2021)
- London Regional Flood Risk Appraisal 2018
- GOV.uk Flood Risk Assessments: Climate Change Allowances guidance
- GOV.uk Flood Risk Maps

The NPPF states the following:

> *"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures."*

The London Plan Policy SI 12 states the following:

> "*Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses."*

The London Borough of Richmond-upon-Thames Local Plan (2018) Policy LP 21 states the following:

> *"All developments should avoid, or minimise, contributing to all sources of flooding, including fluvial, tidal, surface water, groundwater, and flooding from sewers, taking account of climate change and without increasing flood risk elsewhere. Development will be guided to areas of lower risk by applying the 'Sequential Test' as set out in national policy guidance, and where necessary, the 'Exception Test' will be applied. Unacceptable developments and land uses will be refused in line with national policy and guidance, the Council's Strategic Flood Risk Assessment (SFRA) and as outlined in the table below. In Flood Zones 2 and 3, all proposals on sites of 10 dwellings or more or 1000sqm of non-residential development or more, or on any other proposal where safe access/egress cannot be achieved, a Flood Emergency Plan must be submitted."*

The London Borough of Richmond-upon-Thames Local Plan (Draft for Consultation - 2023) Policy 8 states the following:

> *"All developments will need to be made safe for their lifetime and clearly demonstrate that they avoid, minimise or reduce contributing to all sources of flooding, including fluvial, tidal, surface water, groundwater and flooding from sewers; taking account of climate change and that they do not increase flood risk elsewhere."*

7.2 Flood Risk Vulnerability Classification

When considering the flood risk vulnerability, in accordance with the Annex 3 of the "Flood risk and coastal change" PPG, the site at its most conservative utilisation is considered "less vulnerable", due to the proposals comprising 'offices'.

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:

✔ Exception test is not required

X Development should not be permitted

Figure 6*: Flood risk vulnerability and flood zone 'incompatibility' table, taken from Gov.uk website*

7.3 Sequential and Exception Test

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 & 3 (areas with a medium or high probability of river or sea flooding), applying the Exception Test if required. The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

In accordance with Table 3 of the Planning Practice Guidance: Flood Risk and Coastal Change, the Exception test is not required for "less vulnerable" developments within Flood Zone 1. Therefore, it can be considered that the Sequential Test is also not required.

7.4 Sources of Potential Flooding

7.4.1 Fluvial and Tidal Flooding

In accordance with the GOV.uk flood maps for planning, the site is in Flood Zone 1 - land and property assessed as having less than a 0.1% (1 in 1,000) annual probability of river or sea flooding in any given year. Therefore, the risk of the development flooding from rivers and sea is '**low**'.

The Environment Agency (EA) Flood Map for Planning can be found in **Appendix F**.

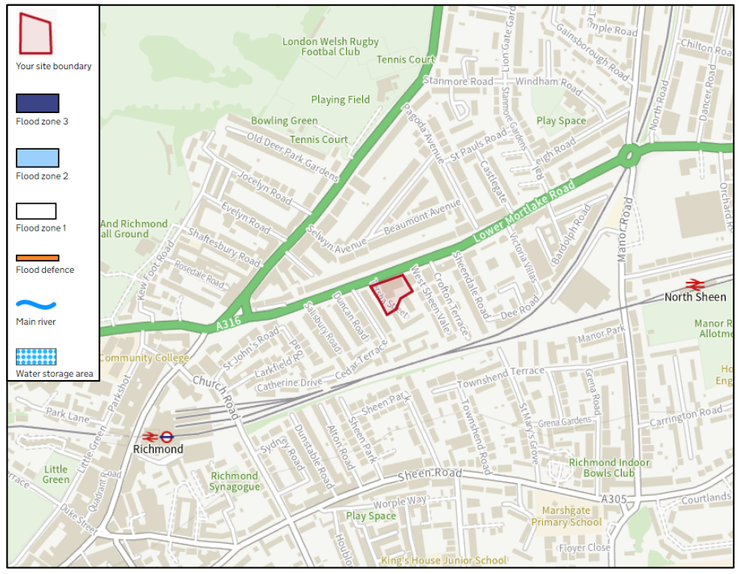

***Figure 7**: Extract of EA Flood Risk Map for Planning*

7.4.2 Surface Water Flooding and Overland Flow

Surface water flooding occurs when intense rainfall is unable to soak into the ground or enter drainage systems, because of blockages or breakages in water pipes or where the drainage capacity has been exceeded. The extent of surface water flooding will depend upon the rainfall event, the degree of saturation of the soil, the permeability of soils and the topography of the site.

A review of the GOV.uk flood risk from surface water maps indicates that the majority of the site is either at **'very low'** risk of surface water flooding (area that has less than 0.1% chance of flooding each year), or **'low'** risk of surface water flooding (area that has between 0.1% and 1% chance of flooding each year). There are small area of land to the south of building within the proposed car parking area that is a **'medium'** risk of surface water flooding (areas that have between 1% and 3.3% chance of flooding each year). This area coincides with the existing low point of the site where it is expected runoff from the site will pond in an exceedance event. To mitigate against surface water ponding, levels on site will be designed to route surface water away from the building and towards strategically placed surface water drainage. This will increase the buildings resilience to flooding from overland flow. The incorporation of a well-designed SuDS scheme will also provide a betterment against the existing scheme.

Although the site is within a Critical Drainage Area, the GOV.uk Flood Risk from Surface Water: Water Velocity at Medium Risk Scenario illustrates that the primary overland flow route does not run near the site. The site is not facing the primary overland flow route, and as such, surface water flooding from overland flow does not pose a risk to the site.

After review of the above information, the risk of flooding from overland surface water flow is considered to be **'low'**.

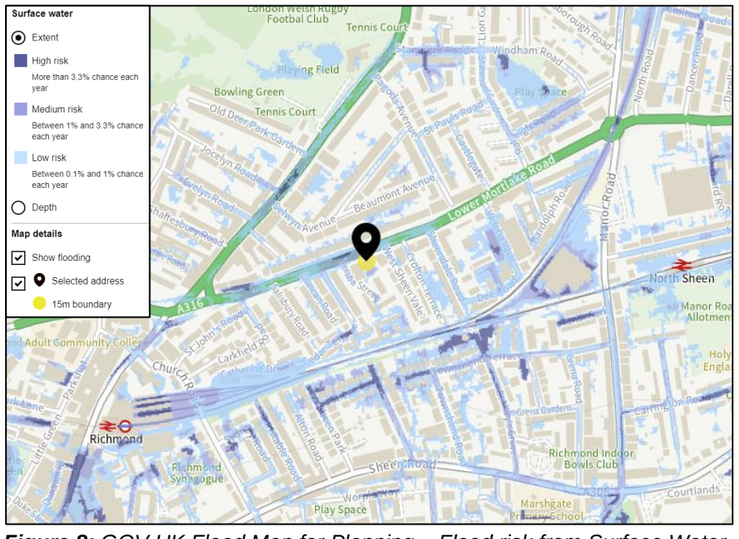

***Figure 8:** GOV.UK Flood Map for Planning – Flood risk from Surface Water*

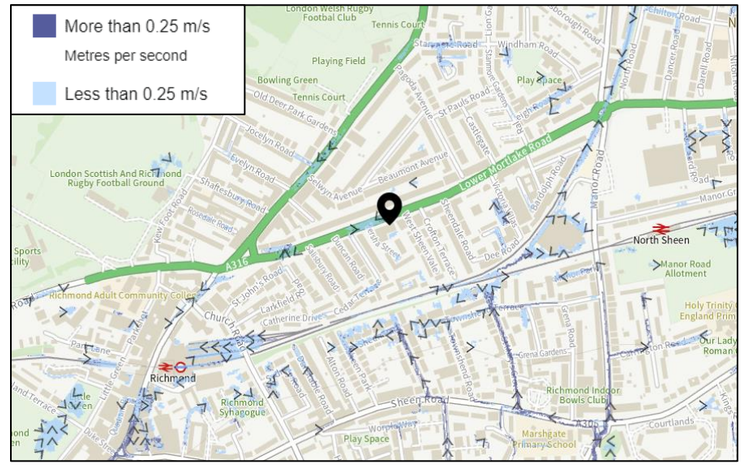

***Figure 9:** GOV.UK Flood Maps for Planning – Flood Risk from Surface Water: Water Velocity in a Medium Risk Scenario (1% chance each year)*

7.4.3 Groundwater Flooding

Groundwater flooding can occur following an extended prolonged period of low intensity rainfall. The future risk from this source is more uncertain than surface water as climate change predictions indicates that although sea levels will rise, thus possibly raising groundwater levels, overall summer rainfall will decrease, therefore having a long-term effect of lowering the groundwater levels. However, long periods of wet weather are predicted to increase, and these are the type of weather patterns that can cause groundwater flooding to occur.

The LBRUT SFRA highlights that the site lies within an area of increased potential for elevated groundwater. It is also noted within the LBRUT SFRA that the site is at high risk (greater than 75%) for the susceptibility to groundwater flooding. However, there are no proposals for the construction of a basement, and it is proposed that the majority of the external area for the development will be paved. This will form a barrier below ground and prevent the emergence of groundwater.

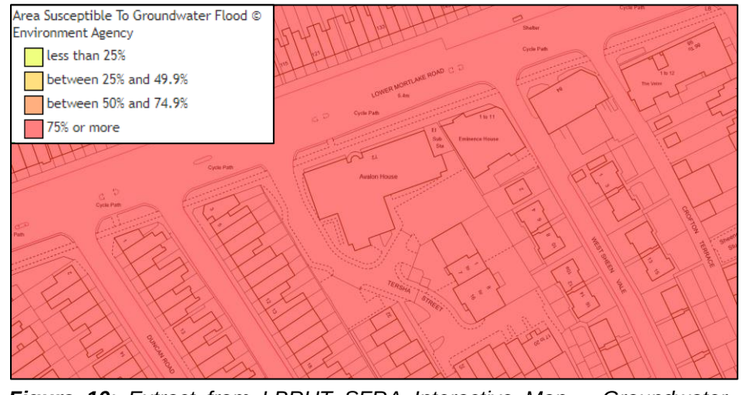

***Figure 10**: Extract from LBRUT SFRA Interactive Map – Groundwater, Sewer & Artificial Flooding Risk Map: Area Susceptible to Groundwater Flooding*

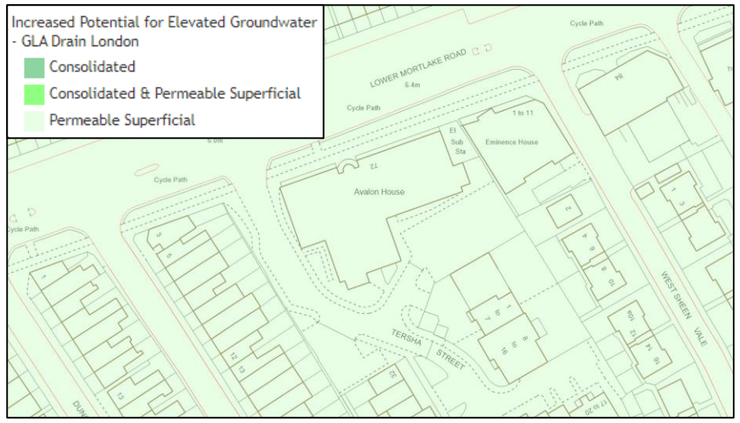

***Figure 11**: Extract from LBRUT SFRA Interactive Map – Groundwater, Sewer & Artificial Flooding Risk Map: Increased Potential for Elevated Groundwater*

7.4.4 Flooding from Artificial Waterbodies

Reservoir Flooding

Reservoirs are artificially created lakes that are usually formed by building a dam across a river. If one of the dams failed then water could escape from the reservoir, resulting in land or property being flooded.

The Environment Agency has mapped areas which could be subject to flooding in the event of reservoir failure. The flood map shown in ***Figure 12*** illustrates that the site not at risk of flooding from reservoirs when river levels are normal, but that it is at risk of flooding when there is also flooding from rivers. The flood map states that there are 9 reservoirs which could affect the area of the site: Brent (aka Welsh Harp Reservoir), Queen Elizabeth II, Queen Mary, Queen Mother, Staines North, Staines South, Walton – Bessborough, Walton – Knight, and Wraysbury.

The consequence of flooding occurring as a result of reservoir failure is considered to be significant, as it can result in rapid inundation of water with little or no warning. It should be noted that the reality of a flood occurring due to a reservoir failure is considered to be extremely low. Reservoirs must be properly maintained and, in this case, will be regulated under the Reservoirs Act 1975. This legislation is enforced by the Environment Agency which requires reservoirs to be routinely inspected and maintained to an appropriate standard. Additionally, there has been no loss of life in the UK from reservoir flooding since 1925. The LBRUT SFRA considers 'the probability of a structural breach [as] low'. Moreover, the London Regional Flood Risk Appraisal 2018 (London RFRA) state that 'reservoir flooding is extremely unlikely to happen'.

Following review of the relevant information, the risk of flooding from reservoirs is considered to be **low**.

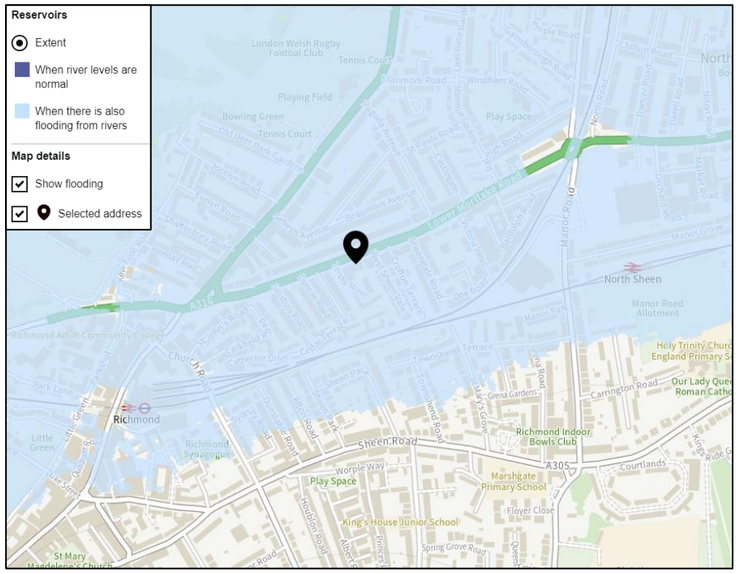

***Figure 12:** GOV.UK Flood Map for Planning – Flood risk from reservoirs*

Canal Flooding

The nearest canal to the site is the Grand Union Canal which is located approx. 1.95km north of the site. The LBRUT SFRA states 'if the application site is within 100m of an existing canal, the applicant must assess if any failure of the canal structure could result in flooding of the development site'. Because our structure is considerably greater than 100m from any canal, in the event of a breach of the canal bank is very unlikely to pose a flood risk to the site. The risk of flooding from a canal failure is therefore considered to be low.

7.4.5 Infrastructure Failure and Sewer Flooding

Thames Water Mains Failure

A copy of the Thames Water asset maps is included in **Appendix B.**

The asset maps show that there are two distributions main located beneath Lower Mortlake Road. Thames Water asset records show that these distribution mains are 4" and 6" in diameter respectively. There is also a distribution main located beneath Tersha Street. Thames Water asset record show this to be 110mm in diameter. Due to their size, the risk of the distribution main bursting is considered low, however, should they burst, the water will follow the overland flow route away from the building, and therefore the potential flood risk posed to the site from water main failure is low.

Based on the above, the site is considered to be at **'low'** risk of flooding from a potential water main burst.

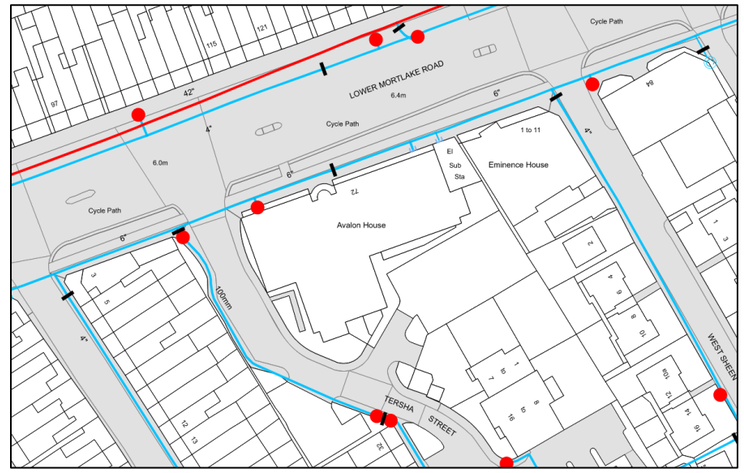

***Figure 13:** Extract from Thames Water Asset Records – Water Mains Map*

Thames Water Public Sewer Failure

A copy of the Thames Water asset maps is included in **Appendix B.** These show that the area is served by a network of foul and surface water sewers within Lower Mortlake Road and Tersha Street.

Thames Water are responsible for operating and maintaining their sewer infrastructure, therefore the likelihood of surcharge due to blockages is expected to be low. The flood records held by Thames Water as of May 2023 indicate that there have been no incidents of flooding in the area as a result of surcharging public sewers. Thames Water Sewer Flooding History Enquiry can be found in **Appendix G**.

Within the LBRUT SFRA interactive Maps, its suggest that the sight falls within an area that has reported between 0 to 10 incidents of sewer flooding. Equally, within the Surface and Fluvial Water Flooding Incidents Map in the LBRUT PFRA, there are no records of flooding for the site or any area within its immediate vicinity. However, Due to the SFRA and PFRA being slightly outdated and based on postcodes, it has been assumed that Thames Water records are more accurate and as a result the site and its surrounding areas have no records of flooding due to surcharging public sewers.

As a result, the risk of flooding from infrastructure and sewer failure is considered to be '**low'**.

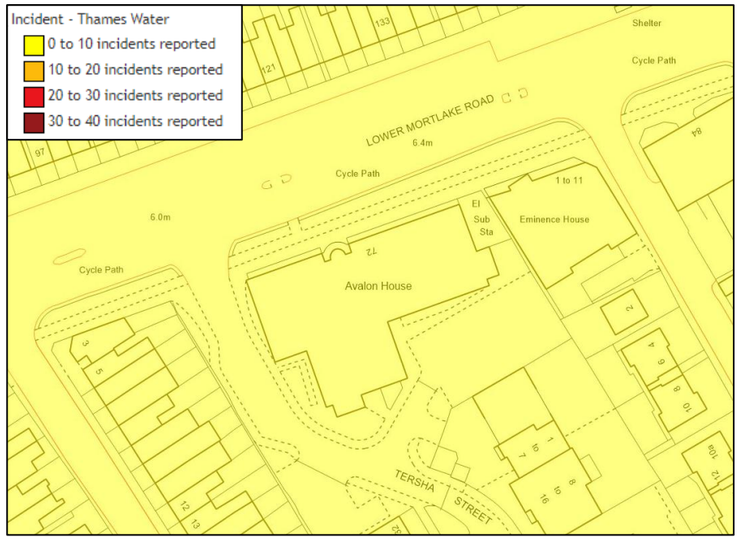

***Figure 14**: Extract from LBRUT SFRA Interactive Map – Groundwater, Sewer & Artificial Flooding Risk Map: Incident – Thames Water*

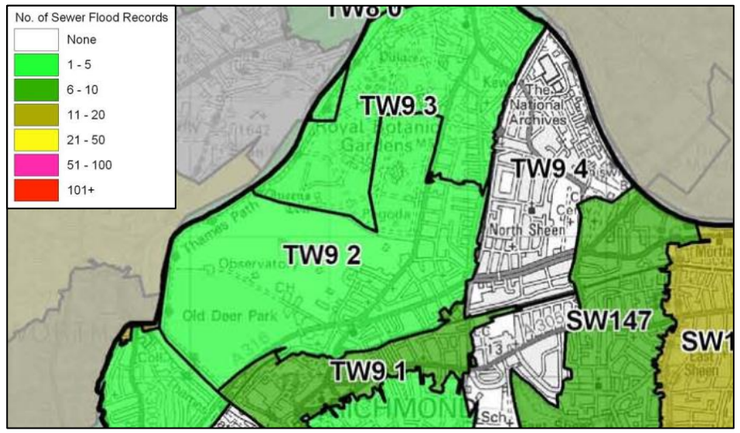

***Figure 15**: Extract from LBRUT PFRA – Figure 3: Sewer Flooding Incidents*

Private Drainage

The full below ground drainage CCTV report produced by GO Drainage Services Ltd. can be found in **Appendix C**.

The existing private below ground drainage network outfalls to public sewers are proposed to be reused, with the rest of the network to be abandoned. The CCTV survey undertaken confirms that the existing drainage network outfalls are in a suitable condition for reuse, and as a result, the risk of flooding from private drainage failure is considered to be '**low'**.

8. Proposed Drainage and SuDS

8.1 Planning and SuDS Policy Summary

Surface water will be managed on site using sustainable drainage techniques in accordance with the National Planning Policy Framework (NPPF), the London Plan and the London Borough of Richmond-upon-Thames Sustainable Drainage policy.

The London Borough of Richmond-upon-Thames Local Plan Sustainable Drainage Policy LP 21 (2018) states the following:

> *"Applicants will have to demonstrate that their proposal complies with the following:*
>
> 1. *A reduction in surface water discharge to greenfield run-off rates wherever feasible*
> 2. *Where greenfield run-off rates are not feasible, this will need to be demonstrated by the applicant, and in such instances, the minimum requirement is to achieve at least a 50% attenuation of the site's surface water runoff at peak times based on the levels existing prior to the development."*

The London Borough of Richmond-upon-Thames Local Plan (Draft for Consultation - 2023) Policy 8 states the following:

> *"The Council requires the use of Sustainable Drainage Systems (SuDS) in all development proposals to manage surface water runoff as close to its source as possible, using the most sustainable solutions to reduce runoff volumes and rates. Ideally, all surface water should be managed on site. The development must not increase flood risk elsewhere and where possible reduce flood risk overall. Applicants will have to demonstrate that their proposal complies with the following:*
>
> 1. *A reduction in surface water discharge to greenfield run-off rates wherever feasible.*
> 2. *Where greenfield run-off rates are not feasible, this will need to be demonstrated by the applicant, and in such instances, the minimum requirement is to achieve at least:*
>   a. *a runoff rate of 2 l/s or below, or*
>   b. *a 50% attenuation of the site's surface water runoff at peak times based on the levels existing prior to the development."*

The following drainage hierarchy has been considered:

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

8.2 SuDS / Surface Water Drainage

8.2.1 Appraising the use of Rainwater Re-Use

It is not proposed to use rainwater harvesting techniques for the scheme due to the limited space within the building for an appropriately sized tank, and the additional complexity involved with the routing of duplicate water supplies within the proposed building. The demand on the potable water supply will be reduced as much as possible through the use of low flow appliances.

8.2.2 Appraising the use of Infiltration Techniques

The underlying geology indicates that it is likely to comprise clay. Based on the above, infiltration has not been deemed feasible for this site.

8.2.3 Appraising the use of Open Water Features

As the site is located within an urban area and the building occupies the majority of the site it is not feasible to provide any meaningful open water features such as basins, ponds, filter strips or swales.

8.2.4 Appraising Draining to a Watercourse

There are no nearby accessible water courses, therefore surface water generated from the development will discharge to the local Thames Water sewer network, at a restricted rate.

8.2.5 Appraising the use of Green / Blue Roofing

As the proposed building takes up large proportion of the site area, it is proposed to include blue roofs on both the second and third level terraces, alongside the roof area. A blue roof system restricts surface water at the rainwater outlets and provides temporary attenuation at high level through the use of layer of geocellular crates. A blue roof manages surface water closer to source (in line with CIRIA guidance) and provides attenuation that would otherwise be required below ground. Within smaller roof areas (above the eastern stairwell, and bike storage areas) green roofs have also been incorporated. During dry weather periods green roofs can capture the first few millimetres of rainfall, attenuate it on site and slow down surface water flow rates to the sewer network. Where green roofs are accessible or will be overlooked, they can provide an amenity benefit as they provide an aesthetically pleasing environment amongst an urban landscape. Green roofs also provide an area of biodiversity and reduce the urban heat island effect.

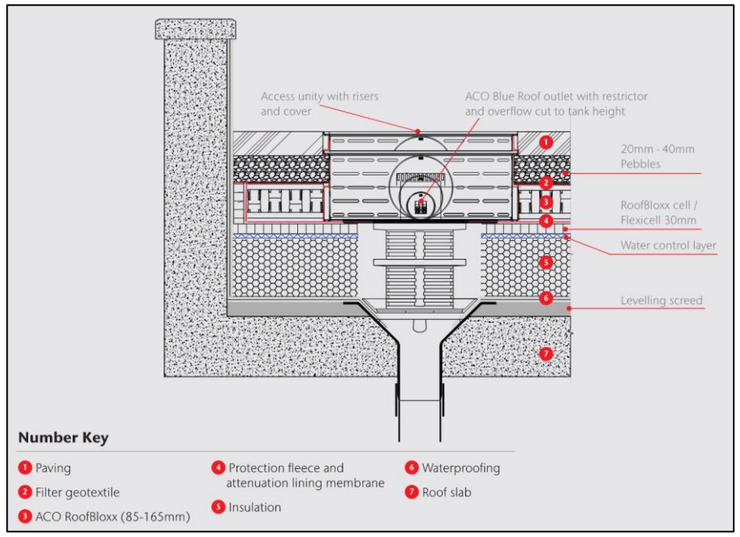

***Figure 16**: Typical Inverted Blue Roof Construction (Source: ACO Technologies Plc.)*

8.2.6 Appraising the use of Permeable Surfacing

The proposed vehicular entrance and car parking bays are proposed to incorporate permeable surfacing with a porous sub-base. Surface water run-off in this area, and the associated access road and external hardstanding areas will drain to these permeable surfaces.

8.2.7 Appraising the use of Below Ground Attenuation

As other SuDS techniques such as open water features, infiltration, and rainwater re-use have not been deemed feasible, surface water attenuation will also be required in the form of a below ground geocellular attenuation tank within vehicular parking area.

8.3 Evaluation of SuDS Techniques

The evaluation of SuDS is demonstrated in ***Table 2***.

***Table 2**: Evaluation of SuDS Techniques*

SuDS Techniques	Y/N	Comment
Blue / Green Roof	Y	Both blue and green roof have been proposed on this development. Blue roofs have been proposed on both the second and third level terraces, alongside the roof area. Within smaller roof areas (above the eastern stairwell, and bike storage areas) green roofs have also been incorporated.
Rainwater Reuse	N	Rainwater reuse is not proposed for the scheme due to the limited space required for an appropriately sized tank, and the additional complexities involved with the routing of duplicate water supplies within the proposed building.
Basin & Ponds	N	The site is located within an urban area, as such there is no feasible location or space for a detention basin or pond.
Filter Strips & Swales	N	Filter strips and swales are not appropriate due to there being no suitable location on site or space for open water features.
Infiltration Devices	N	The underlying ground conditions of the site area are not conducive to infiltration and therefore discharge to the ground via infiltration is not deemed feasible.
Permeable Surfaces	Y	The proposed vehicular entrance and car parking bays are proposed to incorporate permeable surfacing with a porous sub-base.
Tanked Systems	Y	It is proposed to use a below ground surface water geocellular attenuation tank within the vehicular car parking area.
Draining to Watercourse	N	There are no nearby accessible watercourses.

8.4 Proposed Surface Water Drainage Strategy

8.4.1 Greenfield Run-off Rate

In line with the London Plan (March 2021) Policy SI13, 'development proposals should aim to get as close to greenfield run-off rates as possible depending on site conditions.' Greenfield runoff is the surface water runoff that would occur from the site in its undeveloped and undisturbed state'. The HR Wallingford "Greenfield runoff estimation for sites" available at uksuds.com has been used to determine the greenfield runoff rate for the total site area. The greenfield run-off rate calculations can be found in **Appendix H**.

***Table 3:** Greenfield Runoff rate estimations (from HR Wallingford online tool)*

Return Period	Greenfield Run-off Rate (l/s)
Qbar	0.32
1 in 1 year	0.27
1 in 30 years	0.73
1 in 100 years	1.02

8.4.2 Proposed Surface Water Discharge Rate

As illustrated in **Table 3**, greenfield runoff rates are prohibitively low and would lead to an increase in flood risk if proposed to restrict surface water run-off from the proposed development at this rate.

The area breakdown within the sites extent of works is illustrated within ***Table 4***

***Table 4:** Proposed Site Area Breakdown*

Proposed Site Area Breakdown	Area (m^2)
Blue Roof Catchment Area	534m^2
Green Landscaping Area	175m^2
Area To Be Attenuated via Below Ground Geocellular Tanks	634m^2
Permeable Paving Catchment Area	668m^2
Total Extent of Works Area	**2011m^2**

The development will utilise both blue and green. Blue roofs have been proposed on both the second and third level terraces, alongside the roof area. Within smaller roof areas (above the eastern stairwell, and bike storage areas) green roofs have also been incorporated. Blue roof flow rate calculations provided by ACO Technologies Plc. can be found in **Appendix I**. The flow restrictors incorporated within the blue roofs restrict discharge flow rate to 0.37l/s for all blue roofed areas.

It is also proposed to utilise permeable surfacing with a porous sub-base within the vehicular entrance road and car parking bays, with a below ground geo-cellular attenuation tank within the vehicular access area to the parking bays. The surface water flow rate from the geo-cellular attenuation tank is restricted via a vortex flow control device, and the permeable paving is restricted via an orifice plate. The vortex flow control device has a peak discharge flow rate at 4 l/s, and the orifice plate has a peak discharge flow rate at 4 l/s.

There are also several areas of proposed soft landscaping included within the scheme. It is anticipated that these areas of soft landscaping will not require positive drainage and will not require drainage connections for irrigation purposes.

It is proposed to attenuate surface water run-off from the development area within the extent of works boundary to a peak discharge rate of 8.37l/s for all storm events up to an including the 1-in-100 years event plus 40% climate change. The peak discharge rate provides a greater than 63.7% reduction for all modelled storm events, including the 1-in-1-year return period.

It is considered that whilst the greenfield runoff rate has not been achieved, the proposed discharge rates for each return period have been significantly reduced over the pre-development situation and will reduce flood risk both on site and downstream. The proposed SuDS strategy draws on the CIRIA Four Pillars of SuDS by controlling and treating surface water runoff at source.

Refer to **Appendix J** for the proposed below ground drainage drawing and **Appendix K** for MicroDrainage hydraulic calculations.

Table 5: *Pre and Post Development Discharge Rate Comparison*

Return Period	Existing Run-off Rate (l/s)	Greenfield Run-off Rate (l/s)	Proposed Run-off Rate (/s)	Percentage Betterment on Existing Run-off Rate
1 in 1 year	18.1	0.27	6.57	63.7%
1 in 30 years	45.5	0.73	8.07	82.3%
1 in 100 years	58.0	1.02	8.17	85.9%
1 in 100 years + 40% Climate Change	81.2		8.37	89.7%

8.4.3 Proposed Surface Water Outfall

It is proposed to utilise the existing 225mm diameter connection to the Thames Water combined sewer beneath Tersha Street. This proposed connection will be subject to Thames Water's approval. Thames Water have confirmed that there is sufficient capacity in the existing network to serve the proposed development. Thames Water confirmation of sufficient capacity letter can be found in **Appendix L**.

8.5 London Borough of Richmond-upon-Thames – The London Sustainable Drainage Proforma

To assess the approach to water quantity and water quality for a new development, The London Borough of Richmond-upon-Thames (LBRUT) require an LLFA Technical Assessment Proforma to be completed. Please refer to **Appendix M** for the completed SuDS proforma.

8.6 Proposed Foul Water Drainage Strategy

All foul water drainage from the site will, where possible, drain to the existing external foul water manhole on site via gravity, before discharging to the public foul water sewer beneath Tersha Street.

9. Pollution Prevention and Surface Water Treatment

Pollution control and treatment has been developed in line with the recommendations and guidance within the CIRIA SuDS Manual C753.

The Simple Index Approach has been used to evaluate the site's pollution hazards and proposed mitigation. The Simple Index Approach assigns pollution indices to different land use classifications and mitigation indices to SuDS elements. Depending on whether surface water is being discharged to the ground or to surface waters, the mitigation indices can be used to provide a total mitigation index which is equal to or higher than the pollution hazard index.

Pollution hazard indices for land usage have been evaluated in accordance with the CIRIA SuDS Manual – refer to **Table 6**. Commercial/industrial roofs, low traffic roads & non-residential car parking all represent a low pollution hazard.

Table 6: *Pollution hazard indices for various land uses (taken from the SuDS Manual Table 26.2)*

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other Roofs (typically commercial/industrial roofs)	Low	0.3	0.2	0.05
Low Traffic Roads & Non-Residential Car Parking with Infrequent Change (e.g. Offices)	Low	0.5	0.4	0.4

Reference is made to Table 26.3 of the SuDS Manual for pollution mitigation indices for permeable pavement for discharges to surface waters (***Table 7***).

Table 7: *SuDS mitigation indices for Permeable Paving and Proprietary Treatment Systems (taken from the SuDS Manual Table 26.3)*

SuDS Components	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7

As per the SuDS Manual, provided that all roof water downpipes are sealed against pollutants entering the system from polluted surface runoff, it is deemed acceptable to discharge surface water captured on a roof to groundwater, and subsequently, it can be assumed acceptable to discharge to a public sewer. Additionally, mitigation indices for the permeable pavement are shown to be higher than the pollution indices for its specific catchment.

Based on the SuDS mitigation indices for the proposed SuDS features it is considered that adequate treatment is provided on site for all surface water runoff.

10. Operation and Maintenance Requirements

During the construction phase of the development, the responsibility for the maintenance of below ground drainage lies with the developer. Post-construction, all proposed drainage within the site is to be private (i.e., does not lie on public land) therefore all below ground drainage will be maintained by the site owner for the lifetime of the development.
The drainage system should be regularly inspected and maintained to ensure that is kept clear of silt and debris. Permanent inspection records should be kept by the site owner or management company, recording any previous issues and future work to be carried out.

There are three categories of maintenance activities, as follows:

1) Regular maintenance (including inspections and monitoring)
2) Occasional maintenance
3) Remedial maintenance

Regular maintenance consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the regular tasks (e.g., sediment removal or filter replacement). Table 2 summarises the likely maintenance activities required for each SuDS component and guidance on specific maintenance activities is given in the following sections.

Remedial maintenance describes the intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design, construction, and regular maintenance activities. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and so timings are difficult to predict. Remedial maintenance can comprise activities such as:

- inlet/outlet repairs
- erosion repairs
- reinstatement or realignment of edgings, barriers, rip-rap or other erosion control
- infiltration surface rehabilitation
- replacement of blocked filter fabrics
- construction stage sediment removal (although this activity should have been undertaken before the start of the maintenance contract)
- system rehabilitation immediately following a pollution event.

It is important to note that these remedial activities will not be required for all systems, but for the purpose of estimating whole life maintenance costs, a contingency sum of 15-20% should be added to the annual regular and occasional maintenance costs to cover the risk of these activities being required.

The sections below summarise the proposed schedule of maintenance for below ground drainage elements.

10.1 Silt Traps and Catchpits

Regular inspection and maintenance are required to ensure the effective long-term operation of below ground silt traps and catchpits systems. Maintenance responsibility for systems should be placed with a responsible organization. Maintenance requirements are described in the table below. Maintenance plans and schedules should be developed during the design phase. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

Maintenance Schedule	Required Actions	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Inspection of silt traps and catchpits to assess silt accumulation	Monthly (and after large storms)
	Removal of accumulated silt from silt trap and catchpit sumps	Annually, or as required
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows, and vents	As required
Monitoring	Inspect/check all inlets, outlets, and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

10.2 Geocellular/Modular Systems

Regular inspection and maintenance are required to ensure the effective long-term operation of below ground modular storage systems. Maintenance responsibility for systems should be placed with a responsible organization. Maintenance requirements for modular systems are described in the table below. Maintenance plans and schedules should be developed during the design phase. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

Maintenance Schedule	Required Actions	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Were rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae, or other matter. Remove and replace surface infiltration medium as necessary.	Monthly (and after large storms)
	Remove sediment from pre-treatment structures	Annually, or as required
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows, and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

10.3 Permeable Paving

Regular inspection and maintenance are important for the effective operation of pervious pavements. Maintenance responsibility for a pervious pavement and its surrounding area should be placed with an appropriate responsible organisation. The facility should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

Pervious surfaces need to be regularly cleaned of silt and other sediments to preserve their infiltration capability. Experience in the UK is limited, but advice issued with permeable precast concrete paving has suggested a minimum of three surface sweepings per year. Manufacturers' recommendations should always be followed.

A brush and suction cleaner, which can be a lorry-mounted device or a smaller precinct sweeper, should be used and the sweeping regime should be as follows:

- End of winter (April) – to collect winter debris.
- Mid-summer (July/August) – to collect dust, flower, and grass-type deposits.
- After autumn leaf fall (November).

Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material. Any lost material should be replaced.

Operation and maintenance requirements for permeable paving are described below.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Brushing and vacuuming.	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed.	As required.
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.	As required (if infiltration performance is reduced as a result of significant clogging).
Monitoring	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 h after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

10.4 Miscellaneous

10.4.1 Gullies and Linear Drains

Inspection and removal of debris from silt trap every 3 months, preferably after leaf fall in the autumn. (Timeframe can be adjusted to suit actual site conditions.) Charge water trap where necessary.

10.4.2 Drainage pipes, manholes and silt traps

Inspect manholes & silt traps for build-up of silt and general debris once a year, preferably after leaf fall in the autumn. If silt/debris is building up, then clean with jetting lorry / gully sucker and inspect pipe – repeat cleaning if required. If the pipes to be jetted are plastic, then a high flow, low pressure setting should be used so that the pipes are not damaged.

NOTE: Manhole covers can be heavy and suitable lifting equipment / procedures should be used. Where possible, personnel should not enter manholes to carry out maintenance.

10.4.3 Unusual / unresolved problems

If the drainage system is still holding water following cleaning with a jetter, or the jetting of the system removes excessive amounts of debris this may indicate greater issues within the system. A CCTV survey is likely to be required and further advice should be sought from a drainage engineer.

The following are specific indicators which may trigger intervention:

- Witnessing waterlogged areas / standing or stagnant water / poorly drained areas, indicative of a blockage
- Removal of fallen leaves and debris particularly in autumn months
- Significant storm events are typically classed as MET Office weather alert Amber and above.

11. Conclusion

Elliott Wood partnership have prepared this Flood Risk Assessment and Sustainable Drainage Strategy report to support the full planning application for the proposed redevelopment at Avalon House, London, TW9 2JY, located within the London Borough of Richmond-upon-Thames (LBRUT).

The existing development comprises a three-storey commercial office building known as 'Avalon House' constructed in the early 2000's and accommodates 3,076m^2 (GIA) of Commercial (Class E) floorspace. The building is a multi-tenanted office building, with a shared central reception and core facilities accessed from the primary pedestrian entrance from Lower Mortlake Road. The Site benefits from access to a shared internal vehicular road, which also provides access to the residential properties to the south, known as Tersha Street accessed from a driveway to Lower Mortlake Road. The development proposals are to remove the existing roof and erection of a roof extension at fourth floor and rear extensions to floors ground - four to accommodate additional commercial floorspace (Class E), provision of rear and rooftop terraced amenity spaces, alterations to the ground floor entrance, recladding and remodelling of the façade, landscaping improvements to the rear carparking area, provision of end of journey and cycle parking facilities, associated building servicing and sustainability improvements, and other associated works.

Flood zone information published by GOV.uk shows that the development is located within Flood Zone 1 - land and property assessed as having less than a 0.1% (1 in 1,000) annual probability of river or sea flooding in any given year. The risk of the development flooding from fluvial or tidal sources are therefore considered to be 'low'. Based on a review of all other potential sources of flooding the site is considered to be at low risk of flooding, and the development does not increase flood risk to the site or surrounding area. Therefore, this report concludes that the proposed development is considered to be in accordance with all flood risk policy at a local and national level and it is considered that the information provided within this report satisfies the requirements of the National Planning Policy Framework and local policy.

The development will achieve this by utilise permeable surfacing with a porous sub-base within the vehicular entrance road and car parking bays, with a below ground geo-cellular attenuation tank within the vehicular access area to the parking bays. The surface water flow rate from the geo-cellular attenuation tank is restricted via a vortex flow control device, and the permeable paving is restricted via an orifice plate. The vortex flow control device has a peak discharge flow rate at 4 l/s, and the orifice plate has a peak discharge flow rate at 4 l/s. The flow restrictors incorporated within the blue roofs restrict discharge flow rate to 0.37l/s for all blue roofed areas.

It is proposed to utilise the existing 225mm diameter connection to the Thames Water combined sewer beneath Tersha Street. This proposed connection will be subject to Thames Water's approval. Thames Water have confirmed that there is sufficient capacity in the existing network to serve the proposed development.

There are also several areas of proposed soft landscaping included within the scheme. It is anticipated that these areas of soft landscaping will not require positive drainage and will not require drainage connections for irrigation purposes. The proposed SuDS strategy draws on the CIRIA Four Pillars of SuDS by controlling and treating surface water runoff at source.

Appendices

Appendix A: Topographical & Measured Building Survey

N

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
S1	518551.259	175458.965	6.618
S2	518516.792	175446.581	6.494
S3	518512.958	175402.255	6.741

OS Note:

The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36(15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Building Survey Legend:

SHt 1.00 HHt 2.12	Sill Height from FFL. Head Height from FFL.
SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
Susp. CHt: 2.00 Struct CHt: 3.00	Suspended Ceiling Height from FFL. Structural Ceiling Height from FFL.
Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Incoming Services

Elec Gas Water

Topographical Survey Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge, Station and Name, Station Level, Tree / Bush / Sapling, Area of Undergrowth, Woodland, Ridge Level, Eaves Level, Flat Roof Level, Gate

Fence types: IW Interwoven, IR Iron Railings, WM Wire Mesh, PR Post & Rail, PW Post & Wire, CL Chain Link, WP Wooden Panels, CP Concrete Panels, SP Steel Palisade

IC	Inspection chamber	BollI	Bollard		
PInv	Pipe invert	IB	Illuminated bollard		
Gy	Gully	Bin	Rubbish bin		
Bg	Back gully	Vp	Vent pipe		
Dp	Down pipe	Gri	Ground light		
Pipe	Pipe above ground	Lbox	Letter box		
MH	Manhole	Ldr	Ladder		
WL	Water level	Sby	Sitte		
Fl	Flood light	IFL	Internal floor level		
Lp	Lamp post	THL	Threshold level		
Tp	Telegraph post	Sp	Sign post		
Ep	Electricity post	TH	Trishole		
Tl	Traffic light	BH	Borehole		
Box	Box Misc	ELC	Electric		
Sv	Stop valve	BT	British Telecom		
St	Stop tap	CTbox	Control box		
Er	Earth rod	TT	Tactile		
Wm	Water meter	BP	Brick paved		
Gas	Gas valve	CPS	Concrete paving slab		
Av	Air valve	CVR	Cover		
ICU	Unidentified inspection	IC	Inspection chamber		
Wo	Wash out	Rwall	Retaining wall		
Re	Rodding eye	UTL	Unable to lift		
BB	Bellsline beacon	TCL	Tree canopy level		
CTV	Cable tv	G	Girth		
Mkr	Marker post	MQ	Multi girth		
Gmkr	Gas marker post	Stmp	Tree Stump		
So	Soffit	CL	Cover level		
		IL	Invert level		

Rev	Date	Description	Drawn	Q. Ref.

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Bathymetric Surveys
- Measured Building Surveys
- 3D Laser Scanning
- 3D Revit & BIM Models
- Area, Lease & Fire Plans

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CLIENT

JM Architects

PROJECT

Avalon House
72 Lower Mortlake Road
Richmond Upon Thames

TITLE

Site Plan

SCALE	DATE
A1@ 1: 200	16/03/2023
DRAWN	QUALITY REF
RC	GH16375

Level datum	GPS Verified
Grid orientation	GPS Verified
Job number	46686
Drawing No.	Rev.
46686_01	

Comments

This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

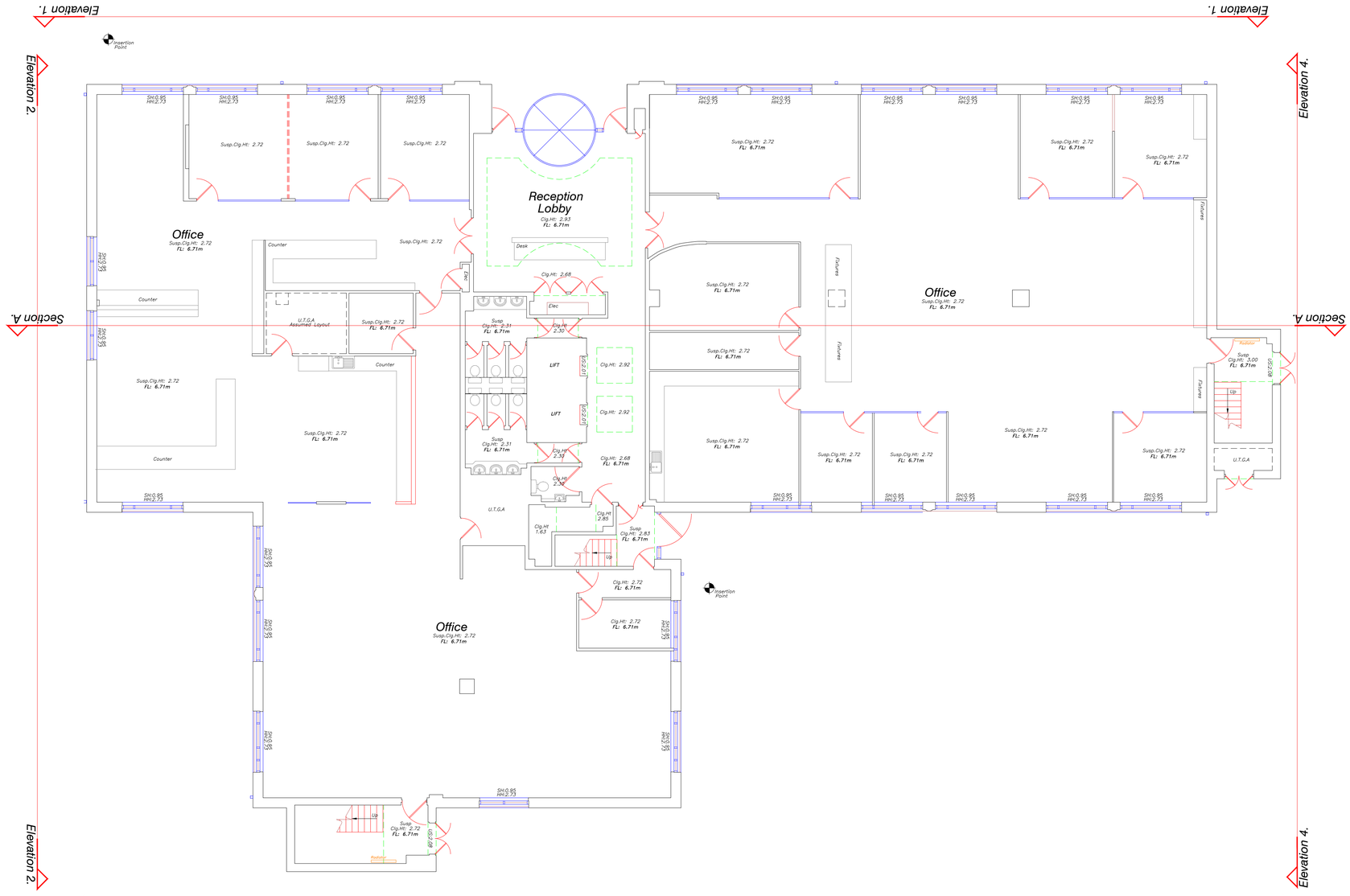
All dimensions should be checked on site prior to design and construction.

Some services may have been omitted due to parked vehicles.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Existing Ground Floor Plan



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Please refer to Survey Station Table to enable establishment of the on-site grid.

Building Survey Legend:

SHt 1.00 HHt 2.12	Sill Height from FFL. Head Height from FFL.
SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
Susp CHt: 2.00 Struct CHt: 3.00	Suspended Ceiling Height from FFL. Structural Ceiling Height from FFL.
Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Incoming Services

Elec Gas Water

Topographical Survey Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge, Station and Name, Station Level, Tree / Bush / Sapling, Area of Undergrowth, Woodland, Ridge Level, Eaves Level, Flat Roof Level, Gate

Fence types: Inter-woven, Iron Railings, Wire Mesh, Post & Rail, Post & Wire, Chain Link, Wooden Panels, Concrete Panels, Steel Palisade

IC	Inspection chamber	BollI	Bollard
PInv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
Bg	Back gully	Vp	Vent pipe
Dp	Down pipe	Gl	Ground light
Pipe	Pipe above ground	Lbox	Letter box
MH	Manhole	Ldr	Ladder
WL	Water level	Sty	Stile
Fl	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trishole
Tl	Traffic light	BH	Borehole
Box	Box Wall	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	CTbox	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gas	Gas valve	CPS	Concrete paving slab
Av	Air valve	CVR	Cover
ICU	Unidentified inspection	IC	Inspection chamber
Wr	Wash out	RWall	Retaining wall
Re	Rodding-eye	UTL	Unable to lift
BB	Belisha beacon	TCL	Tree canopy level
CTV	Cable tv	G	Girth
MkI	Marker post	MG	Multi girth
GmkI	Gas marker post	Stmp	Tree Stump
So	Soffit	CL	Cover level
		IL	Invert level

Rev.	Date	Description	Drawn	Q. Ref.

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Central London: 27 Cornwall Terrace Mews, Regents Park, London, NW1 5LL, t. (0207) 2241806

CLIENT

JM Architects

PROJECT

Avalon House
72 Lower Mortlake Road
Richmond Upon Thames

TITLE

Existing Ground Floor Plan

SCALE	DATE
A1@ 1: 100	16/03/2023
DRAWN	QUALITY REF
RC	GH16375

Level datum	GPS Verified
Grid orientation	GPS Verified
Job number	46686

Drawing No. 46686_02 Rev.

Comments

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All dimensions should be checked on site prior to design and construction.

Some services may have been omitted due to parked vehicles.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Existing 1st Floor Plan

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
S1	518551.259	175458.965	6.618
S2	518516.792	175446.581	6.494
S3	518512.958	175402.255	6.741

OS Note:

The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36(15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Building Survey Legend:

SHt 1.00 HHt 2.12	Sill Height from FFL. Head Height from FFL.
SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
Susp. CHt: 2.00 Struct CHt: 3.00	Suspended Ceiling Height from FFL. Structural Ceiling Height from FFL.
Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Incoming Services

Elec | Gas | Water

Topographical Survey Legend:

Buildings; Overhead Cable; Wall; Concrete edge; Kerb line; Tarmac edge; Line marking; Grass verge; Drop kerb; Canopy/Overhang; Centre line; Verge; Station and Name; Station Level; Tree / Bush / Sapling; Area of Undergrowth; Woodland; Ridge Level; Eaves Level; Flat Roof Level; Gate

Fence types: Hedgerow; Iron Railings; Wire Mesh; Post & Rail; Post & Wire; Chain Link; Wooden Panels; Concrete Panels; Steel Palisade

IC	Inspection chamber	BollB	Bollard
PInv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
Bg	Back gully	Vp	Vent pipe
Dp	Down pipe	Gri	Ground light
Pipe	Pipe above ground	Lbox	Letter box
MH	Manhole	Ldr	Ladder
WL	Water level	Sty	Stile
Fl	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trishole
Tl	Traffic light	BH	Borehole
Box	Box Wall	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	CTbox	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gas	Gas valve	CPS	Concrete paving slab
Av	Air valve	CVR	Cover
ICU	Unidentified inspection	IC	Inspection chamber
Wo	Wash out	Rwall	Retaining wall
Re	Rodding eye	UTL	Unable to lift
BB	Bellzinha beacon	TCL	Tree canopy level
CTV	Cable tv	G	Girth
Mkr	Marker post	MG	Multi girth
Gmkr	Gas marker post	Strip	Tree Stump
Sp	Soffit	CL	Cover level
		IL	Invert level

Rev	Date	Description	Drawn	Q. Ref

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Central London: 27 Cornwall Terrace Mews, Regents Park, London, NW1 5LL, t. (0207) 2241806

CLIENT

JM Architects

PROJECT

Avalon House
72 Lower Mortlake Road
Richmond Upon Thames

TITLE

Existing 1st Floor Plan

SCALE	DATE
A1@ 1: 100	16/03/2023
DRAWN	QUALITY REF
RC	GH16375

Level datum	GPS Verified
Grid orientation	GPS Verified
Job number	46686
Drawing No.	Rev.
46686_03	

Comments

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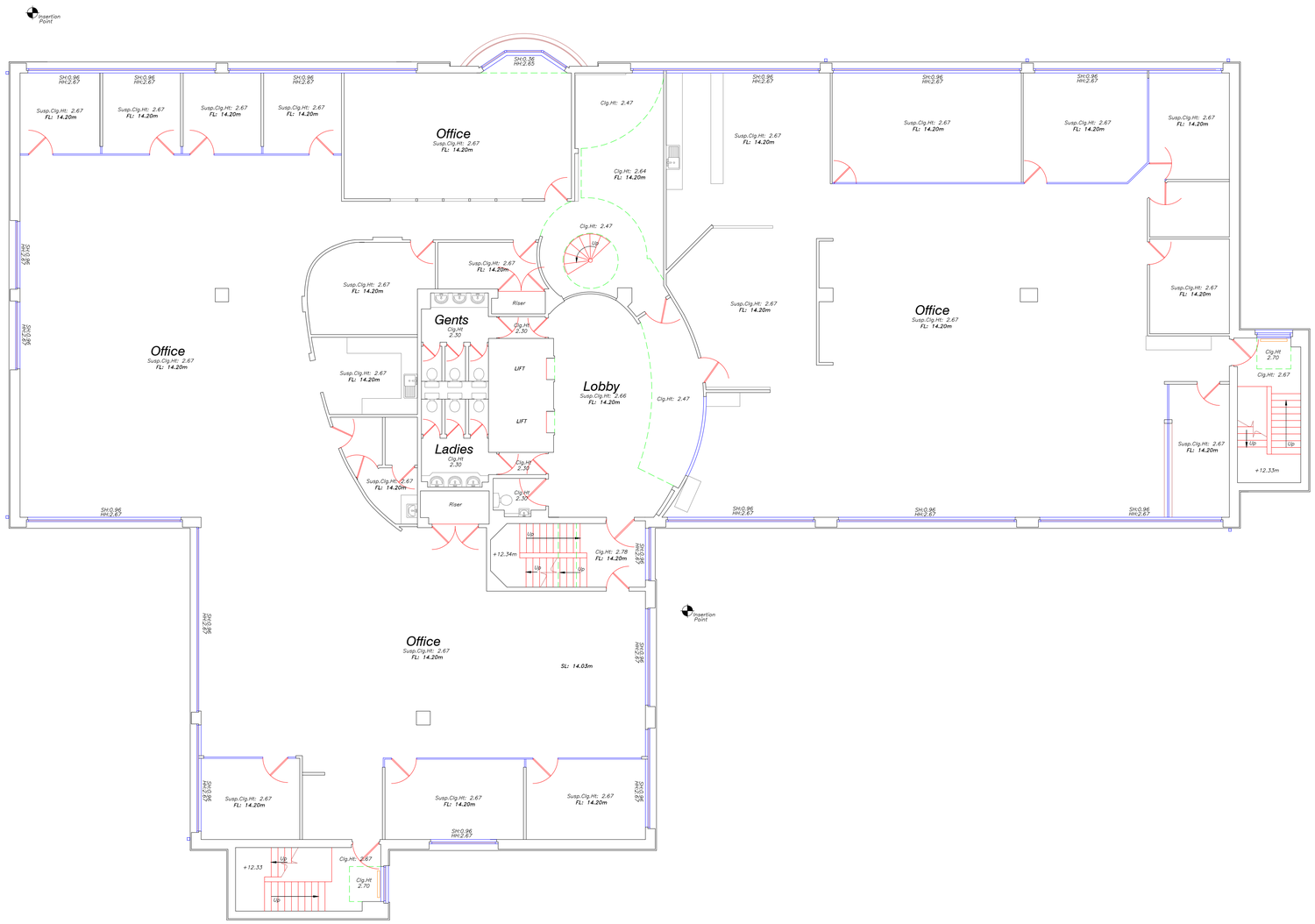
All dimensions should be checked on site prior to design and construction.

Some services may have been omitted due to parked vehicles.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Existing 2nd Floor Plan



Station Information:

Station	Easting (m)	Northing (m)	Level (m)
S1	518551.259	175458.965	6.618
S2	518516.792	175446.581	6.494
S3	518512.958	175402.255	6.741

OS Note:

The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

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Please refer to Survey Station Table to enable establishment of the on-site grid.

Building Survey Legend:

SHt 1.00 HHt 2.12	Sill Height from FFL. Head Height from FFL.
SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
Susp CHt: 2.00 Struct CHt: 3.00	Suspended Ceiling Height from FFL. Structural Ceiling Height from FFL.
Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Incoming Services

Elec Gas Water

Topographical Survey Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge, Station and Name, Station Level, Tree / Bush / Sapling, Area of Undergrowth, Woodland, Ridge Level, Eaves Level, Flat Roof Level, Gate

Fence types: FW, HH, WIM, PVR, PW, CL, WP, CP, SP

IC	Inspection chamber	BollI	Bollard		
PInv	Pipe invert	IB	Illuminated bollard		
Gy	Gully	Bin	Rubbish bin		
Rg	Back gully	Vp	Vent pipe		
Dp	Down pipe	Gl	Ground light		
Pipe	Pipe above ground	Lbox	Letter box		
MH	Manhole	Ldr	Ladder		
WL	Water level	Sby	Stile		
Fl	Flood light	IFL	Internal floor level		
Lp	Lamp post	THL	Threshold level		
Tp	Telegraph post	Sp	Sign post		
Ep	Electricity post	TH	Trishole		
TL	Traffic light	BH	Borehole		
Box	Box Wall	ELC	Electric		
Sv	Stop valve	BT	British Telecom		
St	Stop tap	CTbox	Control box		
Er	Earth rod	TT	Tactile		
Wm	Water meter	BP	Brick paved		
Gas	Gas valve	CPS	Concrete paving slab		
Av	Air valve	CVR	Cover		
ICU	Unidentified inspection	IC	Inspection chamber		
Wo	Wash out	Rwall	Retaining wall		
Re	Rodding eye	UTL	Unable to lift		
BB	Beltaire beacon	TCL	Tree canopy level		
CTV	Cable tv	G	Girth		
Mkr	Marker post	MG	Multi girth		
Gmkr	Gas marker post	Stmp	Tree Stump		
So	Soffit	CL	Cover level		
		IL	Invert level		

Rev.	Date	Description	Drawn	Q. Ref.

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CLIENT

JM Architects

PROJECT

Avalon House
72 Lower Mortlake Road
Richmond Upon Thames

TITLE

Existing 2nd Floor Plan

SCALE	DATE
A1@ 1: 100	16/03/2023
DRAWN	QUALITY REF
RC	GH16375

Level datum	GPS Verified
Grid orientation	GPS Verified
Job number	46686

Drawing No. 46686_04 Rev.

Comments

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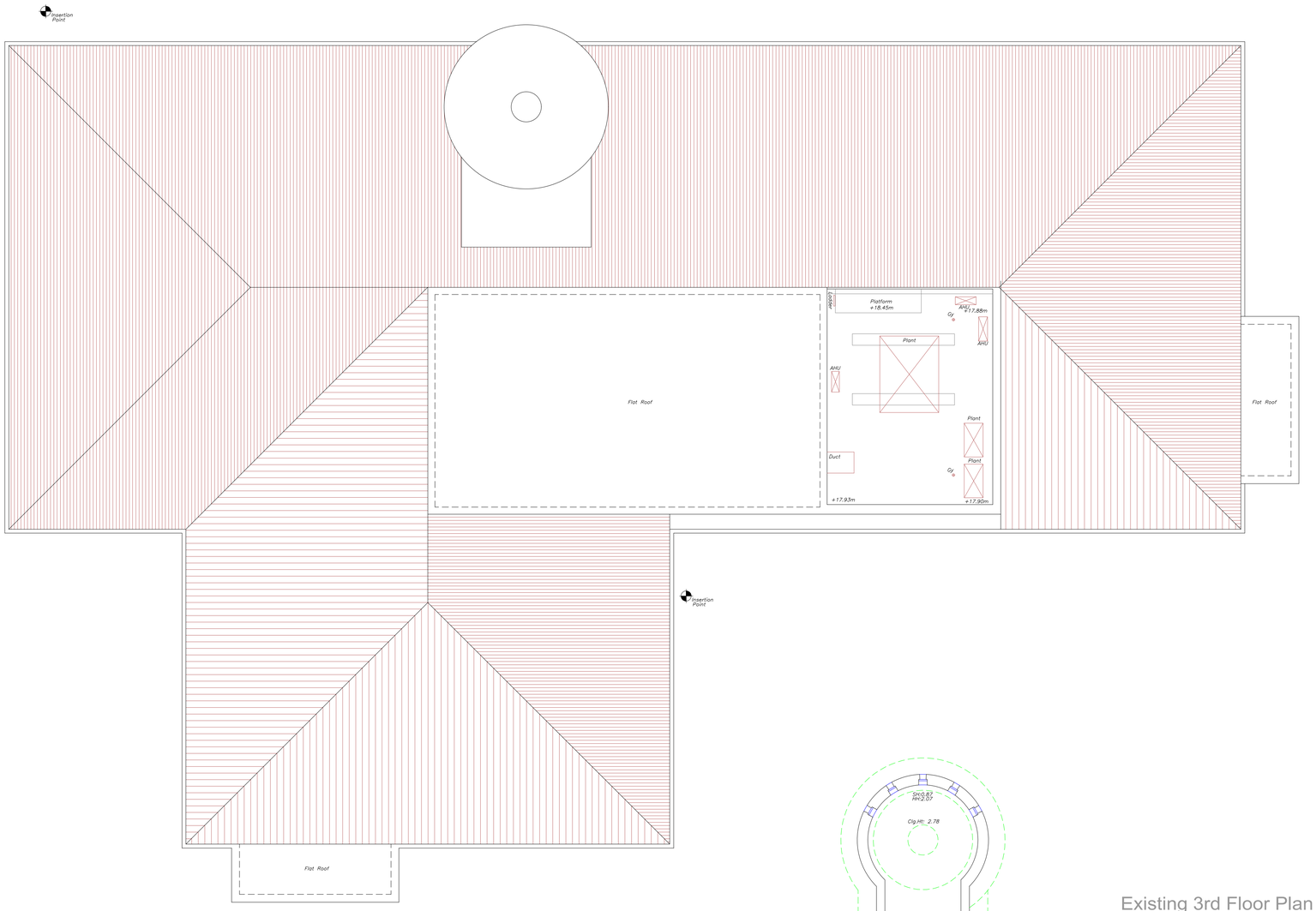
All dimensions should be checked on site prior to design and construction.

Some services may have been omitted due to parked vehicles.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Existing Roof Plan



Station Information:

Station	Easting (m)	Northing (m)	Level (m)
S1	518551.259	175458.965	6.618
S2	518516.792	175446.581	6.494
S3	518512.958	175402.255	6.741

OS Note:

The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

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Please refer to Survey Station Table to enable establishment of the on-site grid.

Building Survey Legend:

SHt 1.00 HHt 2.12	Sill Height from FFL. Head Height from FFL.
SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
Susp CHt: 2.00 Struct CHt: 3.00	Suspended Ceiling Height from FFL. Structural Ceiling Height from FFL.
Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Incoming Services

Elec Gas Water

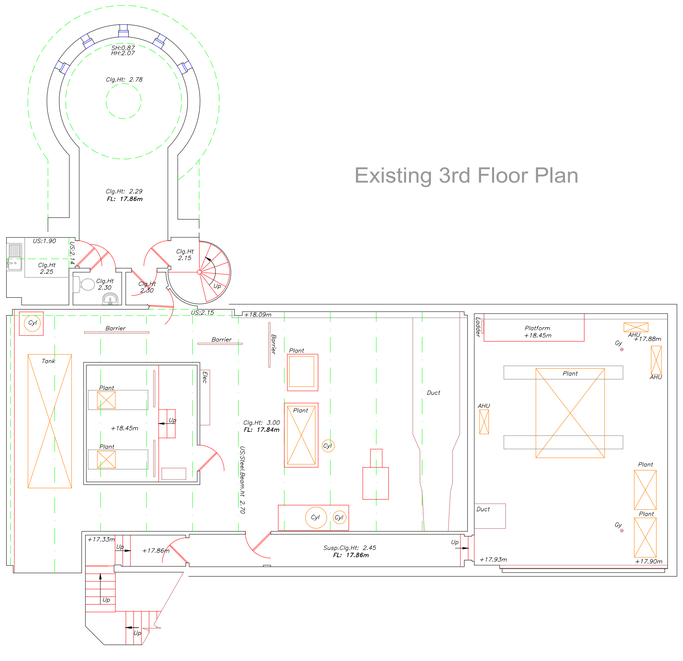
Topographical Survey Legend:

Buildings; Wall; Kerb line; Line marking; Drop kerb; Centre line; Overhead Cable; Concrete edge; Tarmac edge; Glass verge; Canopy/Overhang; Verge; Station and Name; Station Level; Tree / Bush / Sapling; Area of Undergrowth; Woodland; R Ridge Level; E Eaves Level; F Flat Roof Level; Gate

Fence types: IW Interwoven; IR Iron Railings; WM Wire Mesh; PR Post & Rail; PW Post & Wire; CL Chain Link; WP Wooden Panels; CP Concrete Panels; SP Steel Palisade

IC	Inspection chamber	Bollard	Bollard
PInv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
Bg	Back gully	Vp	Vent pipe
Dp	Down pipe	Gl	Ground light
Pipe	Pipe above ground	Lbox	Letter box
MH	Manhole	Ldr	Ladder
WL	Water level	Sty	Stile
Fl	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trishole
Tl	Traffic light	BH	Borehole
Box	Box Wall	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	CTbox	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gas	Gas valve	CPS	Concrete paving slab
Av	Air valve	CVR	Cover
ICU	Unidentified inspection	IC	Inspection chamber
Wo	Wash out	R'wall	Retaining wall
Re	Rodding eye	UTL	Unable to lift
BB	Bellcha beacon	TCL	Tree canopy level
CTV	Cable tv	G	Girth
Mkr	Marker post	MG	Multi girth
Gmkr	Gas marker post	Stmp	Tree Stump
So	Soffit	CL	Cover level
		IL	Invert level

Rev	Date	Description	Drawn	Q. Ref



Existing 3rd Floor Plan

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CLIENT

JM Architects

PROJECT

Avalon House
72 Lower Mortlake Road
Richmond Upon Thames

TITLE

Existing 3rd Floor & Roof Plan

SCALE	DATE
A1@ 1: 100	16/03/2023
DRAWN	QUALITY REF
RC	GH16375

Level datum	GPS Verified
Grid orientation	GPS Verified
Job number	46686
Drawing No.	Rev.
46686_05	

Comments

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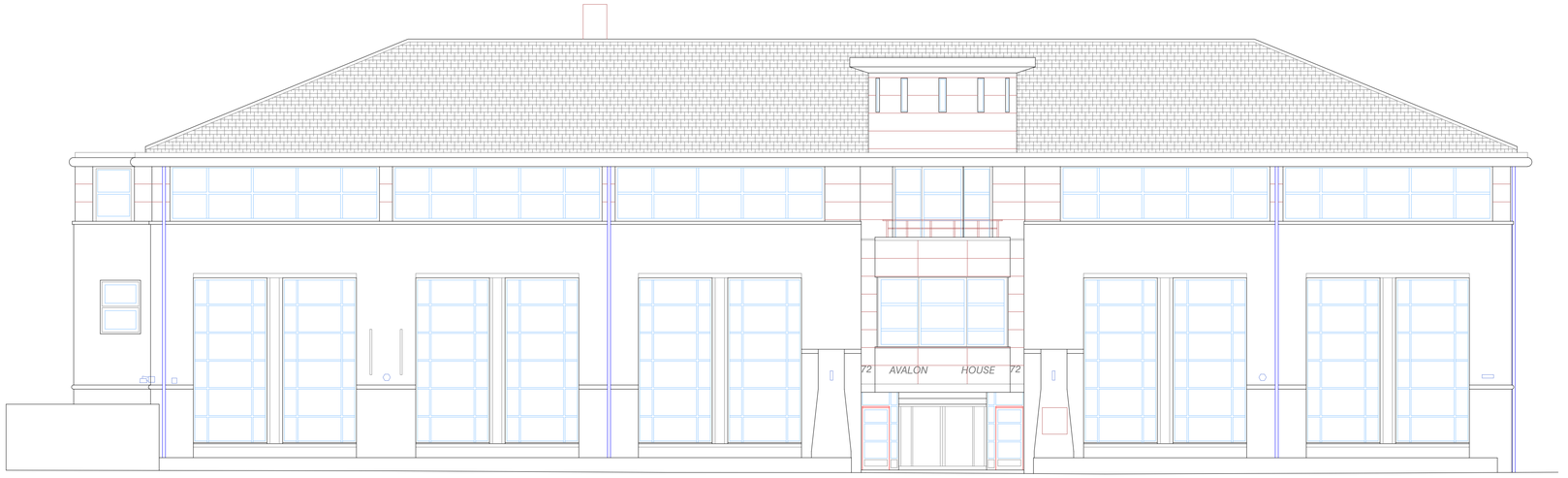
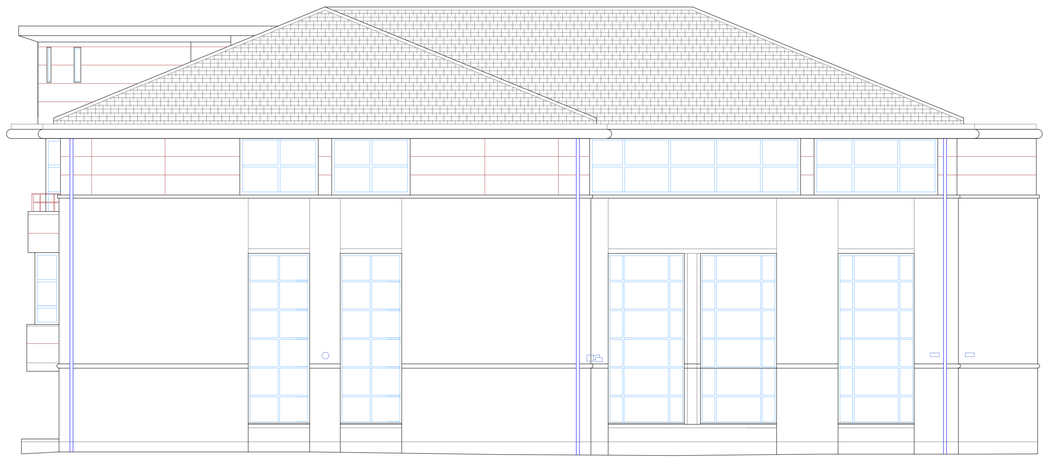
Notes:

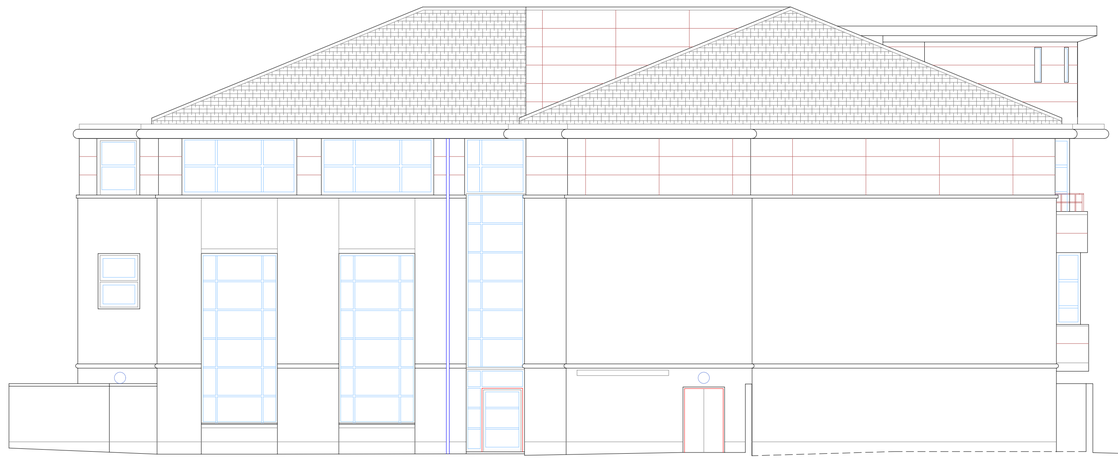
Existing Elevations



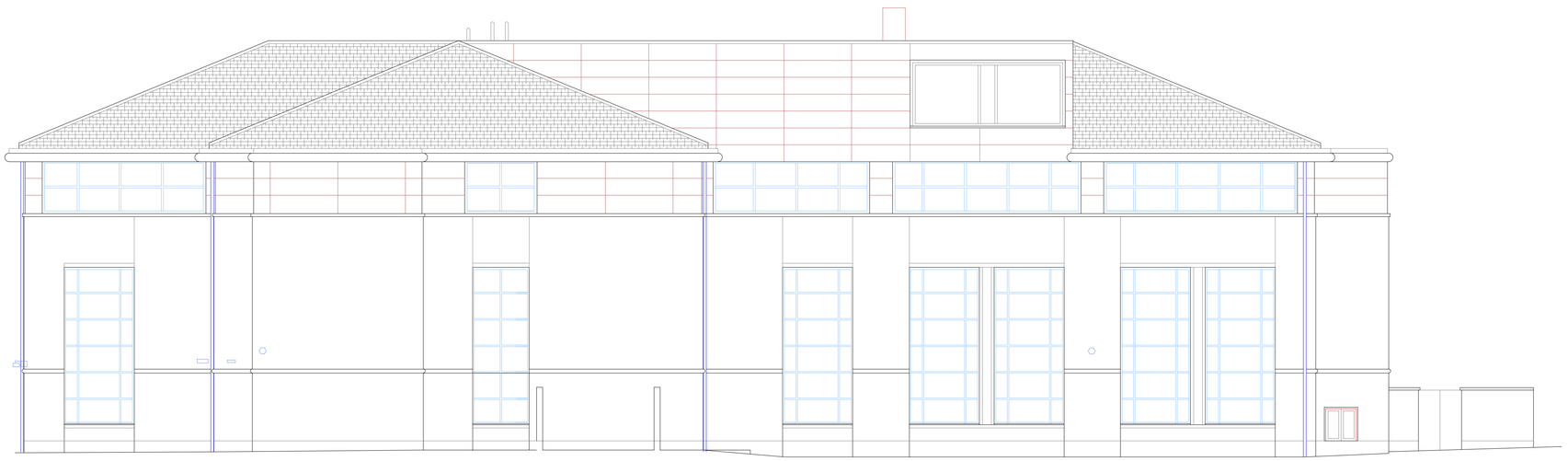
Datum: 5.00m.
Elevation 1.



Datum: 5.00m.
Elevation 2.



Datum: 5.00m.
Elevation 4.



Datum: 5.00m.
Elevation 3.

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
S1	518551.259	175458.965	6.618
S2	518516.792	175446.581	6.494
S3	518512.958	175402.255	6.741

OS Note:

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OS Buildings *Surveyed Buildings*

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SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
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Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Incoming Services

Elec Gas Water

Topographical Survey Legend:

Buildings; Wall; Kerb line; Line marking; Drop kerb; Centre line; Overhead Cable; Concrete edge; Tarmac edge; Grass verge; Canopy/Overhang; Verge; 1 100.000 Station and Name; Station Level; Tree / Bush / Sapling; Area of Undergrowth; Woodland; R Ridge Level; E Eaves Level; F Flat Roof Level; Gate

Fence types: Hedge; Interwoven; Iron Railings; WIM Wire Mesh; PVR Post & Rail; PVW Post & Wire; CHL Chain Link; WVP Wooden Panels; CP Concrete Panels; SIP Steel Palisade

IC	Inspection chamber	Bollard	
PInv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
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Dp	Down pipe	Gif	Ground light
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WL	Water level	Sty	Stile
Fl	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trishole
Tl	Traffic light	BH	Borehole
Box	Box Wall	ELC	Electric
Bv	Stop valve	BT	British Telecom
St	Stop tap	CTbox	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gas	Gas valve	CPS	Concrete paving slab
Av	Air valve	CVR	Cover
ICU	Underdrilled inspection	IC	Inspection chamber
Wo	Wash out	Rwall	Retaining wall
Re	Rodding eye	UTL	Unable to lift
BB	Bellsthe breecon	TCL	Tree canopy level
CTV	Cable tv	G	Girth
Mkr	Marker post	MG	Multi grid+
Girder	Gas marker post	Stmp	Tree Stump
So	Soffit	CL	Cover level
		IL	Invert level

Rev.	Date	Description	Drawn	Q. Ref.

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CLIENT

JM Architects

PROJECT

Avalon House
72 Lower Mortlake Road
Richmond Upon Thames

TITLE

Existing Building Elevations

SCALE	DATE
A1@ 1: 100	16/03/2023
DRAWN	QUALITY REF
RC	GH16375

Level datum	GPS Verified
Grid orientation	GPS Verified
Job number	46686

Drawing No. 46686_06 Rev.

Comments

This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

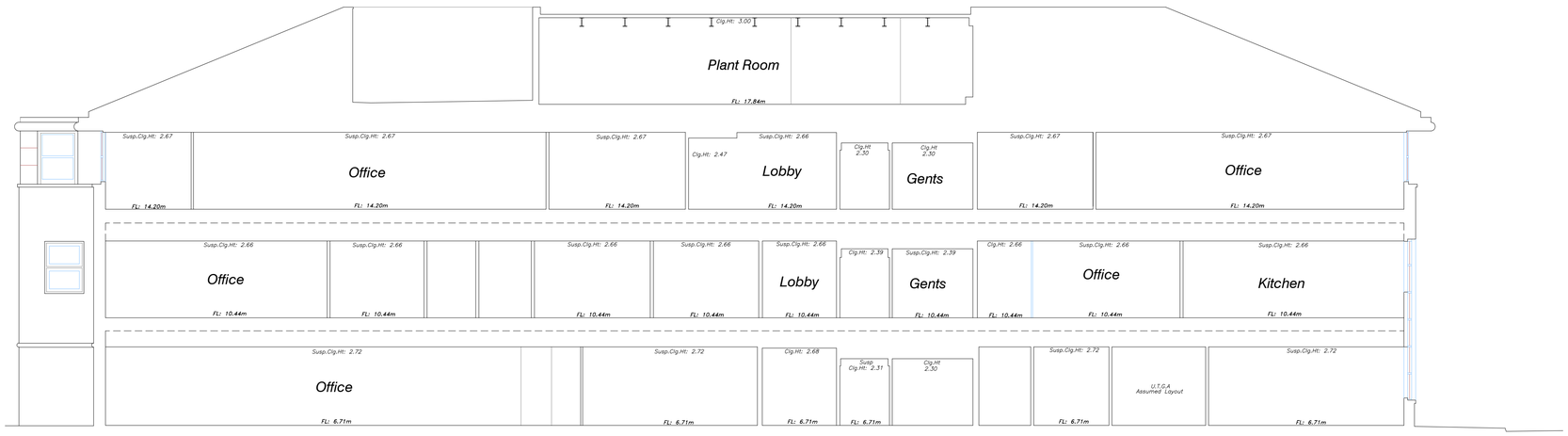
All dimensions should be checked on site prior to design and construction.

Some services may have been omitted due to parked vehicles.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Existing Section



Datum: 5.00m.

Section A-A.

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
S1	518551.259	175458.965	6.618
S2	518516.792	175446.581	6.494
S3	518512.958	175402.255	6.741

OS Note:

The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36(15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Building Survey Legend:

SHt 1.00 HHt 2.12	Sill Height from FFL. Head Height from FFL.
SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
Susp CHt: 2.00 Struct CHt: 3.00	Suspended Ceiling Height from FFL. Structural Ceiling Height from FFL.
Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Incoming Services

Elec Gas Water

Topographical Survey Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Overhead Cable, Concrete edge, Tarmac edge, Glass verge, Canopy/Overhang, Verge, Station and Name, Station Level, 1 100.000

Tree / Bush / Sapling, Area of Undergrowth, Woodland, R Ridge Level, E Eaves Level, F Flat Roof Level, Gate

Fence types: IW Interwoven, IR Iron Railings, WM Wire Mesh, PiR Post & Rail, PiW Post & Wire, CL Chain Link, WF Wooden Panels, CP Concrete Panels, SP Steel Palisade

IC	Inspection chamber	Bollard	Bollard
PInv	Pipe invert	Illuminated bollard	Illuminated bollard
Gy	Gully	Rubbish bin	Rubbish bin
Bg	Back gully	Vp	Vent pipe
Dp	Down pipe	Gif	Ground light
Pipe	Pipe above ground	Lbox	Letter box
MH	Manhole	Ldr	Ladder
WL	Water level	Stly	Stile
Fl	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trishole
Tl	Traffic light	BH	Borehole
Box	Box Wpr	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	CTbox	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gas	Gas valve	CPS	Concrete paving slab
Av	Air valve	CVR	Cover
ICU	Unidentified inspection	IC	Inspection chamber
Wo	Wash out	R'wall	Retaining wall
Re	Rodding eye	UTL	Unable to lift
BB	Belisha beacon	TCL	Tree canopy level
CTV	Cable tv	G	Girth
Mkr	Marker post	MG	Multi girth
Gmkr	Gas marker post	Stmp	Tree Stump
So	Soffit	CL	Cover level
		IL	Invert level

Rev.	Date	Description	Drawn	Q. Ref.

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Bathymetric Surveys
- Measured Building Surveys
- 3D Laser Scanning
- 3D Revit & BIM Models
- Area, Lease & Fire Plans

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London
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t. (0207) 2241806

CLIENT

JM Architects

PROJECT

Avalon House
72 Lower Mortlake Road
Richmond Upon Thames

TITLE

Existing Building Section

SCALE	DATE
A1@ 1: 100	16/03/2023
DRAWN	QUALITY REF
RC	GH16375

Level datum	GPS Verified
Grid orientation	GPS Verified
Job number	46686
Drawing No.	Rev.
46686_07	

Comments

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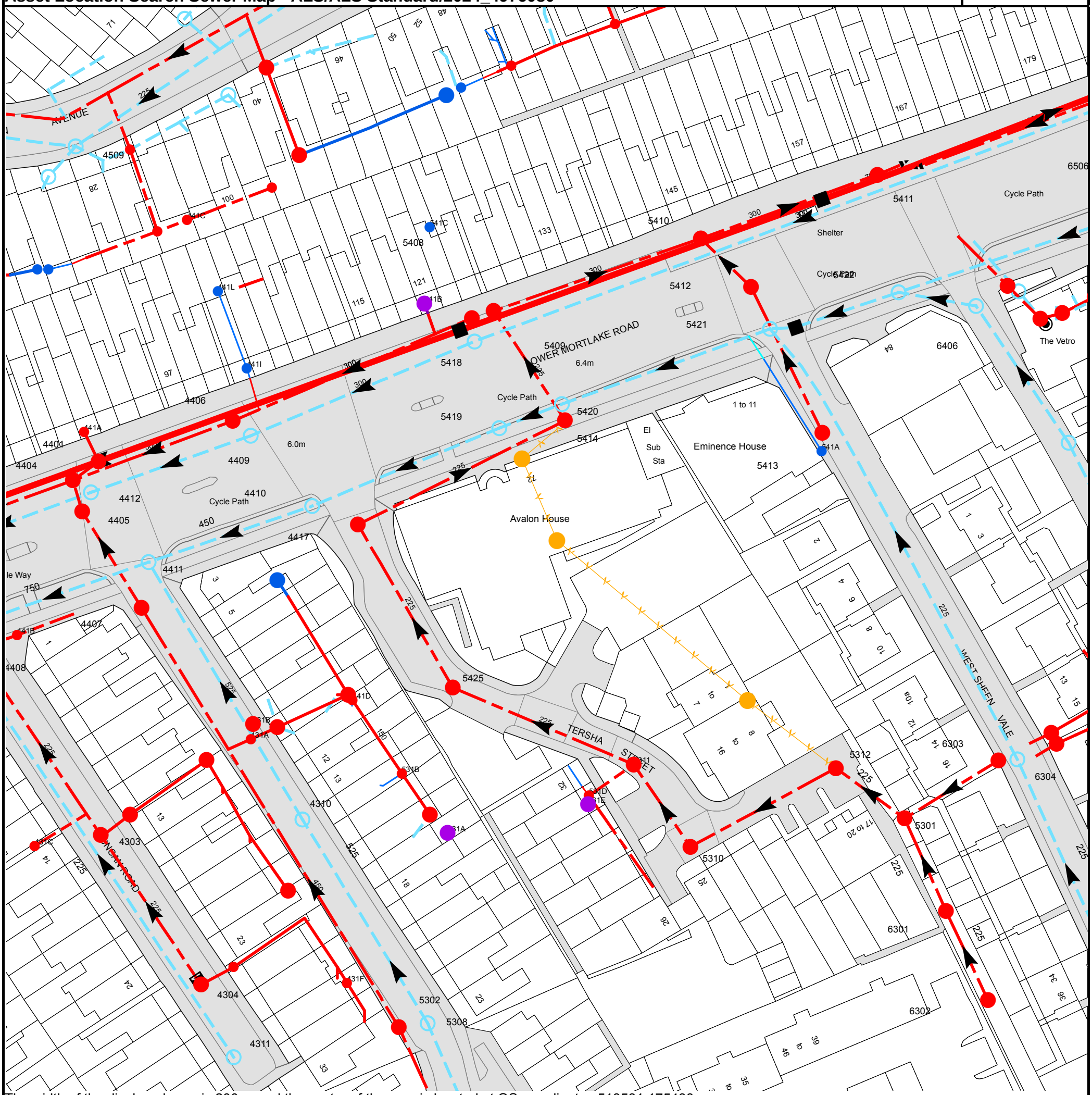
Notes:

Appendix B: TW Asset Maps

Asset Location Search Sewer Map - ALS/ALS Standard/2024_4976080



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 518531,175430

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.

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
5413	6.44	4.08
541A	n/a	n/a
6410	7.44	4.16
5419	6.16	3.58
5414	6.4	3.419
5420	6.35	4.43
5418	6.11	3.72
5421	6.35	3.66
64WW	n/a	n/a
5408	6.27	2.92
64WX	n/a	n/a
5409	6.27	2.86
6406	6.55	4.47
541B	n/a	n/a
64WY	n/a	n/a
5422	6.68	3.81
64XR	n/a	n/a
5412	6.41	3.12
64WV	n/a	n/a
5410	6.43	2.79
541C	n/a	n/a
5411	6.46	2.73
5302	6.62	4
5308	6.61	4.05
6302	6.87	5.04
6301	6.9	4.77
5310	6.62	3.972
531A	n/a	n/a
5301	6.94	4.35
53ZY	n/a	n/a
531E	n/a	n/a
531D	n/a	n/a
531B	n/a	n/a
5312	7.06	4.17
5311	6.78	3.847
6303	6.9	4.48
6304	6.85	4.84
63YY	n/a	n/a
63ZT	n/a	n/a
5425	6.57	3.675
55VY	n/a	n/a
55YR	n/a	n/a
55YP	n/a	n/a
55YW	n/a	n/a
4311	6.57	4.97
4304	6.57	3.34
431F	n/a	n/a
43YS	n/a	n/a
43ZV	n/a	n/a
431C	n/a	n/a
4303	6.42	2.59
4310	6.39	3.82
43ZQ	n/a	n/a
43ZR	n/a	n/a
431A	n/a	n/a
43ZY	n/a	n/a
431B	n/a	n/a
441D	n/a	n/a
44ZW	n/a	n/a
441B	n/a	n/a
4407	6.26	3.02
44ZY	n/a	n/a
4411	6.18	3.39
4417	6.28	3.51
4405	6.24	2.29
4410	6.33	3.48
4412	6.22	3.67
4404	6.34	1.99
4401	n/a	-3.59
4409	6.07	3.71
441A	n/a	n/a
4406	6.61	2.54
441I	n/a	n/a
441L	n/a	n/a
44WX	n/a	n/a
44WZ	n/a	n/a
44WV	n/a	n/a
441C	n/a	n/a
44WT	n/a	n/a
44WR	n/a	n/a
45ZX	n/a	n/a
45XW	n/a	n/a
4509	6.93	5.42
45XS	n/a	n/a
45ZW	n/a	n/a
45VW	n/a	n/a

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Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

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

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

Sewer Fittings

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

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

Operational Controls

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

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

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

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

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

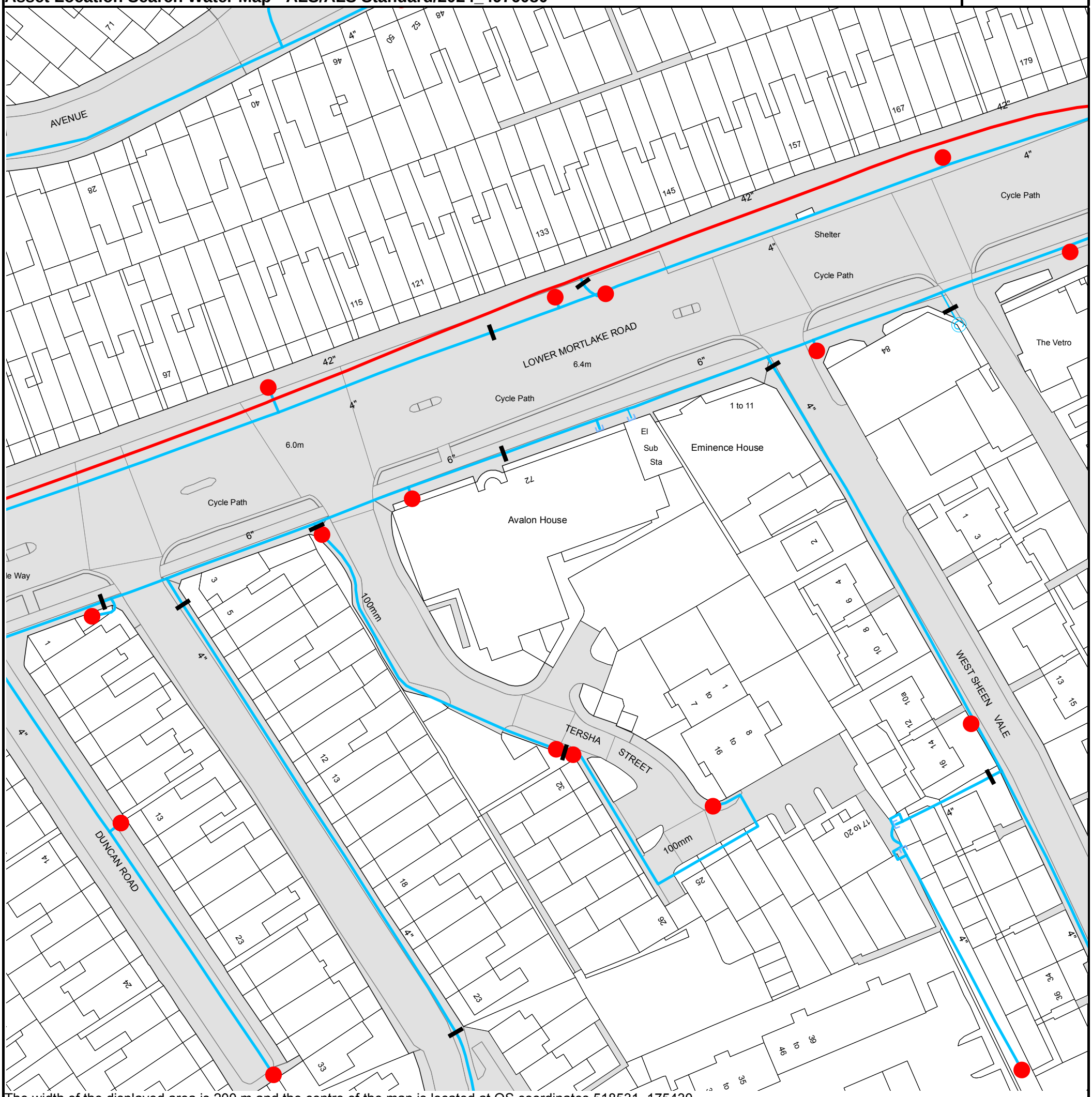
Ducts or Crossings

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

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2024_4976080



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Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

- Data Logger

Casement: Ducts may contain high voltage cables. Please check with Thames Water.

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

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Appendix C: Below Ground CCTV Drainage Survey