



elliottwood

**Braemar Avenue Baptist  
Church**

Sustainable Drainage Strategy

engineering a better **society**



|           |            | Remarks:     | Issued for planning                                                               |             |                                                                                    |              |                                                                                     |
|-----------|------------|--------------|-----------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------|
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# One

## Executive Summary

Elliott Wood Partnership Ltd has been commissioned to produce a Sustainable Drainage Strategy report in support of the proposed redevelopment at Braemar Avenue Baptist Church, Braemar Avenue, Wood Green, London, N22 7BY in the London Borough of Haringey.

The site comprises Braemar Avenue Baptist Church and a separate tin tabernacle. The development proposals consist of the demolition of the tin tabernacle and the existing church prayer room to the rear of the church and construction of a new building which will incorporate new residential units and amenity space for the church, along with upgrades to the surrounding soft and hard landscaping. The residential units will be split across 5 floors including at lower ground floor level.

Thames Water records show that the site is served by a 305mmø foul sewer beneath Braemar Avenue running from south to north, a 229mmø/305mmø surface water sewer beneath Braemar Avenue running from south to north and a 305mmø surface water sewer beneath the external landscape north of the Church, running from west to east.

Water butts are proposed for inclusion to serve some of the roof areas, and green roofs will be incorporated on the main residential roof and the roof over the new church access area to improve the quality of the rainwater discharged from site. Permeable paving is proposed for external paved areas where they do not lie directly over the basement footprint. The majority of the surface water runoff from the proposed development is to be attenuated in a below ground attenuation tank. The sustainable drainage solutions on site will reduce the discharge rate as close as greenfield as possible – greenfield rates are prohibitively low therefore it has been proposed that the total runoff rate for the 1 in 1 year storm event is reduced to the 1 in 100-year greenfield runoff rate, with a greater than 50% betterment achieved for greater storm events. The new drainage system has been designed for the 1 in 100-year storm event plus an allowance for 40% climate change.

The proposed foul drainage strategy requires all foul facilities at lower ground floor level to be pumped, with appropriate 24-hour storage provided. A proportion of the foul drainage serving the ground floor level and above is to drain by gravity; there are some areas which cannot drain by gravity due to restrictions on levels and will therefore be directed to the basement pump.

# Two

## Introduction

Elliott Wood Partnership Ltd has been commissioned to design the sustainable drainage strategy to support the planning application for the proposed redevelopment at Braemar Avenue Baptist Church, Braemar Avenue, Wood Green, London, N22 7BY.

This report outlines the proposed surface and foul water drainage strategy for the site, including the use of sustainable drainage systems (SuDS).

# Three

## Site Context

### 3.1 Site Location

The site is located in Wood Green, London. It is bounded by the A109 Bounds Green Road to the north, Braemar Avenue to the west and New River Path/Nightingale Gardens to the east. A residential property bounds the site to the south. Refer to **Figure 1** for the site location.

The site approximately centred at OS grid reference 530479 E, 190772 N.



Figure 1: Site location

### 3.2 Existing Development

The red line boundary for the site covers an area of 1,940m<sup>2</sup> (0.19 hectares).

The existing site (see **Figure 2**) consists of the Baptist Church building in the centre of the site, with a 2-storey tin tabernacle to the south of the church. There is an area of soft landscaping and pedestrian walkways to the north of the church. Only the southern portion of the site is to be redeveloped; for the purposes of this report this portion of the site is denoted the “developable site boundary”, denoted by the purple dashed line in **Figure 2**.

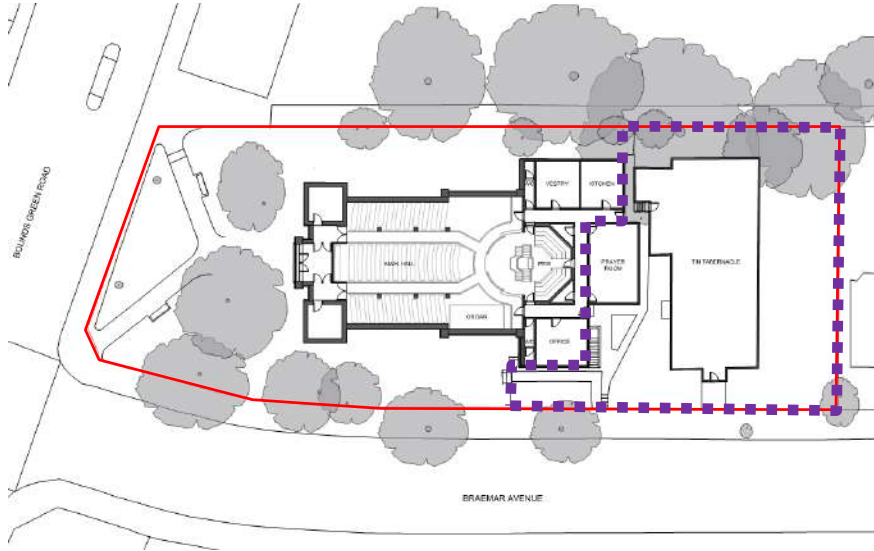


Figure 2: Existing site layout

The developable site boundary totals approx. 687m<sup>2</sup>. **Table 1** highlights the area take-off conducted for the developable site boundary.

Table 1: Existing area take-off for developable site boundary (estimated)

|                  | Existing area (m <sup>2</sup> ) |
|------------------|---------------------------------|
| Buildings        | 251                             |
| Hardstanding     | 64                              |
| Soft landscaping | 372                             |
| Total            | 687                             |

### 3.3 Topography

A topographic survey was undertaken by Terrain Surveys Ltd in April 2018. A copy of this survey is included in **Appendix A**.

Levels on the site are relatively flat; they vary from +36.13mAOD in the north-east corner to +36.74mAOD in the south-west corner. The entrance of the existing tabernacle building is raised at +36.97mAOD. There is a small landscaped slope to the north-east corner of the church.

### 3.4 Underlying Geology and Hydrogeology

According to the British Geological Survey data, the site’s underlying bedrock geology is London Clay. There are no superficial deposits recorded on the site.

There are no publicly available borehole records for the site itself nor its immediate surrounds. The nearest boreholes are along Cumberland Road, Winslow Place and Wood Common Green, and give the following information:

- Weathered London Clay is encountered as shallow as 0.55m below ground level
- Thanet Sand and Upper Chalk is encountered approx. 52m below ground level
- A water level was encountered in borehole TQ39SW651 near Winlow Place, at 7.0m below ground level.

The nearest watercourse to the site is New River, located approximately 0.33km to the south of the site and also 0.69km to the north of the site. The Haringey SFRA maps show that New River is culverted between these two points and runs along the eastern side of the site, beneath Nightingale Gardens. The Haringey Surface Water Management Plan states that New River is classified as a canal and is owned and managed by Thames Water.

The site lies above a Source Protection Zone designated as Zone I – Inner Protection Zone. The site is not shown to lie above a designated aquifer for either bedrock or superficial drifts.

## Four

### Existing Drainage

#### 4.1 Public Sewers

Thames Water is the principal sewerage provider for the area.

A copy of the Thames Water asset maps is included in **Appendix B**. The asset maps show that there are several public sewers in the vicinity of the site as follows:

- 305mmø foul sewer beneath Braemar Avenue running from south to north. Asset records show that this sewer is approx. 2.3m deep to invert at chamber 4703.
- 229mmø/305mmø surface water sewer beneath Braemar Avenue running from south to north. Asset records show that this sewer is approx. 1.5m deep to invert at chamber 4702.
- 305mmø surface water sewer beneath the external landscape north of the Church, running from west to east. Asset records show that this sewer is approx. 1.1m deep to invert at chamber 4814.

#### 4.2 Existing Private Drainage

The topographic survey indicates two drainage connections from the site towards Braemar Avenue, at the south-west corner of the church. These connections are both shown as 150mmø. There is a third 100mmø connection shown north of the church, draining towards Braemar Avenue. A CCTV Survey of the site was conducted in November 2022. The survey shows the site to be served by 150mmø foul and surface water networks, which discharge via the connections identified by the topographic survey into foul and surface water sewers respectively. Foul and surface water pipework currently runs through the proposed basement. These runs serve the existing church and the routes will need to be maintained. A copy of the CCTV survey is included in **Appendix A**.

## Five

### Proposed Development

The development proposals consist of the following:

- Demolition of the tin tabernacle and the existing church prayer room
- Construction of a new building alongside the church which will incorporate new residential units and amenity space for the church. The residential units will be split across 5 floors including at lower ground floor level
- Upgrades to the surrounding soft and hard landscaping.

Architectural layouts for the proposed development are incorporated in **Appendix C**.

# Six

## Planning and Drainage Policy

The sustainable drainage strategy uses a series of techniques to manage surface water run-off as close to the source as possible. Managing surface water in this manner provides water quality improvements, reduces future maintenance requirements and enhances amenity value for the end user.

Surface water will be managed on site using sustainable drainage techniques in accordance with:

- National Planning Policy Framework (NPPF)
- The Haringey Development Management DPD, July 2017
- Haringey SuDS Design Requirements for LLFA Technical Assessment

The Haringey SuDS Design Requirements for LLFA Technical Assessment states the following:

*“The LLFA would typically anticipate a Cv of 0.95 from roofed areas and a Cv of 0.9 from other hard standing areas. These values should be applied for both summer and winter scenarios if using hydraulic design software.”*

Policy DM25 of the Haringey Development Management DPD states the following:

*“The Council will require Sustainable Drainage Systems (SuDS) to be sensitively incorporated into new development by way of site layout and design, having regard to the following requirements:*

- All major development proposals will be required to reduce surface water flows to a greenfield run-off rate for a 1 in 100 year critical storm event;*
- All minor development proposals should aim to achieve a greenfield run-off rate and, at a minimum, achieve a 50 per cent reduction on existing site run-off rates;*
- All other development should seek to achieve a greenfield run-off rate and include at least one ‘at source’ SuDS measure resulting in a net improvement in water quantity or quality discharging to a sewer; and*
- For all development where a greenfield run-off rate cannot be achieved justification must be provided to demonstrate that the run-off rate has been reduced as much as possible.”*

# Seven

## Foul Drainage Strategy

No information is available regarding existing foul facilities within the tin tabernacle.

The development proposals are split as follows:

- Church community facilities: 97 seats or 201m<sup>2</sup> internal floor area
- Residential properties: 15no. units or 919m<sup>2</sup> internal floor area

Using the Sewerage Sector Guidance (Design and Construction Guidance) for residential flows and the “Plumbing Engineering Services Design Guide” by The Institute of Plumbing for the church amenity space (where it is treated as an art gallery/library place of assembly), the anticipated proposed peak foul flows are calculated as 0.83l/s.

All foul flows are to be directed to the 305mmø public foul sewer beneath Braemar Avenue. The existing 150mmø connection to the sewer is proposed to be reused. It is recommended that remedial measures be undertaken to improve the condition of the outfall drainage and replace any blocked or damaged pipework. The proposed reuse of the existing connection will be subject to a S106 agreement with Thames Water.

A proportion of the foul drainage serving the ground floor level and above is to drain by gravity and will exit the building on the western side. There are some areas on the eastern side of the building which cannot drain by gravity due to restrictions on levels and head height; downpipes serving these areas will therefore be directed to the lower ground floor.

Foul flows from the lower ground floor will be pumped. The M&E engineer has advised that the existing foul run serving the church cannot be retained at its existing level due to potential clashes other services at high level, and flows from this drain will also need to be directed to the pump. The rising main outfall will include non-return valves in an accessible location to protect against sewer surcharge. The pumping station will contain dual pumps in a duty/standby formation, alarms and control panel telemetry / links to the BMS system if available. With the pumping station serving sleeping accommodation, 24-hour storage will need to be provided in accordance with Building Regulations Part H to allow for disruption in service.

Any sink connections from kitchen areas should incorporate chemical dosing traps above ground to trap grease at source prior to it entering the below ground drainage system.

Foul calculations are included in **Appendix D**. Proposed drainage drawings are included in **Appendix E**.

A pre-planning enquiry has been submitted to Thames Water to confirm acceptance of the proposed foul water flow and connection points to the sewer network. Assuming that approx. 3no. flats can drain by gravity and that the pumped outflow from lower ground floor level will be restricted to 1l/s, Thames Water confirmed that there is sufficient capacity within the foul sewer network to accommodate the proposed foul flows. A copy of the correspondence is included in **Appendix B**. This proposed connection will be subject to an S106 agreement with Thames Water.

# Eight

## Surface Water Drainage Strategy

### 8.1 Existing Discharge Rates

Existing runoff rates for the site (315m<sup>2</sup> hardstanding) have been calculated using the Wallingford Procedure and are set out in **Table 2** below. These rates are all for a storm duration of 15 minutes, using a Cv value of 0.95 for roof areas and 0.9 for other hardstanding areas as stated in the Haringey LLFA Technical Assessment requirements.

Table 2: Existing surface water runoff rates

| Storm event                   | Existing runoff rate (l/s) |
|-------------------------------|----------------------------|
| 1 in 1-year                   | 3.4                        |
| 1 in 30-year                  | 8.5                        |
| 1 in 100-year                 | 10.9                       |
| 1 in 100-year + 40% intensity | 15.3                       |

### 8.2 Drainage Hierarchy

The surface water drainage system has been designed in accordance with the London Plan Policies 5.11 (Green Roofs), 5.12 (Flood Risk Management) and 5.13 (Sustainable Drainage). The following drainage hierarchy has therefore been considered:

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

### 8.3 Surface Water Drainage Outfalls, Attenuation and Discharge Rates

#### 8.3.1 Proposed Drained Areas

**Table 3** presents the approximate proposed hardstanding areas within the developable site boundary.

Table 3: Approximate proposed hardstanding areas

|                                | m <sup>2</sup> | Hectares (ha) |
|--------------------------------|----------------|---------------|
| Proposed buildings             | 359            | 0.036         |
| Proposed external hardstanding | 200            | 0.020         |
| Total                          | 559            | 0.056         |

Approximately 26.1m<sup>2</sup> of the proposed external hardstanding area is located at lower ground level.

8.3.2 SuDS Appraisal

Water butts are to be provided at various locations around the eastern and southern sides of the building. the water butts will capture runoff from roof areas which can be used for irrigation. Overflows will allow rainwater to be directed to an attenuation tank in the event that the water butts are full when a storm event occurs. The provisional total storage provided in the water butts is anticipated to be approximately 1780 litres (= 1.78m<sup>3</sup>) at this stage.

Green roofs are proposed for inclusion on the main residential roof and the roof over the new church access area, to improve the quality of the rainwater discharged from site. Green roofs increase the time of entry for surface water runoff entering the drainage network and can subsequently reduce the volume of rainfall discharged off site. During dry periods green roofs can capture the first few millimetres of rainfall and attenuate it on site, however this cannot be quantified as the roof design assumed that the planted medium is saturated. 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 aid with the urban greening effect. Inclusion of a variety of planting and vegetation on a green roof provides a natural environment for birds, bees, butterflies and invertebrates.

In order to avoid pumping the full roof area, it is proposed that the green roof areas be attenuated through blue roofs. Blue roofs allow rainwater to be captured and stored at high level in a shallow crate system, which can then be released at a controlled rate to the below ground drainage network.

As the site lies in a Source Protection Zone I and above London Clay strata, infiltration is excluded as a main form of rainwater discharge from the site.

There is little external area on the site therefore open water features such as attenuation basins, swales etc. are not considered feasible.

Permeable paving is to be incorporated for external paved areas where they do not lie directly over the basement.

An attenuation tank is to be provided beneath the lower ground floor slab. For rainwater runoff which cannot be captured at high level in blue roof attenuation, this will be stored within the below ground tank and released at a controlled rate (via a pump) to the public sewer.

A cavity drainage system is proposed for the basement, this will be directed to the pumped surface water drainage system.

The proposed drainage strategy drawings and associated details are included in **Appendix E**.

In line with the drainage hierarchy, **Table 4** details the sustainable drainage systems (SuDS) techniques that have been considered suitable together with supporting rationale.

Table 4: SuDS evaluation

| SuDS technique                                                            | Included? | Comment                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rainwater reuse                                                           | Y         | Water butts are to be provided to allow for capture of roof runoff from the eastern side of the building, to be reused for irrigation.                                                                                                                                                                                      |
| Infiltration devices                                                      | N         | The proposed building footprint (including basement) occupies almost the full developable site area which precludes the use of infiltration devices due to a lack of space.<br><br>The site also lies above a Zone I Source Protection Zone and therefore infiltration is excluded as a main method of rainwater discharge. |
| Attenuation in green infrastructure (i.e. green roofs, rain gardens etc.) | Y         | Green roofs are proposed on the uppermost residential roof area and the roof over the new church access area.<br><br>Permeable paving to be considered for external hardstanding areas where not situated over the basement.                                                                                                |
| Attenuation in tanks or sealed water features                             | Y         | Blue roofs are proposed for inclusion beneath the green roof areas.<br><br>A below ground tank will be provided beneath the basement slab for additional attenuation.                                                                                                                                                       |
| Rainwater discharge direct to a watercourse                               | N         | There are no watercourses located within the vicinity of the development.                                                                                                                                                                                                                                                   |
| Controlled rainwater discharge to a surface water sewer or drain          | Y         | Rainwater runoff will discharge to the surface water sewer beneath Braemar Avenue.                                                                                                                                                                                                                                          |
| Controlled rainwater discharge to a combined sewer                        | N         | There are no combined sewers located in the vicinity of the development.                                                                                                                                                                                                                                                    |

8.3.3 Proposed Discharge Rates and Attenuation Volumes

The London Borough of Haringey SuDS Design Requirements state that surface water runoff should be reduced to greenfield runoff where feasible. Greenfield runoff rates for the developable site area have been calculated using the IH124 method and are shown in **Table 5** below.

Table 5: Greenfield runoff rates to IH124

| Storm event   | Greenfield runoff rate (l/s) |
|---------------|------------------------------|
| Qbar          | 0.6                          |
| 1 in 1-year   | 0.5                          |
| 1 in 30-year  | 1.4                          |
| 1 in 100-year | 1.9                          |

The greenfield runoff rates for the developable site area are prohibitively low. Where the 1 in 100-year greenfield runoff rate cannot be met for all storm events up to and including the 1 in 100-year event plus 40% climate change, runoff rates will be reduced as close to this rate as possible in line with Policy DM25 of the Haringey Development Management DPD.

The proposed water butts and green roofs have been excluded from the attenuation calculations as these SuDS will not offer any storage volume should a storm event occur when they are already at capacity or saturated.

Blue roof attenuation is proposed for inclusion beneath the green roof areas. Flow rates from the blue roof have been initially calculated by a blue roof manufacturer and are presented in **Appendix D**. The flow from attenuated areas will be restricted by a series of high level flow controls (effectively acting as orifices). The blue roof outlets will have an overflow weir to carry exceedance flows from storm events which exceed the design storm.

It is proposed that an area of permeable paving be incorporated for part of the external hard paved area to the west of the building, where it does not lie over the basement footprint. It is proposed that runoff from this small area be restricted via an orifice plate to control the runoff rate to 0.5l/s.

All external hardstanding areas located at lower ground floor level, external hardstanding areas which lie over the basement footprint and all rainwater downpipes serving the building terraces will be routed to the attenuation tank. The tank is to be located beneath the church assembly space, with the pump located in the adjacent cycle store. It is proposed that the pump rate be set at 1.0l/s.

The total surface water runoff rates are presented in **Table 6**. For flats and apartments, no urban creep allowance is required in line with the Haringey SuDS Design Requirements for LLFA Technical Assessment. MicroDrainage Quick Storage Estimate calculations are presented in **Appendix D**.

Table 6: Proposed surface water runoff rates

| Storm event                        | Proposed total surface water runoff rate (l/s) | Improvement over existing runoff rates |
|------------------------------------|------------------------------------------------|----------------------------------------|
| 1 in 1-year                        | 1.9                                            | 44%                                    |
| 1 in 30-year                       | 2.2                                            | 74%                                    |
| 1 in 100-year                      | 2.4                                            | 78%                                    |
| 1 in 100-year + 40% climate change | 2.5                                            | 84%                                    |

In line with the Haringey Development Management DPD requirements where the 1 in 100-year greenfield runoff rate cannot be met for all storm events, runoff rates have been reduced as far as possible. The runoff rate for the 1 in 1-year event is reduced to the 1 in 100-year greenfield runoff rate, with a greater than 50% betterment achieved for greater storm events.

8.3.4 Proposed Surface Water Outfall

It is proposed that surface water be discharged from the site via the existing 150mmØ connection to the Thames Water surface water sewer beneath Braemar Avenue. Remediation measures are recommended in the form of jetting to remove the existing settled deposits in the pipe and pipe relining to smooth over the existing crack.

A pre-planning enquiry was submitted to Thames Water to confirm acceptance of the proposed surface water flows and connection points to the sewer network. An initial response was received from Thames Water in November 2022 (see **Appendix B**) confirming acceptance of the proposed connection points however a revised response is awaited to confirm acceptance of the proposed flows. Elliott Wood is currently awaiting this finalised response to the pre-planning enquiry.

The proposed reuse of the existing connection will be subject to a S106 agreement with Thames Water.

The existing surface water drain serving the church which passes through the proposed development footprint is proposed to be replaced to run at high level at the lower ground floor of the new development. Existing flows, levels and outfall of this connection are to remain the same as existing.

8.3.5 Haringey SuDS Proforma

The Haringey SuDS Proforma for the site is included in **Appendix F**.

# Nine

## 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.

The below ground drainage network ultimately discharges to a surface water sewer. This is not a high-risk receptor, however surface water discharging to a surface water sewer should still be treated where possible as these sewers often ultimately discharge to watercourses.

Pollution hazard indices for land usage have been evaluated in accordance with the CIRIA SuDS Manual – refer to **Table 7**.

Table 7: Pollution hazard indices for various land uses (taken from the SuDS Manual Table 26.2 and Annex 5)

| Land use                                                                                                                                                | Total suspended solids (TSS) | Metals                                                     | Hydrocarbons |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------|--------------|
| Residential roofs*                                                                                                                                      | 0.4-0.5                      | 0.2-0.5                                                    | 0.1          |
| Commercial/ industrial roofs                                                                                                                            | 0.3                          | 0.2 (up to 0.8 if potential for metals to leach from roof) | 0.05         |
| Low traffic roads                                                                                                                                       | 0.5                          | 0.4                                                        | 0.4          |
| *Pollution indices for residential roof areas have been taken from Annex 5 of the SuDS Manual; other pollution indices have been taken from Table 26.2. |                              |                                                            |              |

Mitigation indices for discharge to surface waters are presented in **Table 8**.

Table 8: SuDS mitigation indices for discharge to surface waters

| Land use           | Total suspended solids (TSS) | Metals | Hydrocarbons |
|--------------------|------------------------------|--------|--------------|
| Permeable pavement | 0.7                          | 0.6    | 0.7          |

The above table shows that permeable paving is sufficient on its own to adequately treat runoff from low traffic roads.

Reference is made to Annex 5 of the SuDS Manual for pollution mitigation indices for green roofs (**Table 9**).

Table 9: SuDS mitigation indices for green roofs (taken from the SuDS Manual Table 26.3 and Annex 5)

| SuDS component | Total suspended solids (TSS) | Metals  | Hydrocarbons |
|----------------|------------------------------|---------|--------------|
| Green roof     | 0.8-0.9                      | 0.7-0.9 | 0.9          |

Mitigation indices for green roofs are shown to be higher than the pollution indices for commercial and residential roofs. For each pollutant group, the land use pollution index (i.e. the pollution index multiplied by the mitigation index) is no higher than 0.36. This is considered to be a low impact level and acceptable for discharge to a sewer.

# Ten

## Operation and Maintenance Requirements

During the construction phase of the development, the responsibility for the maintenance of SuDS 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 SuDS will be maintained by the site owner for the lifetime of the development.

Maintenance requirements for green roofs are listed in **Table 10**.

Table 10: Green roof maintenance schedule

| 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 (i.e. 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                 | Annually/after severe storms.                        |

|  |                                                                                                                    |                               |
|--|--------------------------------------------------------------------------------------------------------------------|-------------------------------|
|  | waterproofing and structural stability.                                                                            |                               |
|  | 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. |

Maintenance requirements for blue roofs and below ground attenuation tanks are listed in **Table 11**.

Table 11: Blue roof and below ground attenuation tank maintenance schedule

| Maintenance Schedule   | Required Action                                                                                             | Frequency                              |
|------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Regular Maintenance    | Remove debris and litter from catchment surface (where may cause risk to performance).                      | Monthly                                |
|                        | Inspect and identify any areas that are not operating correctly. If required, take remedial action.         | Monthly for 3 months, then six monthly |
|                        | Remove sediment from pre-treatment structures / outlet drains.                                              | Annually, or as required               |
| Occasional maintenance | -                                                                                                           | -                                      |
| Remedial Actions       | Repair/rehabilitation of inlets, outlets and overflows.                                                     | As required.                           |
| Monitoring             | Inspect drain inlets, outlets and overflows to ensure they are in good condition and operating as designed. | Annually/after severe storms.          |
|                        | For blue roofs, inspect underside of roof for evidence of leakage                                           | Annually/after severe storms.          |

General maintenance requirements for drainage pipes, silt traps and gullies are shown in **Table 12**.

Table 12: Pipes, silt traps and gullies maintenance schedule

| 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 and chambers (where may cause risks to performance)                            | Monthly                                |
|                      | Inspection of manholes, 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                            |
|                      | Cleaning/jetting of pipework if silt/debris is building up in system                                                 | 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        |

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.

### 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.

# Eleven

## Conclusions

It is proposed that the new foul and surface water drainage systems for the site be discharged to the Thames Water sewer network.

Both foul and surface water drainage serving the lower ground floor will be pumped. 24-hour storage is required for the pumped foul network. A proportion of the foul drainage serving the ground floor level and above is to drain by gravity; there are some areas which cannot drain by gravity due to restrictions on levels and will therefore be directed to the basement pump.

Surface water drainage proposals for the development are to incorporate SuDS including water butts for rainwater harvesting, green and blue roofs, permeable paving and below ground attenuation tanks. The drainage system for all new hardstanding areas will be designed for storms up to and including the 1 in 100-year event plus 40% climate change. The surface water runoff rate will be restricted so that so that the total runoff rate from the site for the 1 in 1 year storm event is reduced to the 1 in 100-year greenfield runoff rate, with a greater than 50% betterment achieved for greater storm events.

A pre-planning enquiry was submitted to Thames Water to confirm acceptance of the proposed surface water flows and connection points to the sewer network. Elliott Wood is currently awaiting a finalised response to the pre-planning enquiry.



elliottwood

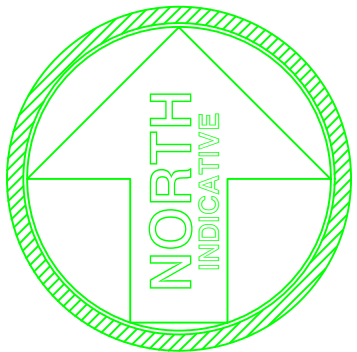
## **Appendices**

engineering a better society

A Topographic & CCTV Surveys



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GPS Note:  
This survey is related to OSGB36(15) coordinate system by GPS 'rapid static' methods. No scale factor has been applied to the survey information. All horizontal distances taken from this drawing are ground distances.

| Co-ordinate Table |            |            |        |
|-------------------|------------|------------|--------|
| Station           | Easting    | Northing   | Level  |
| 1                 | 530459.494 | 190749.351 | 36.697 |
| 2                 | 530449.943 | 190762.547 | 36.711 |
| 3                 | 530473.474 | 190813.707 | 36.247 |
| 4                 | 530498.585 | 190802.327 | 36.119 |
| 5                 | 530491.563 | 190746.448 | 35.925 |
| 6                 | 530470.438 | 190745.832 | 36.695 |
| 20                | 530482.173 | 190759.994 | 36.191 |
| 30                | 530466.357 | 190786.003 | 36.695 |
| 50                | 530493.485 | 190758.520 | 35.899 |

Every effort has been made to confirm tree species on site, yet it is advised to confirm these details with an arborist before proceeding with any design.

Every effort has been made to confirm drainage run, type and size on site, yet it is advised to check these details against statutory authority records before proceeding with any design.

| Revision | Description | Date |
|----------|-------------|------|
|----------|-------------|------|

### LEGEND

|                                      |  |                 |  |
|--------------------------------------|--|-----------------|--|
| Survey control station               |  | Building        |  |
| Banking                              |  | Fence           |  |
| Gate (single)                        |  | Contour         |  |
| Gate (double)                        |  | Wall            |  |
| Tree Spread and Girth shown to scale |  | Ordnance Survey |  |

### Abbreviations

|                        |     |                       |     |
|------------------------|-----|-----------------------|-----|
| Belisha Beacon         | BB  | Pipe                  | PE  |
| Bollard                | BD  | Road Sign             | RS  |
| Borehole               | BH  | Rodding Eye           | RE  |
| British Telecom Box    | BTB | Service Marker        | MK  |
| BT Inspection Cover    | BT  | Sign Post             | SP  |
| Concrete Paving Slabs  | CPS | Sluice Valve          | SV  |
| Cable Television Cover | CTV | Stop Tap              | ST  |
| Electricity Cable Pit  | EC  | Stop Cock             | SC  |
| Electricity Pole       | EP  | Telegraph Pole        | TP  |
| Earth Rod              | ER  | Telephone Call Box    | TCB |
| Fire Hydrant           | FH  | Traffic Light         | TL  |
| Flag Staff             | FS  | Unsurfaced            | U/S |
| Gas Valve              | GV  | Vent Pipe             | VP  |
| Gate Post              | GP  | Water Meter           | WM  |
| Gully                  | GY  | Eaves Level           | EL  |
| Inspection Cover       | IC  | Ridge Level           | RL  |
| Kerb Outlet            | KO  | Roof Level            | RFL |
| Lamp Post              | LP  | Soffit Level          | SFL |
| Manhole                | MH  | Threshold Level       | THL |
| Marker Post            | MK  | Parapet Wall Level    | PWL |
| Parking Meter          | PM  | Finished Floor Level  | FFL |
| Post                   | P   |                       |     |
| Retaining Wall         | RTW | Cover Level           | CL  |
| Barbed Wire Fence      | BWF | Invert Level          | IL  |
| Close Boarded Fence    | CBF | No Visible Connection | NVC |
| Chainlink Fence        | CLF | Unable to Lift        | UTL |
| Chestnut Paling Fence  | CPF | Surface Water         | SW  |
| Post and Chain Fence   | PCF | Foul Water            | FW  |
| Post and Rail Fence    | PRF |                       |     |
| Post and Wire Fence    | PWF | Flower Bed            | F/B |
| Wooden Panel Fence     | WPF | Shrub Bed             | S/B |



Terrain Surveys Ltd  
Bridge Chambers  
28a High Street  
Weymouth  
Dorset DT8 3EQ

Tel 01438 841300  
Fax 01438 841301  
enquiries@terrainsurveys.co.uk  
www.terrainsurveys.co.uk



Land and Architectural Surveyors

Client  
**SPACELAB**

Project  
**BAPTIST CHURCH  
BRAEMAR AVENUE  
LONDON, N22 7BY**

Title  
**TOPOGRAPHICAL SURVEY**

|                       |                         |
|-----------------------|-------------------------|
| Drawn by<br><b>TP</b> | Checked by<br><b>PG</b> |
|-----------------------|-------------------------|

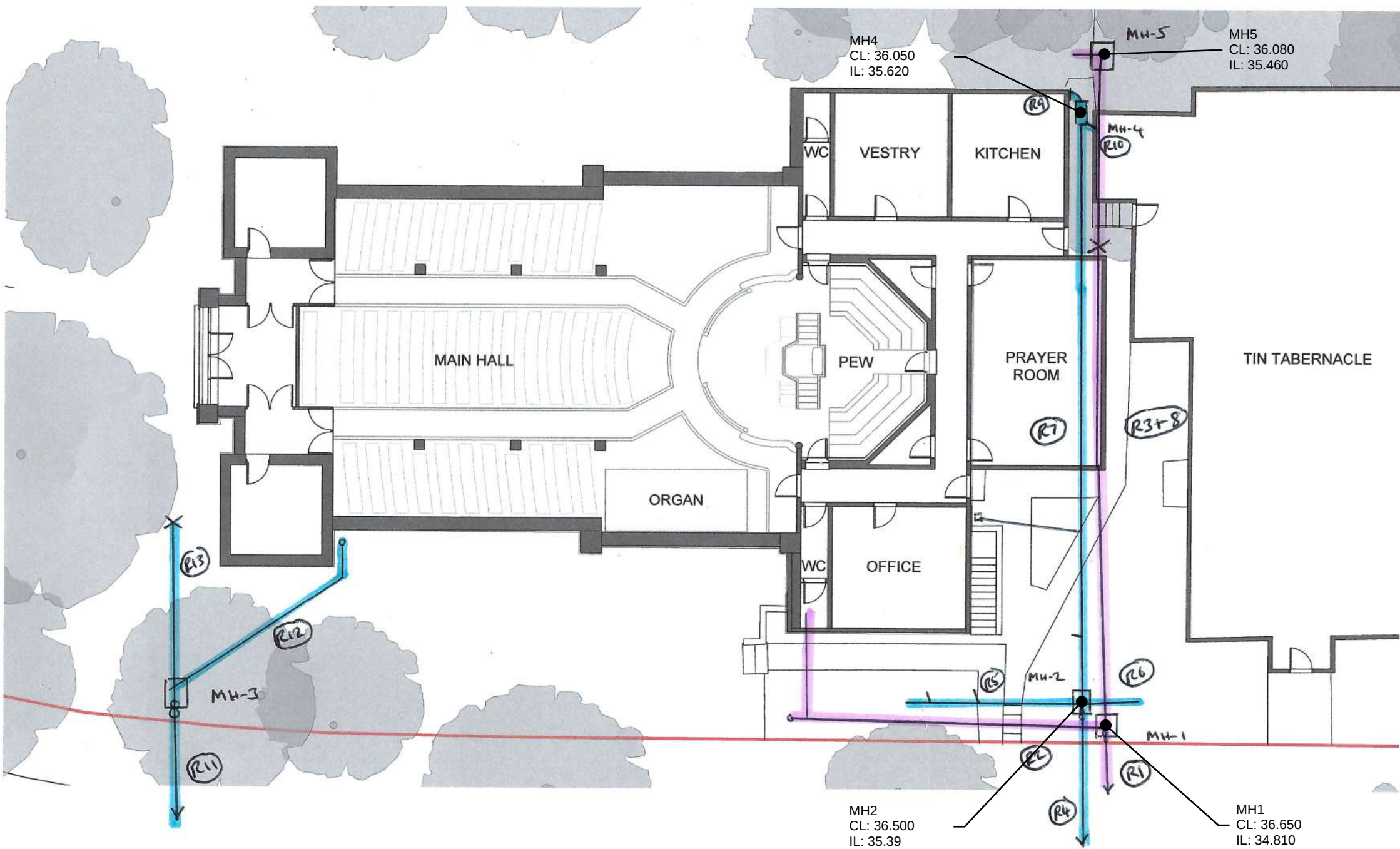
|                          |                         |
|--------------------------|-------------------------|
| Scale<br><b>1:100@A1</b> | Date<br><b>APR 2018</b> |
|--------------------------|-------------------------|

|                                      |                      |
|--------------------------------------|----------------------|
| Drawing Number<br><b>TS18-163M\1</b> | Revision<br><b>-</b> |
|--------------------------------------|----------------------|

|                   |                |
|-------------------|----------------|
| Sheet<br><b>1</b> | of<br><b>1</b> |
|-------------------|----------------|

All levels related to Ordnance Survey active GPS network, at survey station 1.

Value 36.697m



B Thames Water Asset Records and Correspondence

# Asset location search



## Property Searches

Elliott Wood Partnership  
55 Whitfield Street  
LONDON  
W1T 4AH

**Search address supplied** Braemar Avenue Baptist Church  
Braemar Avenue  
London  
N22 7BY

**Your reference** 2220367

**Our reference** ALS/ALS Standard/2022\_4746236

**Search date** 7 November 2022

### Knowledge of features below the surface is essential for every development

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

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

Contact us to find out more.



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



[searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)  
[www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)



0800 009 4540

**Search address supplied:** Braemar Avenue Baptist Church, Braemar Avenue, London, N22 7BY

Dear Sir / Madam

**An Asset Location Search is recommended when undertaking a site development.** It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

### Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd  
Property Searches  
PO Box 3189  
Slough  
SL1 4WW

Email: [searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)

Web: [www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)

### Waste Water Services

**Please provide a copy extract from the public sewer map.**

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

### Clean Water Services

**Please provide a copy extract from the public water main map.**

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and

pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

### **Payment for this Search**

A charge will be added to your suppliers account.

### Further contacts:

#### Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)  
Thames Water  
Clearwater Court  
Vastern Road  
Reading  
RG1 8DB

Tel: 0800 009 3921  
Email: [developer.services@thameswater.co.uk](mailto:developer.services@thameswater.co.uk)

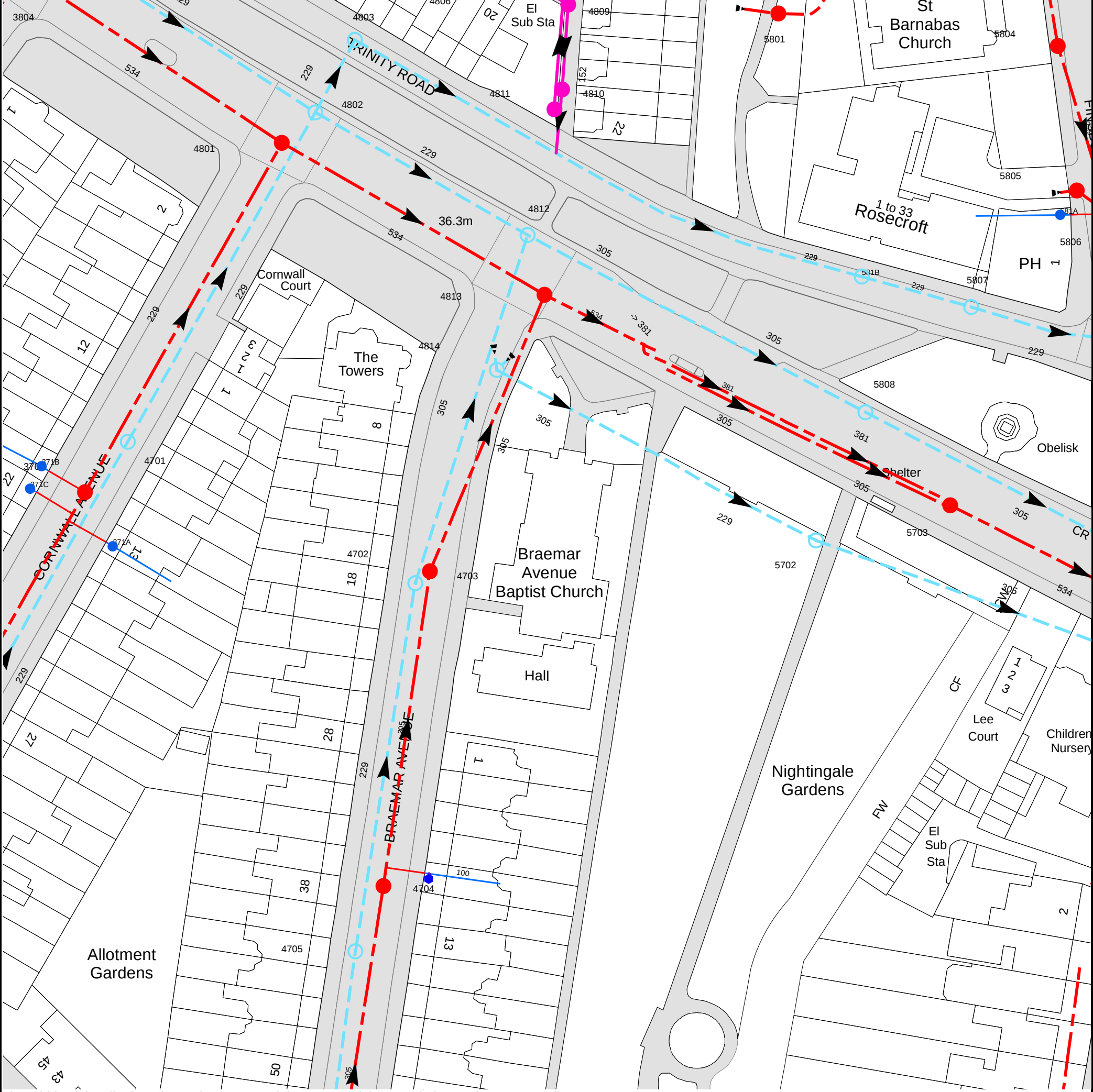
#### Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)  
Thames Water  
Clearwater Court  
Vastern Road  
Reading  
RG1 8DB

Tel: 0800 009 3921  
Email: [developer.services@thameswater.co.uk](mailto:developer.services@thameswater.co.uk)

Asset Location Search Sewer Map - ALS/ALS Standard/2022 4746236



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 530479,190778  
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.

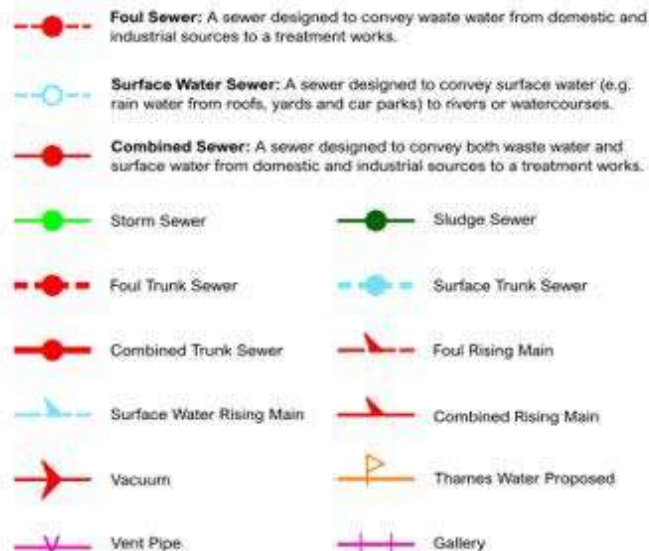
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference                                                                                                                                                                                                                                                                                                                                                                                                      | Manhole Cover Level | Manhole Invert Level |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|
| 371C                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 371B                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 3703                                                                                                                                                                                                                                                                                                                                                                                                                   | 37.63               | 35.35                |
| 371A                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 4701                                                                                                                                                                                                                                                                                                                                                                                                                   | 37.51               | 36.08                |
| 4801                                                                                                                                                                                                                                                                                                                                                                                                                   | 37.06               | 30.42                |
| 4802                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.91               | 34.72                |
| 4803                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.77               | 34.51                |
| 4705                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.92               | 35.52                |
| 4704                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.89               | 34.91                |
| 4702                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.69               | 35.16                |
| 4703                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.7                | 34.39                |
| 5702                                                                                                                                                                                                                                                                                                                                                                                                                   | 35.37               | 34.46                |
| 5703                                                                                                                                                                                                                                                                                                                                                                                                                   | 35.29               | 29.19                |
| 5808                                                                                                                                                                                                                                                                                                                                                                                                                   | 35.44               | 34.06                |
| 4814                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.29               | 35.21                |
| 5807                                                                                                                                                                                                                                                                                                                                                                                                                   | 35.14               | 33.87                |
| 4813                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.16               | 30.19                |
| 581B                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 4812                                                                                                                                                                                                                                                                                                                                                                                                                   | 36.21               | 33.11                |
| 581A                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 5805                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 4811                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 4810                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 5804                                                                                                                                                                                                                                                                                                                                                                                                                   | 35.04               | 32.6                 |
| 5801                                                                                                                                                                                                                                                                                                                                                                                                                   | 35.35               | 34.61                |
| 4809                                                                                                                                                                                                                                                                                                                                                                                                                   | n/a                 | n/a                  |
| 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. |                     |                      |

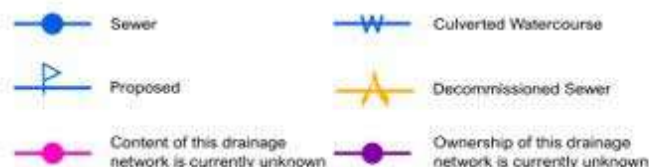


# Asset Location Search - Sewer Key

## Public Sewer Types (Operated and maintained by Thames Water)



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



### 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.

## 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.



## Operational Controls

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



## 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.



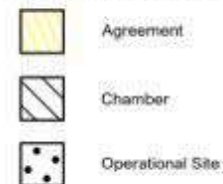
## Other Symbols

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



## Areas

Lines denoting areas of underground surveys, etc.



## Ducts or Crossings



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.

The map illustrates a residential area with several streets and buildings. A proposed water main installation is shown as a blue line running diagonally across the map. Key features include:

- Streets:** Cornwall Avenue, Braemar Avenue, Fifty Road, and Finsbury Road.
- Buildings and Landmarks:** St Barnabas Church, Rosecroft (1 to 33), The Towers, Braemar Avenue Baptist Church, Hall, Nightingale Gardens, Lee Court, Childrens Nursery, Obelisk, and Allotment Gardens.
- Infrastructure:** El Sub Sta, PH, 1 to 33, 180mm HPPE, 125mm PIPE BURST, 180mm Shelter, and CR.
- Proposed Installation:** A blue line representing the water main, with red dots indicating specific locations. Black T-junction symbols are shown at intersections.
- Scale:** A scale bar indicates 36.3m.

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.

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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' 6")     |
| 600mm and bigger (24" plus) | 1200mm (4')        |

## Valves

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

## Hydrants

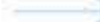
-  Single Hydrant

## 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:** Indicates 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.