



Hornsey Park Road

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

For Combined Residential and Commercial Development

On behalf of Trinity International Properties

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1 INTRODUCTION

RGP has been commissioned by Trinity International Properties (the 'Client') to consider the flood risk associated with the proposed development at 157-159 Hornsey Park Road, London, N8 0JX from all potential sources of flooding, as defined by the National Planning Policy Framework (NPPF).

In compiling this Flood Risk Assessment, reference has also been made to the Strategic Flood Risk Assessment (SFRA), produced for London Borough of Haringey dated November 2020.

The aim of this FRA is to review the potential flooding impact on the proposed development site due to tidal, fluvial (Rivers), pluvial (Overland), sewer, reservoir, canal and other artificial flooding sources. The FRA will also review the potential impact of the development on the flooding in the surrounding area and the measures that could be incorporated as part of the design to mitigate the potential risk.

This FRA has been developed in accordance with the requirements of Chapter 14 of the NPPF, liaison with the Environment Agency (EA), the Lead Local Flood Authority (LLFA) and Thames Water.

Information used in preparing this Flood Risk Assessment was obtained from the following sources and Statutory Consultees:

- (i) Environment Agency Flood Map
- (ii) Environment Agency Main River Map
- (iii) Environment Agency Long Term Flooding Map
- (iv) SFRA produced for London Borough of Haringey (2015)
- (v) London Borough of Haringey Surface Water Management Plan (2011)
- (vi) The London Plan (2021)

2 PLANNING POLICY

2.1 Introduction

The proposed development will be designed in accordance with the requirements as set out in the National Planning Policy and Haringey Council SWMP and SFRA.

2.2 National Planning Policy Framework (NPPF)

Section 14 of the NPPF (December 2023) outlines the requirements for determining if a Flood Risk Assessment is required to be undertaken for new developments. A site-specific FRA should be provided for all sites which are located in Flood Zones 2 and 3.

An FRA should be provided for sites located in Flood Zone 1 where:

- The development site area > 1ha;
- The site has been identified by the Environment Agency as having critical drainage problems;
- The site has been identified in a strategic flood risk assessment as being at increased flood risk in future;
- Land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use; or
- The site is a small scale major development which where the number of residential units to be constructed is between 10 and 199 and:
 - ◆ Floor space to be built is between 1,000 m² and 9,999 m²; or
 - ◆ The site area is between 1ha and 2ha.

The development site is located within Flood Zone 1 in accordance with the EA flood maps. The site, however, may be at risk of surface water flooding and as such, an FRA is to be provided. The overall development area is approximately **1,840m² (0.184ha)**.

The NPPF sets out the strategy throughout the UK for future development. The key policy provision states that:

- Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
- Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.
- All plans should apply a sequential, risk-based approach to the location of development – taking into account the current and future impacts of climate change so as to avoid, where possible, flood risk to people and property.

2.3 Local Policies

London Borough of Haringey have released a *Strategic Flood Risk Strategy (2015)* providing a framework of flood management control & risks within the county, accompanied by a series of technical appendices providing additional information.

The London Plan (2021) gives guidance on planning to reflect the overall strategy for how London can develop sustainably. Within this, guidance is given on flood risk and sustainable drainage.

London Borough of Haringey have released a *Surface Water Management Plan (2011)* which provides a summary of the information gained on local flood risk.

London Borough of Haringey Site Allocation policy SA21 in reference to de-culverting the Moselle River

This FRA has been produced in line with the above-mentioned documentation.

2.4 Statutory Authority Consultation

The site is located within an area served by Thames Water.

3 PLANNING POLICY CONTEXT

3.1 Introduction

A site-specific FRA should be carried out to demonstrate how flood risk will be managed now and over the development's lifetime, taking into account climate change and with regards to the vulnerability of its users.

In order to adequately consider and demonstrate how the flood risk will be managed, we need to identify what the probability is of the site flooding, what the site is going to be used for, the associated flood risk vulnerability, and the compatibility between the flood risk vulnerability and the flood zones.

This section details how the planning policy is applied to this site-specific FRA. Items highlighted in 'Green' in the following tables detail the site specific classification for Flood Zones, Flood Risk Vulnerability and Compatibility.

3.2 Flood Zones

The flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.

Table 1 – Flood Zones

Flood Zone	Probability	Definition
Flood Zone 1	Low	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Flood Zone 2	Medium	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Flood Zone 3a	High	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Flood Zone 3b	Functional Flood Plain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

The particular flood zone(s) for the development are detailed on the Environment Agency's 'Flood Map for Planning', which is available online and is detailed further in Section 6 of this report.

3.3 Flood Risk Vulnerability Classification

The different types of flood risk vulnerability classifications are detailed in Table 2 below:

Table 2 - Flood Risk Vulnerability Classification

Classification	Description
Essential Infrastructure	- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. - Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to

Classification	Description
	remain operational in times of flood. • Wind turbines.
Highly Vulnerable	• Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable	• Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for residential houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

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

3.4 Flood Risk Vulnerability and Flood Zone Compatibility

Table 3 - Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zone	Flood Risk Vulnerability Classification				
	Essential Infra	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	✗	✓	✓	✓	✓
Flood Zone 3a†	Exception Test	✗	Exception Test	✓	✓
Flood Zone 3b*	Exception Test	✗	✗	✗	✓*

✓ Development Appropriate

✗ Development Should not be Permitted

† Essential Infrastructure should be designed and constructed to remain operational and safe in times of flood

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

3.5 Sequential Test & Exception Test

The site falls within flood zone 1 and is considered “more vulnerable”, and therefore a sequential and exception test are not necessary.

4 EXISTING SITE INFORMATION

4.1 Site Location

The proposed development is for two buildings comprising residential units and one commercial unit at 157-159 Hornsey Park Road, London, N8 0JX.



Figure 1 - Site Location Plan with the Redline Boundary

4.2 Existing Site Description

The existing site is a brown field site, with existing offices/industry buildings, which comprises an overall area of approximately 1,840m² (0.184ha).



Figure 2 - Existing Site (Google Satellite Image)

The approximate OS Grid Location for the development site is E: 530908, N: 189951.

4.3 Source Protection Zone

The site is located in the Inner Source Protection Zone, as shown in Figure 3 below. This information has been obtained from the EA Magic Map.



Figure 3 – Source Protection Zone (Magic Map)

4.4 Aquifers

The site is not located over any bedrock or superficial aquifers. This information has been obtained from the Defra Magic Map.



Figure 4 – Aquifer Designation Map (Magic Map)

4.5 Existing Geology

Having reviewed the existing British Geological Society (BGS) online mapping, the existing site is shown to be located in an area underlain by London Clay. Please refer to Figure 5, below, which details the existing bedrock deposits and the site location.

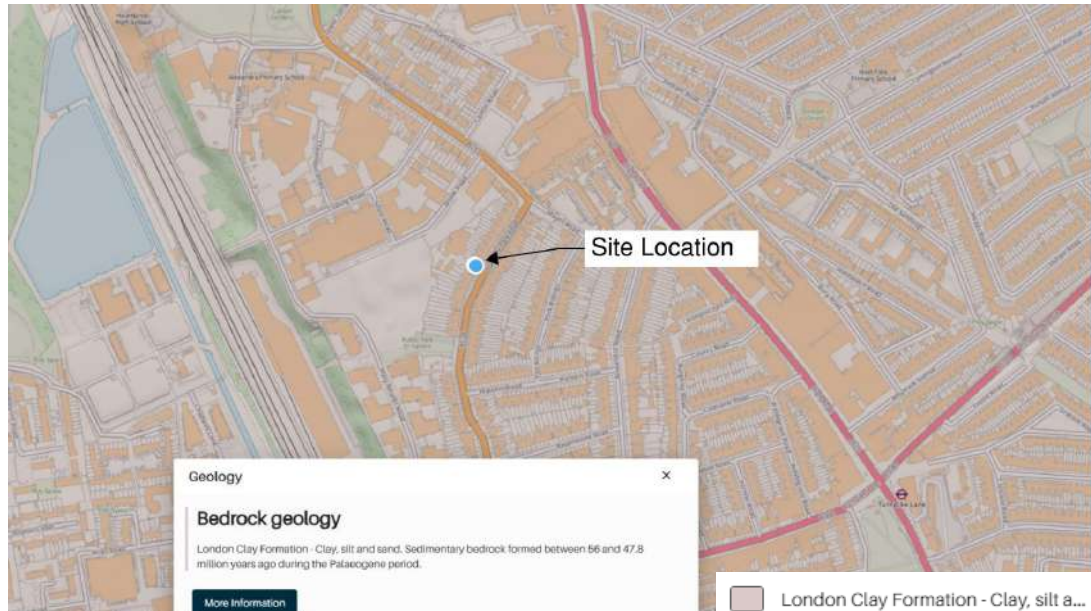


Figure 5 - Bedrock Deposits (BGS)

BGS data shows the site is not located above any superficial deposits.

4.6 Surrounding Hydrology

The River Moselle is a main river on site which is culverted across the site. Please refer to Figure 6, below, (red outline at proposed site) which is an extract from the EA Statutory Main River Map.

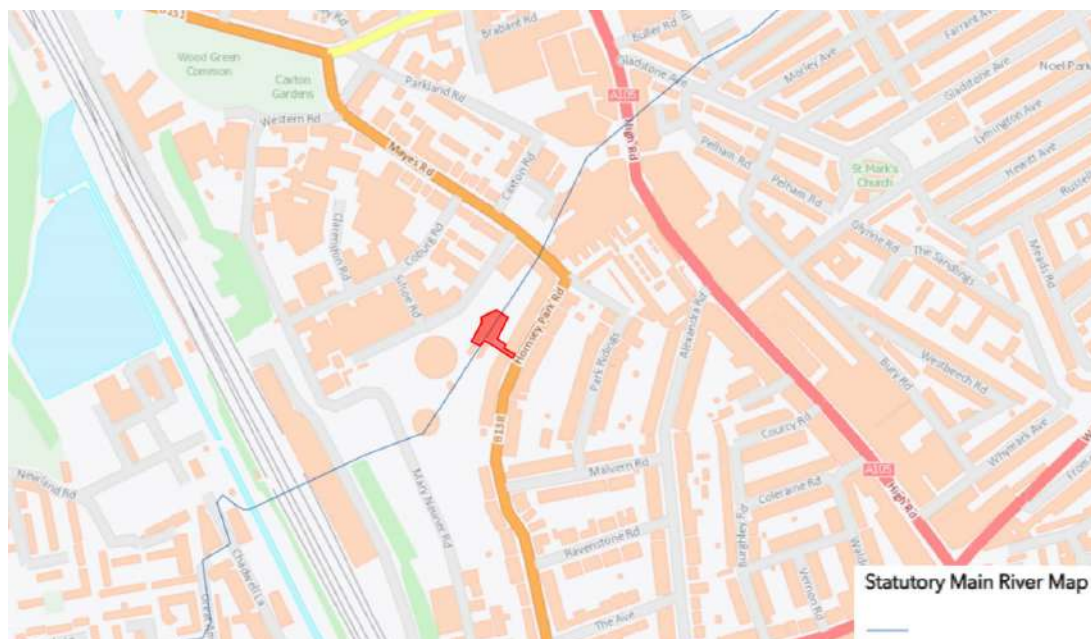


Figure 6 - EA Statutory Main River Map

5 PROPOSED DEVELOPMENT INFORMATION

5.1 Proposed Development Description

Please refer to Appendix 1 of this report for the site layout plan provided to RGP by the client.

The proposed development is demolition of existing structures and erection of two buildings to provide residential units and Class E floorspace; and provision of associated landscaping, a new pedestrian route, car and cycle parking, and refuse and recycling facilities.

The proposed development footprint fall completely within Flood Zone 1.

Refer to Section 7 for more information on the proposed drainage strategy.

6 FLOOD RISK

6.1 Flooding from Rivers (Fluvial) and Seas (Tidal)

The site is located above the culverted River Moselle and is in an area with low probability of flooding from rivers. Please see Figure 7 below, which details the extent of flooding from rivers or the sea at the location of the site.

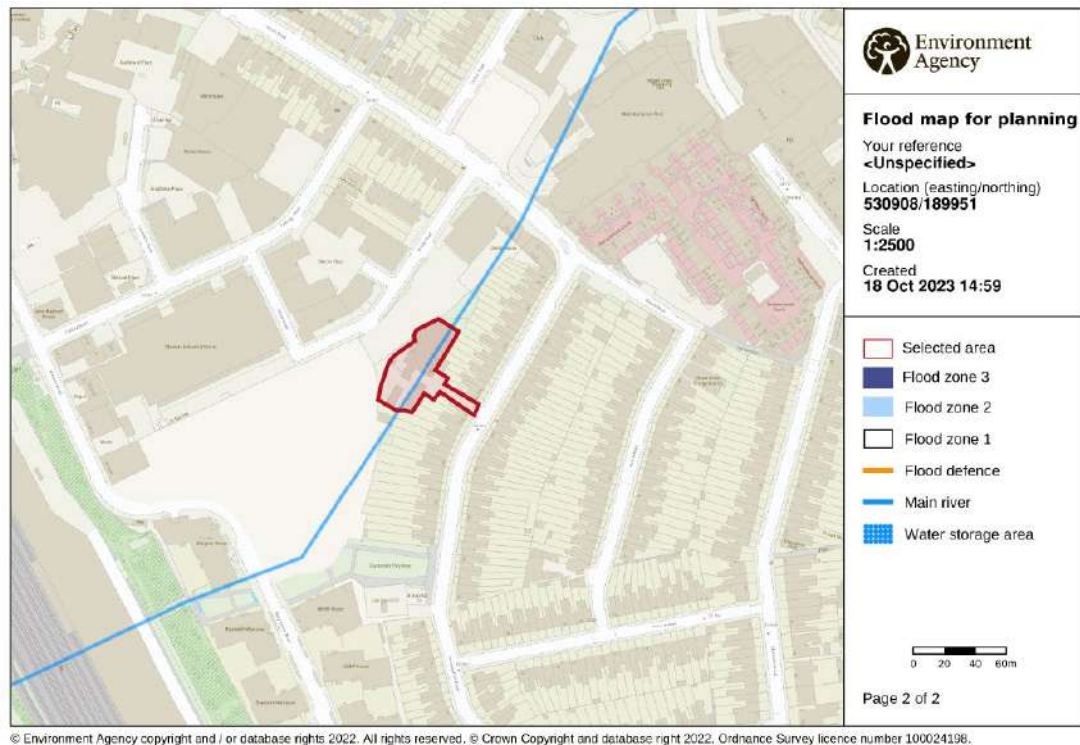


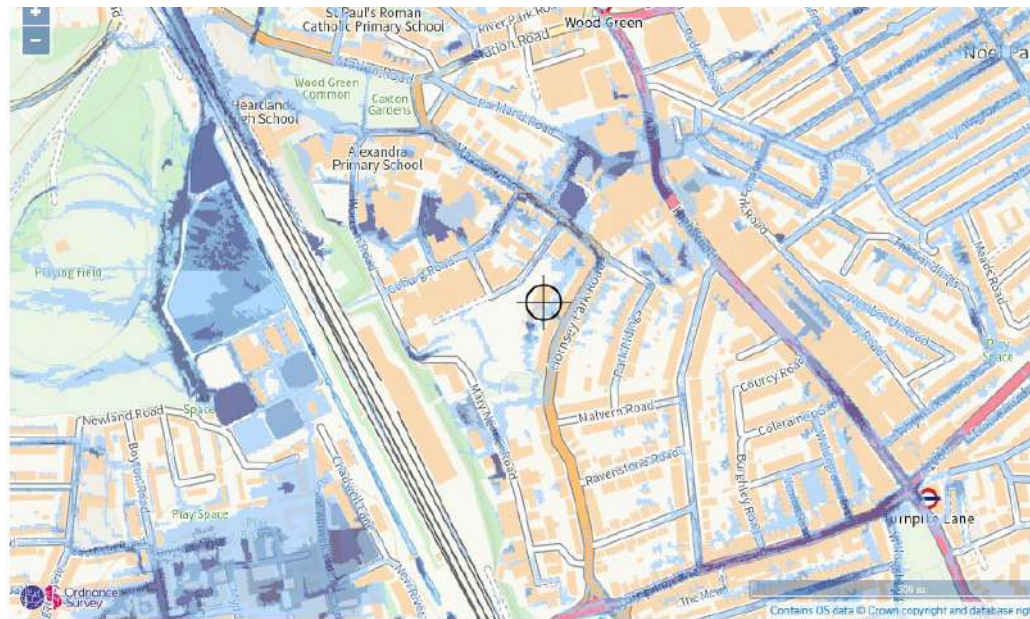
Figure 7 - EA Flood Map for Planning

6.2 Flooding from Surface Water (Pluvial)

In the event of excessive rainfall, where the ground has become saturated and rainfall is not able to infiltrate into the ground, the overland flow would typically flow towards the nearest drainage system.

The existing topography of the site indicates that surface water on the site will flow from Northwest to Southeast towards Hornsey Park Road.

The EA Surface Water Flood Map confirms that the risk from surface water flooding is low for the northwest end of the site where the proposed development is located. Additionally, the risk is medium for the southeast side across the entrance, as illustrated in Figure 8.



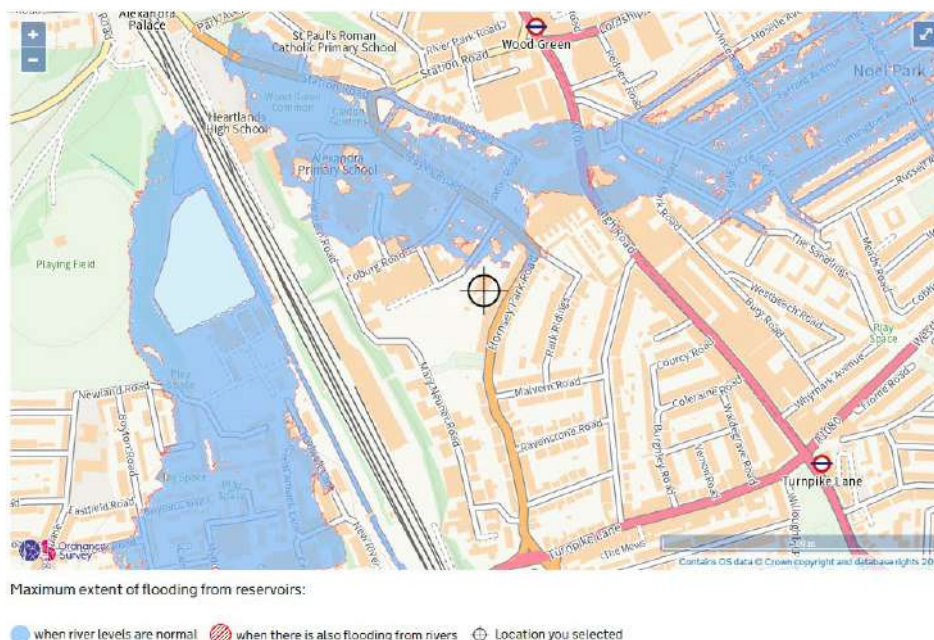
Extent of flooding from surface water

● High ● Medium ● Low ○ Very low ⊕ Location you selected

Figure 8 - EA Surface Water Flood Extent Map

6.3 Flooding from Artificial Sources

Based on the Environment Agency's 'Long Term Flood Risk' map, the site is not affected by the failure of any reservoir or other man-made infrastructure as shown in Figure 9 below.



Maximum extent of flooding from reservoirs:

● when river levels are normal ● when there is also flooding from rivers ⊕ Location you selected

Figure 9 – EA Reservoirs Flood Extent Map

6.4 Flooding from Groundwater

There are typically seven sources, or mechanisms, of groundwater flooding. These were described by Defra (Jacobs 2007) as:

- The rise of typically high groundwater levels to extreme levels due to prolonged extreme rainfall;
- The rise of groundwater levels in aquifers in hydraulic continuity with high in-bank river levels or extreme tidal conditions;
- The increase in groundwater levels and change of ground water flow paths due to artificial obstructions or pathways, like foundations, and the loss of natural storage and drainage paths;
- Rising groundwater levels due to a reduction in ground water extraction in Urban areas;
- Rising groundwater levels due to leaking sewers, drains and water mains;
- Faulty borehole headworks or casings causing upward leakage of groundwater through confining layers driven by artesian heads;
- Subsidence of the ground surface below the current groundwater level.

Of the abovementioned potential causes of groundwater flooding, only the first two are directly affected as a result of environmental conditions. The remaining five potential causes of groundwater flooding are mainly the result of man-made activities, or the stopping of such activities.

There are no works currently being undertaken at the development site, or planned to be undertaken at the development site that would have an impact on the five man-made causes of ground water flooding.

In addition, groundwater flooding from extreme water level rise at the development site is unlikely.

The proposed development site is located within an area that is not susceptible to groundwater flooding. Figure 10 below shows the site location in relation to groundwater flood risk. The excerpt was taken from the SFRA Appendices for London Borough of Haringey.

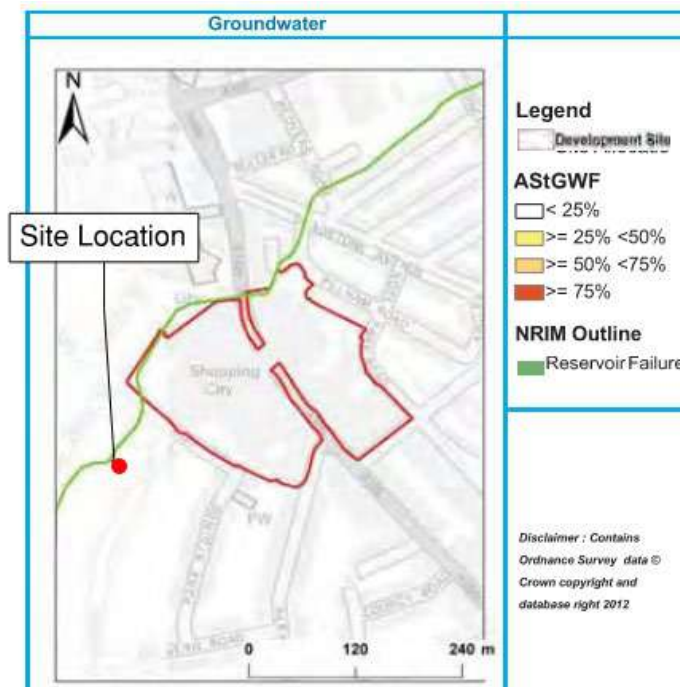


Figure 10 - Groundwater Flood Risk

6.5 Flooding from Public Sewers/Highway Drains

Sewer flooding can occur when sewer systems become overloaded. Flooding of properties usually happens when either; flood water backs up in the pipes and enters directly into low lying properties or where the capacity of the system is exceeded and water discharges from the manholes and runs overland into properties.

It has traditionally been thought that in areas where the ground water level is shallow, the risk of groundwater entering the sewer network through pipe joints and cracks is high. As a result, the capacity of the pipe network is reduced. As has been discussed above in Section 6.4, the risk of ground water flooding to the development site area is low and as such, the risk of sewer flooding is also low.

6.6 Historical Flooding

The SFRA for London Borough of Haringey does not have a history of flooding at the site location.

6.7 Peak River Flow Flood Allowance for Climate Change

The site is not located within the vicinity of an existing watercourse. No provision has been included for Peak River Flow Flood Allowance.

6.8 High ++ Allowances for Climate Change

The EA defines High ++ Allowances as to “only apply in assessments for developments that are very sensitive to flood risk, and with lifetimes beyond the end of the century. For example, infrastructure projects or developments that significantly change existing settlement patterns. This includes urban extensions and new settlements.” Although the life expectancy of the proposed development will extend into the next century, we do not believe that the development of a single dwelling meets the requirements for a High ++ Allowance and as such have not included for this allowance.

6.9 Peak Rainfall Intensity Allowance for Climate Change

Having reviewed the Environment Agency's Climate change allowances, the London Management Catchment peak rainfall allowances require a 40% allowance on the 1% exceedance event.

7 DRAINAGE STRATEGY

7.1 Background Information

A desktop study was done in preparation for this drainage strategy.

The site at Hornsey Park Road is classified as a brownfield site.

The bedrock underlying the site is London Clay, with no superficial deposits, as per the BGS Geology Viewer.

The EA Magic Map online mapping shows the site is within the Inner Source Protection Zone and not above any aquifers.

The main river, River Moselle, is culverted and runs along the northern edge of the site. The approximate Invert level is 3m below ground level.

7.2 Existing Surface Water Run-Off

The existing surface water drainage on site drains to the Thames Water network in Hornsey Park Road to the front, and to the culvert at the rear. Figure 11 below shows the estimated areas in light blue and dark blue draining to the front and rear, respectively.



Figure 11 - Layout of Areas Draining to the Front and Rear of Site

During a site visit on 14th of November 2023, surface water drainage from the access road was identified to discharge into the Thames Water system in Hornsey Park Road. See Figure 10 for a photo of the drainage MH draining towards Hornsey Road.



Figure 12 – Photo of Drainage Manhole from Site Visit

From a review of the culvert survey, there were 2 connections which are most likely from the existing buildings onsite. Please see Figure 13 below which shows the connections from the culvert survey.



Figure 13 – Connections Found in Culvert Survey

Figure 14 below shows the layout of existing connections found during the culvert survey. The highlighted boxes in red are the connections which are most likely from the existing buildings onsite.

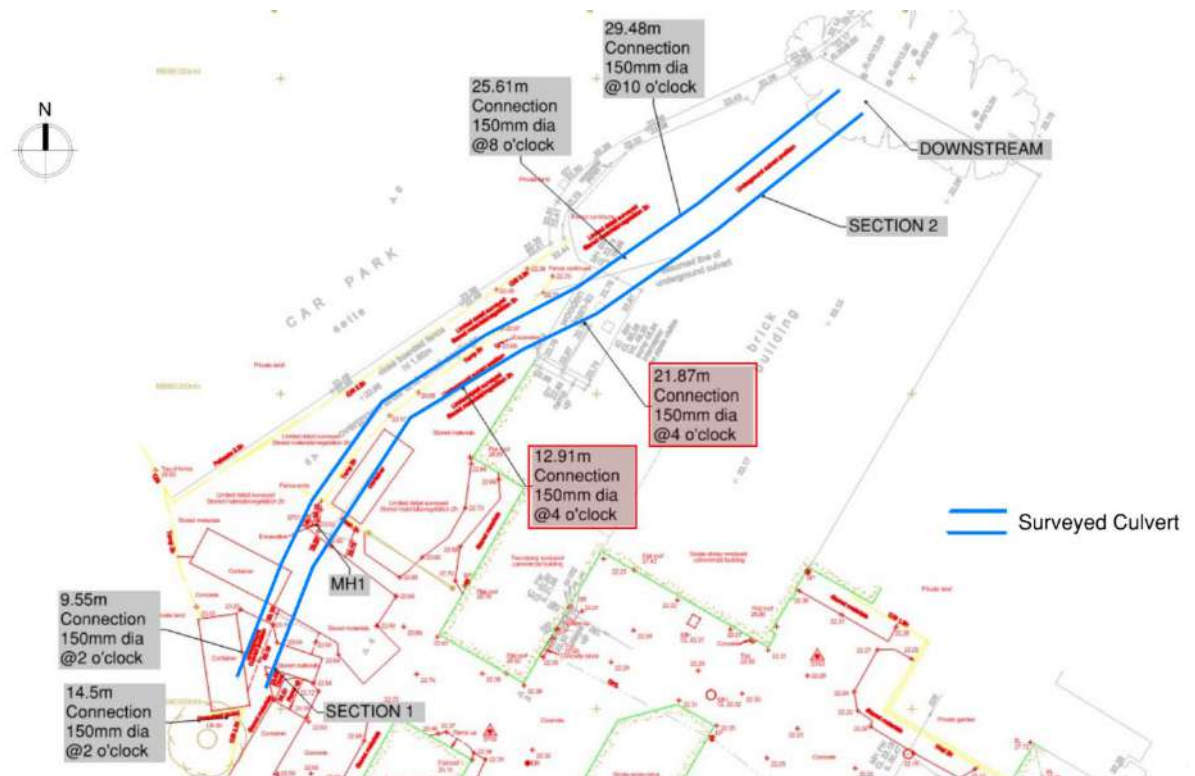


Figure 14 – Culvert Survey

7.3 De-Culverting assessment

A review of the culvert being removed and an open watercourse being reinstated has been briefly investigated.

The culvert underside of the crown is higher than some of the surrounding site, so if it was de-culverted it would result in the top water levels being at risk of flooding the site.

There are structures close to the existing site boundary and an open watercourse would require a bigger footprint.

Open water next to a residential area would be a significant hazard.

Part of the Moselle River is located outside the applicants ownership therefore it is not possible to completely de-culvert as a part of this application due to ownership constraints.

In cases of blockages the open section of culvert in this location would cause flooding of Hornsey Park Road, that isn't currently at risk from this sort of flooding.

It is therefore recommended that the watercourse remains culverted in this area.

7.4 Proposed Areas

The site covers an area of 1,840 m², most of which is impermeable.

The proposed areas are shown in Figure 15 below, and detailed in Table 4.



Figure 15 – Proposed Surface Area Layout

Item	Description	Area (m ²)	Percent (%)
1	Roof Area	628m ²	34%
2	Road Area	314m ²	17%
3	Paving Area	571m ²	31%
4	Green Area	327m ²	18%
Total		1,840m ²	100%

Table 4 - Proposed Surface Areas

The total proposed impermeable area is 1,513m², which is 82% of the total area. However, the whole site has been considered impermeable in the calculations as described in Section 7.8.

7.5 Proposed Development Drainage

The roof, paving, and road areas of the development will be drained.

It is proposed to collect roof run-off using a partial green roof, with the remaining to be collected via channels at roof level. Then, convey the run-off to attenuate in a below-ground tank through downpipes. The roof is not pitched and there is access to the essential infrastructure at this level.

The green roofs can absorb up to 45% of yearly rainfall, however for the purposes of the calculations only the time of entry has been lengthened to ensure the attenuation can cope in periods of prolonged rain when the roof is already saturated.

The bike storage roof area is proposed to drain into a water butt for rainwater re-use. An overflow connection would be provided to the attenuation tank.

Permeable paving will be used to collect run-off and attenuate in the subbase. Linear channel drains will also be used for collection around the buildings and drain into the attenuation tank.

Surface water run-off will drain towards tree pits and the rain garden where feasible, which will be connected to the attenuation tank.

A swale with gullies will be used in the road for collection of surface water along the northern edge of the access road off Hornsey Park Road. This will discharge into a pipe before discharge into the surface water drain in Hornsey Park Road. The pipe will be oversized to provide attenuation and flow restricted to 2l/s.

All surface water flows on the northwest side of the site will gravity fall from the attenuation tank to an onsite drainage manhole fitted with a flow control device to restrict flows to 2l/s.

It is proposed to discharge to the culverted watercourse onsite either through an existing connection if feasible or a new connection. There will be an overflow connection with a non-return flap valve.

The Proposed Drainage Layout is included in Appendix 2.

7.6 Outfall Proposals

The London Plan details a surface water drainage hierarchy which has been used for guidance in this strategy. It describes several development proposals for the outfall & management of the surface water which are listed below.

- **Proposal 1:** Rainwater use as a resource
- **Proposal 2:** Rainwater infiltration to ground at or close to source
- **Proposal 3:** Rainwater attenuation in green infrastructure features for gradual release
- **Proposal 4:** Rainwater discharge direct to a watercourse
- **Proposal 5:** Controlled rainwater discharge to a surface water sewer or drain
- **Proposal 6:** Controlled rainwater discharge to a combined sewer

A summary of the proposals is detailed below.

Proposal 1: Rainwater use as a resource has been considered and included through the inclusion of water butts at the bike storage area.

Proposal 2: Rainwater infiltration was discounted due to the ground being made up of London Clay and therefore unlikely for infiltration to be feasible.

Proposal 3: There is a potential for rainwater attenuation in green infrastructure through the use of a green roof, tree pits, a rain garden, and a swale and this forms part of the strategy. It is also proposed to attenuate rainwater in the permeable paving subbase.

Proposal 4: Rainwater discharge direct to a watercourse is proposed as the main discharge option for this strategy. The culverted River Moselle runs approximately 3m below ground level along the northern edge of the site. It is proposed to discharge to the watercourse at 2l/s.

Proposal 5: Discharge to a surface water sewer makes up part of the drainage strategy to utilise an existing connection to the Thames Water network in Hornsey Park Road. Only the access road will be discharged to the sewer at a controlled rate.

Proposal 6: Discharge to a combined sewer has been discounted due to the previous proposals being feasible which follows the surface water drainage hierarchy.

In summary, Proposals 1, 3, 4, and 5 will be utilised to reuse rainwater, attenuate rainwater in green infrastructure, and discharge most of the rainwater to a culverted watercourse and the rest to the Thames Water surface water sewer in Hornsey Park Road, utilising an existing connection.

Thames Water has confirmed that discharge to the surface water sewer is acceptable, on the condition that the LLFA has confirmed the drainage hierarchy has been followed. The confirmation from Thames Water has been included in Appendix 5.

7.7 Surface Water Design Criteria

Climate Change allowances have been taken from 'Flood risk assessments: climate change allowances' and the allowances for the upper end in the London Management Catchment has been used, which is as follows;

The climate change allowance for the 1% exceedance event is 40%.

The climate change allowance for the 3.3% exceedance event is 35%.

The surface water drainage system will be sized to accommodate the 3.3% exceedance event.

The 1% exceedance event +40% will be checked to ensure that there is no flooding off site and will be contained, so to not adversely affect the site infrastructure.

Exceedance flows have been checked and do not adversely affect any sensitive infrastructure.

An urban creep allowance of 10% has not been included in calculations, due to allowing for 100% impermeability of the site.

7.8 Calculations

The site has been considered as 100% impermeable in calculations, and therefore 1,840m² was taken as the impermeable area. The estimated storage for the attenuation tank is 20m³, and 30m³ for the permeable paving area.

The proposed discharge rate is 2l/s.

The calculations are included in Appendix 3.

7.9 Design Guidance

The documents used for guidance in the surface water drainage strategy is the CIRIA SuDS Manual 2015 and the London Plan.

7.10 Surface Water Quality

The quality of surface water collected and discharged to the surrounding environment, by direct discharge to watercourses or by infiltration should be managed such that the receiving entities are protected from pollution.

Residential roofs are considered a “very low” pollution hazard level as shown in Table 4.3 of the CIRIA SuDS Manual 2015 and does not need to be treated.

The run-off from the roofs is proposed to be collected in a green roof where applicable and channel drains, then conveyed to a below-ground attenuation tank before discharge to the culverted watercourse.

The permeable paving is considered a “low” pollution hazard level and is proposed to discharge to surrounding tree pits where feasible, with the rest conveyed to the tank, which will be sufficient to remove any silt and provide interception for any oils in accordance with the pollution control indices in Table 26.3 of the CIRIA SuDS Manual 2015.

A low traffic road is considered a “low” pollution hazard level. The access road is proposed to run-off into the adjacent swale then attenuate in pipe storage before controlled discharge to the Thames Water network in the road. The swale will treat and collect the likely pollutants and is therefore the flow will meet the quality requirements.

7.11 Biodiversity and Amenity

Green and blue SuDS help to support flora and fauna of the environment and interlink biodiversity and amenity benefits.

The green and blue SuDS included in this strategy are a green roof, tree pits, a rain garden, and a swale. These features will increase the development's biodiversity and amenity benefits.

The biodiversity benefits of SuDS are included in Table 6.1 of the CIRIA SuDS Manual 2015. The amenity benefits are included in Table 5.1.

7.12 SuDS

The proposed SuDS for this development include a green roof, tree pits, a rain garden and a swale.

Please refer to the Proposed Drainage Layout in Appendix 2.

7.13 Exceedance Routes

Exceedance routes (flow from events greater than the 1% +climate change) will flow Southeast. There is no increased risk to the downstream infrastructure as per the current arrangement.

The Exceedance Route Arrow Plan is included in Appendix 2.

7.14 Lead Local Flood Authority (LLFA) and Internal Drainage Board

The LLFA for this site is London Borough of Haringey, and there is no Internal Drainage Board for this site.

7.15 Maintenance

The green roof, tree pits, rain garden, and swale will be owned and managed by the development. These will include bi-weekly visual inspections, with remedial works undertaken when required.

The attenuation tank, pump station and internal building drainage will be managed by the development, with monthly visual inspections from above ground, with further investigation and remedial works taking place as per the manufacturer's instructions.

The external drainage will be inspected visually every 6 months with further investigation and remedial works taking place as per the manufacturer's instructions.

The Maintenance and Management plan is found in Appendix 4.

7.16 Foul Drainage

The foul drainage will be discharged into the foul sewer in Hornsey Park Road via a gravity connection.

The proposed development has 32 residential units and a commercial space of 97m².

The estimated peak flow is approximately 5.27l/s from Block A and 3.73l/s from Block B. This will be refined once the total number of all appliances are known.

Thames Water has confirmed that there is sufficient capacity in the network for discharge of the foul water drainage. The confirmation is included in Appendix 5.

8 SAFE ACCESS

The development site is at low risk of flooding from rivers, seas, reservoirs or groundwater. There is a medium surface water risk at the entrance of the site on Hornsey Park Road.

The access road has a new drainage swale and proposed cross fall which will ensure that surface water is directed towards one side of the road, leaving access available to more vulnerable users and vehicles.

Additionally, there is a second pedestrian access/ egress route to the rear of the development, this is located outside of any flooding extents.

This FRA demonstrates that the risk to human life associated with access and egress at the development site is **very low**.

9 CONCLUSION

This FRA has been undertaken in accordance with the requirements of the NPPF and the London Borough of Haringey Strategic Flood Risk Assessment. The FRA has considered the potential risk of flooding for all sources, including the specific requirements to review the risk from ground water flooding and fluvial flooding.

The development site is located within Flood Zone 1.

The site is at medium risk from surface water flooding, however improved drainage on site and an alternative pedestrian access / egress to the site reduces the risk to an acceptable level for all users of the development.

The River Moselle, a culverted main river, runs along the northwest edge of the site. This culvert cannot be de-culverted as part of this development due to flood safety and ownership constraints.

Based on the information collated as part of this FRA, the proposed development flood risk from all sources has been assessed as low.

As part of the drainage strategy, the surface water run-off is proposed to be attenuated in an underground tank, permeable paving and green infrastructure around the site. Approximately 50m³ of attenuation is required.

As per the existing arrangement there are two outfalls, (Culverted River Moselle and the surface water drain in Hornsey Park Road) both of which will be maintained with betterment to the existing discharge rate being restricted to 2l/s.

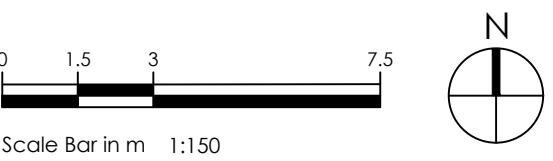
The development proposed for this site should not be precluded based on flood risk grounds.

APPENDIX 1 SITE PLAN



- NOTES:
1. This drawing is to be read in conjunction with all relevant contract documentation from the design team, with any conflicting information to be brought to the attention of Turkington Martin Landscape Architects in writing before commencing on site.
 2. The contractor is to check and verify all levels and dimensions before construction. Any discrepancies are to be brought to the attention of Turkington Martin Landscape Architects in writing before commencing on site.
 3. All dimensions in mm, unless otherwise stated.
 4. Do not scale from this drawing.
 5. All sub base and concrete design and specification to engineer's details. All diagrams provided here are purely indicative.
 6. Waterproofing of any element to be specified by others.
 7. All proprietary products shall be installed in accordance with manufacturers written instructions.
 8. Plant numbers are an indication only and plants should be ordered to suit site areas in accordance with scheduled plant densities.
 9. Any proposed plant substitution shall be agreed with the landscape architect prior to ordering.

- KEY**
- Site boundary
- PAVING**
- Pre-cast concrete block paving (pedestrian areas)
 - Pre-cast concrete block paving (vehicle and parking area)
 - Private gardens
 - Mulch to Play Area
 - Maintenance BOH paving TBC
- PLANTING**
- Perennial Planting
 - Defensible Planting
 - Lawn
 - Proposed Trees (standard)



02/02/24	EN	Updated plan as per architect's new levels	P07	MM
03/02/24	EN	Updated plan. Removed refuse store. New kerb lines.	P06	MM
15/02/24	EN	Updated plan as per updated tracking, new ground floor, added parking line	P05	MM
24/12/23	EN	Updated kerb lines as per tracking. Additional parking line as per Transport officers comment. Revised cycle area as per landscape officer's comments.	P04	MM
16/12/23	EN	Updated road width, play area, bike store	P03	MM
08/12/23	EN	Updated layout as per comments and revised architectural plans	P02	MM
DATE	DRAWN	DESCRIPTION OF REVISION	REVISION LETTER	CHECKED BY

turkington martin

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CLIENT
Trinity Group
PROJECT TITLE
Hornsey Park Road
DRAWING TITLE
Landscape GA - Ground Floor
DRAWING STATUS
S2 - Suitable for Information

DRAWING SCALE: 1:100
PAPER SIZE: A1
DRAWN BY: EN
CHECKED BY: MM
DRAWN DATE: 26.10.23
CHECKED DATE: 26.10.23

DRAWING NUMBER: 613-TML-XX-00-DR-L-0200
REVISION: P07
Turkington Martin LANDSCAPE ARCHITECTS

APPENDIX 2 PROPOSED LAYOUT PLANS



- NOTES:
- DO NOT SCALE OFF THE DRAWING
 - ALL MEASUREMENTS ARE IN METRES UNLESS OTHERWISE NOTED

LEGEND:

- ROAD AREA - 314m²
- ROOF WITH PARTIAL GREEN AREA - 254m²
- GREEN ROOF AREA - 371m²
- PERMEABLE PAVING AREA - 573m²
- PLAY AREA - 38m²
- GREEN AREA - 327m²
- SITE BOUNDARY

DESIGNERS' NOTES:

- RGP DESIGN HAS BEEN DEVELOPED USING TOPOGRAPHICAL SURVEY "32127/PLS-01A.dwg" (RECEIVED FROM SURVEY SOLUTIONS 07/11/2023).
- RGP DESIGN HAS BEEN DEVELOPED USING PROPOSED SITE PLAN "2218-P003-31-P3-Proposed Site Plan.dwg" (RECEIVED FROM STEPHEN DAVY 24/01/2024).

P2	MINOR AMENDMENTS	IB	DB	15.12.24
P1	FIRST DRAFT	TKG	DB	02.02.24

Revision	Description	By	Checked	Date
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Transport Planning and Infrastructure Design Consultants

GODALMING & LONDON



Client
TRINITY INTERNATIONAL DEVELOPMENTS

Project
HORNSEY PARK ROAD
WOOD GREEN, N8 0JX

Drawing Title
PROPOSED AREAS

Issue Status

☒ INFORMATION ☐ PRELIMINARY ☐ TENDER ☐ CONSTRUCTION ☐ RECORD COPY

Scale	Date Issued	Drawn	Checked	Approved
1:200	FEBRUARY 2024	TKG	DB	DB

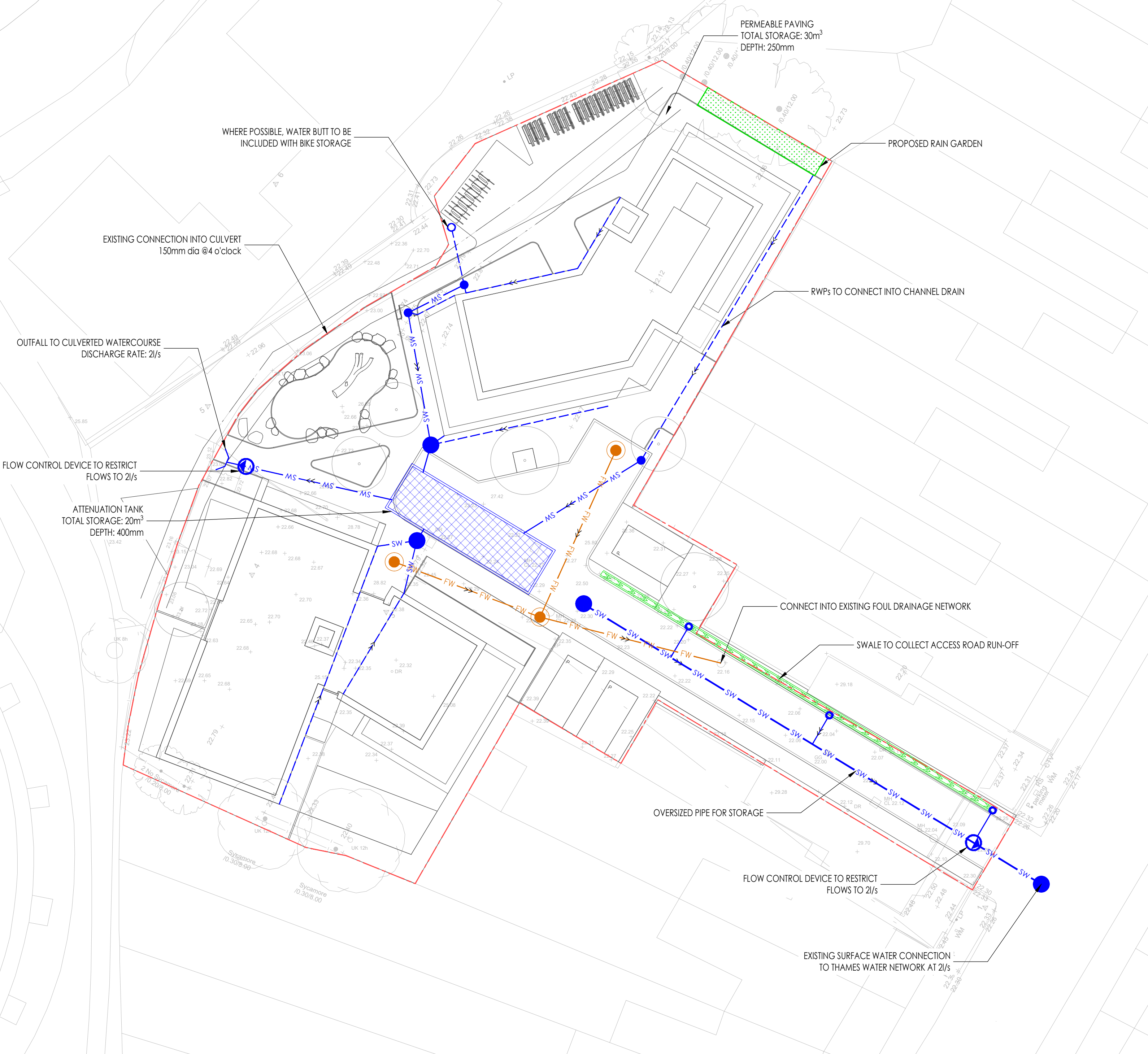
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7601-RGP-ZZ-00-DR-C-0501	P2

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 - ALL MEASUREMENTS ARE IN METRES UNLESS OTHERWISE NOTED.
 - THIS DRAWING IS CONCEPTUAL ONLY AND SUBJECT TO CHANGE.
 - ALL SURFACE WATER FLOWS ARE RESTRICTED TO 2l/s AT DISCHARGE LOCATIONS.
 - RWP LOCATIONS TO BE CONFIRMED BY ARCHITECT.
 - WATER BUTT LOCATION TO BE CONFIRMED AT DETAIL DESIGN.
 - ALL SURFACE WATER STORAGE VOLUMES ARE BASED ON A 3.3% EXCEEDANCE EVENT. THE 1% EXCEEDANCE EVENT + 40% CLIMATE CHANGE HAS BEEN CHECKED TO ENSURE THERE IS NO FLOODING OFF SITE.

- LEGEND:
- SW PROPOSED SURFACE WATER DRAINAGE
 - FW PROPOSED FOUL WATER DRAINAGE
 - PROPOSED SURFACE WATER LINEAR CHANNEL DRAIN
 - PROPOSED SURFACE WATER ATTENUATION TANK
 - PROPOSED FLOW CONTROL MANHOLE
 - PROPOSED SURFACE WATER OUTFALL
 - PROPOSED SWALE & OUTLET
 - PROPOSED RAIN GARDEN
 - PROPOSED WATER BUTT
 - SITE BOUNDARY

- DESIGNERS' NOTES:
- RGP DESIGN HAS BEEN DEVELOPED USING TOPOGRAPHICAL SURVEY "32127/PLS-01A.dwg" (RECEIVED FROM SURVEY SOLUTIONS 07/11/2023).
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P1	FIRST DRAFT	TKG	DB	02.02.24
Revision	Description	By	Checked	Date

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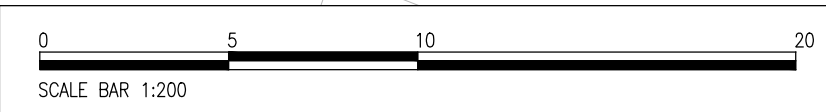
Project
HORNSEY PARK ROAD
WOOD GREEN, N8 0JX

Drawing Title
PROPOSED DRAINAGE LAYOUT

Issue Status
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Scale	Date Issued	Drawn	Checked	Approved
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 - RWP LOCATIONS TO BE CONFIRMED BY ARCHITECT.
 - WATER BUTT LOCATION TO BE CONFIRMED AT DETAIL DESIGN.
 - ALL SURFACE WATER STORAGE VOLUMES ARE BASED ON A 3.3% EXCEEDANCE EVENT. THE 1% EXCEEDANCE EVENT + 40% CLIMATE CHANGE HAS BEEN CHECKED TO ENSURE THERE IS NO FLOODING OFF SITE.

- LEGEND:
- OVERLAND FLOW EXCEEDANCE ROUTE ARROWS
 - SITE BOUNDARY

- DESIGNERS' NOTES:
- RGP DESIGN HAS BEEN DEVELOPED USING TOPOGRAPHICAL SURVEY "32127/PLS-01A.dwg" (RECEIVED FROM SURVEY SOLUTIONS 07/11/2023).
 - RGP DESIGN HAS BEEN DEVELOPED USING PROPOSED SITE PLAN "2218-P003-31-P3-Proposed Site Plan.dwg" (RECEIVED FROM STEPHEN DAVY 24/01/2024).

P2	MINOR AMENDMENTS	IB	DB	15.02.24
P1	FIRST DRAFT	TKG	DB	02.02.24

Revision	Description	By	Checked	Date
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Project
HORNSEY PARK ROAD
WOOD GREEN, N8 0JX

Drawing Title
EXCEEDANCE ROUTE ARROW PLAN

Issue Status
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Scale	Date Issued	Drawn	Checked	Approved
1:200	FEBRUARY 2024	TKG	DB	DB

Drawing Number	Revision
7601-RGP-ZZ-00-DR-C-0503	P2

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SCALE BAR 1:200

APPENDIX 3 DRAINAGE CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	14.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.200	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	3.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Depth (m)
1	0.111	3.00	22.950	1.000

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	14.000	Drain Down Time (mins)	240
Ratio-R	0.200	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
10	0	0	0
30	0	0	0
100	40	0	0

Node 1 Lined Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.950	Pit Length (m)	12.000
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.400
Safety Factor	2.0	Ring Diameter (m)	0.600	Inf Depth (m)	
Porosity	0.95	Pit Width (m)	3.500	Number Required	1



Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	21.950	0.000	10.9	0.0000	0.0000	OK

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	21.950	0.000	20.6	0.0000	0.0000	OK



Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	21.950	0.000	25.6	0.0000	0.0000	OK



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	21.950	0.000	45.3	0.0000	0.0000	OK

APPENDIX 4 MAINTENANCE AND MANAGEMENT PLAN

**COMBINED RESIDENTIAL AND
COMMERCIAL DEVELOPMENT AT
HORNSEY PARK ROAD**

**Surface Water Maintenance & Management
Strategy**

**On behalf of Trinity International
Developments**

February 2024

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1 INTRODUCTION

- 1.1.1 Regular inspections and maintenance of the surface water drainage system is important to ensure the effective and efficient operation of the system and to reduce the likelihood of blockages and flooding on site.
- 1.1.2 The surface water drainage network comprises of permeable paving, an attenuation tank, a swale, tree pits, a rain garden, and underground piped network.
- 1.1.3 The system has been designed to accommodate all surface water runoff for the design storm up to and including the 1% exceedance event + 40% for climate change, and should not need to be inspected or maintained for the first 12 months following construction during the defects liability period for the construction works.
- 1.1.4 A post-construction CCTV survey of the installed system should be undertaken to confirm the system has been installed in accordance with the drawings and specification and that there are no damages or obstructions within the system.
- 1.1.5 The information from the CCTV survey should be included in the Health & Safety File or O&M manual for the site, which should be passed to the management company and/or individual owner(s) for their information. Once the defects liability period has lapsed, the surface water drainage system should be inspected at regular intervals and any blockages cleared or remediation works undertaken at the earliest opportunity to ensure the effective operation of the drainage system.

2 INSPECTION REGIME

- 2.1.1 The surface water drainage system should be inspected and cleaned by a suitable Specialist Contractor, in accordance with the guidance provided in BS EN 752:2017 in the Maintenance and Operations section.
- 2.1.2 The system should be monitored monthly by lifting the covers to the manholes and chambers to monitor debris build-up. If required, these are to be cleaned at the earliest opportunity to prevent blockages.
- 2.1.3 Every six months, the drainage system should be inspected to identify areas that are not operating as required and any remedial works identified should be carried out at the earliest opportunity.
- 2.1.4 Refer to the Surface Water Management Schedule, detailed in Table 1, below, for the proposed maintenance schedule for the site.

Table 1 – Surface Water Maintenance Schedule

Feature	Schedule	Required Action	Frequency
Swale, Tree Pits, and Rain Garden	Regular	Inspect surface structure removing obstructions and silt as necessary. Check there is no physical damage	Monthly
		Trim vegetation 1m min. surround to structures to keep free from silt and debris	Monthly
		Undertake inspection after leaf fall in autumn	Annually
	Remedial	Rehabilitation of surface and upper substructure	As required
		Repair physical damage if necessary	As required
	Monitoring	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	Annually
		Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
Pervious Pavement	Regular	Stabilise and mow contributing and adjacent areas	As required
	Occasional	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less
		Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	Frequently used pavements - As required
	Remedial	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
		Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
		Initial inspection	Monthly for three months after installation
	Monitoring	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	Annually
		Inspect and identify any areas that are not	Monthly for 3 months,

Feature	Schedule	Required Action	Frequency
		operating correctly. If required, take remedial action.	then annually
Drainage (Pipe Network)	Regular	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
		Maintain vegetation to designed limits within the vicinity of below ground drainage pipes to avoid damage to system.	Monthly or as required
		Inspect rainwater down pipes, channel drains and road gullies, removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
		Remove silt and leaf build up from manholes, gutters etc.	Annually (or as required)
	Occasional	Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually (or as required)
		Remove inspection covers and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.	Annually
		Removal of sediment, oil, grease and floatables from separator	Biannually (or as required)
		Replacement of malfunctioning parts	As Required
	Remedial	Repair physical damage if necessary	As Required
		Inspect inlets and pre-treatment systems for silt accumulation. Establish appropriate silt removal frequencies.	Biannually
	Monitoring	Undertake inspection after leaf fall in Autumn	Annually
		Inspect all inlets, outlets and vents to ensure that they are in good condition and operating as designed.	Annually
		Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required
		Check manholes, gutters etc. for silt and leaf build up.	Annually
Attenuation Tank	Regular	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
		Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
		Remove sediment from pre-treatment structures	Annually, or as required
	Remedial	Repair/rehabilitate inlets, outlet, overflows and vents	As required
	Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually

2.1.5 A full CCTV survey of the surface water drainage system should also be carried out at 10-yearly intervals to assess the condition of the drainage system.

- 2.1.6 Reference should also be made to the manufacturer's detailed information and maintenance requirements for their recommended intervals and safe methods of cleaning for the following proprietary systems:

- Flow control device

3 RESIDUAL RISKS

- 3.1.1 In all instances, all underground drains, access chambers and manholes represent working in confined spaces. Appropriate precautions should be taken before entering drains and manholes. Access should only be undertaken by appropriately trained personnel.
- 3.1.2 Reference should be made to the as-built drawings for the site, which will detail the layout and additional information for the drainage system. A copy of the drawings should be maintained in the Health & Safety file for the site and/or within the O&M manual.

4 RESPONSIBILITY FOR INSPECTIONS AND MAINTENANCE

- 4.1.1 The responsibility for the inspection and maintenance of the surface water drainage system lies with the Management Company or owner(s) of the individual properties.
- 4.1.2 In the event no Management Company is appointed, the responsibility for inspections and maintenance of the surface water drainage system lies wholly with the individual property owner(s).
- 4.1.3 The recommendations included in this Maintenance and Management Strategy are typical and may need to be amended to suit the site-specific requirements of the development, individual users and owner(s) requirements throughout the life span of the development.

APPENDIX 5 THAMES WATER CORRESPONDENCE



Tajol Gill

RPG
1-2 Paris Garden
London
SE1 8ND



11 December 2023

Pre-planning enquiry: Confirmation of sufficient capacity

Site: 157-159 Hornsey Park Road, London, N8 0JX

Dear Tajol,

Thank you for providing information on your development.

Proposed site: The demolition of a 1840sqm Commercial premises and the construction of 179sqm Commercial premises and 32 flats.

Proposed foul water: Foul water discharge by gravity into existing manhole located in the access road.

Proposed surface water: Surface water for the access road only to discharge via gravity, restricted to maximum of 2.0l/s.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you



have followed the sequential approach to the disposal of surface water and considered all practical means.

When developing a site, policy SI 13 of the London Plan states “Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:”

The disposal hierarchy being:

1. rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2. rainwater infiltration to ground at or close to source
3. rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4. rainwater discharge direct to a watercourse (unless not appropriate)
5. controlled rainwater discharge to a surface water sewer or drain
6. controlled rainwater discharge to a combined sewer

Where connection to the public sewerage network is still required to manage surface water flows, we will accept these flows at a discharge rate in line with CIRIA’s best practice guide on SuDS or that stated within the sites planning approval.

If the above surface water hierarchy has been followed and if the flows are restricted to a total of 2.0 l/s, then Thames Water would not have any objections to the proposal.

Trade Effluent

Please be advised a Trade Effluent consent will be required to discharge trade effluent into the public sewer. Trade effluent can be best described as anything other than domestic sewage (toilet, bath or sink waste and groundwater) or uncontaminated surface water and roof drainage (rainwater). Applications should be made at <https://www.thameswater.co.uk/wholesale/trade-effluent> and for enquiries, please contact our trade effluent team by phone on 0203 577 9200 or via email at trade.effluent@thameswater.co.uk.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days’ notice of the date you wish to make your new connection/s.

If you have any further questions, please contact me on 0800 009 3921.

Kind Regards,

Steve Knight

Developer Services – Adoptions Engineer

Thames Water Utilities Ltd,

Get advice on making your sewer connection correctly at connectright.org.uk

Clearwater Court, Vastern Road, Reading, RG1 8DB

Find us online at developers.thameswater.co.uk



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