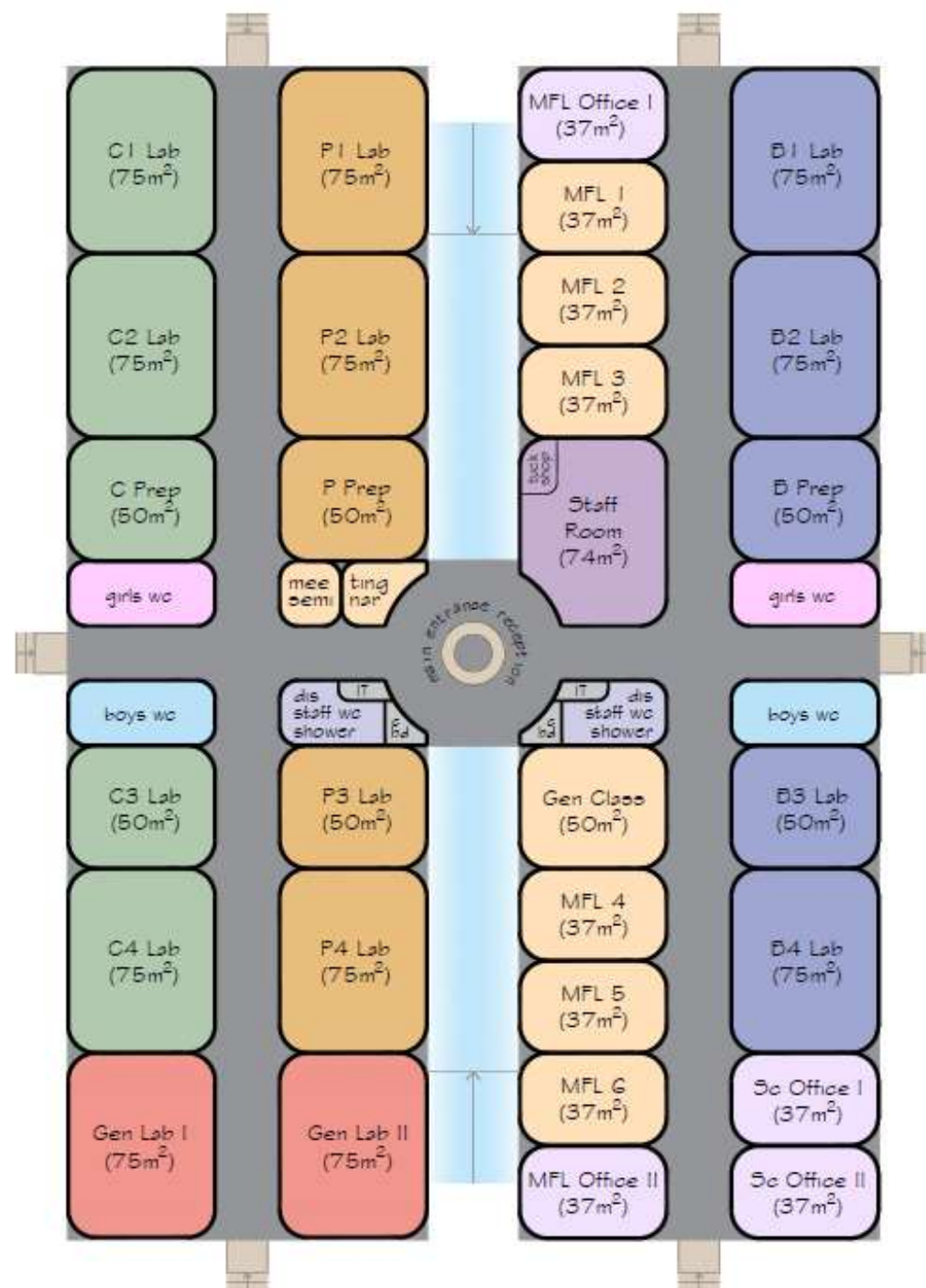


Highgate School Temporary Accommodation on Synthetic Sports Pitch

Flood Risk Assessment



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Executive Summary

The proposal is to place a temporary accommodation building on the Highgate School synthetic sports pitch to enable decanting of existing buildings to refurbish various facilities within the school estate. The factory-constructed temporary accommodation building will be delivered to the site and placed above the synthetic sports pitch surface. The temporary structure will be removed upon completion of the works, and the synthetic sports pitch is to return to its original use.

The proposal is to discharge rainwater from the roof of the temporary accommodation building onto the existing permeable surface of the synthetic sports pitch.

The rainwater from the roof will be distributed under the building using an interconnected network of permeable drainage pipes, avoiding water pooling, and potentially damaging the synthetic surface. The existing power, water and foul drainage services are all located close to the proposed site without requiring major connection works. Therefore, there is no change or loss of the existing natural rainwater/surface water drainage.

The Edenvale Young Highgate's School surface water modelling report (May 2019) includes water rainwater discharge from the synthetic sports pitch. The rainwater catch of the artificial sports pitch remains constant as the flat-roofed single-story temporary building has the same horizontal area as the sports pitch. The low-level walls make a minimal difference to the collection of rainwater. Edenvale Young undertook the hydraulic modelling work to support the Flood Risk Assessment (FRA) for capital projects as part of a planning application relating to the Highgate School Sports facilities redevelopment.

As a result of the surface water modelling, the capital projects now include a swale designed as landscaped amphitheatre feature. (Highgate MSC 4Phase, Design and Access statement, Robert Meyers Associates (2019)).

The environment agency defines the temporary building site as being flood risk level 1 with the likelihood of low water depth (0.1m) due to the 1 in 100-year storm criteria.

The location of the temporary classroom will not affect the surface water flooding risk downstream from the site beyond that already defined in the Edenvale Young surface water modelling report.

Summary of Haringey Development Plan Policies

Policy DM24: Managing and Reducing Flood Risk

London Borough of Haringey does not require additional modelling or calculations for surface water in Flood Zone area 1.

Policy DM25: Sustainable Drainage Systems

Temporary structure using the existing permeable surface of the synthetic playing field.

Policy DM26: Critical Drainage Areas

The synthetic playing field site has no risk from surface water flooding

Policy DM27: Protecting and Improving Groundwater Quality and Quantity

There are no local open water courses, and the site has a low risk of causing water course pollution. (No Carpark or industrial activities).

Policy DM28: Protecting and Enhancing Watercourses and Flood Defences

The site is not located close to an open water course or flood defences



Figure 1 Landscape master plan Including swale surface water flood defence.

1 Introduction

- 1.1 Capital Projects have commissioned Peter Deer and Associates to undertake a Flood Risk Assessment (FRA) to support the planning application relating to the Highgate School Temporary Classroom Accommodation.
- 1.2 This report has been carried out following the National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance (PPG) "Flood Risk and Coastal Change". This report also incorporates advice and guidance from the Environment Agency, the North London Strategic Flood Risk Assessment Level 1, the London Borough of Haringey Strategic Flood Risk Assessment Level 2 (SFRA, 2014), the London Borough of Haringey Surface Water Management Plan (SWMP, 2011), CIRIA documents and Haringey SUDS Design Requirements for Lead Local Flood Authority (LLFA) Technical Assessment 1.0 (2016).
- Proposed Works
- 1.3 The main redevelopment works will require old school buildings to be fully vacated. It will be, therefore, impossible to maintain the daily operation of the senior School in the existing buildings. It is essential that the senior school facilities, even in their temporary home, are close to the other school facilities such as the dining, sports, and communal foundation facilities such as the Mills Centre for Art and Design Technology and Engineering. As part of the main redevelopment works, a temporary building should be installed for a shorter duration. The temporary structure is intended to provide teaching facilities to cater for the decanting requirements of three schemes at the School on a phased programme over a period of at least 5 to 6 years.
- 1.4 The proposed works in this submission include:
 - Install a single-storey temporary modular teaching block at the south end of the synthetic playing sports pitch on the east side of Bishopswood Road.
 - Alterations to the existing cricket pitch
 - Alterations and extensions to existing pathways to provide access around the perimeter of the site with low-level lighting for safety
 - Installation of temporary utilities intake shed and connections to the existing sewer
 - Removal of the temporary buildings and reinstatement of the site.
 - Replacement of the existing damaged synthetic turf with permanent new synthetic turf to meet current standards and SpEx (sports and exercise) curriculum requirements
 - Installation of a temporary staff room marquee in the Chapel Quad and mobile toilet units in the Garner Quad on the senior school island site during a shorter period
- 1.5 Highgate School aims to maintain a high standard of the physical environment for all pupils throughout this interim period until the main redevelopment projects are completed.
- 1.6 The School will commit to returning the site as quickly and as practically possible to the original appearance and use once the proposed phased works have been completed.

Site

- 1.7 The address is Synthetic Pitch (adjacent to Mallinson Sports Centre), Bishopswood Road, Highgate, Haringey, London N6 4NY.
- 1.8 The synthetic playing sports pitch forms part of the school estate and is near other essential School buildings such as the Mills Centre, the Dining Hall, the Pre-Prep School, and the Junior School.



Figure 2 Site location in context (Open Street Map)



Figure 3 Aerial view of the synthetic playing sports pitch.

- 1.9 Synthetic sports pitches are located within the Highgate school grounds. The sports pitches are uphill from the Mallison sports centre, slightly below the level of the primary school playfield to the east. The natural surface water drainage is downhill toward the Mallison Sports centre.
- 1.10 There are no open water courses close to synthetic pitches.

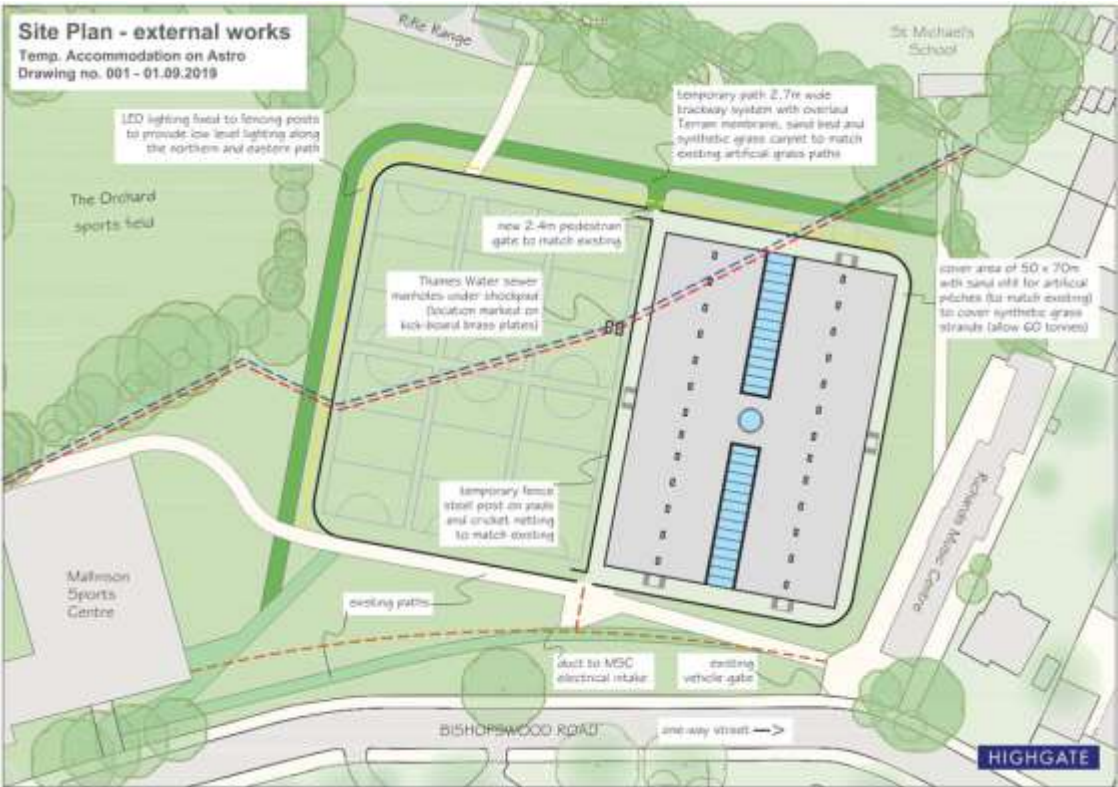


Figure 4 Site plan utility services in the vicinity of the site.



Figure 5 Local geology, hydrology, and hydrogeological details (BGS).

Geology

- 1.11 The site is on heavy clay soil and likely has a poor water infiltration rate. The synthetic sports pitch has a water storage layer under the artificial surface, attenuating heavier rainwater and providing additional storage to allow the ground to accept the rainwater without flooding the sports pitch.
- 1.12 The temporary building will continue to use sport as the method of disposal for the rainwater (surface water).

2 Planning Policies

- 2.1 Planning law requires that applications for planning permission be determined following the development plan unless material considerations indicate otherwise. Planning policies and decisions must also reflect relevant international obligations and statutory requirements. The National Planning Policy Framework must be considered in preparing the development plan and is a material consideration in planning decisions.
- 2.2 The purpose of the planning system is to contribute to achieving sustainable development. At a very high level, sustainable development's objective can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.
- 2.3 The planning system should fully support the transition to a low-carbon future in a changing climate, considering flood risk and climate change. It should help to:
- shape places in ways that contribute to radical reductions in greenhouse gas emissions
 - minimise vulnerability and improve resilience
 - encourage the reuse of existing resources
 - including the conversion of existing buildings
 - support renewable and low-carbon energy and associated infrastructure.

National Planning Policy

- 2.4 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared housing plans and other developments can be produced.
- 2.5 The NPPF was published in February 2019 and superseded the 2012 and 2018 editions. Paragraphs 2 and 12 within the Framework confirm that the NPPF must be considered a material planning consideration in planning decisions.
- 2.6 To ensure that sustainable development is pursued positively, a presumption favouring sustainable development is at the heart of the NPPF. Sustainable Development is explained in more detail in NPPF paragraph 11, which requires Local Planning Authorities to:
- Approve development proposals that accord with an up-to-date development plan without delay
- Or
- Where there are no relevant development plan policies or the policies which are most important for determining the application are out-of-date, granting permission unless:
- Applying policies in the framework that protect areas or assets of particular importance provides an apparent reason for refusing the proposed development.
- Or
- Any adverse impacts of doing so would significantly and demonstrably outweigh the benefits when assessed against the policies in this framework when taken as a whole.
- 2.7 The NPPF includes a 'presumption in favour of sustainable development. It states that for plan-making, the presumption means that local authorities should positively seek opportunities to meet the development needs

of their area and that plans should meet objectively assessed needs. Plans should also be based on the Local Plan.

London Plan

- 2.8 The London Plan is the Mayor's planning strategy for Greater London. It sets borough-level housing targets and identifies locations for future growth of London-wide importance.
- 2.9 The London Plan is the overall strategic Plan for London, setting out an integrated economic, environmental, transport and social Framework for the Development of London over the next 20 to 25 years.
- 2.10 The London Plan is part of the Development Plan. The policies have been drafted to allow London to implement this ambitious London Plan as soon as possible. There is no requirement for the policies to be repeated locally. However, some instances require a local approach within the overall policy context. The London Plan sets out where this is the case.
- 2.11 The London Plan provides the strategic framework for making all these decisions. It guides boroughs' Development Plans to ensure they work toward a shared vision for London. It establishes policies that allow everyone involved in new developments to know what is expected.

Policy SI 12 Flood risk management

- A.** Current and expected flood risk from all sources (as defined in paragraph 9.2.12) across London should be managed sustainably and cost-effectively in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers, and infrastructure providers.
- B.** Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should cooperate and jointly address cross-boundary flood risk issues, including with authorities outside London.
- C.** Development proposals should ensure that flood risk is minimised and mitigated and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.
- D.** Developments Plans and proposals should contribute to delivering the measures set out in the Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.
- E.** Development proposals for utility services should remain operational under flood conditions, and buildings should be designed for quick recovery following a flood.
- F.** Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades sustainably and cost-effectively.
- G.** Natural flood management methods should be employed in development proposals due to their multiple benefits, including increased flood storage and creating recreational areas and habitats.

- 2.12 In London, the boroughs are Lead Local Flood Authorities (LLFAs) and are responsible for local surface water flood risk management and maintaining the flood risk management assets register. They produce Local Flood Risk Management Strategies. LLFAs should cooperate on strategic and cross-boundary issues.

Policy SI 13 Sustainable Drainage

- A.** Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas with particular surface water

management issues and aim to reduce these risks. Increases in surface water run-off outside these areas also need to be identified and addressed.

B. *Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:*

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

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

D. *Drainage should be designed and implemented to promote multiple benefits, including increased water use efficiency, improved water quality, enhanced biodiversity, urban greening, amenity, and recreation.*

- 2.13 London is at particular risk from surface water flooding, mainly due to the large extent of impermeable surfaces. Lead Local Flood Authorities are responsible for managing surface water drainage through the planning system and ensuring that appropriate maintenance arrangements are implemented.
- 2.14 Local Flood Risk Management Strategies and Surface Water Management Plans should ensure they address flooding from multiple sources, including surface water, groundwater and small watercourses that occur because of heavy rainfall.
- 2.15 Development proposals should aim to get as close to greenfield run-off rates as possible, depending on site conditions. The well-established drainage hierarchy in this policy helps reduce the speed and volume of surface water run-off. Rainwater should be managed as close to the top of the order. There should be a preference for green over grey features and drainage by gravity over pumped systems. A blue roof is an attenuation tank at the shelter or podium level; combining a blue and green roof is particularly beneficial, as the attenuated water is used to irrigate the green roof.

London Borough of Haringey

Local Plan Strategic Policies ~ (March 2013)

- 2.16 Haringey's Local Plan is made up of several individual planning policy documents. These are currently adopted or in development. In addition to this Development Management DPD, the Local Plan documents include:
- 2.17 Haringey's Local Plan Strategic Policies 2013 – 2026 (formerly the Core Strategy) March 2013 Consolidated with alterations since 2017 – sets out the Council's spatial strategy and critical policies for the Borough's future development through to 2026.
- 2.18 SP5 Water Management and Flooding

SP5: Water Management and Flooding

The Council will require all Development in Haringey to be water efficient during construction and operation and to reduce all forms of flood risk. All development shall:

- *Improve the water environment, water quality and drainage systems.*
- *Minimise water use and illustrate how the development would contribute to general and flash flooding.*
- *Take account of flood risk vulnerability classification as set out in paragraph 100 of the NPPF and will apply the NPPF Sequential Test and Exception Test.*
- *Implement measures to prevent (or mitigate as a last resort) local surface water and downstream flooding.*
- *Implement Sustainable Drainage Systems from strategic to individual site levels to improve water attenuation, quality, and amenity.*
- *Restore and enhance the Blue-Ribbon Network, including Pymmes Brook, Moselle Brook, the River Lee, and its tributaries, deculverting wherever feasible, to improve water quality and amenity of these waterways and to help reduce flood risk (in line with London River Action Plan); and ••Require higher resilience and levels of flood protection for critical infrastructure to ensure the protection of essential services such as water and power.*

To facilitate this, the Council:

- *Has completed a joint SFRA (Strategic Flood Risk Assessment) Stage 1 for the whole Borough.*
- *Has carried out a Sequential Test for the Areas of Development (Growth Areas and Areas of Change).*
- *It is carrying out, in association with other north London boroughs in the Drain London sub-region, a Surface Water Management Plan to identify issues with drainage networks and the effects of new development.*

- 2.19 The water environment is a valuable recreational, educational and leisure resource for the residents of Haringey. From the large reservoirs of the Lee Valley to small ponds in parks and gardens, it is a resource that needs to be protected.
- 2.20 Developments should ensure measures are incorporated to protect and improve water quality for surface and ground waters, particularly in areas of land contamination. An increase in residential and commercial developments in the growth areas of Haringey Heartlands and Tottenham Hale will increase the demand for water and abstraction from rivers. Too much water taken from rivers can cause problems for wildlife and increase the risk of pollution, as there is less water available to dilute pollutants.

Flood Risk

- 2.21 Implications of anticipated change in climate in the UK's increased frequency of extreme weather conditions and the possibility of flash floods are being considered carefully. The Borough contains flood risk areas in proximity to Pymmes Brook on Pinkham Way, Moselle Brook, and River Lee. In Haringey, risk areas include parts of the Lee Valley and South Tottenham (as identified in the Strategic Flood Risk Assessment) and regions identified by the Environment Agency mapped data showing areas susceptible to flooding. According to the Environment Agency, approximately 9% of Haringey's land has a 100-year probability of flooding from rivers. About 8,000 properties are at risk of flooding, although the defences, such as the river Lee flood relief channel, reduce the risk of this happening.

Development Plan Development Management DPD Adopted July 2017

- 2.22
- This document sets out Haringey's spatial strategy for managing development and growth in the Borough up to 2026. The Local Plan provides a positive framework for ensuring that housing, employment, infrastructure, and other needs are met to contribute to sustainable development in both the Borough and Greater London. Several key objectives, which are set across five overarching themes, as follows, guide the Local Plan:

 - People are at the heart of change.
 - An environmentally sustainable future.
 - All share economic vitality and prosperity.
 - Safer for all; and
 - Healthier people with a better quality of life.

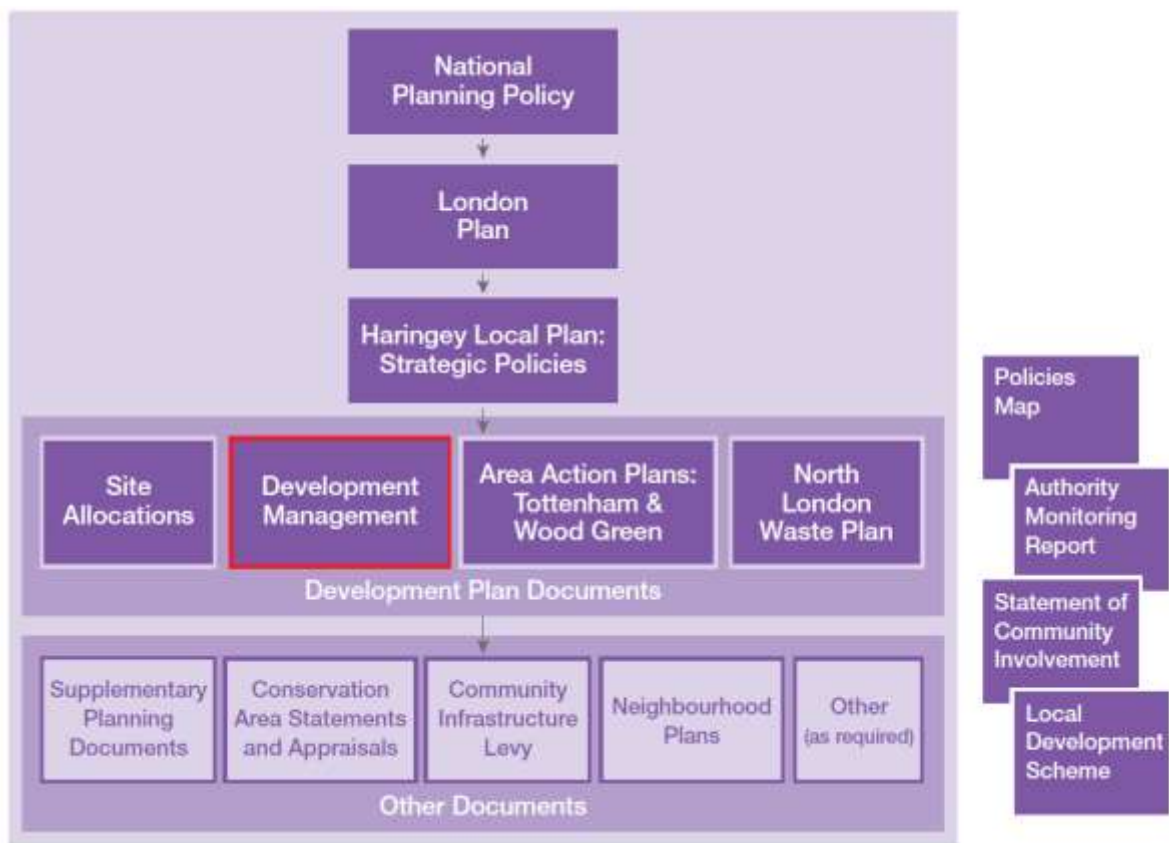


Figure 6 London Borough of Haringey Policy Hierarchy

Development Management DPD Adopted July 2017

- Policy DM24: Managing and Reducing Flood Risk
- Policy DM25: Sustainable Drainage Systems
- Policy DM26: Critical Drainage Areas
- Policy DM27: Protecting and Improving Groundwater Quality and Quantity
- Policy DM28: Protecting and Enhancing Watercourses and Flood Defences

- 2.23
- The North London Strategic Flood Risk Assessment (SFRA) Level 1, Haringey's SFRA Level 2, and Surface Water Management Plan (SWMP) provide local evidence of all forms of flooding, including fluvial, surface water, groundwater, sewers, and reservoirs.
- 2.24
- As part of the preparation of the Local Plan, a sequential test was carried out to assist in identifying suitable future areas for development within the Borough, including growth areas and areas of change. Further sequential tests were undertaken on DPD and Tottenham AAP site allocations. Allocated sites that have passed the sequential test will not need to apply for the test again unless the proposed development is not consistent with the allocated land use.
- 2.25
- For those sites which are not included as site allocations, the Council will apply the requirements of the sequential and exception tests contained within the NPPF and associated technical guidance.
- 2.26
- In line with national policy, a site-specific Flood Risk Assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

Policy DM24: Managing and Reducing Flood Risk

- A) The Council will ensure that all proposals for new development avoid and reduce the risk of flooding to future occupants and do not increase the risk of flooding.
- B) All proposals for new Development within Flood Zone 2 and 3a will be required to provide sufficient evidence for the Council to assess whether the requirements of the Sequential Test and Exception Test, where required, have been satisfied. Proposals must be informed by a site-specific Flood Risk Assessment (FRA), taking account of all potential sources of flooding and should:

a) Demonstrate the application of a sequential approach for the development of individual sites to ensure that the most vulnerable land uses are located in areas of the site that are at the lowest risk of flooding.

b) Preserve overland flood and flow routes and ensure there is no net loss of flood storage. Adequate flood storage and compensation should be provided on-site, or if this is not possible, provided off-site where circumstances allow.

c) Where appropriate, set out the mitigation measures that will be incorporated on-site to manage residual flood risk, including:

i) Finished floor levels are set no lower than 300mm above the 1 in 100 chances in any given year, including an allowance for climate change, flood level; and

ii) Ensure safe access and egress for future users of the development or an appropriate emergency evacuation plan.

d) Contribute to naturalising watercourses where opportunities arise.

C) All proposals for new development will be required to:

a) Manage and reduce surface water run-off; and

b) Manage water and wastewater discharges.

D) With the exception of water-compatible uses and essential infrastructure, development in areas designated in Haringey's Strategic Flood Risk Assessment as being within Flood Zone 3b will not be permitted.
- 2.27

The Environment Agency requires that Flood Risk Assessments consider the hazard posed to the development by climate change. These should form the basis of any flood risk assessment submitted for sites at risk of fluvial flooding. Applicants should refer to the Environment Agency's published standing advice on flood risk when preparing site-specific Flood Risk Assessments.
- Temporary Accommodation on Synthetic Sports Pitch
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FRA Requirements

9.1 Over-Archiving Principles

In line with the NPPF guidance and evidence from the LB of Haringey Level 2 SFRA, development proposals should:

- Show development is not at risk of flooding or is compatible with the residual risk.
- Not increase flood risk elsewhere, taking into account the impacts of climate change.
- Not increase surface water peak flow rates or run-off volumes above green sports pitch levels, including an allowance for climate change, as this would result in increased flood risk to the receiving catchments.
- Not increase the risk of groundwater flooding elsewhere or change the hydrogeological regime of the area.
- The location of basement development should be carefully considered within the LB of Haringey, and attention should be paid to all sources of flood risk early within the planning process for new development (including the impact of potential future subterranean works that fall under permitted development).
- Wherever possible, use the opportunities offered by new development to reduce flood risk within site and elsewhere; and
- ensure that where new development is necessary for areas of flood risk (in exceptional circumstances), it is made safe from flooding for the lifetime of the development, taking into account the impacts of climate change. This includes consideration of the potential effect of residual risks

Policy DM25: Sustainable Drainage Systems

- A) All proposals for new development must seek to manage surface water as close to its source as possible in line with the London Plan drainage hierarchy.
- B) 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:
 - a) All major development proposals will be required to reduce surface water flows to a greenfield run-off rate for a 1 in a 100-year critical storm event.
 - b) 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.
 - c) 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
 - d) 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.
- C) Where Sustainable Drainage Systems are implemented, they will be expected to:
 - a) Meet the requirements set out in the Council's relevant local standards and guidance or national standards where agreed.
 - b) Incorporate measures identified in the Surface Water Management Plan.
 - c) Be designed to maximise biodiversity and local amenity benefits, and where appropriate, ensure that SuDS techniques provide for clean and safe water at the surface.
 - d) Improve water quality and
 - e) Function effectively over the lifespan of the development.
- D) Where SuDS cannot be implemented due to site constraints (such as land contamination or space limitations), robust justification must be provided along with proposed alternative sustainable approaches to surface water management.

- 2.28 Haringey's Strategic Flood Risk Assessment has identified surface water run-off as the most significant risk to the Borough concerning flooding. Surface water run-off is the excess water that flows off the land due to rainfall that cannot filter through the soil. Surface water flooding occurs when high-intensity or prolonged rainfall generates run-off, which flows over the surface of the ground and ponds in low-lying areas. It can be

especially problematic when the ground is saturated or the drainage network has insufficient capacity to cope with the additional flow.

- 2.29 Climate change is projected to increase the frequency and intensity of heavy rainfall events, placing greater pressure on traditional drainage systems.

Policy DM26: Critical Drainage Areas

- A) All proposals for new development within a Critical Drainage Area (CDA) will be required to incorporate measures to reduce the overall level of flood risk in the CDA.
- B) Proposals for new Development within Local Flood Risk Zones must include a statement describing how flood risk issues have been addressed. The Council may require a further site-specific Flood Risk Assessment to assess risk, particularly surface water flooding.

- 2.30 Haringey has prepared a Surface Water Management Plan (SWMP) that identifies areas in the Borough at the greatest risk of surface water flooding. These are known as Critical Drainage Areas (CDA). The SWMP identifies 9 number CDAs within the Borough. These CDAs are identified as Local Flood Risk Zones (LFRZ), representing the extent of predicted flooding in specific locations. New Developments must respond appropriately to managing flood risk in these locations.

Policy DM27: Protecting and Improving Groundwater

Quality and Quantity

- A) The Council will seek to protect and improve the quality and quantity of groundwater resources within the Borough.
- B) All proposals for new development will be required to identify existing and potential new sources of groundwater pollution and, where appropriate, submit a relevant desktop study to demonstrate this has been fully considered, including on sites with a historical legacy of contamination.
- C) All proposals for new development must ensure that:
 - a) There is no adverse impact on groundwater quality, either by design, construction, or operation of the development; and
 - b) Appropriate construction techniques are used to limit disturbance to natural groundwater flows.
- D) Proposals for new Development in Source Protection Zones must not result in an unacceptable risk to groundwater quality.

- 2.31 The Water Framework Directive sets out objectives for improving groundwater quality. Groundwater bodies are classified under the Directive, and the Council must protect this important resource.

Policy DM28: Protecting and Enhancing Watercourses and Flood Defences

A) *New Development must be set back at a distance of 8 meters from the main river and 5 meters from an ordinary watercourse, or at an appropriate width as agreed by the Council and the Environment Agency, in order to provide an adequate undeveloped buffer zone.*

B) *Development proposals on sites containing the main river or ordinary watercourse will be required to demonstrate how the objectives of the Thames River Basin Management Plan and London River Restoration Action Plan have been taken into account.*

C) *Having regard to (B) above, all major development will be required, and minor development should:*

a) *Investigate and secure the implementation of environmental enhancements to open sections of the river or watercourse; and*

b) *Investigate and secure the implementation of measures to restore culverted sections of the river or watercourse.*

D) *Proposals must not adversely affect the natural functioning of main rivers and ordinary watercourses, including through culverting.*

E) *Where appropriate, the Council will require proposals to include a condition survey of existing watercourse infrastructure to demonstrate that it will adequately function for the lifetime of the development and, if necessary, make provision for repairs or improvements.*

F) *Development on or adjacent to a watercourse must not result in the deterioration of the quality of that watercourse.*

2.32 Watercourses in Haringey form part of the network of rivers and streams within the London basin. They are an important resource that offers amenity, supports biodiversity, and plays a critical role in sustainable flood management (such as by reducing the rate of water run-off and providing capacity for flood storage). Many watercourses have been significantly altered from their original state, thus compromising these key functions. The changes to the flow of the local watercourse result from a legacy of urban development in which watercourses were redirected away from sites or piped into culverted sections below ground. The Council will seek to stop and reverse such unsustainable alterations by requiring that proposals for site redevelopment fully exploit opportunities to restore and enhance the natural functioning of watercourses. In line with the London Plan objectives for the Blue-Ribbon network, the Council will extend these policy principles to all watercourses in Haringey.

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3 Temporary Accommodation Surface Water Drainage Proposal

The temporary building has a flat roof. The proposal is to continue to use permeable synthetic sports pitch surfaces to absorb the rainwater from the temporary building roof. The rainwater catchment remains the same as the synthetic sports pitch. Installing regular rainwater down pipes from the roof will evenly distribute rainwater over the permeable sports pitch surface, allowing the rainwater to flow under the temporary building using the original porous surface areas. The rainwater downpipe will discharge into a network of perforated drainage pipes under the building to ensure even distribution avoiding the pooling of rainwater.

The system is designed to utilise the existing permeability of the synthetic surfaces to avoid large puddles and/or streams of water from the artificial sports pitches.

- 3.1
- There will be no change to the rates of water flow from the synthetic playing fields as there is no increase in hard impermeable surfaces or reduction of the available permeable surfaces.

Flood Risk Assessment: Highgate School Surface Water Modelling Report by Edenvale Young Highgate School SW (May 2019)

- 3.2
- Hydraulic modelling work has been undertaken to support the Flood Risk Assessment (FRA) for Capital Projects as part of a planning application relating to the Highgate School Sports facilities redevelopment. See separate Edenvale report for full modelling details
- 3.3
- The report includes the existing synthetic playing fields as part of the surface water modelling, and therefore the water from this location is included with the proposed swale works.
- 3.4
- The calculation remains valid as the temporary building will not add the synthetic sport rainwater catchment area.



Figure 7 Highgate school 1 in 100 years Storm Event. Flood Risk Assessment: Highgate School Surface Water Modelling Report. Edenvale modelling report (May 2019)

Site Flood Risk

- 3.5
- The site of the proposed temporary building is in Zone 1, an area with a low probability of flooding.
- 3.6
- This zone comprises land assessed as having a less than 1 in 100 annual probability of river or sea flooding in any year (<0.1%).

Historic flooding and defences

- 3.7
- According to the Environment Agency's recorded flood outlines, no significant fluvial events have affected the site. Cases of historical flooding relating to groundwater, sewer flooding etc.

Coastal/tidal flooding

- 3.8
- The SFRA has not identified coastal flooding as a source of flood risk in the vicinity of the site. This source of flooding will not be considered further.

Pluvial (surface water) flooding

- 3.9
- Surface water flooding occurs after intense rainfall events when surface water cannot infiltrate the ground or cannot discharge into a sewer or watercourse. The Environment Agency has assessed surface water flood risk and produced mapping to reflect this (Figure 9 Environmental Agency, Surface Water Flood)
- 3.10
- The mapping indicates a low risk of water flooding the playing sports pitch.
- 3.11
- SWMP mapping (See Appendix B) for 1 in 100-year event + climate change gives a flood depth of fewer than 0.1m at the site.

Sewer Flooding

- 3.12
- The SWMP mapping has not identified a specific sewer flooding issue in the vicinity of the site. The area 'N6 4', where the site is located, is recorded as having '1 to 5' sewer flooding records.
- 3.13
- Other areas within the Borough are recorded as having between '21 to 50' sewer flooding records, so sewer-flooding incidents at the site of temporary accommodation can be considered a low-risk zone. However, as the SWMP mapping is comprehensive, it does not offer firm conclusions regarding the risk of sewer flooding.

Flooding from Infrastructure failure

- 3.14
- Flooding from infrastructure failure can occur if a large reservoir fails and releases the water it holds. The Environment Agency defines the maximum extent of flooding for these cases, derived using highly conservative modelling scenarios.
- 3.15
- The Environment Agency mapping in Figure 3.5 shows that the proposed development is not located within such an inundation extent.

Summary of flood risk from various sources

- 3.16
- The impact of surface water flooding will govern the development as it poses the highest risk to the site of the temporary accommodation building. The threat from other sources of flooding reviewed in this chapter is considered the site to have a low risk of flooding.

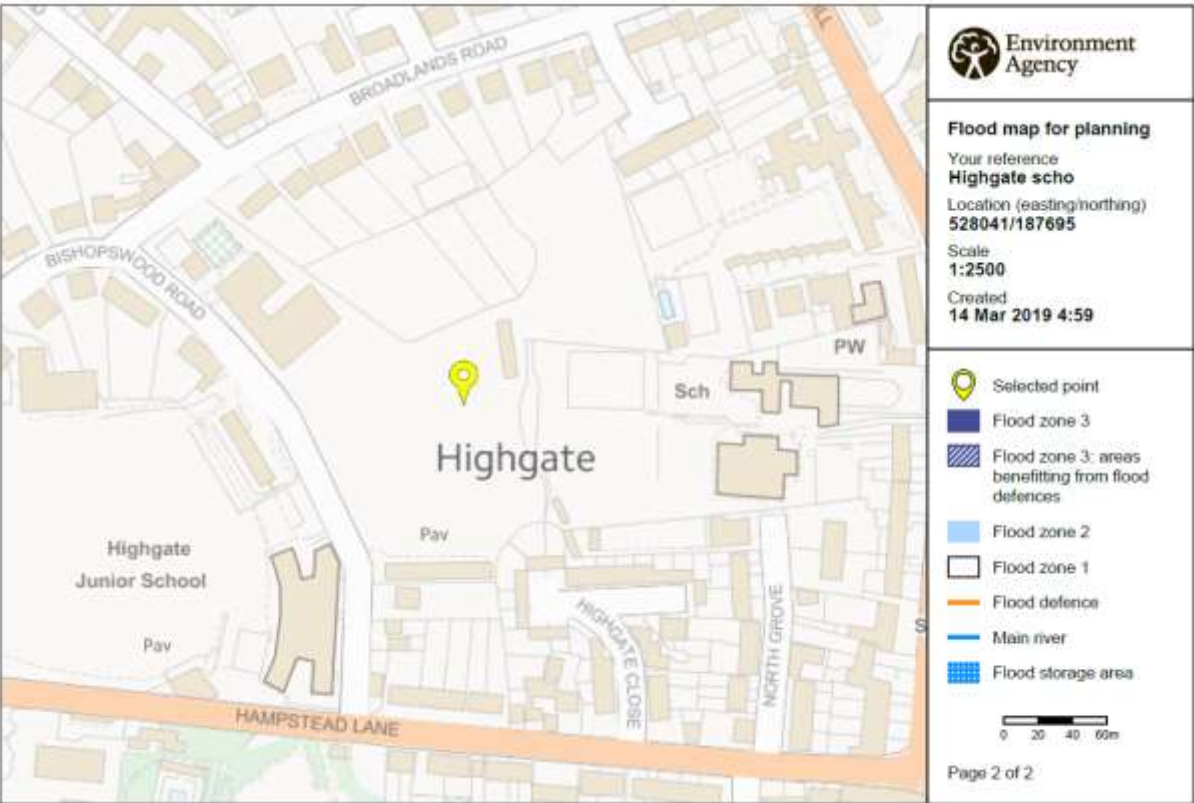


Figure 8 Environmental Flood Risk Map



Figure 9 Environmental Agency, Surface Water Flood



Figure 10 Surface Water Flood Risk Low Depth Water



Figure 11 Surface Water Flood Risk from Medium Depth Surface Water

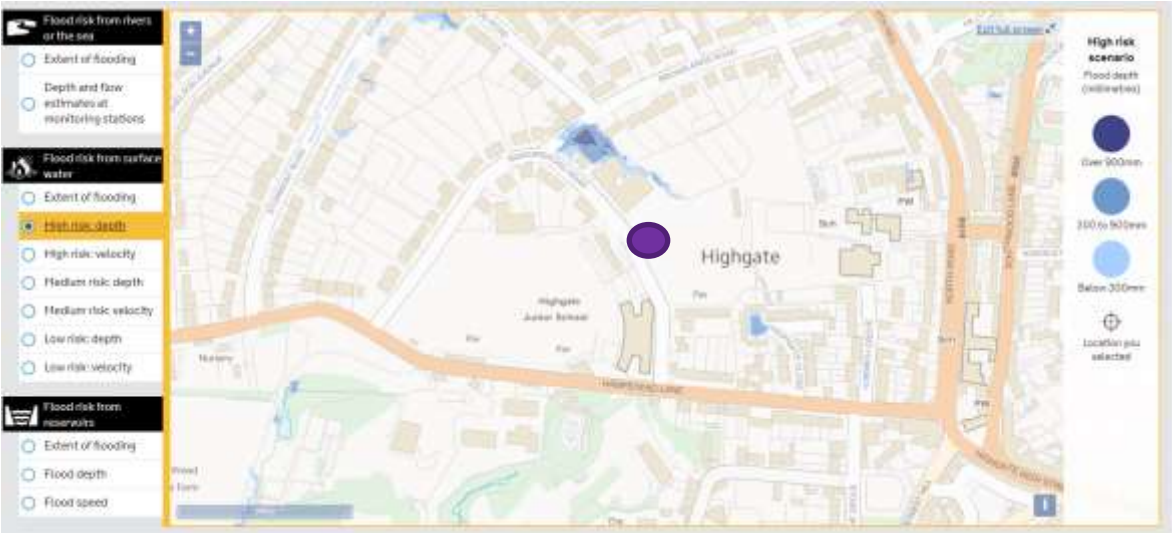


Figure 12 Surface Water Flood Risk high depth water

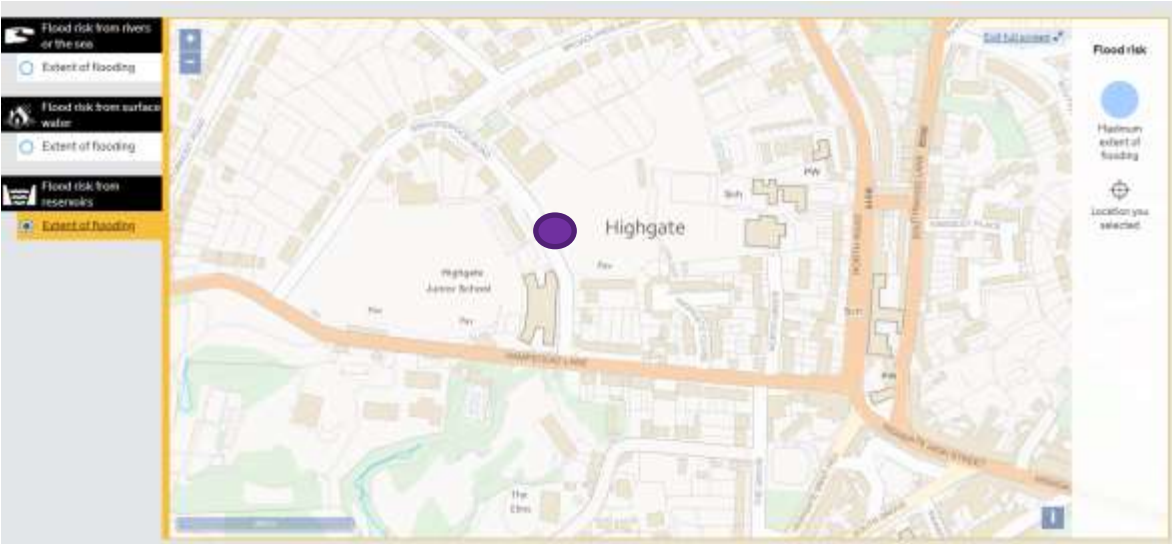


Figure 13 Flood Risk from Infrastructure Failure

4 Conclusion

- 4.1
- The Flood Risk Assessment undertaken to assess the risk of flooding downstream of the proposed temporary accommodation building makes the following conclusions:
- The proposed development lies in Flood Zone 1.
 - There is a slight risk of surface water flooding.
 - Other sources of flooding, such as infrastructure flooding, surface water flooding and groundwater flooding, have been reviewed but are considered low risk.
- 4.2
- The temporary accommodation building is supported on pillars above the synthetic sports pitch's permeable surface. The rainwater downpipes will be located at regular intervals distributing rainwater evenly over the permeable surface of the synthetic sports field. As the rainwater, catchment area, and permeable surface areas remain the same, there is no predicted change to surface water discharge from the School.