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Fox Court

Drainage Strategy

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One

Executive Summary

This Drainage Strategy report has been prepared by Elliott Wood Partnership on behalf of Clare Real Estate (14 Gray's Inn Road) Ltd ("the Applicant") in support of a planning application submitted to the London Borough of Camden ("LBC") for the development of Fox Court, 14 Gray's Inn Road, London, WC1X 8HN ("the Site").

The planning application seeks planning permission for the following description of development:

> *'Demolition of existing facades, retaining existing reinforced concrete frame and basement structures; refurbishment and reconfiguration of the existing office (Use Class E) building for continued office use including extensions with new facades to the west elevation fronting Gray's Inn Road (9 storeys), to the northern courtyard elevation facing Brookes Court (8 storeys), to the existing 5 storey north-east wing fronting Brooke Street (3 storeys) and to the south elevation (8 storeys); external alterations, provision of rooftop amenity terraces, landscaping and associated works'*

The Sustainable Drainage Systems (SuDS) Hierarchy has been followed in order to employ the most suitable and practicable SuDS techniques to improve surface water run off rates from the site. The development will provide benefits to surface water runoff, water quality, amenity space and biodiversity through the proposal of blue and green roofs, and above slab attenuation.

Blue roofs have been proposed across roof areas of the vertical extension where there is sufficient plan area, before draining at a restricted rate to the sewer network via gravity. This includes the level 08 private and shared terrace areas, and on the top roof plant and green roof areas. They have not been proposed on the new terrace areas where there is a need to tie-in with existing floor levels, as this would lead to stepped thresholds. The total peak discharge from the blue roof systems is proposed to be 2.7 l/s.

An attenuation tank located above the B1 slab has been proposed to attenuate surface water from some of the external hard landscaping and roof areas that are not attenuated by blue roofs. Discharge from the attenuation tank will be pumped to the high-level drainage network, prior to discharge to the local sewer network. The pumped discharge rate is proposed to be restricted to a peak flow rate of 1.1 l/s. To achieve this, an attenuation volume of 52.8m^3 is to be provided.

It is proposed that a number of catchment areas, including the level 5 terrace, the access ramp and smaller areas of external hardstanding, discharge directly to sewer outfalls without being attenuated. It is not feasible to attenuate these areas without significant impacts on the existing structure, and additional pumped discharge across the lifetime of the development. These catchments, along with the entire site, currently drain unrestricted to the sewers.

To protect the basement from flooding due to sewer surcharge surface water from the access road will be collected at the base of the ramp and routed to a surface water pump, which will discharge to the high-level suspended gravity network.

The total peak surface water discharge rate from the site will be restricted to 23.2 l/s for all events up to and including the 1 in 100 year + 40% climate change allowance event, without flooding.

All foul drainage below ground floor level will also be positively pumped, discharging to the high-level suspended gravity network. It is proposed that the sub-basement (B2) drainage network drains to the existing pumping station. The re-use of this pumping station is dependant on confirmation of existing pump specification and proposed flow rates. The basement (B1) foul drainage network, including the cycle facilities, are proposed to drain to a new foul pumping station.

There are two existing combined water connections to the Thames Water combined sewer network. It is proposed that foul and surface water from the development will discharge via these existing sewer outfalls. A pre-planning enquiry has been submitted to Thames Water to confirm that there is sufficient capacity within the local sewer network to accommodate the estimated discharge from the development.

Two

Introduction

The purpose of this report is to explain the approach taken with regards to the below ground drainage strategy for the development of Fox Court, 14 Gray's Inn Road, London, WC1X 8HN ("the Site"). It evaluates the selection of SuDS and highlights how the drainage disposal hierarchy has been followed.

This report has been prepared in accordance with the GOV.UK *Sustainable Drainage Systems: Non-statutory Technical Standards*, the CIRIA SuDS Manual C753, the *London Plan 2021* and the London Borough of Camden Local Plan (2017).

Three

Site Context

3.1 Site Location & Existing Development

Fox Court is located within the Holborn & Covent Garden Ward within the London Borough of Camden (LBC). It is a 9 storey purpose built office building (14,287 sqm GIA of Class E office floorspace), in a U-shape with an external courtyard space to the north of the building. The building is finished predominantly in red brick, with glazing and cladding to the Gray's Inn Road frontage. It is of no architectural merit.

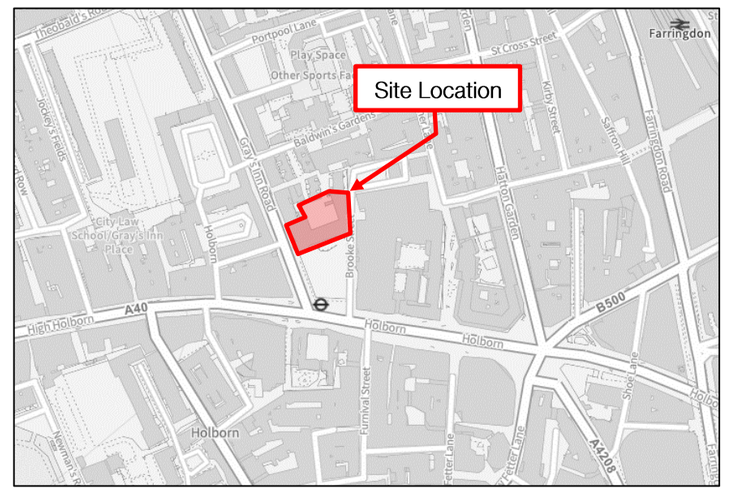

Figure 1: Site Location Plan.

To the south is the recently completed 150 High Holborn office and residential development. To the west, beyond Gray's Inn Road, is an 8 storey building with retail at ground floor and residential above that turns the corner onto High Holborn and the office buildings surrounding Gray's Inn South Square. To the north is a predominantly residential area comprising 6 storey buildings fronting Gray's Inn Road, a 4 storey building facing Brookes Market and 2 storey buildings in Brookes Court, which also includes the Holborn Mosque. To the east, on the other side of Brooke Street, is the Waterhouse Square office complex.

In terms of planning designations, the site lies within the Central Activities Zone (CAZ), the London View Management Framework (LVMF) protected vista from Primrose Hill to St Paul's Cathedral and the background areas of the views from Blackheath Point and Greenwich Park.

In terms of heritage assets, the site lies between two conservation areas, Bloomsbury Conservation Area on the west side of Gray's Inn Road and Hatton Garden Conservation Area to the east of Brooke Street. Waterhouse Square (The Prudential Insurance Building) is Grade II* listed and Church of St Alban the Martyr (Grade II*) and its associated Clergy and Railings (Grade II) to the north of the site are listed. Within the Gray's Inn complex to the west are a number of listed buildings including The Hall (Grade I), The Chapel (Grade II) and Statue of Francis Bacon (Grade II), all set within the Grade II* Gray's Inn Registered Park and Garden.

The site centre OS national grid reference are 531154 E, 181710 N and the total site boundary area is approximately 3,469m^2 (0.347ha), all of which is considered to be impermeable.

The Lead Local Flood Authority (LLFA), responsible for all flood risk matters that do not relate directly to designated Main Rivers, is Camden London Borough Council (CLBC). The Statutory Water and Sewerage Undertaker for the area are Thames Water (TW).

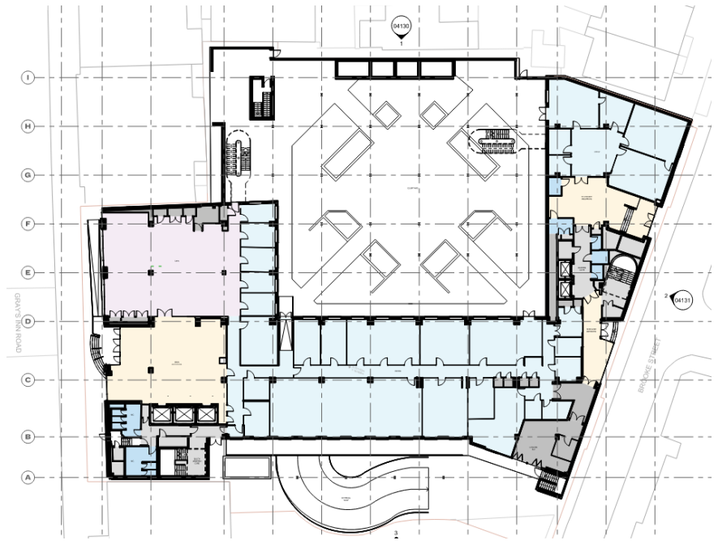

Figure 2: Existing Ground Floor Layout

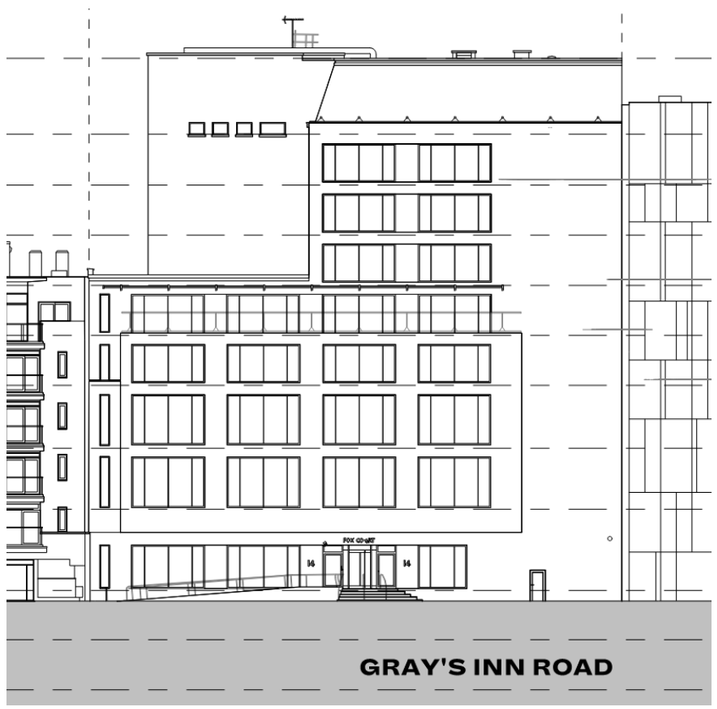

Figure 3: Existing Development (Western Elevation)

3.2 Topography

A topographical survey of the site was undertaken by Point 2 Surveyors Limited in October 2022; this can be found in ***Appendix A.***

The external levels show that the site is very flat, with the levels varying from 20.92m AOD to 20.84m AOD in the courtyard, and 20.74m AOD to 19.87m AOD upon entrance via a ramped and stepped access to the west of the site.

3.3 Underlying Geology and Hydrogeology

The BGS maps indicate that the ground conditions on the site consist of Hackney Gravel Members (sands and gravels) over London Clay. Available BGS borehole data appear to confirm these anticipated ground conditions. From available borehole records (designated TQ38SW5487 on the BGS GeoIndex maps) suggest the expected ground conditions to be:

0m to 1.2m - Made Ground (gravely sandy clay)

1.2m to 3.5m – Clay

3.5m to 5.0m – Sand

5.0m to 6.5m – Gravel

6.5m to 33.65m - Clay

The consistency between the geological maps and borehole data for the area indicates that it is fair to assume that the ground conditions under the site and in the immediate vicinity comprise of Made Ground over Hackney Gravels over London Clay.

Borehole records from 1952 (designated TQ38SW13) found that the rest water level is recorded at approximately 4.3m below ground level.

Four

Existing Drainage

4.1 Asset Records

Public sewer records have been obtained from Thames Water. These show that the area is served by a network of combined sewers within Gray's Inn Road and Brooke Street. A 1219mm x 813mm egg-shaped combined sewer is located under Gray's Inn Road, and a 1219mm x 762mm egg-shaped combined sewer is located under Brooke Street. Both sewers are over 3.5m deep from surface level to the top of the sewer.

The records also indicate an abandoned sewer within the site.

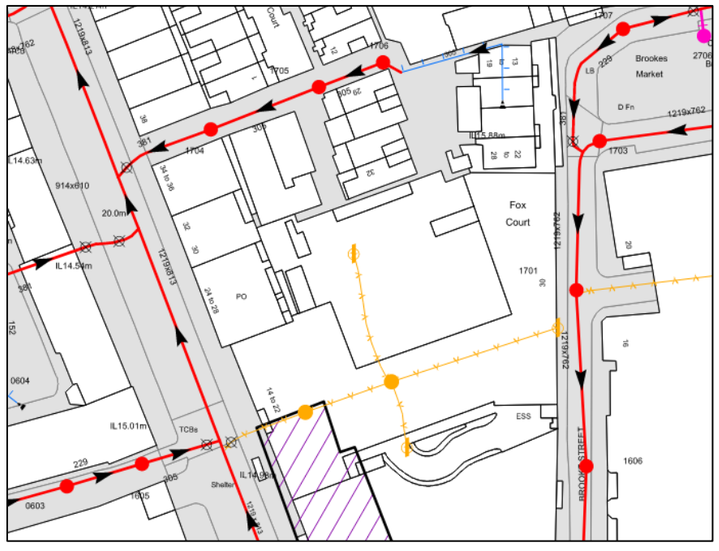

Figure 4: Extract from Thames Water Sewer Records

4.2 CCTV Survey

A CCTV survey was carried out by Clearview Surveys in December 2022 to determine the size, condition, location and connectivity of the building's existing below ground drainage at ground floor, basement and sub-basement levels. It showed siltation and encrustation in a number of the pipes. Based on the alterations proposed as part of the development the majority of the existing below ground drainage is considered to be redundant and can be removed or abandoned, with the exception of the existing outfalls and sub-basement pumping station.

The survey indicated two existing combined sewer outfalls from the site:

1. Ø150mm combined outfall from high level sub-basement to the sewer within Brooke Street.

Surface and foul water from the above ground drainage network drain to this outfall, as well as the pumped discharge from the Sub-basement (B2) foul network. The survey indicates a crack in the outfall pipe. This section of pipe would need to be lined to make the outfall suitable for re-use.

2. Ø300mm combined outfall from below basement level to sewer within Gray's Inn Road

Surface and foul water from the above ground drainage network drain to this outfall, as well as the basement (B1) car park and access ramp drainage. The majority of the car park is routed through an existing 3 stage petrol interceptor. The final demarcation manhole is a deep manhole accessible from the GF lobby area. The surveyors were unable to access this manhole to survey the outfall pipe, due to screed covering the access cover. This will need to be surveyed to confirm if it suitable for re-use.

4.3 Existing Runoff Rates

The existing site area (0.347ha) is considered to be entirely impermeable, with surface water discharging directly to the existing sewer outfalls at an unrestricted rate. The surface water runoff rates for the existing site have been calculated using the 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=0.347ha*

Table 1: Existing Surface Water Run-off Rates

Return Period	Rainfall Intensity, i (mm/hr)	Existing run-off (l/s) (C=1.0)
1yr	31.7	29.9
30yr	79.9	75.1
100yr	101.9	95.8
100yr + 40%	142.66	134.2

Note that the rainfall intensities used in the above calculations have been calculate based on Walling Procedure Volume 4.

Five

Proposed Development

5.1 Proposed Development

The proposed development falls within one red line area and specifically comprises of the following components:

- Retrofit and extension of the existing office building to provide additional office accommodation, with an uplift of 8,426sqm GIA (9,338sqm GEA).
- Existing reinforced concrete frame to be retained, along with ground floor slab and basement structure.
- Extensions to west, north and south sides of the building.
- Provision of a central atrium space between the existing structure and the northern extension for internal circulation and rooftop amenity spaces for tenants, including urban greening.
- Provision of cycle parking and servicing at basement level, and provision of plant space at roof and basement levels.

The proposed development has evolved through pre-application and wider stakeholder consultation process, which has included collaborative discussions with the Council and a number of other key stakeholders. The proposed development provides the opportunity to regenerate this important site through the sustainable retrofitting of the existing poor-quality office building to provide a highly sustainable and modern office building which reflects commercial demand in the area, and seeks to support LBC's aspirations to provide a range of business premises within the Borough.

Figure 5: Proposed Landscape Masterplan (Buckley Gray Yeoman)

Six

Proposed Drainage Strategy

6.1 Drainage Hierarchy

As a 'major development' Sustainable Drainage Systems (SuDS) will need to be considered as part of the development in line with the *New London Plan: Policy SI13* and designed in accordance with the GOV.UK *Sustainable Drainage Systems: Non-statutory Technical Standards*

The following drainage hierarchy has therefore been considered:

- rainwater harvesting (including a combination of green and blue roofs)
- infiltration techniques and green roofs
- rainwater attenuation in open water features for gradual release
- rainwater discharge direct to a watercourse (unless not appropriate)
- rainwater attenuation above ground (including blue roofs)
- rainwater attenuation below ground
- rainwater discharge to a surface water sewer or drain
- rainwater discharge to a combined sewer.

6.2 Use of Rainwater Harvesting

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

6.3 Use of Infiltration techniques and open water features

Drainage via infiltration is not possible due to the ground conditions and limited external area. Therefore, infiltration methods have not been considered feasible for this development.

Due to the site's location and the external area available; it has been deemed that there is no feasible location for open water features where any significant benefit can be gained.

6.4 Use of Green Roofs

A biodiverse green roof has been proposed across the western top roof area, with planters and vegetation proposed on all terrace areas. These areas will further reduce both the total and peak surface water discharge, as well as providing benefits to biodiversity and water quality. In addition to this there are a number of planters proposed across the roof areas. Please refer to **Appendix D** for Proposed Development Plans.

As it is difficult to measure the reduction in surface water discharge, especially following multiple storm events in a short space of time, the impact of green roofs has been ignored in the calculation of surface water run-off and treated as impermeable roof areas. In reality, however they will provide some surface water attenuation. It is proposed that these areas will only be accessed for maintenance.

6.5 Use of Blue Roofs

Blue roofs have been proposed across roof areas of the vertical extension where there is sufficient plan area. This includes the level 08 private and shared terrace areas, and on the top roof plant and green roof areas. They have not been proposed on the new terrace areas where there is a need to tie-in with existing floor levels, as this would lead to stepped thresholds.

These systems will attenuate surface water falling across their separate roof catchments, restricting discharge at the system roof outlets. The systems are designed to accommodate return periods up to the 1 in 100-year storm without flooding with a 40% allowance for climate change.

6.6 Use of Below Ground Attenuation

Retrospective installation of below slab attenuation has been discounted due to impact on the existing basement raft. There is also limited external space suitable for a below ground attenuation tank.

It is proposed to locate an above slab attenuation tank in the basement area beneath the lowered ground floor slab. This will rely on a pumped discharge as a gravity discharge would be at risk of flooding due to sewer surcharge.

6.7 Draining to Sewers and Watercourses

The London Borough of Camden (LBC) Strategic Flood Risk Assessment (SFRA) has highlighted that a culverted watercourse runs in close proximity to the site. The culverted watercourse is assumed to come from 'The New River', a watercourse that is actually a water supply aqueduct built in 1613 to bring fresh drinking water from Hertfordshire to North London. Therefore, the watercourse is not considered suitable for discharge of surface water. Thames Water and the Environment Agency have both confirmed that they are not responsible for this watercourse. No other watercourses are present within the vicinity of the site.

It is proposed that surface water from the site will outfall via the two existing combined water connections to the Thames Water combined sewer network. The condition of the existing outfall to Gray's Inn Road will need to be confirmed by further survey once the upstream demarcation manhole can be accessed

6.8 SuDS Evaluation

The evaluation of SuDS is summarised in Table 2 below.

Table 2: Evaluation of SuDS techniques

SuDS Technique	Y/N	Comment
Rainwater reuse	N	Rainwater reuse is not proposed for the scheme as it is proposed to reduce water usage rather than recycle rainwater.
Green / Biodiverse Roofs	Y	Green roof areas have been proposed, along with vegetation and trees across multiple terraces. These areas will reduce both the total and peak surface water discharge, as well as providing benefits to biodiversity and water quality.
Blue Roofs	Y	Attenuation is to be provided across the roof areas of the vertical extension via blue roof storage systems.
Basins and ponds	N	Due to the site's location and the external area available; it has been deemed that there is no feasible location for a detention basin or pond where any significant benefit can be gained.
Filter strips and swales	N	Filter strips and swales are not appropriate due to unsuitable ground conditions.
Permeable surfaces	N	Due to the limited area available the use of permeable surfaces is not considered suitable.
Infiltration devices	N	Infiltration is not deemed feasible for this site as the existing ground conditions are not conducive to infiltration techniques and due to restricted space on site.
Tanked systems	Y	An above slab attenuation tank is proposed in the basement area beneath the lowered ground floor slab.

6.9 Greenfield Runoff Rate

In line with the National Standards (NPPF) and the New London plan Policy SI13, 'development proposals should aim to get as close to greenfield run-off rates as possible depending on site conditions.' 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 runoff rates for the site are outlined below (refer to **Appendix E** for calculation sheet):

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

Return Period	Greenfield Runoff Rate (l/s)
1 in 1 year	0.45
1 in 30 years	1.23
1 in 100 years	1.70
QBar	0.53

In this case, Greenfield runoff rates are prohibitively low, especially given that the scope of the proposed development works. For this development SuDS techniques have been proposed which aim to provide significant betterment on the existing peak run-off rate, while also providing reasonable scope for attenuation design.

6.10 Blue Roof Discharge

Surface water that falls across the proposed blue roof areas will be captured and attenuated within the blue roof system. The blue roof proposals have been developed in collaboration with blue roof manufacturers ABG to establish proposed build-up depths and achievable discharge rates. The total peak discharge rate from these areas will be restricted to 2.7 l/s (with 2.1 l/s to the Gray's Inn Road outfall and 0.6 l/s to the Brooke Street outfall), for all storm events up to and including the 1in100 year +40% climate change event.

Table 4: Blue Roof Summary

Outfall	System	Catchment Area (m^2)	Peak Discharge Rate (l/s)
Brooke Street (East)	Blue Roof D	383	0.6
Gray's Inn Road (West)	Blue Roof A	1111	1.0
	Blue Roof B	556	0.6
	Blue Roof C	95	0.5
Total		2145	2.7

Refer to the Proposed Surface Water Catchment Plan in **Appendix F** which indicates the proposed areas of blue roof and their catchments (extract below) and **Appendix G** for proposed blue roof calculation summary.

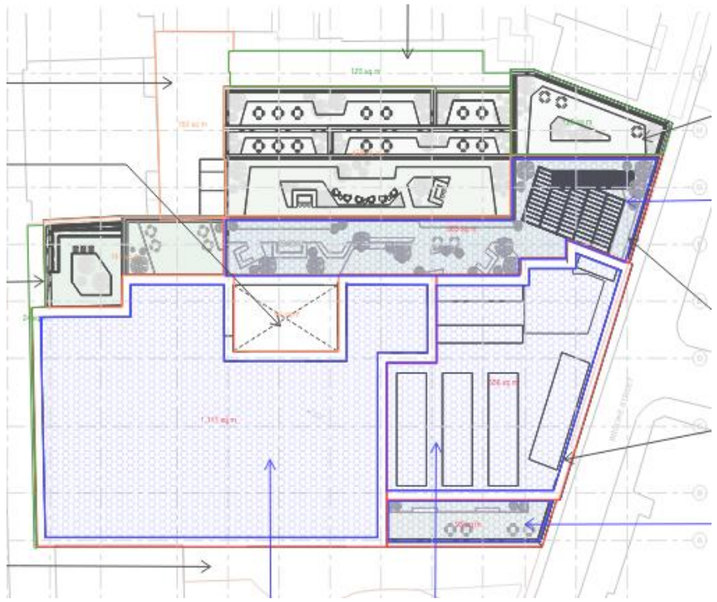

Figure 6: Proposed Blue Roof Areas (Surface Water Catchment Plan extract)

6.11 Attenuation Tank Discharge

The proposed attenuation tank located above the B1 slab will attenuate surface water from some of the external hard landscaping and roof areas that are not attenuated by blue roofs. Discharge from the attenuation tank would then be pumped to the high-level drainage network, prior to discharge via the Gray's Inn Road outfall. The attenuation tank has been designed to maximise the reduction in the surface water discharge rate based on the space available at basement level.

The pumped discharge rate is proposed to be restricted to a peak flow rate of 1.1 l/s, for all storm events up to and including the 1in100 year +40% climate change event. To achieve this an attenuation volume of 52.8m^3 is to be provided.

Refer to **Appendix F** for the Proposed Drainage Layouts and **Appendix H** for Microdrainage calculations.

6.12 Areas of Unrestricted Discharge

It is proposed that a number of catchment areas, including the level 5 terrace, the access ramp and smaller areas of external hardstanding, discharge directly to sewer outfalls without being attenuated. It is not feasible to attenuate these areas without significant impacts on the existing structure, and additional pumped discharge across the lifetime of the development. These catchments, along with the entire site, currently drain unrestricted to the sewers.

To protect the basement from flooding due to sewer surcharge surface water from the access road will be collected at the base of the ramp and routed to a surface water pump, which will discharge to the high-level suspended gravity network.

6.13 Proposed Discharge – Peak Runoff Rates

Through the use of blue roof systems and above slab attenuation it is proposed that surface water discharge to the Brooke Street outfall will be restricted to 10.3 l/s and discharge to the Gray's Inn Road outfall will be restricted to 12.9 l/s.

Therefore, the total peak discharge rate from the site will be restricted to 23.2 l/s for all events up to and including the 1 in 100 year + 40% climate change allowance event, without flooding.

Table 5: Summary of proposed peak discharge rates

Outfall	System	Catchment Area (m^2)	Peak Discharge Rate (l/s)
Brooke Street (East)	Blue Roof (D)	383	0.6
	Lvl 5 Terrace	123	4.9
	Hard Landscaping (Brooke Street)	120	4.8
Gray's Inn Road (West)	Blue Roof (A, B & C)	1762	2.1
	Attenuation tank	876	1.1
	Access Ramp	219	8.7
	Hard Landscaping (Gray's Inn Road)	24	1.0
Total		3507	23.2

The total drained area exceeds the red line boundary area due to the building footprint extending beyond the red line boundary in a number of instances.

The proposed strategy represents a significant improvement on the existing surface water discharge rates, with a betterment of 82% in the 1 in 100 year + 40% CC storm event, while also having a positive impact on water quality and provision of amenity space.

It is proposed that surface water from the site will outfall via the two existing combined water connections the Thames Water surface water sewer network. The condition of the existing outfall to Gray's Inn Road is still to be confirmed.

6.14 Management of Health & Safety Risks Related to SuDS Design

To comply with the Construction (Design and Management) Regulations (CDM) 2015, designers must assess all foreseeable risks during construction and maintenance and the design must minimise them by the following (in order of preference):

1. Avoid.
2. Reduce.
3. Identify and mitigate residual risks.

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

Specific consideration in the design of proposed SuDS include:

- Access to the above slab concrete attenuation tank – A minimum of two access points, with lockable access covers, should be provided to enable man access from ground floor.
- Blue roof design – A minimum of two outlets per blue roof area should be provided (in case one is blocked). Additional overflow outlets are to be included on all roof areas. Design and installation of blue roofs must be carried out by competent specialist.
- Surface water flood risk – The proposed surface water network, including SuDS features, has been designed to accommodate the 1in100yr + 40%CC event. Without flooding.
- Flooding due to sewer surcharge – The existing gravity outfall from the basement drainage network to the sewer in Gray's Inn Road has been identified to be at risk of sewer surcharge. To protect the basement from flooding due to sewer surcharge all drainage below ground floor level will be positively pumped, discharging to the high-level suspended gravity network.

Seven

SuDS Lifetime Maintenance Requirements

All SuDS will be maintained by the property owner for the lifetime of the development in accordance with the 2015 SuDS Manual, as summarised below:

7.1 Attenuation tanks and Modular systems

Regular inspection and maintenance is required to ensure the effective long-term operation of attenuation tanks and 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.

Table 6: Attenuation tanks and Modular Systems

Maintenance	Required Action	Recommended Frequency
Regular	Inspect and identify any areas that are not operating correctly. If required, take remedial action. Debris removal from catchment surface (where may cause risks to performance) Remove sediment from pre-treatment structures	Monthly for 3 months, then six monthly Monthly Annually, or as required
Remedial actions	Repair/rehabilitation of inlets, outlets, 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

7.2 Green Roofs

Intensive green roofs will require regular maintenance. Lawns will require mowing weekly or fortnightly, plant beds may require weeding on a weekly or fortnightly basis during the growing season, and wildflower meadows may require annual mowing with the cuttings removed. Extensive green roofs should normally only require bi-annual or annual visits to remove litter, check fire breaks and drains and, in some cases, remove unwanted colonising plants. The most maintenance is generally required in the first three years, and usually this should be made the responsibility of the green roof provider.

Table 7: Green Roofs

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth.	Six monthly/ Annually or as required.
	During establishment (ie one year), replace dead plants as required.	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required.	Annually (in autumn)
	Remove fallen leaves and debris form deciduous plant foliage.	Six monthly or as required.
	Remove nuisance and invasive vegetation, including weeds.	Six monthly or as required.
	Mow grasses (if appropriate) as required. Clippings must be removed and not allowed to accumulate.	Six monthly or as required.
Occasional maintenance	-	-
Remedial Actions	If erosion channels are evident, these should be stabilised with additional soil substrate similar to the original material. Sources of erosion damage must be identified and controlled.	As required.
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate.	As required.
Monitoring	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes, and roof structure for proper operation, integrity if waterproofing and structural stability.	Annually/after severe storms.
	Inspect soils substrate for evidence of erosion channels and identify any sediment sources.	Annually/after severe storms.
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system.	Annually/after severe storms.
	Inspect underside of roof for evidence of leakage	Annually/after severe storms.

Pumping stations
Pumping stations are to be maintained in accordance with the pump supplier/maintenance company requirements and in accordance with British Standards (BS EN 12056-4) i.e. inspections every quarter.

Gullies / Linear channels
Inspection and removal of debris from silt trap once a year; preferably after leaf fall in the autumn.

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.

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.

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.

Eight

Proposed Foul Water Strategy

All foul water drainage from above ground floor will offset at high-level within the building, as designed by the M&E engineer, and drop to the existing sewer outfalls.

To protect the basement from flooding due to sewer surcharge all foul drainage below ground floor level will be positively pumped, discharging to the high-level suspended gravity network. It is proposed that the sub-basement (B2) drainage network drains to the existing pumping station. The re-use of this pumping station is dependant on confirmation of existing pump specification and proposed flow rates. The basement (B1) foul drainage network, including the cycle facilities, are proposed to drain to a new foul pumping station.

Pumping stations are to include dual vortex pumps (duty and standby), alarms, telemetry, and non-return valves to protect against public sewer surcharge.

It is proposed that foul water from the development will discharge via the existing sewer outfalls to Brooke Street and Gray's Inn Road. Following confirmation from the M&E engineer of the proposed flow rates discharging to each outfall, a pre-planning enquiry is to be submitted to Thames Water to confirm that there is sufficient capacity within the local sewer network to accommodate the estimated discharge from the development.

The initial proposed basement drainage layouts have been included in the appendices.

Nine

Conclusion

This Drainage Strategy report has been prepared by Elliott Wood Partnership on behalf of Clare Real Estate (14 Gray's Inn Road) Ltd ("the Applicant") in support of a planning application submitted to the London Borough of Camden ("LBC") for the development of Fox Court, 14 Gray's Inn Road, London, WC1X 8HN ("the Site").

The SuDS Hierarchy has been followed in order to employ the most suitable and practicable SuDS techniques to improve surface water run off rates from the site. The development will provide benefits to surface water runoff, water quality, amenity space and biodiversity through the proposal of blue and green roofs, and above slab attenuation.

Through the use of blue roof systems and an above slab attenuation tank, the total peak surface water discharge rate from the site will be restricted to 23.2.0 l/s for all events up to and including the 1 in 100 year + 40% climate change allowance event, without flooding.

All foul drainage below ground floor level will also be positively pumped, discharging to the high-level suspended gravity network. It is proposed that the sub-basement (B2) drainage network drains to the existing pumping station. The re-use of this pumping station is dependant on confirmation of existing pump specification and proposed flow rates. The basement (B1) foul drainage network, including the cycle facilities, are proposed to drain to a new foul pumping station.

There are two existing combined water connections to the Thames Water combined sewer network. It is proposed that foul and surface water from the development will discharge via these existing sewer outfalls. A pre-planning enquiry has been submitted to Thames Water to confirm that there is sufficient capacity within the local sewer network to accommodate the estimated discharge from the development.