BASEENERGY
Building Assessments for a Sustainable Environment

North
t: 0151 933 0328
m: info@baseenergy.co.uk
44 Canal Street
Bootle
Liverpool
L20 8QU

South
t: 020 3286 2016
m: info@baseenergy.co.uk
117 Knyvett House,
Watermans Business
Park, The Causeway,
Staines-upon-Thames,
TW18 3BA

Flood Risk and SuDS Assessment Rev2

Westminster House,
Richmond Upon Thames,
TW9 2ND

13 December 2023

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Prepared by	Checked by	Date
Carina Hassall BSc (Hons)	Peter Kinsella BSc (Hons)	13 December 2023

This document has been prepared solely as a Flood Risk and SuDS Assessment for Ali Khan. Base Energy accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

1. Introduction

This Flood Risk and SuDS Assessment has been prepared to support the planning application for the proposed redevelopment of Westminster House, Richmond.

A site location plan is provided in **Appendix A**.

Development Proposals

Westminster House is an existing building with commercial space on the ground floor, and offices on the upper floor.

Proposals are for the creation of two additional levels of Class C3 accommodation comprising 7no.units, conversion and excavation of the existing Class E basement and part conversion of existing floorspace at basement, ground, first, second, and third floor levels to provide internal access and ancillary residential floorspace with external alterations and associated development.

A copy of the proposed site layout plans is provided in **Appendix B.**

2. Planning Policy – Flood Risk, and Surface Water Management

National Planning Policy Framework

The aim of the National Planning Policy Framework (NPPF) (and accompanying Planning Practice Guidance (PPG)) is to direct development away from areas at highest risk of flooding; where development is necessary, it should be made safe without increasing flood risk elsewhere.

The NPPF states that a Flood Risk Assessment (FRA) is required to support a planning application for developments that are:

- located in Flood Zone 2 and/or Flood Zone 3
- located in Flood Zone 1 and comprise 1ha or above

In some instances, for example where a site is located in Flood Zone 1 and comprises less than 1ha, an FRA may be required if the site is within an area which has critical drainage problems (i.e. a Critical Drainage Area - CDA) as notified to the Local Authority by the Environment Agency (EA).

In order to provide an indication of the flood zone classification of the site, and to ascertain whether an FRA is required, the starting point is the EA flood maps which are available on the EA website.

Environment Agency Flood Map

The EA flood maps show fluvial and tidal flood outlines based on the following:

- Flood Zone 1 - land assessed as having less than 1 in 1000 annual probability of river or sea flooding
- Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding, or between a 1 in 200 and 1 in 1000 annual probability of flooding from the sea
- Flood Zone 3 - land assessed as having a 1 in 100 or greater annual probability of river flooding, or a 1 in 200 or greater annual probability of flooding from the sea

The flood maps available on the EA website confirm that the site is located in Flood Zone 1.

Given that the site is located in Flood Zone 1, and comprises less than 1ha, an FRA would not generally be required, unless the site is located within a CDA.

Reference has been made to the London Borough of Richmond 'Critical Drainage Area' (CDA) maps; the site is shown to be in CDA Zone R02, and on this basis an FRA is required to support the planning application.

An assessment of all potential sources of flood risk is provided in the following section.

London Borough of Richmond Local Plan

Local Plan Policy 21 Flood Risk and Sustainable Drainage (2018)

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.

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. Where a Flood Risk Assessment is required, on-site attenuation to alleviate fluvial and/or surface water flooding over and above the Environment Agency's floodplain compensation is required where feasible.

The Council will require the use of Sustainable Drainage Systems (SuDS) in all development proposals. 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. Flood defences D. Applicants will have to demonstrate that their proposal complies with the following: 1. Retain the effectiveness, stability and integrity of flood defences, river

banks and other formal and informal flood defence infrastructure. 2. Ensure the proposal does not prevent essential maintenance and upgrading to be carried out in the future. 3. Set back developments from river banks and existing flood defence infrastructure where possible (16 metres for the tidal Thames and 8 metres for other rivers). 4. Take into account the requirements of the Thames Estuary 2100 Plan and the River Thames Scheme, and demonstrate how the current and future requirements for flood defences have been incorporated into the development. 5. The removal of formal or informal flood defences is not acceptable unless this is part of an agreed flood risk management strategy by the Environment Agency.

Policy LP 11 Subterranean developments and basements

A. The Council will resist subterranean and basement development of more than one storey below the existing ground level to residential properties or those which were previously in residential use.

B. Proposals for subterranean and basement developments will be required to comply with the following: 1. extend to no more than a maximum of 50% of the existing garden land or more than half of any other undeveloped garden area (this excludes the footprint of the original building); 2. Demonstrate the scheme safeguards the structural stability of the existing building, neighbouring buildings and other infrastructure, including related to the highway and transport; a Structural Impact Assessment will be required where a subterranean development or basement is added to, or adjacent to, a listed building. 3. use natural ventilation and lighting where habitable accommodation is provided; 4. include a minimum of 1 metre naturally draining permeable soil above any part of the basement beneath the garden area, together with a minimum 200mm drainage layer, and provide a satisfactory landscaping scheme; 5. demonstrate that the scheme will not increase or otherwise exacerbate flood risk on the site or beyond, in line with policy LP 21 Flood Risk and Sustainable Drainage; 6. demonstrate as part of a Construction Management Statement that the development will be designed and constructed so as to minimise the impact during construction and occupation stages (in line with the Local Environmental Impacts, Pollution and Land Contamination policy of this Plan);

C. Proposals for subterranean and basement developments, including extensions, as well as lightwells and railings, will be assessed against the advice set out in the Council's SPDs relating to character and design as well as the relevant Village Planning Guidance and the forthcoming SPD on Basements and Subterranean Developments. Applicants will be expected to follow the Council's Good Practice Guide on Basement Developments.

The London Plan 2021

Policy SI 12 Flood risk management

A Current and expected flood risk from all sources (as defined in paragraph 9.2.12) across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers.

B Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should cooperate and jointly address cross-boundary flood risk issues including with authorities outside London.

C 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.

D Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.

E Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood

F Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.

G Natural flood management methods should be employed in development proposals due to their multiple benefits including increasing flood storage and creating recreational areas and habitat

Policy SI 13 Sustainable drainage states:

A *Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas where there are particular surface water management issues and aim to reduce these risks. Increases in surface water run-off outside these areas also need to be identified and addressed.*

B *Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:*
1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2) rainwater infiltration to ground at or close to source
3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4) rainwater discharge direct to a watercourse (unless not appropriate)
5) controlled rainwater discharge to a surface water sewer or drain
6) controlled rainwater discharge to a combined sewer.

C *Development proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.*

D *Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation***.**
9.13.1 *London is at particular risk from surface water flooding, mainly due to the large extent of impermeable surfaces. Lead Local Flood Authorities have responsibility for managing surface water drainage through the planning system, as well as ensuring that appropriate maintenance arrangements are put in place. Local Flood Risk Management Strategies and Surface Water Management Plans should ensure they address flooding from multiple sources including surface water, groundwater and small watercourses that occurs as a result of heavy rainfall.*

9.13.2 Development proposals should aim to get as close to greenfield run-off rates as possible depending on site conditions. *The well-established drainage hierarchy set out in this policy helps to reduce the rate and volume of surface water run-off***.**

***Rainwater should be managed as close to the top of the hierarchy as possible. There should be a preference for green over grey features, and drainage by gravity over pumped systems**. A blue roof is an attenuation tank at roof or podium level; the combination of a blue and green roof is particularly beneficial, as the attenuated water is used to irrigate the green roof.*

***9.13.3** For many sites, **it may be appropriate to use more than one form of drainage**, for example a proportion of rainwater can be managed by more sustainable methods, with residual rainwater managed lower down the hierarchy. In some cases, direct discharge into the watercourse is an appropriate approach, for example rainwater discharge into the tidal Thames or a dock. This should include suitable pollution prevention filtering measures, ideally by using soft engineering or green infrastructure.*
In addition, if direct discharge is to a watercourse where the outfall is likely to be affected by tide-locking, suitable storage should be designed into the system. However, in other cases direct discharge will not be appropriate, for example discharge into a small stream at the headwaters of a catchment, which may cause flooding. This will need to be assessed on a case-by-case basis, taking into account the location, scale and quality of the discharge and the receiving watercourse. The maintenance of identified drainage measures should also be considered in development proposals.

***9.13.4** The London Sustainable Drainage Action Plan complements this policy. It contains a series of actions to make the drainage system work in a more natural way with a particular emphasis on retrofitting.*

Non-Statutory Technical Standards for SuDS

The Non-Statutory Technical Standards for SuDS, (and accompanying Local Authority SuDS Officer Organisation (LASOO) Practice Guidance) sets out the details which should be addressed within a SuDS Report, including:

- Flood Risk Outside of the Development
- Peak Flow Control and Volume Control
- Flood Risk Within the Development
- Runoff Destinations
- Structural Integrity

- Designing for Maintenance Considerations
- Construction

3. Sources of Flood Risk

Fluvial Flood Risk

The EA Flood Maps confirm that the site is located in Flood Zone 1 and is therefore considered to be at low risk of fluvial / tidal flooding.

Critical Drainage Area (CDA)

The SWMP defines a CDA as: *'a discrete geographic area (usually within an urban setting) where there may be multiple and interlinked sources of flood risk and where severe weather is known to cause flooding of the area thereby affecting people, property or local infrastructure'*.

The site is shown to be in CDA Zone R02.

Section 4 of this report details the surface water drainage strategy for the site; this will ensure that the proposals do not exacerbate surface water flooding at the site or surrounding areas.

Groundwater Flooding

Groundwater flooding generally occurs during intense, long-duration rainfall events, when infiltration of rainwater into the ground raises the level of the water table until it exceeds ground levels. It is most common in low-lying areas overlain by permeable soils and permeable geology, or in areas with a naturally high water table.

Reference has been made to the British Geological Survey geology maps; these indicate that the site is underlain by Kempton Park Gravel Member (sand and gravel). The underlying bedrock is London Clay.

Based on the above, there may be a risk of rising groundwater in the gravel layers.

The London Borough of Richmond Strategic Flood Risk Assessment (SFRA) also states:

Subterranean conditions in certain areas throughout the London Borough of Richmond upon Thames are also at risk of groundwater influenced flooding via throughflow. Groundwater travels downhill through the aquifers/permeable superficial deposits from the top of the catchment area. In locations where there are no aquifers/permeable superficial deposits for water to flow through, water continues to flow through the interface of the made ground subsurface level and the clay geology stratum. This is referred to as throughflow.

It is understood that the site intersects with an area with >= 25% susceptibility to groundwater flooding and therefore, in line with the SFRA, a Basement Impact Assessment has been carried out by Lustre. This should be read in conjunction with this FRA and Surface Water Assessment, and the recommendations should be followed accordingly.

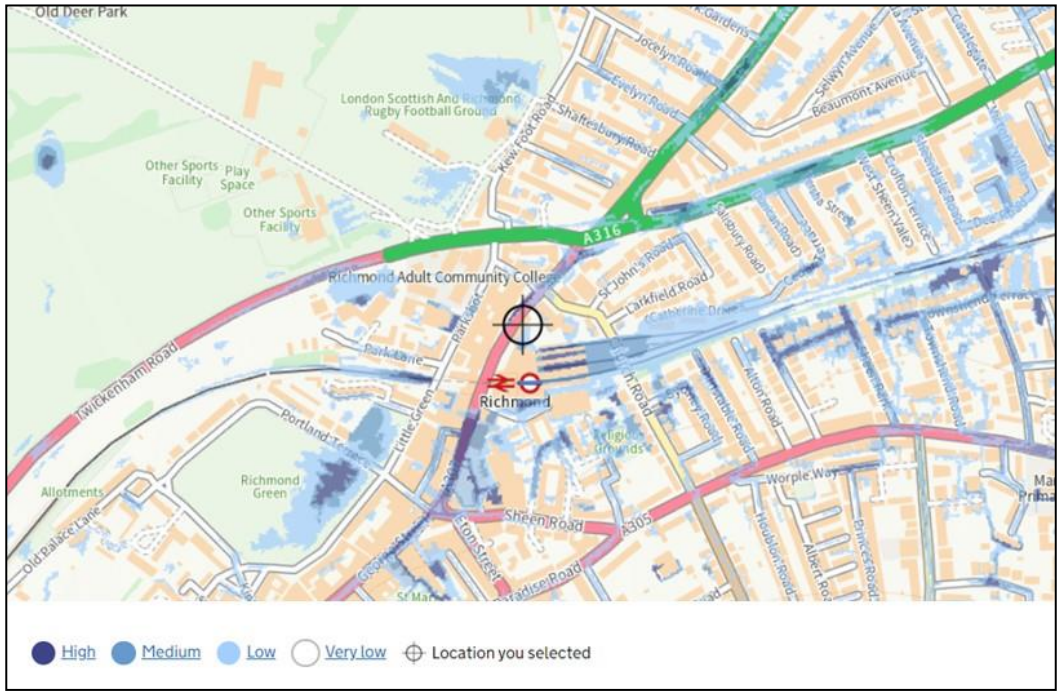

Figure 1 - Environment Agency Surface Water Flooding Maps

Surface Water Flooding

Surface water flooding results from rainfall generated overland flows, before the runoff reaches a watercourse/ drainage system, or where the watercourse/ drainage system is overwhelmed and unable to accept further runoff. Surface water runoff is usually associated with high intensity rainfall events but may also occur with lower intensity rainfall where the ground is saturated, developed or otherwise has low permeability resulting in overland flows and ponding within depressions in the topography.

The EA provide maps on their website which illustrate the risk of surface water flooding along with potential depths and velocities; these show that the site is at low risk of surface water flooding.

Section 4 of this report details the surface water drainage strategy for the site to ensure that the proposals will not exacerbate surface water flooding at the site or surrounding areas.

Sewer Flooding

Sewer flooding occurs when the capacity of underground sewerage systems is exceeded, resulting in flooding inside and outside of buildings. Normal discharge of sewers and drains through outfalls may be impeded by high water levels in receiving waters.

There are no known records of surface water flooding at the site location.

4. Surface Water and SuDS

Site Areas

The whole site is 0.04228ha and is comprised of the existing building, along with small areas of paving.

Following development, the footprint of the building will remain the same and there will be no change in hardstanding areas.

Rates of Runoff

As previously stated, the London Plan requires proposals to aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible.

In the first instance the **ICP SuDS** method within Micro Drainage has been used to calculate flow rates from the total (as detailed in **Appendix C** and shown in **Table 1**).

Table 1 – ICP SuDS – Existing Site Runoff Rates (l/s)

Return Period	Flow Rate from 450m². (l/s)
Qbar	0.1
1 in 30 year	0.2
1 in 100 year	0.2

The London Plan Hierarchy

The following outlines the most feasible ways to manage surface water runoff in line with the London Plan hierarchy.

1) Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
Rainwater reuse would not be a feasible solution, given the proposed site layout.

2) Rainwater infiltration to ground at or close to source
As previously noted, the British Geology Survey (BGS) Geology Maps indicate that the site is underlain by Kempton Park Gravel Member (sand and gravel). The underlying bedrock is London Clay.

Following development, the footprint of the building will remain the same and there will be no change in hardstanding areas. There is no scope for infiltration SuDS to be integrated into the site.

Furthermore, under Approved Document Part H, it is stated that infiltration devices (including soakaways, swales, filter drains) should not be built within 5m of a building or road.

3) Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
As shown on the development proposals in **Appendix B**, the redevelopment will include the introduction of green roof spaces. More details are provided overleaf.

4) Rainwater discharge direct to a watercourse (unless not appropriate)
There are no watercourses in the immediate vicinity of the site.

5) Controlled rainwater discharge to a surface water sewer or drain, and 6) Controlled rainwater discharge to a combined sewer.
A copy of the Thames Water public sewer records is provided in **Appendix D**. This confirm that surface water connects into the public surface wate sewer in Kew Road. Surface water will continue to drain as existing.

SuDS Option

SuDS aim to mimic natural drainage and can achieve multiple objectives such as removing pollutants from urban runoff at source, controlling surface water runoff from developments, ensuring that flood risk is not increased further downstream and combining water management with green space which can increase amenity and biodiversity value. When selecting SuDS, consideration needs to be given to a range of factors including the ground conditions, type of proposals, and the constraints of the site.

In this instance, given the constraints of the site layout, and in line with the London Plan hierarchy, the following is proposed:

- Green roof
- Surface water runoff to continue to drain as existing

Green Roof

The proposals include areas of green roof (~70m^2).

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping. The roof is likely to consist of an impermeable layer, a substrate or growing medium and a drainage layer (although not all green roofs require a drainage layer), Green roofs are designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.

Additional benefits include:

- Ecological, aesthetic and amenity benefits
- No additional land take
- Improve air quality
- Insulates buildings against temperature extremes

The areas of green roof will provide betterment (in terms of surface water management) when compared with the existing situation.

SuDS Maintenance

Operation and maintenance schedules are provided below (taken from Ciria C753 The SuDS Manual): these, or similar schedules, will be adopted by the management company.

Green Roof

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems, membrane and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify sediment source	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system; inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains	Six monthly and annually or as required
	During establishment year replace dead plans as required	Monthly – but usually the responsibility of the manufacturer
	Post establishment replace dead plants where required	Annually (in autumn)

	Remove fallen leaves and debris from deciduous plant foliage; remove nuisance and invasive vegetation; mow grasses, prune shrubs and manage other planting as required - clippings should be removed and not allowed to accumulate	Six monthly or as required

5. Conclusions

This Flood Risk and SuDS Assessment has been prepared to support the planning application for the proposed redevelopment of Westminster House, Richmond in line with the NPPF and the London Borough of Richmond Local Plan.

Westminster House is an existing building with commercial space on the ground floor, and offices on the upper floor.

Proposals are for the creation of two additional levels of Class C3 accommodation comprising 7no.units, conversion and excavation of the existing Class E basement and part conversion of existing floorspace at basement, ground, first, second, and third floor levels to provide internal access and ancillary residential floorspace with external alterations and associated development.

Flood Risk

The EA Flood Maps confirm that the site is located in Flood Zone 1 and is therefore considered to be at low risk of fluvial / tidal flooding.

The site is shown to be in CDA Zone R02.

The BGS geology maps indicate that the site is underlain by Kempton Park Gravel Member (sand and gravel). The underlying bedrock is London Clay. As such, there may be a risk of rising groundwater in the upper gravel layers. It is understood that the site intersects with an area with >= 25% susceptibility to groundwater flooding and therefore, in line with the SFRA, a Basement Impact Assessment has been carried out by Lustre. This should be read in conjunction with this FRA and Surface Water Assessment, and the recommendations should be followed accordingly.

The EA provide maps on their website which illustrate the risk of surface water flooding along with potential depths and velocities; these show that the site is at low risk of surface water flooding.

SuDS

The whole site is 0.04228ha and is comprised of the existing building, along with small areas of paving.

Following development, the footprint of the building will remain the same and there will be no change in hardstanding areas.

In this instance, given the constraints of the site layout, and in line with the London Plan hierarchy, the following SuDS are proposed:

- Green roof (~70m^2)
- Surface water runoff to continue to drain as existing

The areas of green roof will provide betterment (in terms of surface water management) when compared with the existing situation.

Operation and maintenance schedules have been provided; these, or similar schedules, will be adopted by the management company.

Appendices

Appendix A - Site Location Plan

N

0 10 20 30 50 100m

Scale 1:1250

- Do not scale from this drawing, except for planning purposes.
- Check all dimensions on site.
- Subject to survey.
- Subject to site inspection.
- Site boundary lines are indicative only.

Rev	Date	By	Description
-	-	-	-

Revision Schedule

project
WESTMINSTER HOUSE
RICHMOND

title
SITE LOCATION PLAN

sheet number
PLOXX1

drawing status
PRELIMINARY

contract no. | client ref.

scale	date	drawn by	checked by
1 : 1250 @ A3	06/08/22	JK	JK

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drawing number: originator-zone-level -type -role - sheet number

Child Graddon Lewis

Level 2 Irongate House
30 Dukes Place
London EC3A 7LP

T: +44 (0)20 7539 1200
E: hq@cgluk.com
www.cgluk.com

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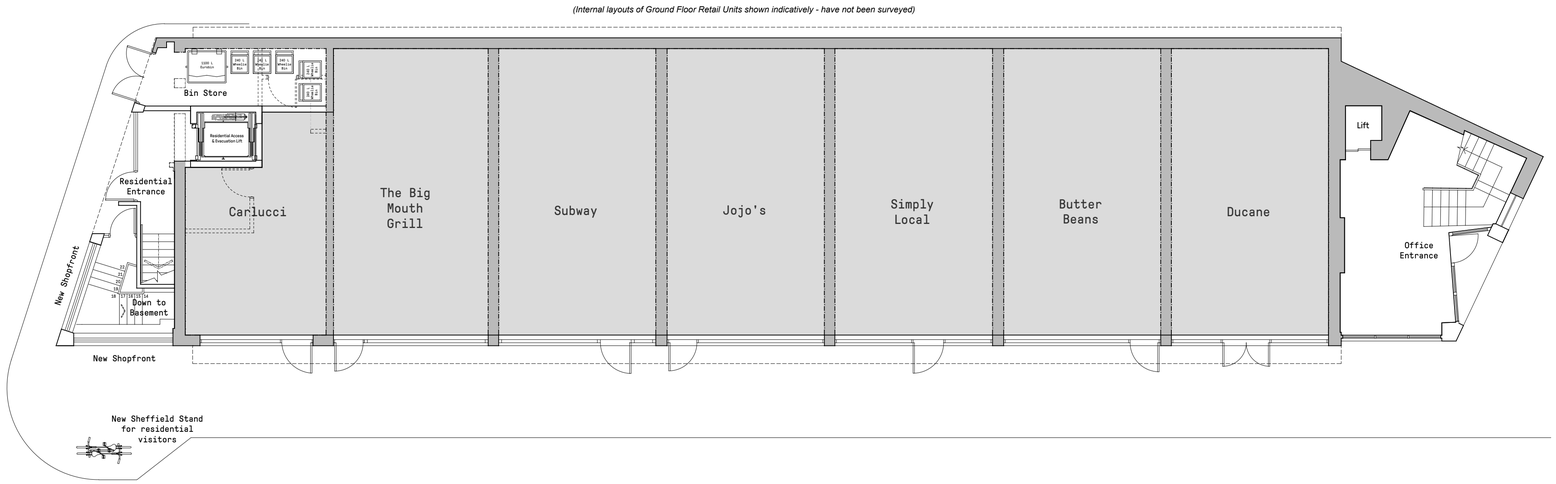
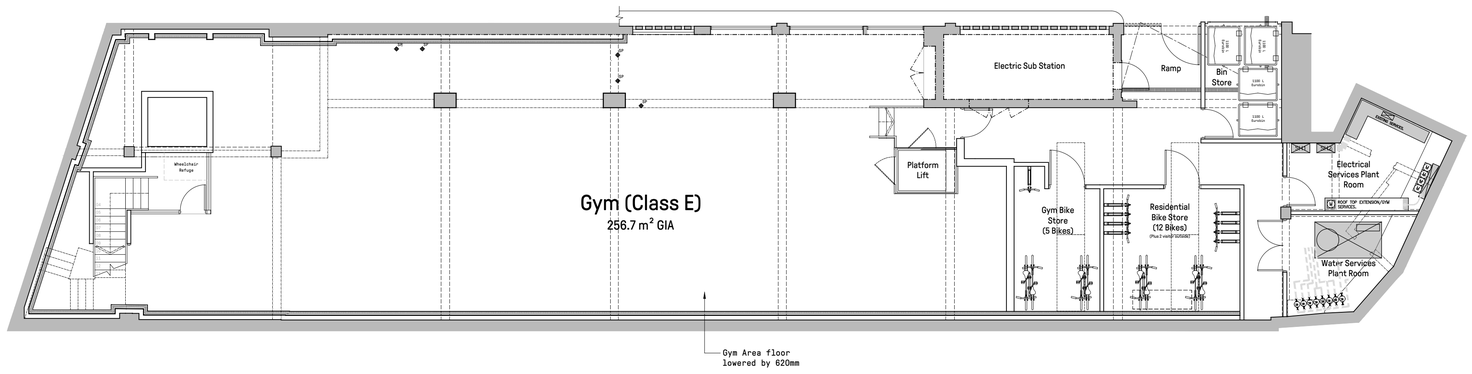
Appendix B - Proposed Site Plans



2 PROPOSED GROUND FLOOR PLAN
1 : 100



1 PROPOSED BASEMENT PLAN
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Scale 1:100

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- Subject to site inspection.
- Site boundary lines are indicative only.

Rev	Date	By	Description
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Revision Schedule

project
WESTMINSTER HOUSE
RICHMOND

title
PROPOSED BASEMENT AND GROUND FLOOR PLANS

sheet number
PL0001

drawing status
PRELIMINARY

contract no. | client ref.

scale	date	drawn by	checked by
1 : 100 @ A1	06/06/22	JT	JK

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Child Graddon Lewis
Level 2 Irongate House
30 Dukes Place
London EC3A 7LP
T: +44 (0)20 7539 1200
E: hq@cgluk.com
www.cgluk.com

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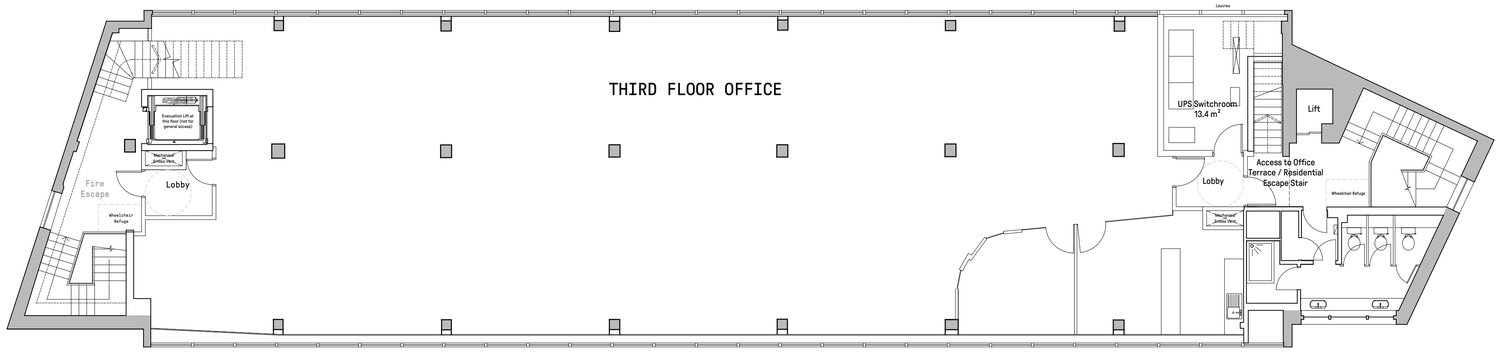

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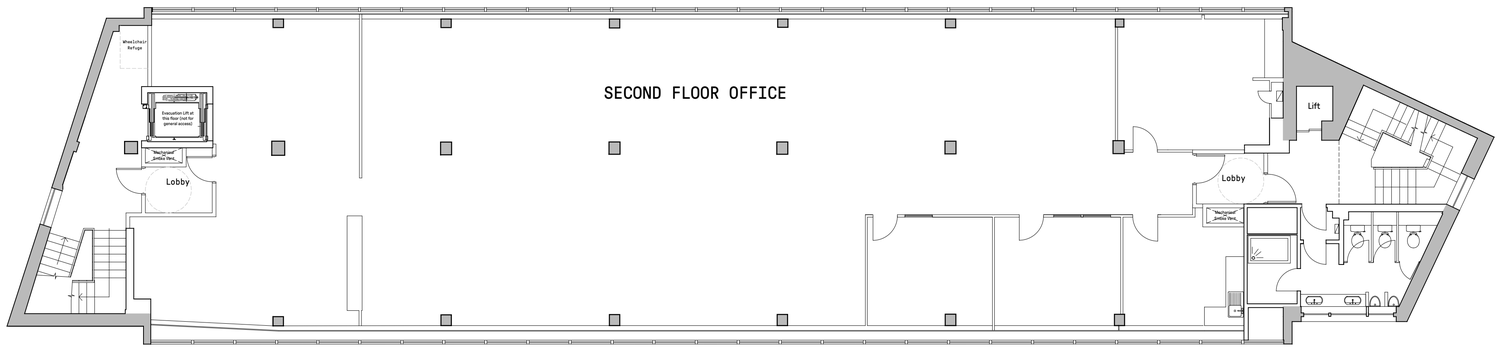

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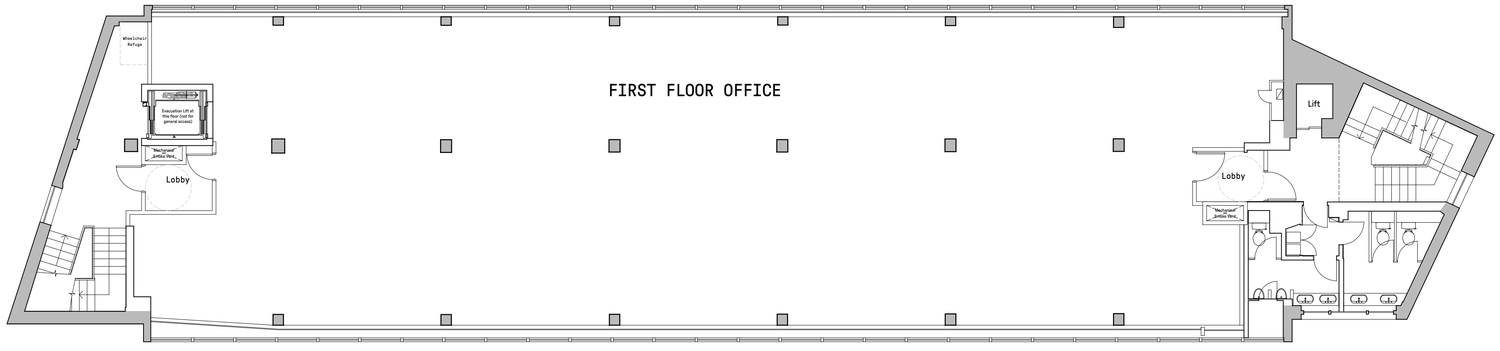

1 PROPOSED FIRST FLOOR PLAN
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Scale 1:100

- Do not scale from this drawing, except for planning purposes.
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- Site boundary lines are indicative only.

Rev	Date	By	Description
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Revision Schedule

project
WESTMINSTER HOUSE
RICHMOND

title
PROPOSED FIRST, SECOND AND THIRD FLOOR PLANS

sheet number
PL0002

drawing status
PRELIMINARY

contract no. client ref.

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P22-058	CGL-Z1-00-GA-A-PL0002	E

Child Graddon Lewis

Level 2 Irongate House
30 Dukes Place
London EC3A 7LP

T: +44 (0)20 7539 1200
E: hq@cgluk.com
www.cgluk.com

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- 1 BED 1 PERSON
- 1 BED 2 PERSON
- 2 BED 3 PERSON
- 2 BED 4 PERSON

3 PROPOSED ROOF PLAN
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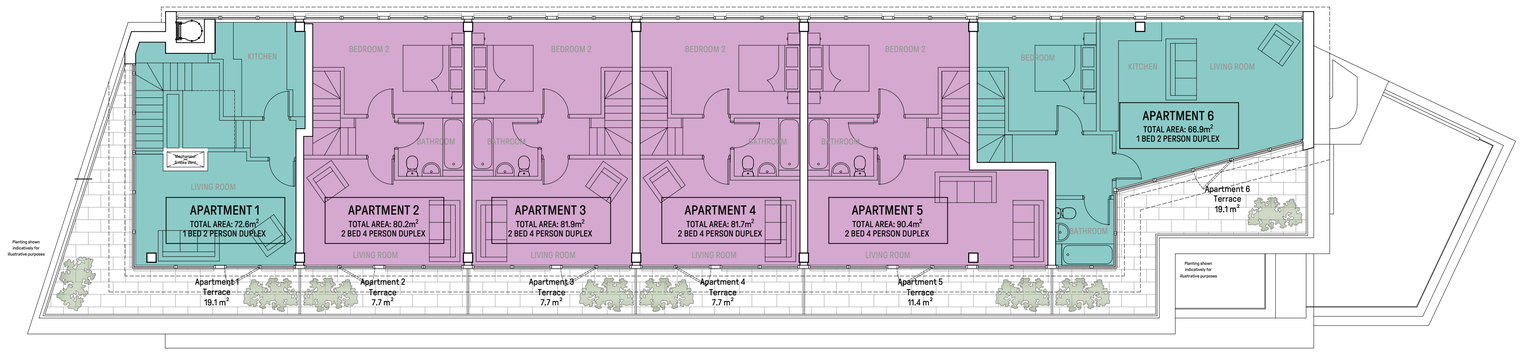

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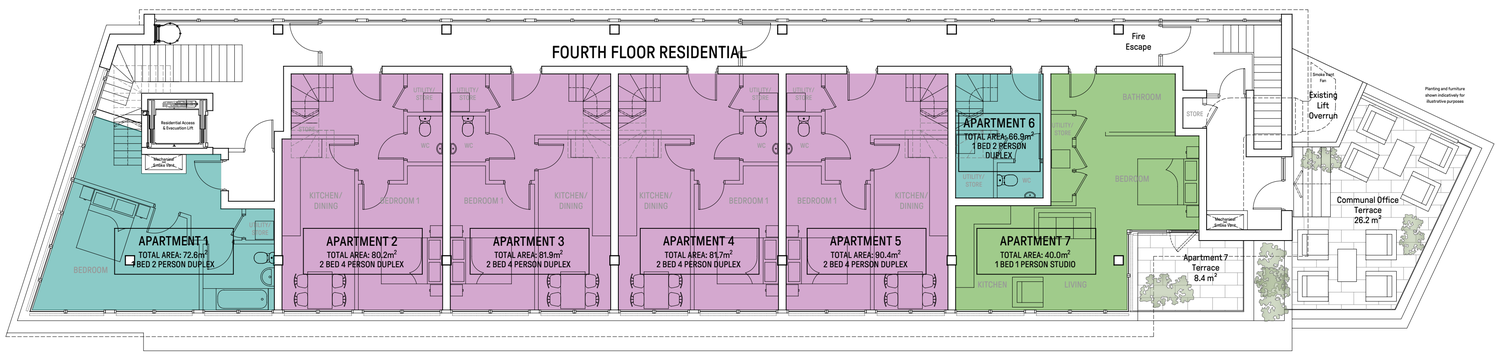

1 PROPOSED FOURTH FLOOR PLAN
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Scale 1:100

- Do not scale from this drawing, except for planning purposes.
- Check all dimensions on site.
- Subject to survey.
- Subject to site inspection.
- Site boundary lines are indicative only.

Rev	Date	By	Description
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Revision Schedule

project
WESTMINSTER HOUSE
RICHMOND

title
PROPOSED FOURTH, FIFTH AND ROOF PLANS

sheet number
PL0003

drawing status
PRELIMINARY

contract no. | client ref.

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1 : 100 @ A1	06/06/22	JT	JK

project no.	drawing number (originator-zone-level -type -role - sheet number)	revision
P22-058	CGL-Z1-00-GA-A-PL0003	K

Child Graddon Lewis
Level 2 Irongate House
30 Dukes Place
London EC3A 7LP
T: +44 (0)20 7539 1200
E: hq@cgluk.com
www.cgluk.com

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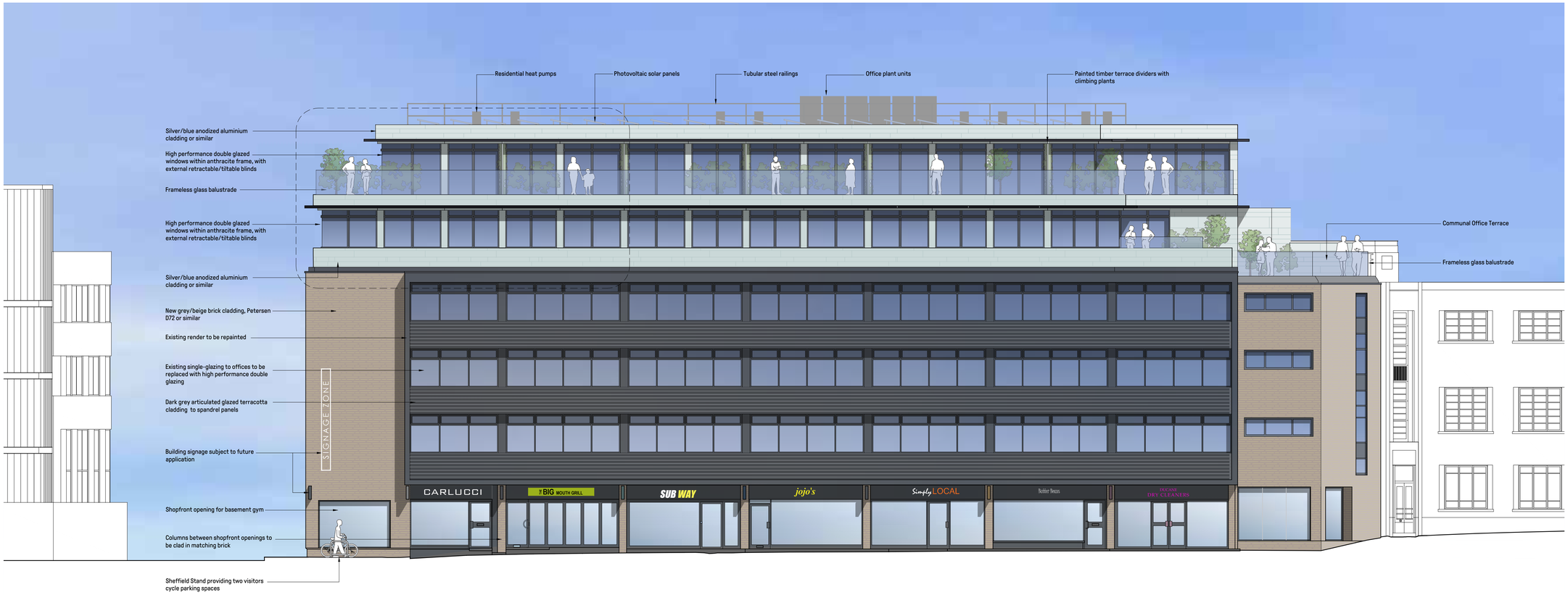
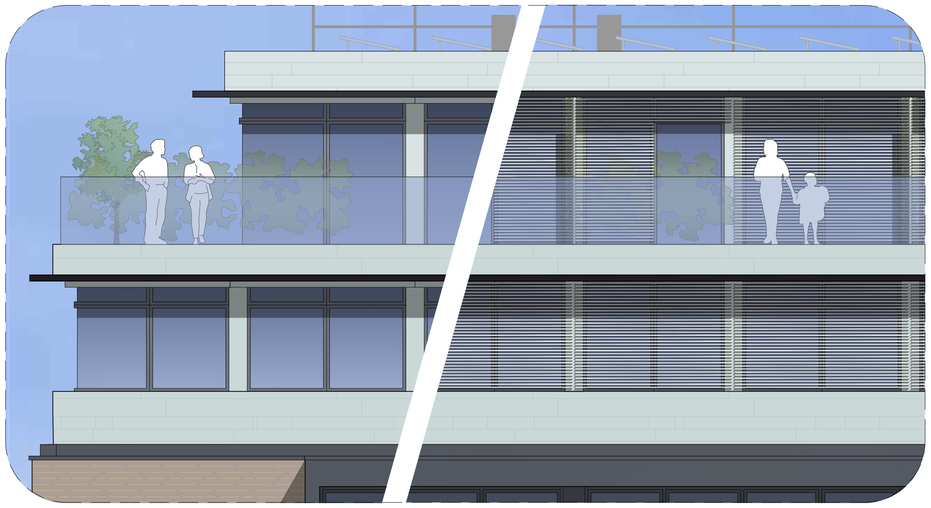
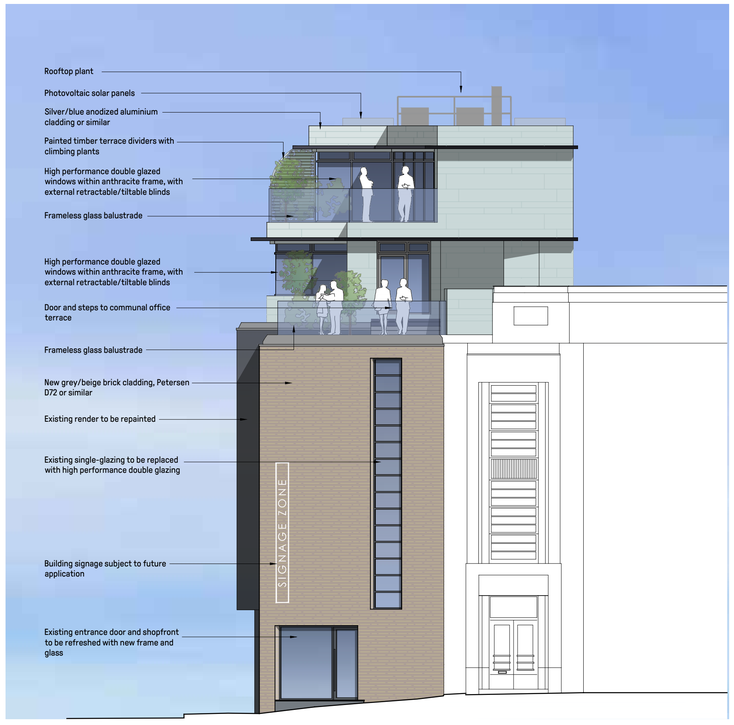


1 PROPOSED FRONT (WEST) ELEVATION
1 : 100



3 EXTRACT SHOWING BLINDS UP Vs DOWN
1 : 50



2 PROPOSED SIDE (SOUTH) ELEVATION
1 : 100

0 1 2 3 5 10m
Scale 1:100

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- Do not scale from this drawing, except for planning purposes.
- Check all dimensions on site.
- Subject to survey.
- Subject to site inspection.
- Site boundary lines are indicative only.

Note:
Planting shown indicatively for illustrative purposes.

Rev	Date	By	Description
-	--/--/--	-	-

Revision Schedule

project
WESTMINSTER HOUSE
RICHMOND

title
PROPOSED
WEST & SOUTH ELEVATIONS

sheet number
PL0004

drawing status
PRELIMINARY

contract no. | client ref.

scale	date	drawn by	checked by
1 : 100 @ A1	06/06/22	JT	JK

project no.	drawing number (originator-zone-level-type-role-sheet number)	revision
P22-058	CGL-Z1-00-GA-A-PL0004	G

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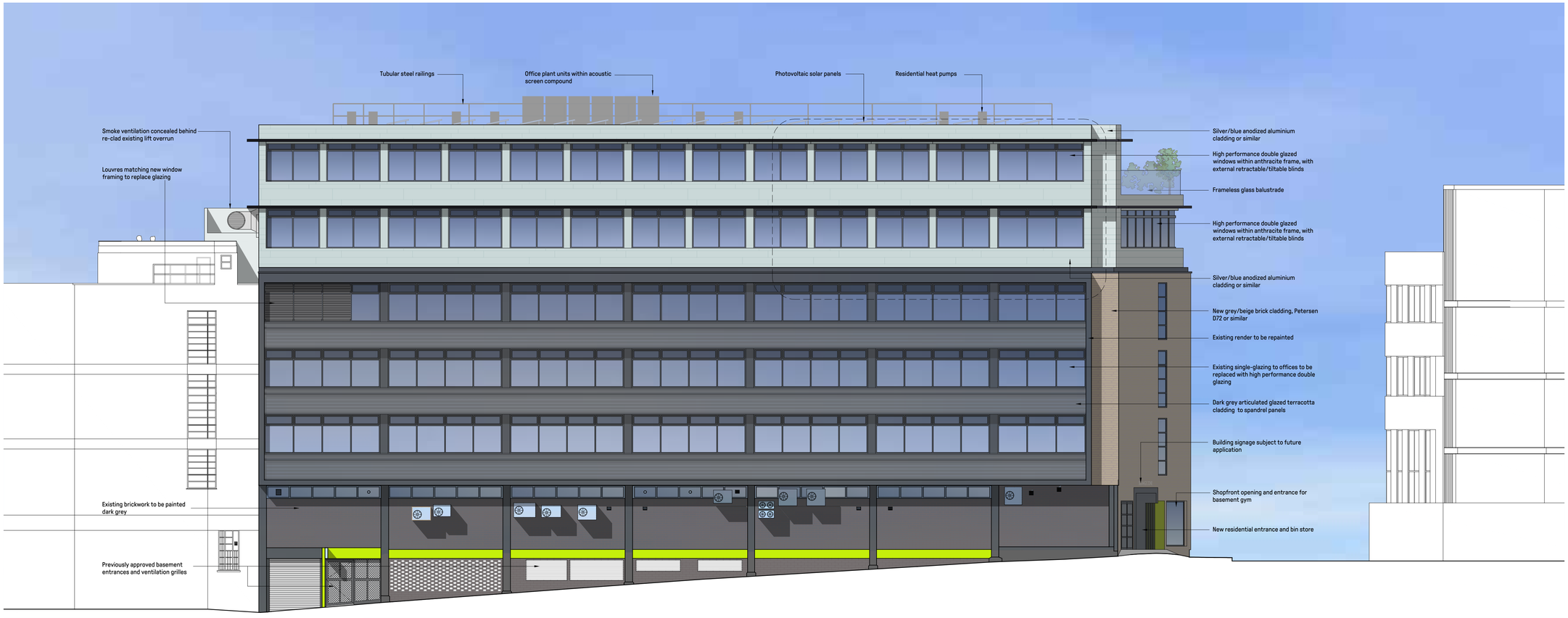
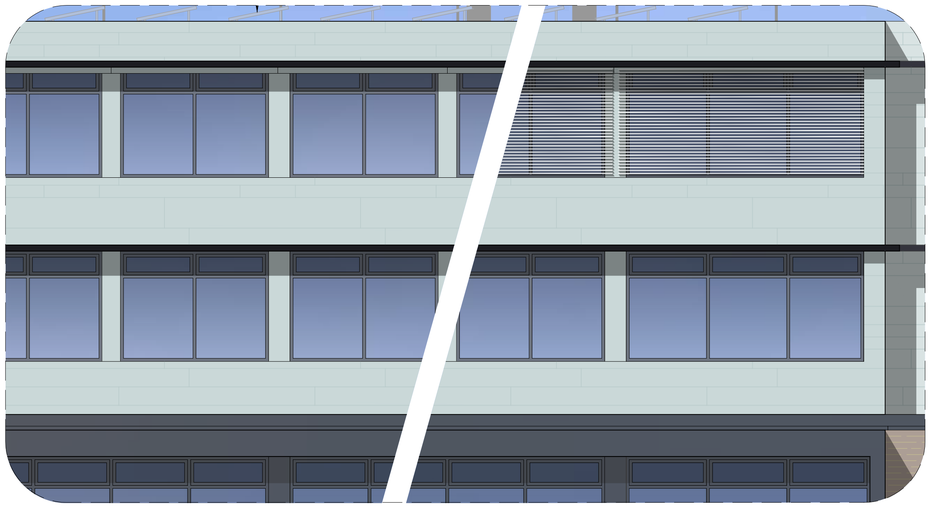


1 PROPOSED REAR (EAST) ELEVATION
1 : 100



3 EXTRACT SHOWING BLINDS UP Vs DOWN
1 : 50

0 1 2 3 5 10m
Scale 1:100

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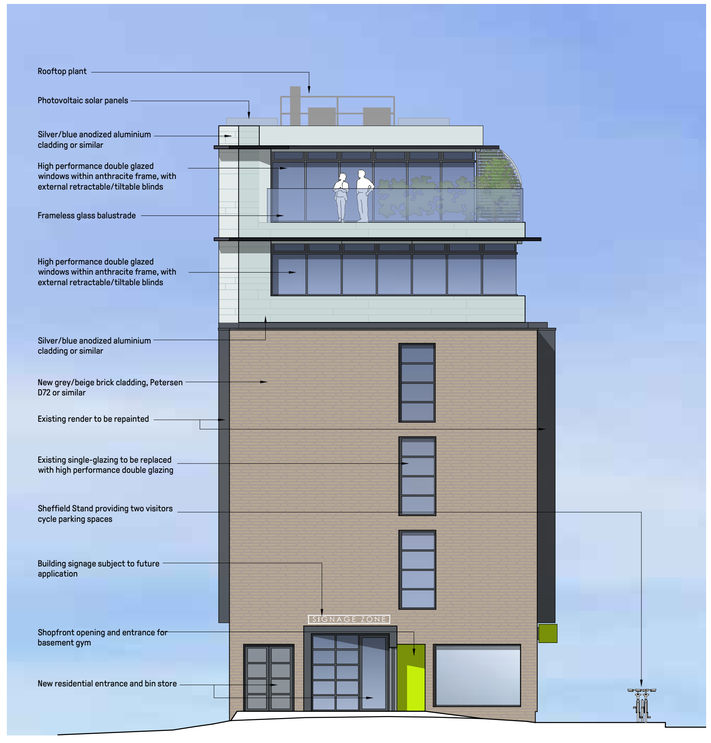

2 PROPOSED SIDE (NORTH) ELEVATION
1 : 100

- Do not scale from this drawing, except for planning purposes.
- Check all dimensions on site.
- Subject to survey.
- Subject to site inspection.
- Site boundary lines are indicative only.

Note:
Planting shown indicatively for illustrative purposes.

Rev	Date	By	Description
-	--/--/--	-	-

Revision Schedule

project
WESTMINSTER HOUSE
RICHMOND

title
PROPOSED
EAST & NORTH ELEVATIONS

sheet number
PL0005

drawing status
PRELIMINARY

contract no. | client ref.

scale	date	drawn by	checked by
1 : 100 @ A1	06/06/22	JT	JK

project no.	drawing number (originator-zone-level-type-role-sheet number)	revision
P22-058	CGL-Z1-00-GA-A-PL0005	C

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E: hq@cgluk.com
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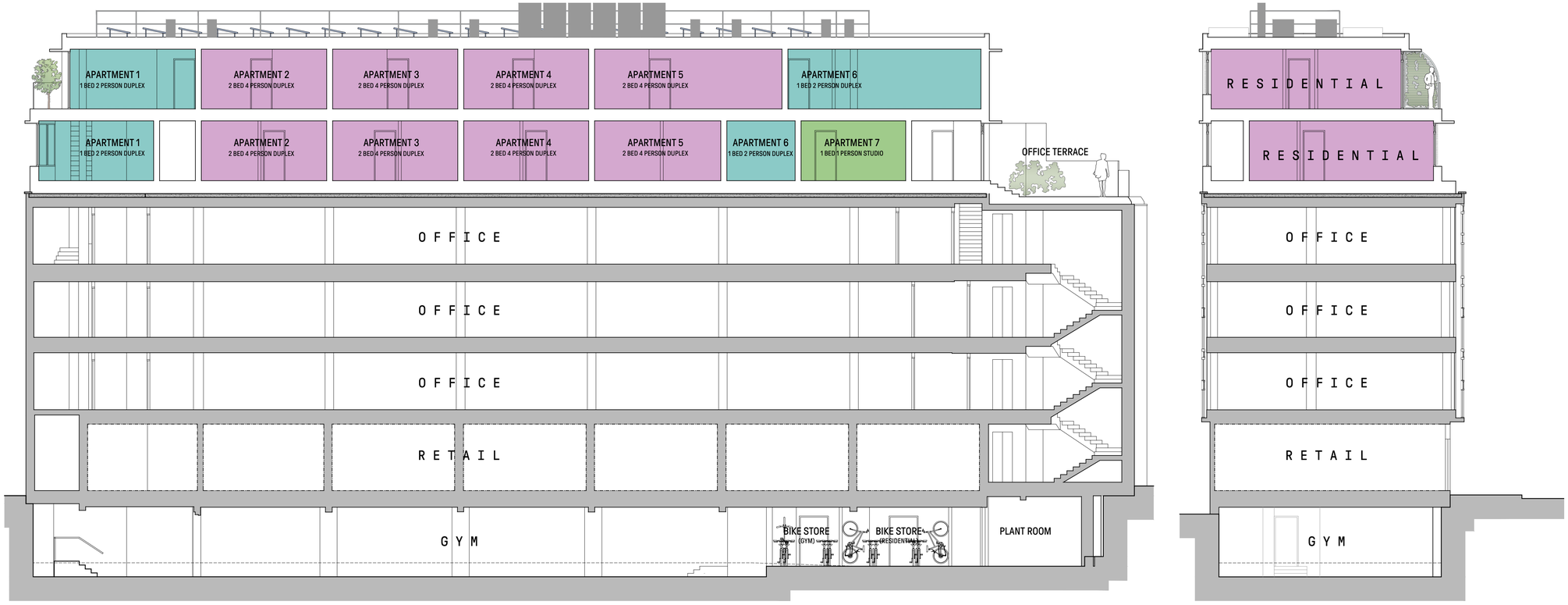

1 PROPOSED LONG SECTION
1 : 100

2 PROPOSED SHORT SECTION
1 : 100

0 1 2 3 5 10m
Scale 1:100

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- Subject to survey.
- Subject to site inspection.
- Site boundary lines are indicative only.

Note:
Planting shown indicatively for illustrative purposes.

Rev	Date	By	Description
-	--/--/--	-	-

Revision Schedule

project
WESTMINSTER HOUSE
RICHMOND

title
PROPOSED SECTIONS

sheet number
PL0006

drawing status
PRELIMINARY

contract no. client ref.

scale	date	drawn by	checked by
1 : 100 @ A1	06/06/22	JT	JK

project no.	drawing number (originator-zone-level -type -role - sheet number)	revision
P22-058	CGL-Z1-00-GA-A-PL0006	A

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Appendix C - Greenfield Runoff Calculation

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.040	Urban	0.000
SAAR (mm)	600	Region Number	Region 6

Results l/s

QBAR Rural	0.1
QBAR Urban	0.1
Q100 years	0.2
Q1 year	0.1
Q30 years	0.1
Q100 years	0.2

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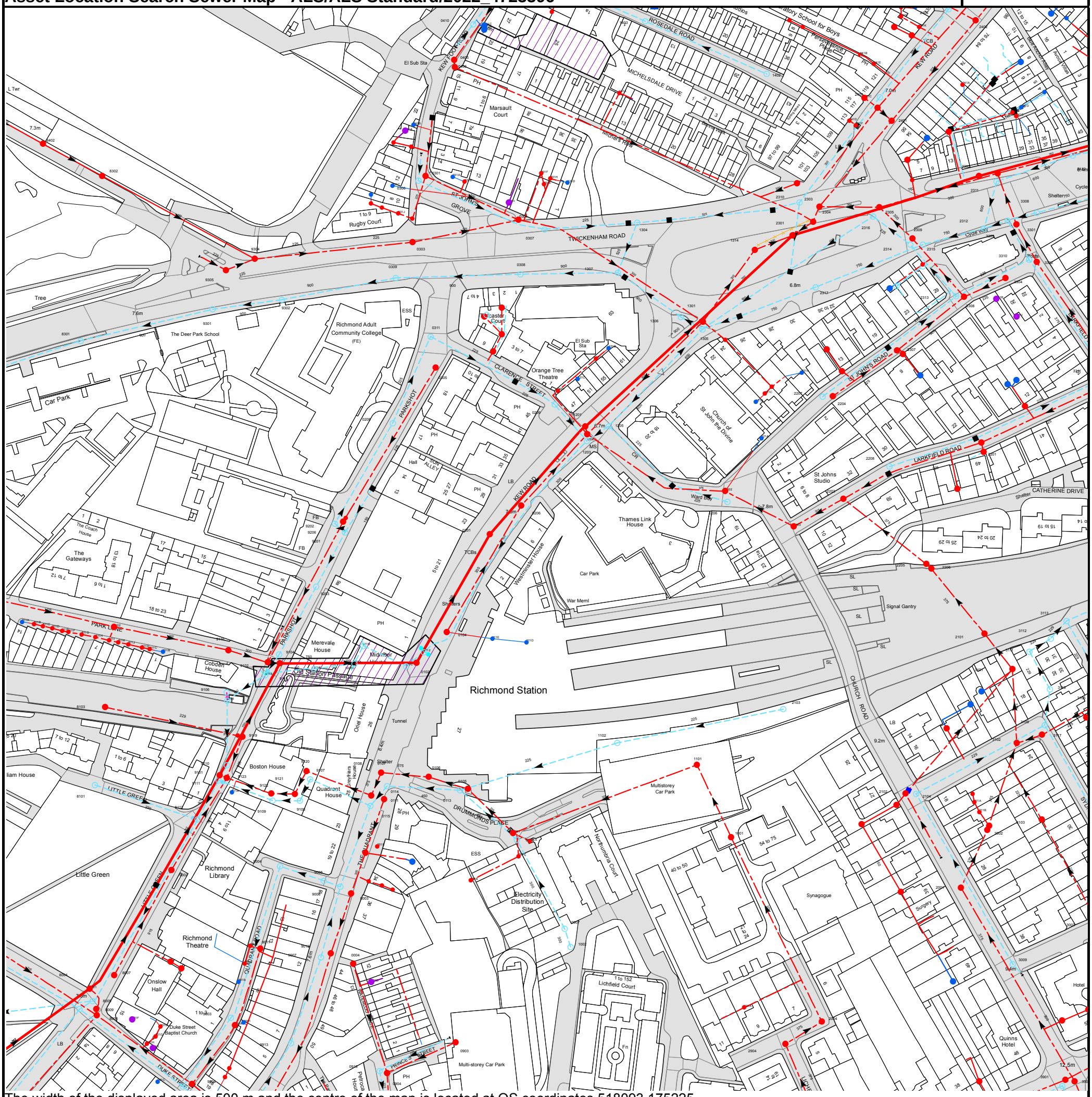
Appendix D- Thames Water Asset Search

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4723396



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 518093,175225

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

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
2402	6.92	1.21
34YY	n/a	n/a
241L	n/a	n/a
34YS	n/a	n/a
2406	6.98	3.63
241J	n/a	n/a
241I	n/a	n/a
241H	n/a	n/a
2311	6.18	3.62
23ZX	n/a	n/a
2302	n/a	-3.45
2306	6.15	2.61
24YV	n/a	n/a
3412	6.48	3.62
24YX	n/a	n/a
24YR	n/a	n/a
2401	6.76	.86
341C	n/a	n/a
341B	n/a	n/a
2407	n/a	n/a
341D	n/a	n/a
241C	n/a	n/a
2405	n/a	n/a
34WZ	n/a	n/a
241A	n/a	n/a
241E	n/a	n/a
34XQ	n/a	n/a
34ZX	n/a	n/a
24ZT	n/a	n/a
24ZV	n/a	n/a
241K	n/a	n/a
3102	8.04	4.73
21ZT	n/a	n/a
3110	n/a	n/a
3101	7.22	4.32
3111	n/a	n/a
3112	n/a	n/a
2101	n/a	n/a
3113	n/a	n/a
2206	n/a	n/a
2205	n/a	n/a
2203	8.53	3.65
2202	7.75	3.74
22ZS	n/a	n/a
2208	7.08	n/a
22ZV	n/a	n/a
2201	7.05	4.93
32ZS	n/a	n/a
2207	6.88	n/a
2204	6.95	5.68
33ZY	n/a	n/a
33ZX	n/a	n/a
23ZR	n/a	n/a
231A	n/a	n/a
2301	n/a	n/a
2310	6.83	3.4
2303	7.51	.51
2317	6.6	2.89
2304	6.8	.82
23YX	n/a	n/a
23YW	n/a	n/a
2316	n/a	3.17
2305	6.88	2.37
23XW	n/a	n/a
23YS	n/a	n/a
2307	6.68	5.28
23ZP	n/a	n/a
2314	6.51	4.37
2309	6.58	4.47
23YP	n/a	n/a
23XT	n/a	n/a
2315	6.61	2.98
2313	6.58	4.64
2308	6.57	4.78
2312	6.62	3.06
231B	n/a	n/a
3304	6.5	4.16
3309	6.4	3.09
3301	6.39	4.22
331I	n/a	n/a
3310	n/a	n/a
3302	6.53	4.46
3308	6.43	3.12
031E	n/a	n/a
231C	n/a	n/a
131D	n/a	n/a
031H	n/a	n/a
031F	n/a	n/a
241F	n/a	n/a
241D	n/a	n/a
141A	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
1402	7.09	6.25
241B	n/a	n/a
24VQ	n/a	n/a
1403	7.13	6.06
24VR	n/a	n/a
04YX	n/a	n/a
011D	n/a	n/a
0206	6.85	2.99
1206	7.38	5.4
1202	7.26	3.37
1204	6.61	3.18
121A	n/a	n/a
1203	6.64	2.88
1201	n/a	-3.18
1205	6.63	3.3
0209	7.25	3.56
121B	n/a	n/a
121C	n/a	n/a
0207	6.72	3.97
1208	n/a	n/a
131C	n/a	n/a
131A	n/a	n/a
131B	n/a	n/a
1315	n/a	n/a
1305	6.45	2.76
1301	6.53	2.76
1306	6.63	2.75
0308	7.5	2.67
1307	7.11	2.72
1314	n/a	n/a
0307	7.37	5.35
1304	6.97	2.79
0003	7.44	6.65
n/a	n/a	n/a
9106	n/a	n/a
9113	9.11	3.55
911E	8.83	3.54
011C	9.08	3.57
011A	8.78	3.55
9102	8.69	-2.99
0102	9.05	-3.07
9115	8.27	3.15
9104	8.11	5.3
0112	8.8	3.66
9116	7.53	4.76
011B	8.82	3.55
011E	n/a	n/a
0104	8.68	4.1
9203	7	5.45
0201	n/a	-3.11
9201	6.65	5.57
9202	n/a	n/a
9206	6.64	3.51
0208	6.81	5.77
0305	6.83	5.66
03YY	n/a	n/a
0311	7.37	2.67
03YZ	n/a	n/a
03ZS	n/a	n/a
03YW	n/a	n/a
03ZQ	n/a	n/a
9301	n/a	n/a
03ZP	n/a	n/a
9302	n/a	n/a
0309	7.87	2.61
9305	n/a	n/a
9304	n/a	n/a
0303	7.96	4.78
0304	7.19	4.47
03ZV	n/a	n/a
031J	n/a	n/a
03ZW	n/a	n/a
03ZX	n/a	n/a
031I	n/a	n/a
03ZY	n/a	n/a
031C	n/a	n/a
031B	n/a	n/a
0306	7.77	5.83
031A	n/a	n/a
0301	7.65	4.91
04ZW	n/a	n/a
04ZX	n/a	n/a
041A	n/a	n/a
041B	n/a	n/a
0406	7.9	4.78
0405	7.71	4.72
041D	7.8	6.25
041C	7.8	5.1
0410	7.71	6.03
911B	n/a	n/a
911C	n/a	n/a
911D	n/a	n/a
811J	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
811K	n/a	n/a
811I	n/a	n/a
811H	n/a	n/a
811G	n/a	n/a
811F	n/a	n/a
811E	n/a	n/a
811D	n/a	n/a
8102	n/a	n/a
811C	n/a	n/a
811B	n/a	n/a
811A	n/a	n/a
8301	n/a	n/a
8302	n/a	n/a
8402	n/a	n/a
2904	8.81	6.67
2004	8.63	6.09
29YS	n/a	n/a
30XX	n/a	n/a
3908	12.53	11.16
3901	n/a	n/a
3902	12.54	n/a
1102	n/a	5.37
1101	6	4.34
1001	7.55	4.87
101A	n/a	n/a
2103	n/a	n/a
20ZP	n/a	n/a
21ZP	n/a	n/a
20ZR	n/a	n/a
2102	8.54	5.09
2104	8.54	6.48
21ZX	n/a	n/a
20ZV	n/a	n/a
2001	8.54	5.49
21ZY	n/a	n/a
21YN	n/a	n/a
211A	n/a	n/a
211B	n/a	n/a
2002	7.21	4.85
20ZY	n/a	n/a
3009	9.41	7.69
3103	7.51	5.15
3117	7.42	n/a
3109	n/a	n/a
31ZP	n/a	n/a
30XY	n/a	n/a
9007	n/a	n/a
9012	n/a	n/a
0004	7.54	6.65
001D	n/a	n/a
0916	7.59	6.68
0904	7.61	5.72
0903	7.83	5.9
1002	n/a	n/a
0007	n/a	n/a
00ZS	n/a	n/a
9006	n/a	n/a
00ZR	n/a	n/a
00ZQ	n/a	n/a
9005	n/a	n/a
001B	n/a	n/a
00ZX	n/a	n/a
001C	n/a	n/a
001E	n/a	n/a
001A	n/a	n/a
0006	7.46	5.35
0001	7.41	4.19
0115	8.26	4.67
9108	n/a	n/a
0111	8.33	5.94
0108	8.31	3.38
9121	n/a	n/a
0113	8.83	5.08
0105	9.19	4.04
0114	8.62	4.81
9107	n/a	n/a
0106	8.89	3.87
0107	8.82	3.48
9120	n/a	n/a
8009	8.28	n/a
8005	n/a	n/a
8001	n/a	-2.79
901B	n/a	n/a
8007	n/a	n/a
90YY	n/a	n/a
901C	n/a	n/a
90YX	n/a	n/a
9011	n/a	n/a
901D	n/a	n/a
9002	n/a	n/a
9004	n/a	n/a
9112	7.95	2.62
9109	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9122	n/a	n/a
911A	n/a	n/a
8101	n/a	n/a
9111	8.23	2.64
9123	8.26	2.28
9101	n/a	-2.91
9110	8.52	2.65
9119	9	2.7
8103	n/a	n/a
9105	n/a	n/a
8004	n/a	n/a
8008	8.29	n/a
901F	n/a	n/a
991H	n/a	n/a
991I	n/a	n/a
901G	n/a	n/a
991C	n/a	n/a
901E	n/a	n/a
9910	8.29	5.8
9904	8.27	3.34
99YX	n/a	n/a
99YW	n/a	n/a
9003	n/a	n/a
901A	n/a	n/a
0001	n/a	n/a
9913	7.86	5.59

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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.