



Appendix 12.2

Flood Risk Assessment and Drainage Strategy

North Hemel Hempstead

Flood Risk Assessment and Drainage Strategy

Hemel North
FRA
4
December 2025

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1 Introduction

- 1.1 RPS was commissioned to produce a Flood Risk Assessment and Drainage Strategy to support the pre-planning discussions prior to the proposed outline planning application for a mixed use development, at land adjacent to Holtsmere Lane, Hemel Hempstead.
- 1.2 This site is part of a wider Hemel Garden Communities (HGC) site being promoted by St Albans City and District and Dacorum Borough Councils (<https://www.hemelgardencommunities.co.uk/>). Figure 1 shows the location of the site as proposed against the allocation site and in context to the wider HGC plan.
- 1.3 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk. The report has been produced in accordance with the guidance detailed in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG).
- 1.4 This report has been produced in consultation with the Environment Agency (EA) and the Lead Local Flood Authority (LLFA). The site is not located within an Internal Drainage Board (IDB) District.
- 1.5 The desk study was undertaken by reference to information provided / published by the following bodies:
 - Environment Agency (EA);
 - Dacorum Borough Council (DBC);
 - St Albans City and District Council (SACDC);
 - Hertfordshire County Council (HCC);
 - Thames Water;
 - Affinity Water;
 - British Geological Survey (BGS); and
 - Ordnance Survey (OS).

2 Planning Policy Context

National Planning Policy

- 2.1 The National Planning Policy Framework (NPPF)¹ was released in March 2012 and was updated in February 2025. The document advises of the requirements for a site-specific Flood Risk Assessment (FRA) for any of the following cases (Planning and Flood Risk paragraph 181 (footnote 63)):
- All proposals (including minor development and change of use) located within the EA designated floodplain, recognised as either Flood Zone 2 (medium probability) or Flood Zone 3 (high probability);
 - All proposals of 1 hectare (ha) or greater in an area located in Flood Zone 1 (low probability);
 - All proposals within an area which has critical drainage problems (as notified to the Local Planning Authority by the EA);
 - Land identified in a strategic flood risk assessment as being at increased flood risk in future; and
 - Where proposed development may be subject to other sources of flooding, where its development would introduce a more vulnerable use.
- 2.2 Paragraph 182 of the updated NPPF identifies that applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff; and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of development proposals should:
- a. Take account of advice from the Lead Local Flood Authority;*
 - b. Have appropriate proposed minimum operational standards; and*
 - c. Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.*
- 2.3 Planning Practice Guidance (PPG) on Flood Risk and Coastal Change², advises how to take account of and address the risks associated with flooding and coastal change in the planning process. This was most recently updated in September 2025.
- 2.4 Defra published their 'National standards for sustainable drainage systems (SuDS)'³ in July 2025. These are supported by the revised NPPF.

¹<https://www.gov.uk/government/publications/national-planning-policy-framework--2>, accessed February 2025

² <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

³ <https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems/national-standards-for-sustainable-drainage-systems-suds>

Local Planning Policy

- 2.5 The St Albans Regulation 19 Draft 2041 Local Plan⁴ ⁵was published in September 2024. It contains the following Policies relating to flood risk and drainage:

Strategic Policy SP2 – Responding to the Climate Emergency

The Council recognises the urgent need to respond to Climate Change through mitigation and adaptation. The Council will support proposals that help combat Climate Change where the proposals:

- a. Demonstrate mitigation and adaptation to Climate Change, including pursuing the reduction of whole life-cycle carbon emissions (both operational and embodied);*
- b. Prioritise the development of previously developed land;*
- c. Are designed to improve resilience to Climate Change, including resilience to increasing temperatures, more frequent drought, more intense storms and wind speeds and heavy rainfall events;*
- d. Use the most sustainable locations for growth and so minimising the need to travel while encouraging walking, cycling and the use of public transport;*
- e. Provide on-site renewables, high standards of energy efficiency, and low carbon energy;*
- f. Prioritise the use of sustainable and active modes of travel in new and existing developments;*
- g. Deliver biodiversity net gain;*
- h. Mitigate increasing flood risk;*
- i. Include Sustainable Drainage Schemes (SuDS) where appropriate;*
- j. Demonstrate tree planting;*
- k. Combine environmental payments through stacking different types of credits on sites (e.g. carbon, biodiversity, Suitable Alternative Natural Green Space (SANG) etc) where appropriate.*

NEB8 – Managing Flood Risk

Proposals located within flood zones (i.e. Flood Zones 2 or 3, or sites within Flood Zone 1 where there is an identified flood risk) need to meet the requirements of the sequential and exception tests, in accordance with national policy. Any Flood Risk Assessment must be undertaken in accordance with advice from the Environment Agency (if applicable) or Lead Local Flood Authority.

Where the sequential and exception tests have been applied, proposals located within areas identified as being at risk of flooding will not be permitted unless the following is demonstrated:

- l. That the most vulnerable development within the site is located in areas of lowest risk;*

⁴ [https://www.stalbans.gov.uk/sites/default/files/attachments/Planning%20Policy/LPCD/LPCD%2002.01%20-%20Reg%2019%20Local%20Plan%20Part%20A%20\(2024\).pdf](https://www.stalbans.gov.uk/sites/default/files/attachments/Planning%20Policy/LPCD/LPCD%2002.01%20-%20Reg%2019%20Local%20Plan%20Part%20A%20(2024).pdf)

⁵ [https://www.stalbans.gov.uk/sites/default/files/attachments/Planning%20Policy/LPCD/LPCD%2002.02%20-%20Reg%2019%20Local%20Plan%20Part%20B%20\(2024\).pdf](https://www.stalbans.gov.uk/sites/default/files/attachments/Planning%20Policy/LPCD/LPCD%2002.02%20-%20Reg%2019%20Local%20Plan%20Part%20B%20(2024).pdf)

- m. *That all sources of flood risk are considered, including fluvial and surface water flood risk;*
- n. *That the development is appropriately flood resistant and resilient and incorporates appropriate infrastructure to address the increasing potential for flood events due to Climate Change;*
- o. *That flood risk will not be increased elsewhere and, where possible, reduce flood risk offsite;*
- p. *How the proposal incorporates sustainable drainage systems;*
- q. *How any residual risk can be safely managed; and*
- r. *That safe access and egress routes are included where appropriate and have an agreed emergency plan.*

Where appropriate, proposals should include a comprehensive green infrastructure strategy with infrastructure that will provide a number of different functions relating to amenity, ecology and flood risk.

Where a development may affect a watercourse or waterbody, the proposal must demonstrate:

- s. *A comprehensive approach to watercourse management;*
- t. *The full use of Sustainable Drainage Systems (SuDS); and*
- u. *Flood and drainage storage areas as necessary.*

Surface water management

- v. *All major development should incorporate sustainable drainage systems (SuDS) into proposals, and manage surface water run-off to achieve greenfield run-off rates where feasible;*
- w. *Proposals for minor and householder development should incorporate SuDS where applicable;*
- x. *SuDS should be green, provide multiple benefits, such as biodiversity and integrate into the green infrastructure network; and*
- y. *Development proposals incorporating SuDS will need to include management and maintenance plans for the proposed SuDS, with appropriate contributions sought where necessary.*

- 2.6 The site has been identified within the St Albans Draft Local Plan 2041 within '1 - Hemel Garden Communities - Broad Locations' as 'H1 - North Hemel Hempstead, AL3 7AU'. The site is allocated for a proposed use of 'primarily residential 1,500 units'

Climate Change

- 2.7 The NPPF and supporting planning practice guidance on Flood Risk and Coastal Change explain when and how flood risk assessments should be used. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

Peak River Flow Allowances

- 2.8 In 2021, the EA updated advice on climate change allowances to support the NPPF. Peak river flow allowances show the anticipated changes to peak flow by management catchment. Management catchments are sub-catchments of river basin districts. Peak River Flow

Allowances should be considered for locations that are currently in Flood Zone 1 but might be in Flood Zone 2 or 3 in the future.

- 2.9 EA guidance on the application of climate changes allowance is dependent on the proposed developments vulnerability. As the development is a residential development, this application is deemed as More Vulnerability. The EA require that for More Vulnerability developments located in Flood Zones 2, 3a or 3b, the central allowance should be used to assess climate change. Residential developments have a lifetime of 100 years therefore, the 2080s epoch will be considered⁶.

- 2.10 The proposed redevelopment is located within the Colne Management Catchment for which the following peak river flow allowances are applicable.

Table 1. Colne Management Catchment Peak River Flow Allowances

Epoch	Central	Higher	Upper
2020s	10%	16%	30%
2050s	8%	16%	38%
2080s	21%	35%	72%

- 2.11 Based on the lifetime of the development and the vulnerability classification, an allowance of 21% is appropriate. The Peak River Flow Allowances are considered to ensure the safety of people using the development when planning safe access, escape routes and places of refuge.

Peak Rainfall Allowances

- 2.12 Peak Rainfall Allowances are used to consider how increased rainfall affects surface water flood risk and the design of drainage systems to manage the increased rainfall.

- 2.13 New guidance requires that for developments with a lifetime beyond 2100, Flood Risk Assessments and Strategic Flood Risk Assessments should assess the upper end allowances for the 2070s epoch for both the 1% and 3.3% annual exceedance probability events. The proposed redevelopment is located within the Colne Management Catchment for which the following Peak Rainfall Allowances are applicable⁷.

Table 2. Colne Management Catchment Peak Rainfall Allowances

3.3% Annual Exceedance Rainfall Event		
Epoch	Central	Upper End
2050s	20%	35%
2070s	25%	35%
1% Annual Exceedance Rainfall Event		
Epoch	Central	Upper End
2050s	20%	40%
2070s	25%	40%

- 2.14 Based on the above information, an allowance of 40% is appropriate. RPS have included this allowance within the conceptual drainage strategy and added 40% to all attenuation / runoff calculations for the development to account for climate change.

⁶ <https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow>

⁷ <https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall>

3 Consultation

Environment Agency

- 3.1 This note has been produced in consultation with EA. Modelled flood level data was requested from the EA, as well as details of historic flooding and flood defences within the vicinity of the site. A response was received (**Appendix A**) and stated:

“Based upon a review of the submitted information, the proposed development raises no environmental concerns within our remit. We therefore have no comments to make.”

St Albans City and District Council

- 3.2 SADC were contacted in January 2024, regarding flood risk issues and incidents at or close to the site. A response is currently awaited.

Hertfordshire County Council

- 3.3 HCC was contacted in January 2024, in their role as Lead Local Flood Authority (LLFA) regarding flood risk issues at the site. Responses have been received on 24 Feb 2025 and 26 November 2025, these are contained in **Appendix B**.

- 3.4 Comments included:

“Please note the various surface water flow paths across the site. If built development (including access/egress routes, land raising or other vulnerable elements) will be located in the flow paths, a flood risk sequential test may be required.

We would anticipate the discharge hierarchy being explored (with preference for shallow infiltration) as far as possible, before considering discharge to river/watercourse and then surface water sewer. Discharge rates should be restricted to greenfield runoff rates, we would accept 1:1 or the QBAR rate. The application should show a commitment to source control SuDS to be located at the plot/street-level to distribute benefits throughout the site before resorting to oversized attenuation features / the “pipe to pond” approach. Please use FEH 2022 rainfall data and CV parameters set to 1.”

- 3.5 The response received from 26 November 2025 contained the following requirements:

- *“Full network calculations for the 100% AEP, 50% AEP (if the drainage network is to be adopted), 3.33% AEP, 3.33% AEP plus appropriate climate change allowance, 1% AEP event, 1% AEP plus appropriate climate event.*
- *We would need to see flood risk resilience and resistance measures, as well as finished floor levels (set at the appropriate level, whichever is the most precautionary of 150mm above external ground levels or 300mm above the maximum design water level of any source of flooding (including the drainage scheme)).”*
- *Safe access and egress must be shown to be possible at the 1% AEP plus climate change.*
- *A detailed maintenance and management strategy will be required for the proposed drainage strategy. This should include details of how each open SuDS feature will be accessed to be maintained.*
- *Given the size of the development, a phased drainage plan will also be required to show how each parcel will be self-contained and be able to function without being reliant on other phases of the development.*

- *We would need to see a construction management plan for the construction phase on site (i.e. temporary and permanent measures).*
- *A phased drainage plan is also required to show how each parcel can function without the whole development being built.”*

Internal Drainage Board

- 3.6 The site is not located within an IDB District.

Thames Water

- 3.7 Thames Water (TW) are the local statutory water company for the area. TW were consulted regarding foul drainage disposal in March 2025. A number of responses have been received to date and discussions are ongoing. Their responses are contained in **Appendix C**.
- 3.8 Thames Water has stated in its pre-planning enquiry response that it will need to carry out modelling to assess foul water and surface water once outline planning permission has been granted. This modelling will identify whether any reinforcement works are needed. The Applicant will approach Thames Water if the Proposed Development is granted planning permission.”

Affinity Water

- 3.9 The Affinity Water Pre-development Report provided details for a new water supply to the proposed development. In order to receive a detailed design and cost advice for the development, the full application and supporting information should be completed. The report is provided in **Appendix D**.

4 Site Description

Site Description

- 4.1 The site is located around National Grid Reference TL082107, is irregular in shape and occupies an area of approximately 105 hectares (ha). A site location plan is provided in Figure 1.

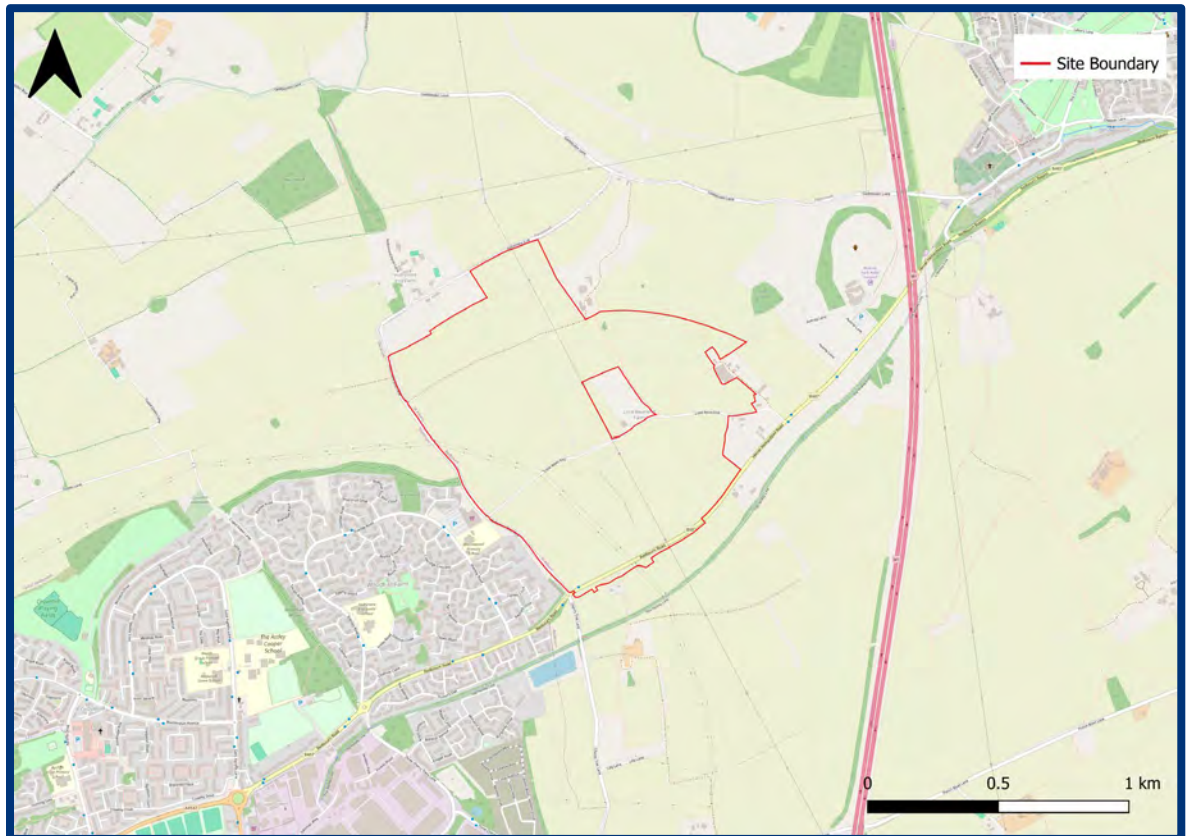


Figure 1. Site Location

Surrounding Land Uses

- 4.2 The site is located to the north-east of Hemel Hempstead. It is bordered by Gaddesden Lane to the north east, Holtsmere End Lane to the north and west, Hemel Hempstead Road to the south and private properties and agricultural land to the east.

Topography

- 4.3 The site is undulating with falls generally from northwest to southeast. Two shallow “valley” features follow the topography towards the Southeast and Hemel Hempstead Road.
- 4.4 Hemel Hempstead Road is slightly elevated from the site by approximately 500mm along the southern boundary of the site.
- 4.5 Topographic surveys are included in **Appendix E**.

Site Observations

- 4.6 A site visit was undertaken on the 7th March 2025 to further understand the topography of the site and surrounding land. The site visit was conducted by 2no. RPS hydrologists. For

the days prior to the site visit the weather was sunny approximately 14 degrees. The ground at the site was not waterlogged.

- 4.7 Large topographic dips were seen in the site, correlating to where the EA RoFSW mapping identified areas of risk. Ponding was seen in the northern flow pathway, associated with a topographic dip in the field.
- 4.8 No structures were identified on site (i.e. culverts/bridges). Ditches along field boundaries were seen and matched what was shown in LiDAR.
- 4.9 No manhole covers were seen within the site during the visit.
- 4.10 Site visit photographs are included in **Appendix F**.

5 Proposed Development

- 5.1 The development proposals comprise the following:

“Outline application for residential-led mixed use development comprising up to 1,500 new dwellings (including residential accommodation and specialist accommodation for older people) (Use Class C3), a care home (Use Class C2), a 3FE primary school (including early years provision) (Use Class F1), a local centre, mobility hub, open space, amenity space, allotments, green infrastructure, sustainable drainage systems, vehicular and active travel routes, and supporting infrastructure and works. All matters reserved save for access from the B487 .” In addition, the development will provide active travel connections into Hemel Hempstead and relevant interurban connections to align with other Local Plan Policies.

- 5.2 Development plans are included in **Appendix G**.

6 Hydrological Setting

Nearby Watercourses

- 6.1 OS Mapping indicates that no surface waterbodies are located within the Site boundary. The nearest surface water features are several ponds which are located within 1km of the Site.
- 6.2 Ecology surveys undertaken for the Development, details of which can be found in Chapter X: Ecology, identified a single pond located in the centre of the site. It was determined to have limited water and be of poor water quality.
- 6.3 During the Hydrology Site Walkover in March 2025, the pond feature was observed, with raised 'banks' and vegetation indicating the presence of water at times. Ditches were present at the site boundary, which were dry at the time of the visit.
- 6.4 It is anticipated that highway drainage systems associated with the B487 will be present; however, details of these are unknown. It is proposed that the implemented drainage strategy for the realigned Hemel Hempstead Road will replace the existing highways drainage.
- 6.5 The nearest EA designated Main River is approximately 1.5km east of the Site, which is a tributary of the River Ver.
- 6.6 Several ponds are located with 1km of the site. Satellite imagery shows the ponds as dry suggesting they may be surface water attenuation features that allow infiltration into the underlying Chalk.
- 6.7 OS Mapping indicates no further surface water features (e.g. ordinary watercourses, canals, reservoirs) are present within 1km of the Site.

Fluvial / Tidal Flood Risk Classification

- 6.8 The EA's Flood Map for Planning⁸, which is available online, identifies areas at risk of flooding from Rivers and the Sea. The EA designated Flood Zones are categorised as the following:
- Flood Zone 1 – Land assessed as having a less than 0.1% (1 in 1,000) annual probability of flooding.
 - Flood Zone 2 – Land assessed as having between 0.1% - 1% (1 in 100 to 1 in 1,000) annual probability of river flooding or 0.1% - 0.5% (1 in 200 to 1 in 1,000) annual probability of sea flooding and accepted recorded flood outlines.
 - Flood Zone 3 – Areas shown to be at a 1% (1 in 100) or greater annual probability of river flooding or 0.5% (1 in 200) or greater annual probability of flooding from the sea.
- 6.9 The EA Flood Map for Planning is shown in Figure 2.

⁸ [Map – Flood map for planning – GOV.UK](#)

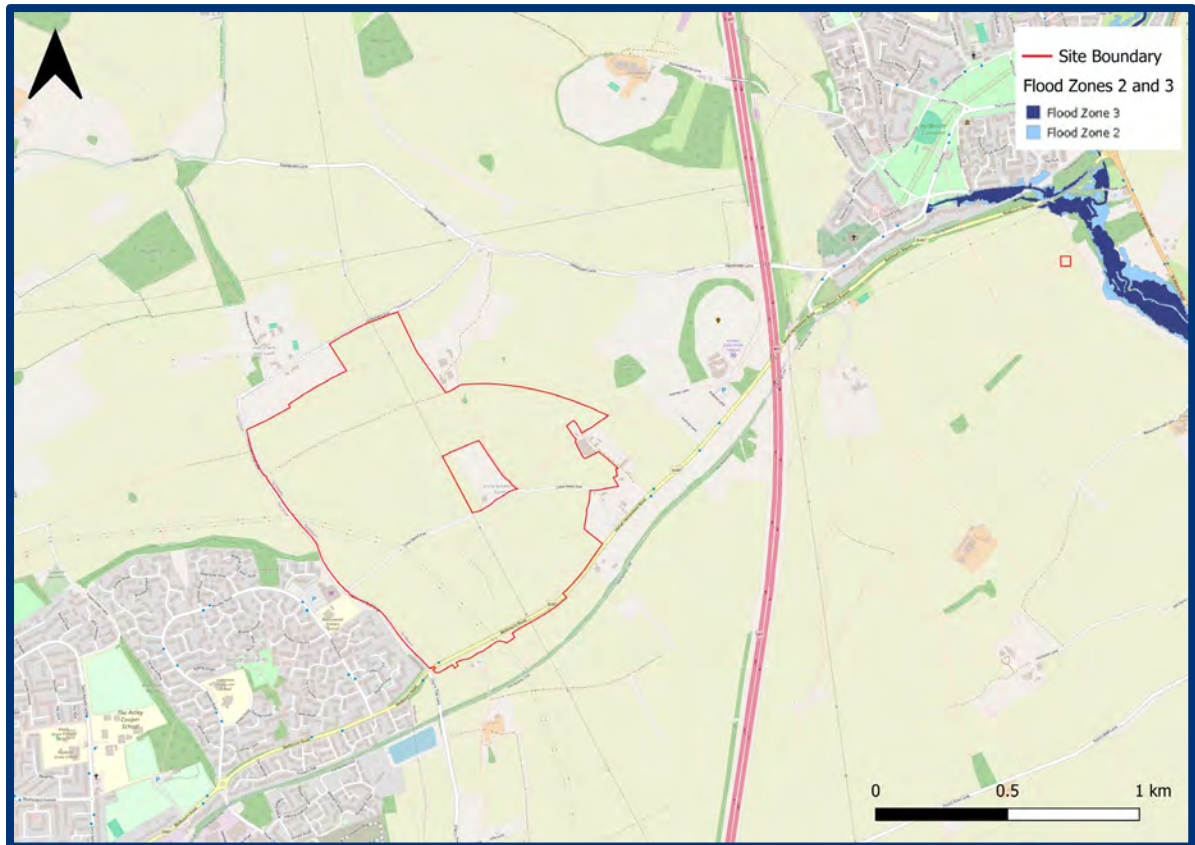


Figure 2. EA Flood Map for Planning

- 6.10 The EA has updated mapping for flooding from rivers and sea including climate change. As with the Flood Zones, the site is located outside of the Rivers and Sea flood extents.

EA Flood Alert Area

- 6.11 The EA defines a Flood Alert Area as “*geographical areas where it is possible for flooding to occur from rivers sea and in some locations groundwater*”.
- 6.12 The Site is not located within a Flood Alert Area.

EA Flood Warning Area

- 6.13 The EA defines a Flood Warning Area as “*geographical areas where we expect flooding to occur and where we provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater.*”
- 6.14 The Site is not located within a Flood Warning Area.

Surface Water Flood Risk Classification

- 6.15 The EA’s Flood Map for Surface Water, which is available online, identifies areas at risk of surface water flooding. The classification of the risk is based on the following annual probability of flooding:
- High risk; area has a chance of flooding greater than 3.3% (1 in 30).
 - Medium risk; area has a chance of flooding between 1% and 3.3% (1 in 30 and 1 in 100).

- Low risk; area has a chance of flooding between 0.1% and 1% (1 in 100 and 1 in 1000).
- Very Low risk; has a chance of flooding less than 0.1% (1 in 1000).

6.16 The EA Flood Map for Surface Water⁹, shown in Figure 4, indicates isolated areas of 'Low' to 'High' surface water risk. Several areas which may be associated with flow paths are present within the site boundary.

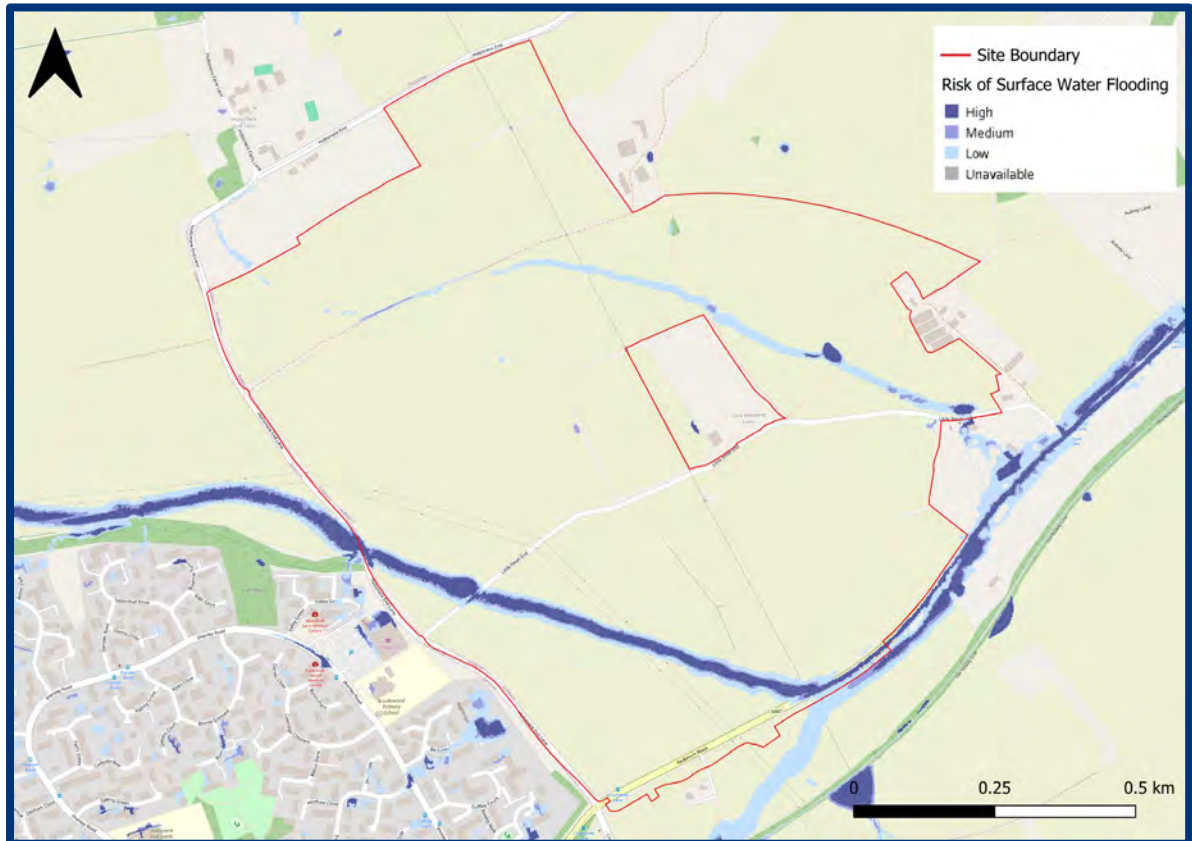


Figure 3. Surface Water Flood Map

6.17 As of January 2025, the EA also provides data for Flood Map for Surface Water including climate change extents, which consider the 'Central' climate change allowance for the 2050s epoch (2040-2060). Within the climate change scenario, in Figure 5, it can be noted that the 'Low' to 'High' risk areas of surface water flood risk have larger extents.

⁹ <https://www.gov.uk/check-long-term-flood-risk>, accessed July 2025



Figure 4. Surface Water + Climate Change Flood Map

Surface Water Modelling

- 6.18 RPS undertook hydraulic modelling for the Site in 2025. Current climate change guidance requires a climate change allowance of 40% to be assessed for the Colne Management Catchment. The modelled 100 year +40% climate change flood extents have been. Results of the modelling exercise are provided within **Appendix H** and discussed further in Section 9.

Reservoir Flood Risk Classification

- 6.19 EA mapping, as shown in Figure 7, indicates that the south east portion of the site falls within the reservoir extents. The flood extents are also present along Hemel Hempstead Road. This emanates from the reservoir off Cherry Tree Lane to the southwest of the site.



Figure 5. Risk from Reservoir Flooding Map

7 Hydrogeological Setting

- 7.1 British Geological Survey (BGS)¹⁰ online mapping (1:50,000 scale) indicates that superficial deposits of Clay with Flints Formation, comprising clay, silt, sand and gravel are present across the north and central portion of the site. A band of Head deposits, comprising clay, silt, sand and gravel, is present along the south eastern boundary of the site. The remainder of the site has no recorded superficial deposits.
- 7.2 Bedrock deposits of Lewes Nodular Chalk Formation and Seaford Chalk Formation, comprising chalk, are present across the entirety of the site.
- 7.3 Intrusive trial pitting and BRE365 soakaway tests were carried out on site by EPS (in 2019 for the southern part of the site and 2025 for the northern sections). Investigations confirmed the presence of Lewes Nodular Chalk Formation and Seaford Chalk Formation bedrock, and Clay-with-Flints Formation. Over the two site investigations, a total of 10 trial pit locations were tested for soakage potential.
- 7.4 A summary of the test results is shown in Table 1. These results mirror the geology with the clay soils towards the north-west either not facilitating soakage tests (TP04, TP05 and TP06) or having the lower permeability. The more central and southerly test result providing good infiltration rates up to 3.52×10^{-4} m/sec. During the 2019 testing, groundwater was monitored through a series of boreholes located in the southern portion of the site. Table 3 summarises the depth to groundwater. As can be seen groundwater was only encountered in some of the boreholes and at considerable depth. For the 2025 ground investigations, it is reported: *'No groundwater was encountered during the ground investigation'*. The ground investigation reports are provided in **Appendix I**.

Table 3. Soakaway Test Results

Trial Pit Location	Calculated Infiltration Rate (m/Sec)
TP01	1.60×10^{-5}
TP02	2.61×10^{-6}
TP03	2.16×10^{-6}
TP04	FAILED
TP05	FAILED
TP06	FAILED
TP201	1.65×10^{-5}
TP202	3.52×10^{-4}
TP203	4.53×10^{-5}
TP204	9.99×10^{-5}

¹⁰ <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/>

Table 4. Groundwater Results

Borehole Location	Ground Level (m AOD)	Depth Of Borehole (M bgl)	Highest Groundwater Elevation (M bgl)	Highest Groundwater Elevation (m AOD)
BH201	106.88	15.00	14.930	91.950
BH202	104.79	13.00	DRY	DRY
BH203	112.73	18.37	DRY	DRY
BH204	113.72	17.47	17.453	96.267

- 7.5 The northern portion of the Site is underlain by 'Slightly acid loamy and clayey soils with impeded drainage', and the southern portion of the site is underlain by 'Freely draining slightly acid but base-rich soils' as classified by Soilscales.¹¹
- 7.6 Indicated by the EA's Aquifer Designation Mapping¹² the bedrock deposits are classified as 'principal'. These formations provide significant groundwater, either for public water supply or by sustaining river and wetland base flows. The superficial deposits are classified as 'unproductive', these formations are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent systems.
- 7.7 EA online groundwater Source Protection Zone (SPZ)¹³ mapping indicates that the site is located within a Zone III – Total Catchment Source Protection Zone. This is the area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point. Consideration should be given as to how a development could affect groundwater.

¹¹ [Magic Map Application](#)

¹² [Magic Map Application](#)

¹³ [Source Protection Zones \[Merged\]](#)

8 Existing Drainage

- 8.1 Due to the greenfield nature of the site, there are no sewers located within the site boundary.
- 8.2 Thames Water sewer records (**Appendix C**) show foul and surface drainage within the urban areas to the immediate west of the site.
- 8.3 There are no on-site watercourses and no significant field drainage on site.
- 8.4 There are no drainage features along or alongside the Hemel Hempstead Road bordering the southern edge of the site.

9 Flood Risk

- 9.1 The key sources of flooding that could potentially impact the site are discussed below:

Fluvial / Tidal Flooding

- 9.2 The EA Flood Map for Planning indicates that the site is located within Flood Zone 1. Flood Zone 1 is land whereby the annual probability of flooding from fluvial or tidal sources is classified as less than a 1 in 1000 (0.1%).
- 9.3 'More Vulnerable' development is deemed suitable for Flood Zone 1.

Flooding from Sewers

- 9.4 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity. Due to the greenfield nature of the site, it is unlikely that sewer flooding would occur at this location.
- 9.5 From the record plans and survey, there are no drainage features that impact the site.
- 9.6 The sewer flooding risk is considered to be low at the site.

Surface Water Flooding (Overland Flow)

- 9.7 This can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems. A number of areas across the site are shown to be at 'Low' to 'High' risk from surface water flooding. The extents appear to be associated with watercourses at the site and low topographic points across the site.
- 9.8 The two main surface water flow pathways are generated towards the northern part of the site with the western pathway catchment extending to the northwest.
- 9.9 Information provided by Hertfordshire LLFA (**Appendix B**) and the more recent EA mapping confirms the flow pathways.
- 9.10 RPS has also carried out a flood modelling exercise to confirm the pathways but also consider the impacts to and from the masterplan during its development. In particular, the main access point from Hemel Hempstead Road is aligned with wider proposals for the allocated land to the south of the road. This junction forms part of the strategic public transport route through the proposed Hemel Garden Community site.
- 9.11 The level of risk to the site from surface water flooding is considered low for the majority of the site but high along the pathways.
- 9.12 Surface water flood mitigation is discussed further in the following sections.

Groundwater Flooding

- 9.13 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures.
- 9.14 Based on the groundwater monitoring carried out on site, groundwater flooding risk is unlikely to impact the proposed development.

Other Sources

- 9.15 There is a limited risk of flooding occurring as a result of a break in a water main. The risk of flooding associated with canals and other artificial structures is considered to be low given the absence of any such structures in the site vicinity.
- 9.16 As described in previous sections, the EA flood risk from reservoir data indicates that the site is located adjacent to an area potentially at risk of reservoir flooding. With the flow path following Hemel Hempstead Road along the southern boundary of the site.
- 9.17 The EA state that reservoir flooding is 'extremely unlikely' to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers. The EA are the enforcement authority for the Reservoirs Act 1975 in England. They ensure that reservoirs are inspected regularly, and essential safety work is carried out.
- 9.18 This particular reservoir is relatively small and not significantly elevated above the surrounding ground. Therefore, the risk of flooding associated with reservoirs is considered to be low.

Proposed Mitigation

- 9.19 As discussed, RPS has developed a surface water flood model to consider the site in more detail and the development of the masterplan.
- 9.20 A number of parameters have been determined based on discussions with the design team, LLFA and LPA to review the impact to and from the existing overland surface water flow pathways. Following pre-application discussions the following key factors have been considered:
- In accordance with NPPF – no increase in off-site flood risk;
 - LPA/LLFA suggested consideration of reducing off-site flood risk to Hemel Hempstead Road and the potential developments to the south as part of the HGC;
 - Impact to and from the proposed strategic link to Hemel Hempstead Road forming an access to the development as well as part of the wider HGC strategic transport link;
 - Assist in the development of a masterplan responding to the site constraints (including levels, flood flow pathways and existing infrastructure including the strategic pipeline); and
 - Potential to utilise infiltration at the southern part of the site further to reduce flood risk.

Flood Model

Introduction

- 9.21 The RPS model has been prepared with the aim of the modelling to provide a greater understanding of the site and wider catchment baseline conditions in more depth than is shown in the Environment Agency (EA) Risk of Flooding from Surface Water Flood Map (RoFSW). The modelling report, provided as Appendix G, describes the modelling approach and presents the baseline model results.
- 9.22 The approach includes the build of a new 2Dimensional (2D) rain on grid surface water model using TUFLOW version: 2023-03-AF-iDP-w64 which is industry standard modelling software.
- 9.23 The catchment boundary was defined using 'watershed' analysis of the local area based on the LIDAR-derived digital terrain model (1m resolution). After initial runs of the model, it was

concluded that model buffer needed to extend to the north of Gaddesden Lane in the northeast to ensure all flows affecting the site were captured.

- 9.24 Due to the large catchment size, TUFLOW HPC (Highly Parallelised Compute) would be used. This nested mesh grid approach meant that there was a 2m grid cell size within the site boundary and a 4m grid cell size outside of the boundary. This decreased run time whilst still presenting accurate results.
- 9.25 The derived catchment boundary is presented in Figure 6.

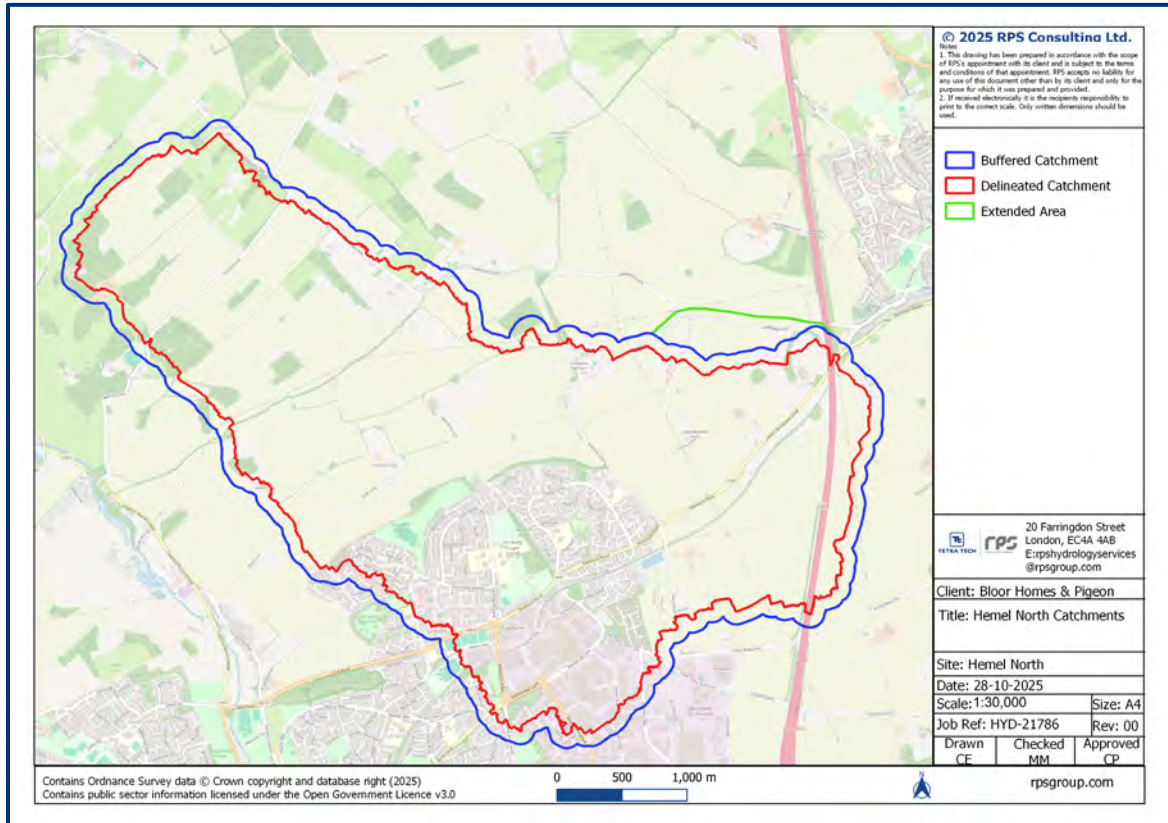


Figure 6. Model Catchment Extents

Model Inflows

- 9.26 The inflows into the model were derived rainfall hyetographs applied to the whole catchment area. These hyetographs were determined for the 30, 100, and 1000-year rainfall using REFH 2 software. The 100-year rainfall was then multiplied by 1.40 to achieve the appropriate climate change inflow of 100-year+40% climate change.
- 9.27 The critical duration from ReFH2 was derived as 1 hour 15 minutes. A range of initial runs were tested to ensure that the calculated critical duration was correct when run through the model. Initially the 1 hour 15 minute, 3 hours 15-minute and 6 hours 15-minute durations ran in line with EA RoFSW methodology. The maximum depths were derived during the 1hr 15 scenario.
- 9.28 The rainfall has been applied across the full model extent and represents total rainfall for the catchment.

- 9.29 For the urban areas in the wider catchment, the EA surface water approach¹⁴ has been used to estimate sub surface drainage in these areas. A restricted 12mm/hr rate was applied.

Infiltration

- 9.30 As mentioned, one of the potential mitigation measures to seek to reduce off site flood risk was to determine if modification to the soils along the flow pathways could be undertaken that increased infiltration.
- 9.31 Although the northern section of the pathway crosses soils of a clay nature, further south through the site and close to Hemel Hempstead Road, the underlying Chalk is exposed or very close to the surface.
- 9.32 Infiltration losses are applied to permeable surfaces based on the underlying soil textural class. TUFLOW uses the hydraulic properties (hydraulic conductivity, suction and porosity) corresponding to each textural class, as well as the initial moisture content, to vary the rate of infiltration over time.
- 9.33 The entirety of the model extent is assumed to be unsaturated at the start of the simulation. Throughout the simulation, TUFLOW monitors the amount of water infiltrated, such that once the soil is saturated, no further infiltration occurs. The presence of no antecedent conditions is in line with EA RoFSW mapping methodology.
- 9.34 A 2D_soil layer was created to represent the soils present within the study area based on the Soilsmap Viewer from Cranfield University's National Soil Resources Institute (NSRI), which is supported by Defra. The soil textural classes and corresponding TUFLOW codes are defined in the TUFLOW manual and shown in Table 3.
- 9.35 An impermeable layer has been defined covering the roads and buildings present in the model. A Soil Type number of '99' has been applied to this layer (shown in Figure 5). This represents the fact that buildings and roads have no infiltration.
- 9.36 A layer was created to account for the drainage capacity of the urban network in the off-site wider catchment. In line with the EA RoFSW methodology, a standard loss 'drainage rate' of 18mm/hr was applied in these built-up areas to account for the drainage capacity of the sewer system.
- 9.37 Figure 5 shows the soil types and urban areas input into the model.

¹⁴ [What is the Risk of Flooding from Surface Water Map?](#)

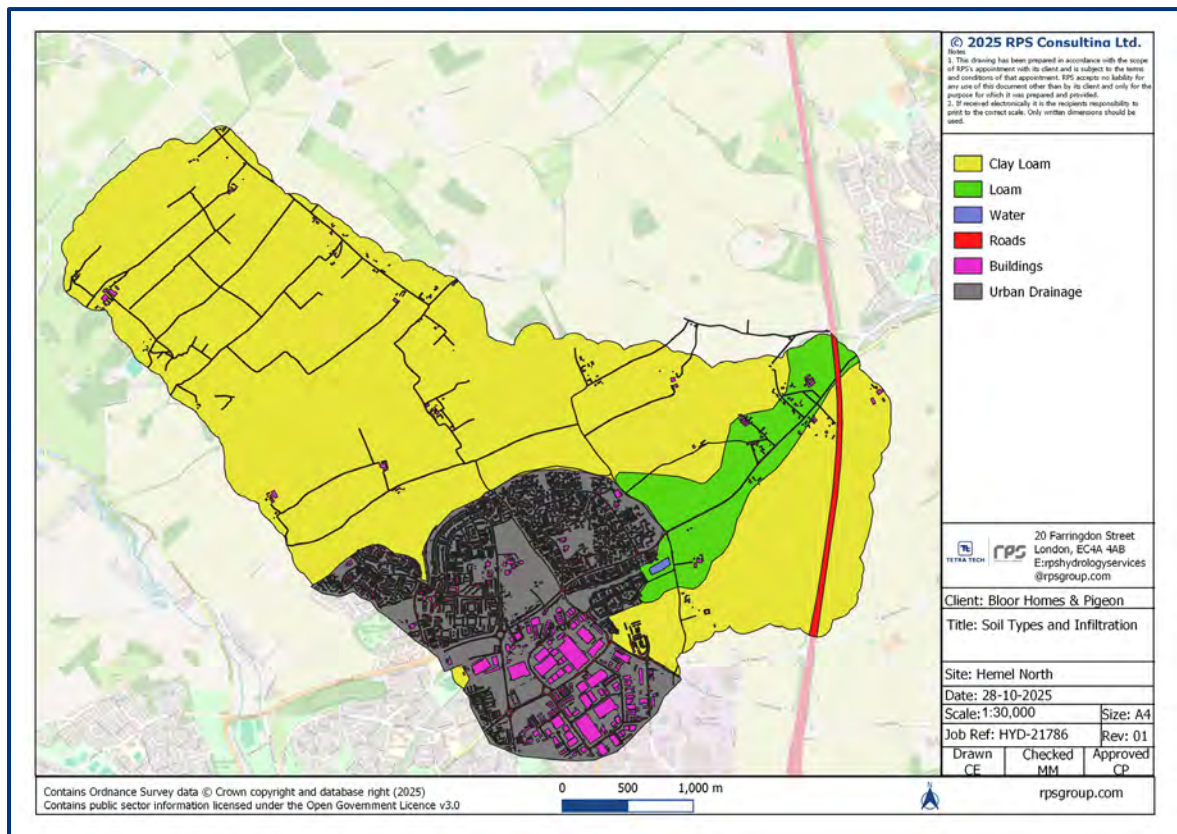


Figure 7. RPS Model Soil Types within Catchment

Baseline Results

- 9.38 The model has been run for pre-development existing conditions of the site.
- 9.39 The results and flow mechanisms are relatively similar throughout the return periods with some additional water ponding in the more extreme flood events. Two clear flow pathways are identified in all return periods and exhibit similar velocities.
- 9.40 Water follows topography though site from the northwest to southeast where it follows Hemel Hempstead Road east.

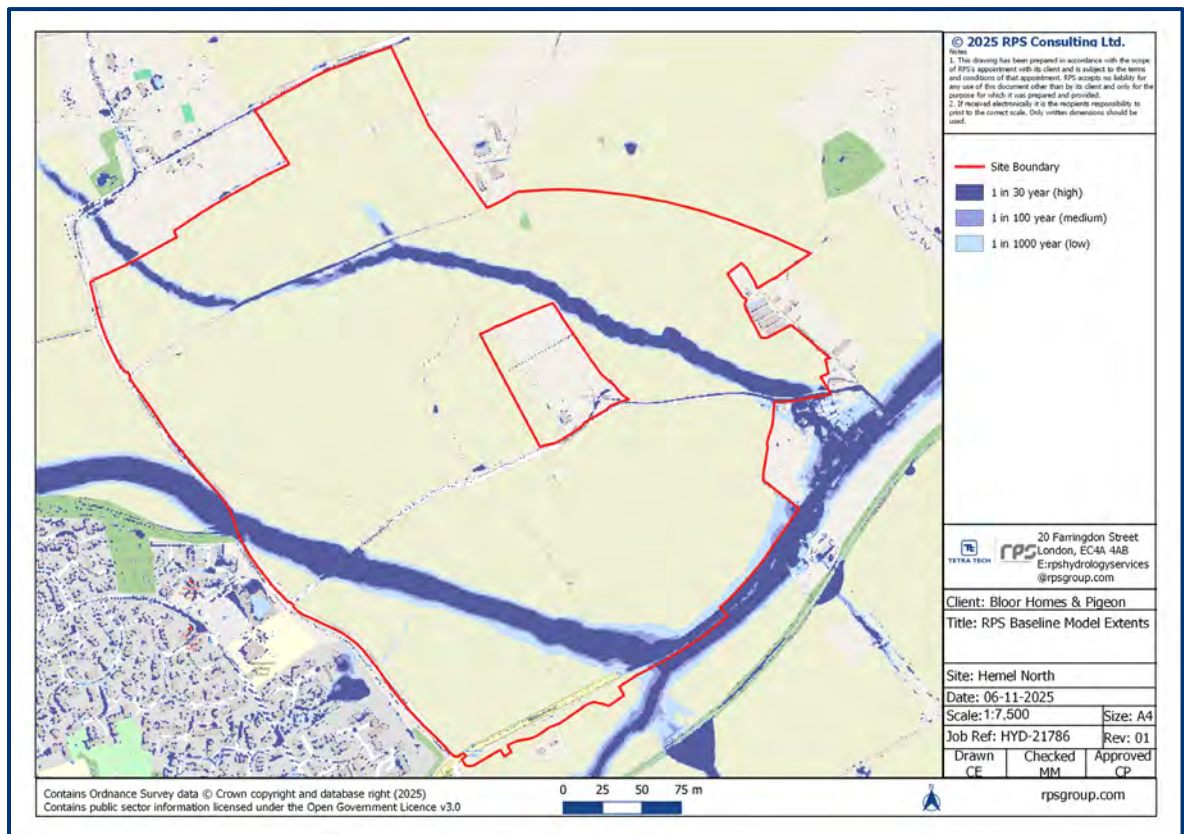


Figure 8. RPS Baseline Model Results

Post-development Model

- 9.41 The development, therefore, incorporates surface water flood risk mitigation measures to reduce the risk of flooding to the proposed 'more vulnerable' development parcels and allow safe access via the proposed on-site road network. Another objective of the mitigation measures is to ensure no increase in flood risk to the surrounding areas outside of the redline boundary.
- 9.42 The following features were represented within the proposed scenario model:
- Proposed residential development platforms.
 - Proposed access roads through the scheme and associated culverts where flow paths are crossed.
 - A lowered channel where the existing flow pathway runs through the site.
 - A lowered area of to the east of the proposed spine road to provide storage and conveyance during flood events.
- 9.43 The main flow pathway on site was lowered by 1.5m to create a channel for surface water flow, this was then conveyed beneath the proposed access road and main spine road with twin rectangular culverts at both crossings. The culvert sizes were 2.4m height x 6m width and 3.6m height x 6m width for the access road and spine road respectively. The flow was then directed into a lowered area to the east of the spine road where it was temporarily stored before leaving site. Downstream, there is a minor decrease in flood depths by up to 0.1m. Depth difference results are shown in Figure 9 below

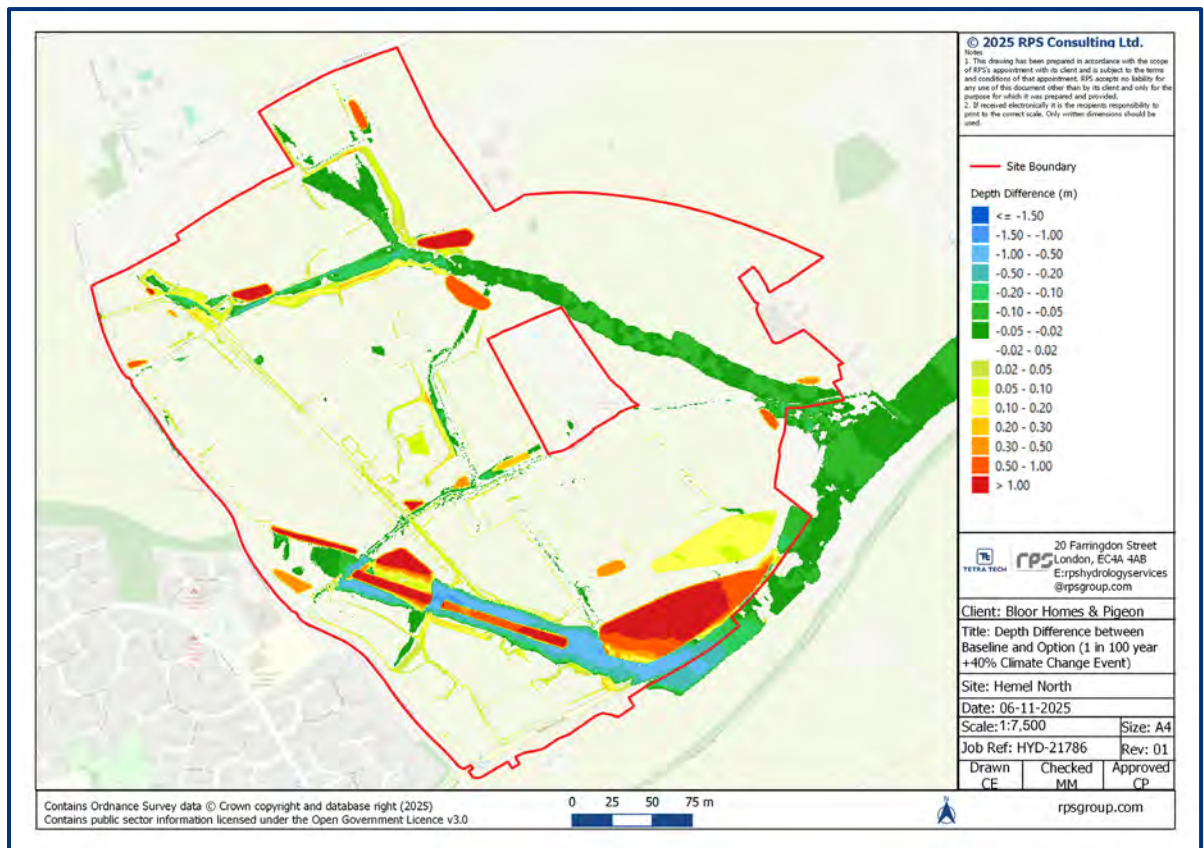


Figure 9. RPS Post-development Model Results

9.44 Full details of modelling can be found within **Appendix H**.

10 Drainage Strategy

Introduction

- 10.1 This section describes the outline drainage strategies for surface water and foul water for the development. At the time of writing, the masterplan is still being finalised.
- 10.2 The type of development proposed is classed as ‘more vulnerable’ residential development, with a design life of 100 years. Therefore, for the purposes of this assessment, taking into account the Environment Agency’s climate change allowances (published in May 2022), a 40% increase in peak rainfall intensity has been included as a climate change allowance, which caters up to the year 2125. No climate change guidance is available beyond 2125.

Existing Surface Water Runoff Rates

Greenfield Runoff Rate

- 10.3 The greenfield nature of the location means that surface water will slowly soak into the ground (infiltrate), be intercepted by vegetation or run off by way of overland flow, according to the soil characteristics and following the local topography. The greenfield runoff rate per hectare (ha) for the proposed impermeable areas have been calculated using the FEH Method. The greenfield rates are presented in Table 4 below and provided in **Appendix J**.

Table 5. Greenfield Runoff (Based on 1ha)

Return Period	Greenfield Runoff Rate (l/s)
Q1	2.6
QBar	3.07
Q30	6.1
Q100	7.9

Existing Surface Water Drainage

- 10.4 There are no formal surface water drainage networks within the site. No significant watercourses and no positive drainage to Hemel Hempstead Road.
- 10.5 Drainage from the site will be via natural infiltration to the underlying soils. Due to the change in superficial soils having a clay content in the north, overland flows are directed south to the areas where the underlying Chalk bedrock is close to or at the surface. Thus, infiltration can occur.
- 10.6 Details of existing drainage are provided within **Appendix K**.

Consideration of Drainage Hierarchy

- 10.7 The recently issued DEFRA “National standards for sustainable drainage systems (SuDS)” (Published June 2025) advises of the following hierarchy for the disposal of surface water;

“Runoff from the development shall be discharged to the following final destinations, to the maximum extent practicable, in accordance with the below hierarchy:

- priority 1: collected for non-potable use
- priority 2: infiltrated to ground
- priority 3: discharged to an above ground surface water body
- priority 4: discharged to a surface water sewer, or another piped surface water drainage system
- priority 5: discharged to a combined sewer

Note 1: priority 1 is the highest priority and priority 5 is the lowest.

10.8 The drainage hierarchy has been considered as follows.

Priority 1 - Collected for non-potable use

10.9 The new standards list the following reasons that rainwater harvesting shall be considered and that this shall be in all circumstances where any of the following apply:

- There is a demand for non-potable water and available contributing catchment area that will deliver safe and efficient water savings.
- There is a need for landscape irrigation.
- The development is in an area identified as seriously water stressed

10.10 The site is not located in an area of water stress, but irrigation and the use of non-potable water within the development will be considered as the masterplan develops. Due to the underlying Chalk geology, any retention of water at the surface will need to be engineered into the collection of irrigation water.

10.11 Bespoke rainwater harvesting could be considered within the commercial centre and the school site. This is to be confirmed as the masterplan develops.

Priority 2 - Infiltration

10.12 Based on the geotechnical and soakage investigations carried out, infiltration rates towards the south if the site are better than areas towards the north and west of the site. As such, discharge to ground is being considered as the primary surface water disposal route.

10.13 Where areas have poor infiltration potential, the flows from these areas are to be directed further south and east to areas with better infiltration. The sections below describe the drainage strategy in more detail.

Priority 3 - To a Surface Water Body

10.14 For this site, there are no watercourses or other “above ground surface water” features to discharge to. This has therefore not been considered as a disposal route.

Priority 4 - To a Surface Water Sewer, Highway Drain or Another Drainage System

10.15 There are no public or private drainage networks in or around the site that could receive surface water. This has therefore not been considered as a disposal route.

Priority 5 - To a Combined Sewer

- 10.16 As with Priority 4, there are no combined sewers within or close to the site. This has therefore not been considered as a disposal route.

Proposed Surface Water Drainage

- 10.17 Under the terms of Section 3 of Approved Document H3 of the Building Regulations 2010 (2015 edition), soakaways should be utilised as the primary means of surface water disposal. If infiltration testing undertaken in accordance with BRE:365 (2016) and provides an unfavourable infiltration rate or contaminated ground is present, other methods of sustainable drainage should be considered. A surface water connection to an existing watercourse should be considered prior to a connection into the public sewerage system.
- 10.18 To provide maximum flexibility as the design progresses, the drainage strategy is based on seeking to keep attenuation and water quality treatment close to each parcel. **Appendix K** shows the current surface water drainage strategy.
- 10.19 All parcels will seek to meet “*Priority 2: infiltrated to ground*” where possible and as close to the parcel as possible. This will be met by a combination of:
- Local soakaways where space allows;
 - Permeable paving (either System A – Total Infiltration or System B – Partial Infiltration) where space allows and end use / adoption permits;
 - Local bio-retention / raingardens in greenspace and alongside roads;
 - Swales, either locally or strategic conveyance swales. These will be designed to allow infiltration where possible; and
 - Parcel specific infiltration basins.
- 10.20 The infiltration rates used are those established by site specific BRE365 tests (Table 1) and vary across the site. The infiltration basin design has been undertaken based on the value nearest the location of the basin.
- 10.21 Where infiltration potential is limited or not possible, the drainage will mirror “*Priority 3: discharged to an above ground surface water body*” with discharge restricted locally to the 1 in 30 year event with 40% climate change. The restricted discharge is to then be conveyed to an infiltration feature in areas of greater infiltration potential acting as the “*above ground surface water body*”.
- 10.22 By attenuating some of the flow and volume close to the Parcel allows the SuDS treatment train to be employed locally. The conveyance network, generally swales, will be designed to allow further infiltration along these routes.
- 10.23 In these areas the above SuDS features can still be utilised but will need to be linked to convey the flows to the infiltration areas.
- 10.24 Appendix K shows the development catchments and how the areas are linked either locally to infiltration or strategically to basins in more favourable areas. A flow exceedance plan is also included within Appendix K.
- 10.25 It should be noted that both the Drainage Strategy indicated within **Appendix K**, and **supporting calculations within Appendix L** are subject to further detailed design and approval by the relevant authorities. However, the designs illustrate that surface water arising from the development may be sustainably managed such that it does not pose a flood risk, either to proposed or existing development, to the 1 in 100 year +40% climate change storm event including an additional allowance for future ‘urban creep’.

Site Specific SuDS Benefits

- 10.26 Sustainable drainage is a departure from the traditional approach to draining sites. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:
- storing run-off and releasing it slowly (attenuation);
 - allowing water to soak into the ground (infiltration);
 - slowly transporting (conveying) water on the surface;
 - filtering out pollutants;
 - allowing sediments to settle out by controlling the flow of water.
- 10.27 CIRIA has produced several guidance documents covering a range of water management scenarios. A summary of the publications used as reference when the site drainage strategy was produced are listed below.
- Planning for SUDS – making it happen (C687)
 - Site handbook for the construction of SUDS (C698)
 - The SUDS Manual 2015 (C753)
 - Sustainable Drainage Systems – Hydraulic, structural and water quality advice.

Water Quality

- 10.28 Surface water run-off should be managed by SuDS that are designed to attenuate flows and to avoid water quality impacts downstream. To demonstrate that surface water arising from the development will be appropriately treated prior to discharge, the Simple Index Approach, as outlined within the SuDS Manual (CIRIA C753) has been followed.
- 10.29 As stated in the SuDS Manual 2015 (C753), the risk posed by surface water runoff to the receiving environment is a function of:
- the pollution hazard at a particular site (i.e. the *pollutant source*)
 - the effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels, groundwater (i.e. the *pollutant pathway*)
 - the sensitivity of the receiving environment (i.e. the *environmental receptor*).
- 10.30 It is anticipated that the following pollutant loads and hazard levels will originate from development at the site:
- 'Residential roofs' – pollutant hazard level of 'Very Low' with identified pollutant hazard indices of 0.2 for Total Suspended Solids (TSS), 0.2 for Metals, and 0.05 for Liquid Hydrocarbon (SuDS Manual (CIRIA C753) Table 26.2);
 - 'Individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change' - pollutant hazard level of 'Low' with identified pollutant hazard indices of 0.5 for Total Suspended Solids (TSS), 0.4 for Metals, and 0.4 for Liquid Hydrocarbon (SuDS Manual (CIRIA C753) Table 26.2); and
 - 'Commercial yard and delivery areas non-residential car parking with frequent change, all roads except low traffic roads and truck roads/mororways' - pollutant hazard level of 'Medium' with identified pollutant hazard indices of 0.7 for Total Suspended Solids (TSS), 0.6 for Metals, and 0.7 for Liquid Hydrocarbon (SuDS Manual (CIRIA C753) Table 26.2);

- 10.31 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type). In systems using two components or more in series a factor of 0.5 is used to account for the reduced performance of secondary components associated with already reduced inflow concentrations.
- 10.32 Table 6 and 7 provides the mitigation indices for the major SuDS components. This confirms that the total level of surface water treatment required by the simple index approach is exceeded based on SuDS Manual (CIRIA C753) Table 26.4.

Table 6. Mitigation Indices – Pre-treatment SuDS

Pollution hazard indices	TSS	Metals	Hydrocarbons
Permeable Pavements	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Pond	0.7	0.7	0.5

Table 7. Mitigation Indices – Infiltration Basins (0.5 x indices)

Pollution hazard indices	TSS	Metals	Hydrocarbons
A soil with good containment attenuation potential of at least 300mm	0.4	0.3	0.3
MINIMUM TOTAL MITIGATION INDEX (Table 3 + ½ Table 4)	0.70	0.75	0.75

- 10.33 In summary, all infiltration basins must be preceded by at least a swale and in the case of the main spine road, potentially an additional SuDS feature to ensure hydrocarbons are captured.
- 10.34 The maintenance and adoption of the SuDS features are outlined below:
- Spine Road – Hertfordshire County Council Highways adopted road;
 - Development Roads – Hertfordshire County Council Highways adopted road where no development drainage enters the network;
 - Development Roads – Thames Water adopted sewers where development drainage enters the network;
 - Private Roads (possible permeable pavements) – adoption to be agreed;
 - Raingardens – Hertfordshire County Council Highways adopted road where no development drainage enters the network;
 - Swales – to be confirmed – generally in open space areas either private or public areas (such as SANG);

- Attenuation basins – Thames Water (under Design and Construction Guidance adoption); and
- Infiltration basins – Thames Water (under Design and Construction Guidance adoption) or others as part of open space adoption.

Proposed Foul Water Drainage

- 10.35 Initial discussions have established that up to approximately 7.5 l/s could be accommodated which would be limited to just 64 no. dwellings equivalent. The connection point is likely to be the existing foul manhole Ref. 2802 located within the northern verge of Hemel Hempstead Road to the southwest of the site.
- 10.36 Thames Water confirmed they were unable to meet the needs for the full development at this time, with requirement for appropriate upgrades. Outline or full planning permission must be granted in order for Thames Water to commence network modelling.

Maintenance and Adoption

- 10.37 A specialist management company will be identified at the detailed design stage and appointed to maintain the SuDS features for the lifetime of the development.
- Tables 8 to 12, below, indicate the envisaged maintenance activities associated with the proposed geocellular storage, attenuation basin, associated headwalls, and the flow control manhole, along with the approximate frequency within which they should be completed.

Table 8. Infiltration Basin Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Remove litter, debris and trash	Monthly
	Cut grass – for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass – meadow grass in and around basin	Half yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
Occasional Maintenance	Reseed areas of poor vegetation growth	Annually, or as required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial Actions	Repair erosion or other damage by reseeding or returfing	As required
	Realign the rip-rap	As required

	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate design levels	As required
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequencies	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly

Table 9. Swales Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth; alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area

Remedial Actions	Repair erosion or other damage by re-turfing or reseedling	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Table 10. Permeable Pavement Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	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 frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	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)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action	Quarterly, 48 hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 11: Inlet and Outlet Headwalls Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Litter removal	As required
	Inspect vegetation above and around headwall and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from aprons	Annually
	Flap valves and grilles: Check for and clear obstructions	Quarterly
Remedial Actions	Repair of erosion or other damage around headwalls	As required
Monitoring	Inspect structures for evidence of poor operation	Monthly/after large storms
	Inspect structures, pipework etc. for evidence of physical damage	Monthly/after large storms
	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly
	Check flap valves	Half yearly

Table 12: Flow Control Manhole Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Inspect vegetation above and around flow control chamber and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)

	Remove sediment from flow control chambers	Annually
	Flow control devices: Check for and clear obstructions	Quarterly
Remedial Actions	Repair of Penstock and flow control device	As required
Monitoring	Inspect structures for evidence of poor operation	Monthly/after large storm
	Inspect structures, flow control and pipework etc. for evidence of physical damage	Monthly/after large storm
	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

11 Sequential Test and Exception Test

Vulnerability Classification

- 11.1 In accordance with the Flood Risk Vulnerability Classification in Annex 3 of the NPPF “Residential institutions such as residential care homes.” and “Buildings used for dwelling houses” would be classified as “More Vulnerable” development in flood risk terms
- 11.2 ‘Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk’ such as the HGC spine road across Hemel Hempstead Road is classified as “Essential Infrastructure”
- 11.3 The site is located in Flood Zone 1. ‘More Vulnerable’ and ‘Essential Infrastructure’ development is deemed suitable for Flood Zone 1.

Sequential Test

- 11.4 The NPPF requires the Local Authority to apply the Sequential Test in consideration of new development. The aim of the Test is to steer new development to areas at the lowest probability of flooding.
- 11.5 The revised section of the NPPF (December 2024) on “planning and flood risk” makes it clear that the flood sequential test is intended to be applied to all sources of flood risk, not just river/sea flooding. Paragraph 174 and 175 of the NPPF states:

“The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test.”

“The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).”
- 11.6 The approach we have taken is to look at all sources of flooding within the site, to determine whether a flood sequential test is required – i.e. we have assessed the development to establish whether it is an area within the lowest risk of flooding from any source.
- 11.7 No “more vulnerable” uses such as residential buildings will be located in areas at risk of surface water flooding.
- 11.8 Although the access road from Hemel Hempstead Road crosses the surface water and reservoir risk associated with the road, mitigation is proposed to make access safe and dry, as detailed in Section 9 and Appendix H.
- 11.9 The site is located in Flood Zone 1. Large areas of the site are at ‘Very Low’ risk of surface water flooding. Areas of ‘Low to High’ surface water flood risk are present across the site.
- 11.10 The site is not considered to be at flood risk from groundwater or reservoir flood risk.
- 11.11 It should be noted that an update to the to the NPPF technical guidance (National flood risk standing advice for local planning authorities, dated 23rd August 2024 (“When development is exempt from the sequential test”) states:

“You may not need a sequential test if development can be laid out so that only elements such as public open space, biodiversity and amenity areas are located in areas at risk of any source of current or future flooding.”

11.12 This is mirrored in Paragraph 175 of the updated NPPF.

11.13 It should also be noted that an update to the Planning Practice Guidance (PPG) in September 2025, states:

“In applying paragraph 175, a proportionate approach should be taken. Where a site-specific flood risk assessment demonstrates clearly that the proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development (therefore addressing the risks identified e.g. by Environment Agency flood risk mapping), without increasing flood risk elsewhere, then the sequential test need not be applied.”

11.14 As evidenced by the modelling discussed in Section 9 and Appendix H, the flow pathways at the site have been managed by the proposed mitigation, and the masterplan has been sequentially designed in line with flood risk at the site. Thus, being in general accordance with the approach of paragraph 175.

The Exception Test

11.15 Following the application of the above and the inherent masterplan design, we do not consider exception test is required for this development

12 Summary and Conclusions

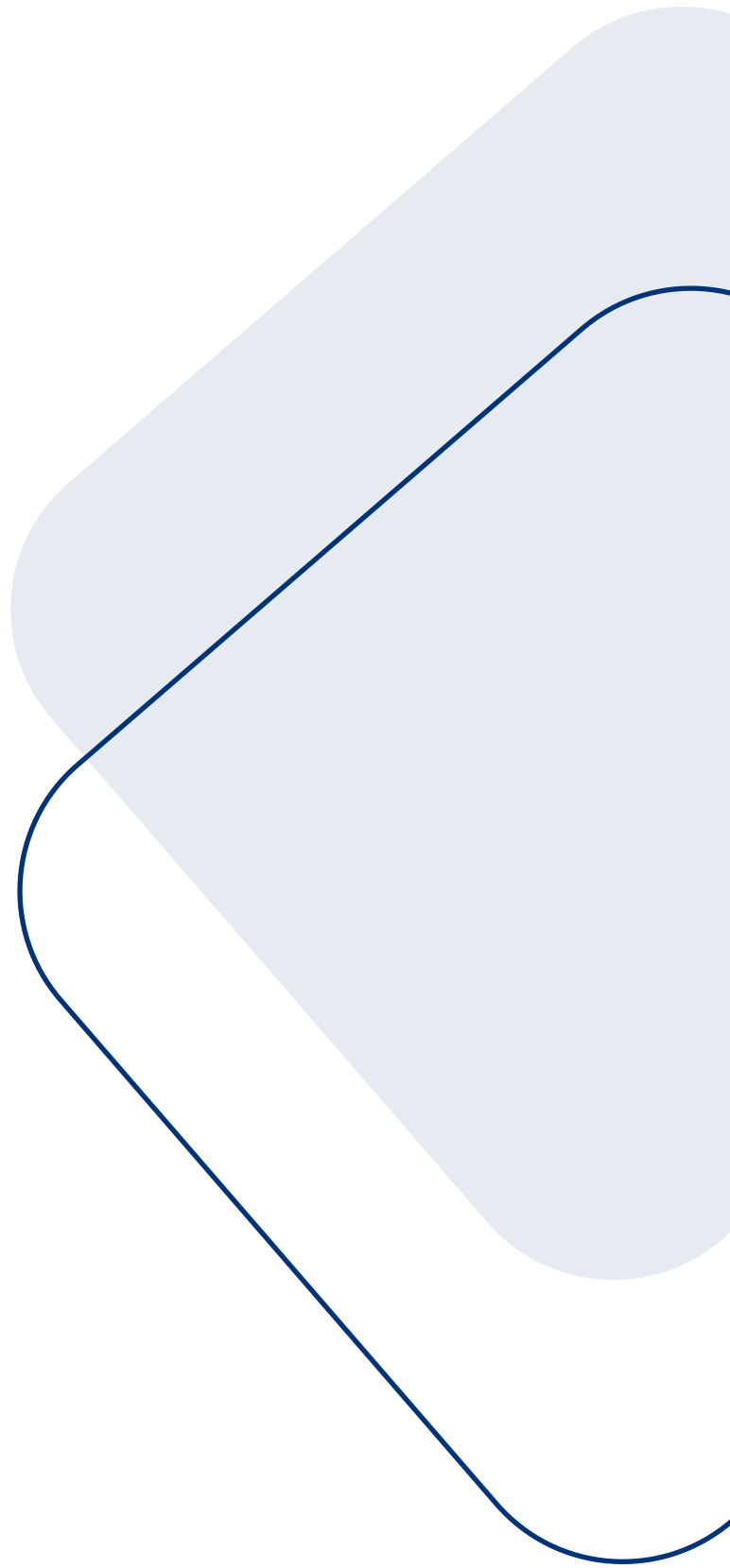
- 12.1 The aim of the technical note is to outline the potential for the site to be impacted or impact existing flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks. The report has been produced in accordance with the guidance detailed in the NPPF.
- 12.2 The potential flood risks to the site, and the measures proposed to mitigate the identified risks, are summarised in Table 13.

Table 13. Proposed mitigation

Source of Flooding	Identified Risk			Mitigation Proposed	Residual Risk		
	L	M	H		L	M	H
Fluvial/Tidal	✓			No mitigation necessary	✓		
Sewers	✓			No mitigation necessary	✓		
Surface Water	✓	✓	✓	Some mitigation necessary to accommodate access and road crossings	✓	✓	✓
Groundwater	✓			No mitigation necessary	✓		
Other Sources (e.g. reservoirs, water mains)	✓			No mitigation necessary	✓		

- 12.3 The site and the proposed areas of development are located totally in Flood Zone 1.
- 12.4 A number of areas across the site are shown to be at 'Low' to 'High' risk from surface water flooding from two main flow pathways emanating from the north and west.
- 12.5 To facilitate the crossing of the flow pathways, some localised mitigation is required but this does not increase off site flood risk.
- 12.6 Infiltration will be the main surface water disposal route. Soil conditions are more favourable towards the southern parts of the site. Where infiltration is limited local attenuation feature will discharge to a network of swale to convey flows to infiltration area.
- 12.7 It has been demonstrated that the development meets the Sequential and Exception Tests imposed under the NPPF.
- 12.8 It has been demonstrated that the flood risk to the development would be managed, without increasing flood risk elsewhere.

Appendices



Appendix A – EA Correspondence

Leanne Pogson
St Albans District Council
Development Control
Civic Centre St. Peters Street
St. Albans
Hertfordshire
AL1 3LA

Our ref: NE/2025/138195/01
Your ref: 5/2025/0645

Date: 21 May 2025

Dear Leanne,

**North Hemel Hempstead Development Site Hemel Hempstead Road Redbourn
Hertfordshire**

Outline application for residential-led mixed use development comprising up to 1,500 new dwellings (including residential accommodation and specialist accommodation for older people) (Use Class C3 and C2), a 3FE primary school (including early years provision) (Use Class F1), a local centre (Use Class E, F1 and F2), mobility hub, open space, amenity space, allotments, green infrastructure, sustainable drainage systems, vehicular and active travel routes, and supporting infrastructure and works. All matters reserved except for access junctions to the B487 and Holtsmere End Lane

Thank you for consulting us on the above application on 17 April 2025.

Based upon a review of the submitted information, the proposed development raises no environmental concerns within our remit. We therefore have **no comments** to make. Please take note of the advice outlined below.

Use of Sustainable Drainage Systems (SuDS)

Support for the use of SuDS to ensure development does not increase flood risk elsewhere is set out in paragraph 181 of the National Planning Policy Framework.

Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management (SuDS). SuDS manage surface water run-off by simulating natural drainage systems. Whereas traditional drainage approaches pipe water off-site as quickly as possible, SuDS retain water on or near to the site. As well as reducing flood risk, this promotes groundwater recharge, helps absorb diffuse pollutants, and improves water quality. Ponds, reedbeds and seasonally flooded grasslands can also be particularly attractive features within public open spaces.

SuDS involve a range of techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, green roofs, ponds and wetlands. As such, virtually any development should be able to include a scheme based around these principles. In doing so, they'll provide multiple benefits and will reduce costs and maintenance needs.

Further information on SuDS can be found in:

- the CIRIA C697 document SuDS manual
- HR Wallingford SR 666 Use of SuDS in high density developments
- CIRIA C635 Designing for exceedance in urban drainage – good practice
- the Interim Code of Practice for Sustainable Drainage Systems – the Interim Code of Practice provides advice on design, adoption and maintenance issues and a full overview of other technical guidance on SuDS

Water Resources

Increased water efficiency in new developments potentially enables more growth to be realised without an increased availability of water resources. Developers can highlight responsible water use as a positive corporate social responsibility message that will boost the commercial appeal of the development. For the homeowner/tenant, lower water usage also reduces water and energy bills.

We endorse the use of water efficiency measures in all developments, particularly in those that are new. Use of technology that ensures efficient use of natural resources could support the environmental benefits of future proposals and could help attract investment to the area. Therefore, water efficient technology, fixtures and fittings should be all considered as an integral part of new developments and/or refurbishments. The technology used to achieve improved water efficiency (e.g. efficient fittings, greywater recycling, etc) is also an attractive feature for many prospective building owners and tenants.

Residential developments

The supply of water in the area is under serious water stress (as identified in our report: [Water stressed areas – 2021 classification](#)). All residential developments must therefore achieve the higher water consumption efficiency standard of 110 litres per person per day, as set out within [the Building Regulations &c. \(Amendment\) Regulations 2015](#). This standard **or higher** may already be a requirement of the local planning authority.

Commercial/Industrial developments

We recommend that all new non-residential developments of 1000sqm gross floor area or more (i.e. 'major' developments) should achieve the [BREEAM 'excellent' standard](#) for water consumption (category 'WAT 01'), or equivalent. This standard may already be a requirement of the local planning authority.

We also recommend you contact your Local Planning Authority for more information.

Should you have any queries regarding this response, please contact me.

Yours sincerely,

Lauren Clayton-Spencer
Planning Advisor

Email: HNL.SustainablePlaces@environment-agency.gov.uk

creating a better place
for people and wildlife



Direct Dial: 020 3025 0962

Appendix B – HCC Correspondence

Dear Caitlin

Thank you for your email.

Please find extract of surface water flood mapping below. You may wish to compare this with the recently released EA NaFRA2 mapping but please note the EA currently advise that mapping isn't suitable for planning purposes yet, but gives an indication. The stars on the map show locations of property flooding.

We are not aware of any fluvial or groundwater risk at this location, but would advise that groundwater levels in Hertfordshire are higher than usual due to weather patterns in 2024. We recommend that a period of groundwater monitoring is undertaken, preferably over winter/spring.

Please note the various surface water flow paths across the site. If built development (including access/egress routes, land raising or other vulnerable elements) will be located in the flow paths, a flood risk sequential test may be required.

We would anticipate the discharge hierarchy being explored (with preference for shallow infiltration) as far as possible, before considering discharge to river/watercourse and then surface water sewer. Discharge rates should be restricted to greenfield runoff rates, we would accept 1:1 or the QBAR rate. The application should show a commitment to source control SuDS to be located at the plot/street-level to distribute benefits throughout the site before resorting to oversized attenuation features / the "pipe to pond" approach. Please use FEH 2022 rainfall data and CV parameters set to 1.



Best wishes,



David Uncle
Senior Flood Risk Officer | Lead Local Flood Authority
Growth and Environment
Hertfordshire County Council
 Farnham House, Six Hills Way, Stevenage, SG1 2ST
 E: David.Uncle@hertfordshire.gov.uk
 T: 01992 555839 (Internal: 25839)
 Working hours: 08:00 – 16:00 Monday - Friday



[Our vision](#) is to create a cleaner, greener and healthier Hertfordshire, guided by our RISE values

**We improve
Residents' lives**

**We work with
Integrity**

**We act
Sustainably**

**We champion
Equality & fairness**

Dear Caitlin

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We are not aware of any fluvial or groundwater risk at this location, but would advise that groundwater levels in Hertfordshire are higher than usual due to weather patterns in 2024. We recommend that a period of groundwater monitoring is undertaken, preferably over winter/spring.

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Best wishes,



David Uncle
Senior Flood Risk Officer | Lead Local Flood Authority
Growth and Environment
Hertfordshire County Council
 Farnham House, Six Hills Way, Stevenage, SG1 2ST
 E: David.Uncle@hertfordshire.gov.uk
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Equality & fairness**

Leanne Pogson
Local Planning Authority
St Albans City & District Council
Civic Centre
St Peter's Street
St Albans
Hertfordshire
WD6 1WA

**Lead Local Flood Authority
Growth and Environment
Hertfordshire County Council
Post Point CHN 215
Farnham House
Six Hills Way, Stevenage
HERTFORDSHIRE, SG1 2ST
www.hertfordshire.gov.uk**

Contact: Flood Risk Management Team
Email: FRMConsultations@hertfordshire.gov.uk

Date 16 April 2025

Dear Leanne

RE: 5/2025/0645 – North Hemel Hempstead Development site Hemel Hempstead Road Redbourn

Thank you for consulting the LLFA in relation to development proposals for the residential-led redevelopment of approximately 154 hectares of land to the north-east of Hemel Hempstead. We also note that it is intended to be a Hybrid application.

The LLFA would not wish to make any comments on whether an EIA report is, or is not, required for this development, however we would like to offer some guidance in relation to the flood risk and drainage that may concern the proposed site.

The LLFA have reviewed the EIA Scoping report, undertaken by Quod, dated March 2025. A surface water drainage assessment should be carried out to demonstrate that the proposed development will not create an increased risk of flooding from surface water to the development site and the surrounding area for the critical storm up to and include the 1% AEP plus climate change event. This should be done in accordance with the National Planning Policy Framework (NPPF) and Planning Policy Guidance (PPG) along with the Hertfordshire LLFA guidance.

Since the site is over 1 hectare in size, a comprehensive Flood Risk Assessment (FRA), in line with Hertfordshire Lead Local Flood Authority guidance and the current NPPF and PPG guidance, would be required to be submitted as part of the planning application. The FRA should demonstrate that any existing areas of surface water flood risk, any ordinary watercourses with the risk of flooding from them defined and groundwater flood risk are managed within the site without increasing flood risk elsewhere. We would expect any submitted documents to support a planning application to demonstrate the proposed surface water drainage system is designed to include the four pillars of SuDS within the site and the post development surface water runoff rates and volumes for its lifetime for all rainfall events up to and including the 1% AEP plus climate change rainfall event.

The Environment Agency's Surface Water Flood Risk mapping indicates that the part of the site (centre & east boundary of proposed site) is located in areas at high risk of flooding. This would need to be incorporated into the drainage network. The surface water flood map highlights three flow paths impacting the site. These are located on the northern boundary; through the middle of the site and towards the southern end of the site and all of them flow from west to east. These must be investigated and avoided, and mitigation or management measures should be incorporated where required.

Other sources of flooding, such as from groundwater, should also be investigated. The FRA must demonstrate that the sequential test and sequential approach has been applied in accordance with NPPF and PPG along with flood mitigation measures without any adverse flood risk off-site. The FRA must demonstrate that any development has safe access and egress for the 1% AEP plus climate change rainfall event in accordance. Avoidance is the most sustainable form of flood risk management and hence surface water flow paths must be investigated and avoided.

The latest climate change allowances are required to be applied at the time of the assessment and ordinary watercourses (less than 3km²) that need to be assessed for flood risk can use the appropriate rainfall climate change allowances.

The latest FEH rainfall data (FEH13 or FEH22) should be applied in all hydraulic modelling calculations at the time of any calculations and assessment (flood risk or surface water drainage).

Sustainable Drainage Strategy should be considered at an early stage of the planning. The drainage system should consider the four pillars of sustainable drainage (SuDS) of Water Quality, Water Quantity, Amenity, and Biodiversity. We would expect that above-ground green SuDS such as water reuse solutions, source control, green roofs, bio-retention area, wetlands, ponds, basins, swale, to be used frequently and as a priority within the proposed surface water design. Sufficient space to provide these multifunctional SuDS must be evidenced at an outline stage of development or masterplan development to support any parameter plan or drawing. For example, a strip of 5 to 10m next to a main link road may be required to include swales and multi-use footpaths.

The LLFA expects the application of the surface water discharge hierarchy to the development of the sustainable drainage solution. We would expect that ground investigations into the viability of infiltration to be undertaken using the methods in accordance with the BRE 365 methods across the whole site but in more detail in any area being applied for Full Planning Permission (i.e. at the proposed location and depth of any infiltration feature). However, if unfavourable infiltration testing results are obtained, any existing greenfield runoff rates / volumes be released at pre-development rates / volumes and a discharge location on a watercourse proved to be positively connected to the wider watercourse network.

All SuDS must demonstrate that there will be sufficient surface water quality treatment by implementing an appropriate amount of water quality treatment stages using SuDS. An appropriate water quality assessment specific to and for each of the proposed surface water drainage networks is required to demonstrate the suitable water quality management arrangements are in place to prevent pollution from any potential

contaminants. The site is in Groundwater Source Protection Zone III (Total Catchment Zone); and hence surface water quality runoff should be considered in the proposed drainage for the site, potentially requiring measures to prevent pollutants prior to any discharge to ground.

For any supporting surface water drainage modelling, the following must be used; up to date FEH; climate change allowances on any rainfall modelling scenarios; the CV value of 1; and allowance for urban creep within any SuDS conveyance and storage features.

Phasing of the development should match any phasing of the supply of flood risk mitigation and drainage infrastructure. So, each phase can be completed with an independent flood risk mitigation and drainage strategy. This includes the consideration for how any phases e.g. schools, strategic link roads or other civic infrastructure will be constructed by a specific developer but rely on connection to the housing development areas to discharge surface water runoff. A high-level assessment of a timeline of how each flood mitigation or drainage scheme needs to be implemented prior to the phasing of each development parcel should be provided.

Details of the required maintenance of any blue green infrastructure for flood risk management or SuDS features / structures and who will be adopting these features for the lifetime of the development must be provided in accordance with NPPF. Early engagement with adopting authorities is highly recommended to consider any specific requirements which may not be immediately apparent in the planning process e.g. easements to allow for maintenance along linear or pond features. We recommend that multifunctional designs are included e.g. roads and pavements / cycle tracks separated with swales or linear bio-retention areas.

The LLFA also requires the applicant to submit information and drawings for full planning applications which clearly shows the exceedance flood flow routes for all areas of the development. These plans should include the finished floor levels of all buildings, the finished ground levels and the potential exceedance flow routes.

Details of the construction phase temporary drainage arrangements are required by the LLFA to ensure there will be no increase in flood risk due to the construction works of the development either onsite or elsewhere. Furthermore, the applicant will also need to submit the proposed construction phasing plans for the development to demonstrate that prior to completing the site there will be no increase in flood risk due to the interim development phases either onsite or elsewhere.

For further advice on what we expect to be contained within the FRA to support an outline planning or full planning application, please refer to our Proforma and Checklist on our surface water drainage webpage <https://www.hertfordshire.gov.uk/services/recycling-waste-and-environment/water/surface-water-drainage/surface-water-drainage.aspx> this link also includes HCC's policies on SuDS in Hertfordshire.

Yours sincerely

Ritesh

Ritesh Jaiswal

SuDS and Watercourses Support Officer
Growth and Environment

Growth & Environment

Sam Miller
St Albans City & District Council
Civic Centre
St Peter's Street
St Albans
AL1 3JE

Lead Local Flood Authority
Hertfordshire County Council
Post Point CHN215
Farnham House
Six Hills Way, Stevenage
Hertfordshire SG1 2FQ
www.hertfordshire.gov.uk

Contact: SuDS and Watercourses Team
FRMConsultations@hertfordshire.gov.uk

Your ref: North Hemel Hempstead
Date: 26 November 2025

Dear Sam,

RE: North Hemel Hempstead – Residential-led mixed use development comprising up to 1,500 new dwellings

Thank you for your pre-application advice request regarding the above site. Following the meeting held on 08 July 2025, the LLFA is providing written pre-application feedback on the submitted flood risk and drainage information.

Flood Risk

Flood risk was addressed within the meeting and it was confirmed that:

- The site is located within Flood Zone 1.
- There are no formal watercourses near or within the site boundary.
- The main concern in relation to flooding is the surface water flood risk and specifically the two overland flow routes that pass through the site.

Flood Modelling

We note that a hydraulic model has been undertaken to establish the extent of surface water flooding across the site. The model outputs show the two major overland flow routes that pass through the site. Both originate offsite and must be carefully managed throughout the development of any masterplan. We note that built development will not take place within the flow routes, but infrastructure will need to pass through the flow route to connect the development parcels. The model has shown that the flow path is very flashy and fast flowing.

A multi-use drainage feature is proposed to manage the flow path and there is potential to turn the southern flow path into a chalk stream. Concerns were raised

regarding the potential to create a valley through the site but submitted section drawings show that the gradients are accessible to allow maintenance.

The LLFA is concerned with changes that are made to flow paths and exceedance event routes and but providing the development can avoid the area as much as practicably possible without increasing risk to the site or surrounding area then the risk is reduced. Any crossings should be clear span and raised above the flood level.

Sustainable Drainage Strategy

- Detailed infiltration testing has taken place across the site and the LLFA is encouraged to see infiltration being utilised where feasible.
- The LLFA is encouraged to see that multi-use SuDS features will be utilised throughout the site.
- The main principles of the National Standards for SuDS are being followed within the proposals.
- Source control features are being proposed where feasible and an assessment of the water quality benefits has also been provided.

The below information outlines the minimum requirements we would expect to see for any application that is formally submitted:

National Standards for Sustainable Drainage Systems (SuDS)

The National Standards for SuDS (updated July 2025) replaced the Non-statutory technical standards for SuDS and now set the requirements for sustainable drainage within planning developments. All proposed drainage and evidence accompanying any future planning applications must be compliant with these standards.

Outline Applications:

- A full Flood Risk Assessment should be submitted to support any planning application. This should include information on all sources of flooding and also include information regarding safe access and egress to show how the development will be safe for its lifetime.
- An outline Drainage Strategy is required to provide evidence that surface water can be appropriately drained from the site without increasing risk to the site or the surrounding area.
- Greenfield runoff rates will be required with any submission.

Full Application - Detailed Design (including any initial phase and spine roads):

- Full network calculations for the 100% AEP, 50% AEP (if the drainage network is to be adopted), 3.33% AEP, 3.33% AEP plus appropriate climate change allowance, 1% AEP event, 1% AEP plus appropriate climate event.
- We would need to see flood risk resilience and resistance measures, as well as finished floor levels (set at the appropriate level, whichever is the most precautionary of 150mm above external ground levels or 300mm above the

maximum design water level of any source of flooding (including the drainage scheme)).

- Safe access and egress must be shown to be possible at the 1% AEP plus climate change.
- A detailed maintenance and management strategy will be required for the proposed drainage strategy. This should include details of how each open SuDS feature will be accessed to be maintained.
- Given the size of the development, a phased drainage plan will also be required to show how each parcel will be self-contained and be able to function without being reliant on other phases of the development.
- We would need to see a construction management plan for the construction phase on site (i.e. temporary and permanent measures).
- A phased drainage plan is also required to show how each parcel can function without the whole development being built.

Informative:

For further advice on what we expect to be contained within the FRA and/ or a Drainage Strategy to support a planning application, please refer to the Validation List and Proforma on our surface water drainage webpage

<https://www.hertfordshire.gov.uk/services/recycling-waste-and-environment/water/surface-water-drainage/surface-water-drainage.aspx> this link also includes HCC's Flood Risk Management policies on SuDS in Hertfordshire. We do expect the Validation List to be submitted to the Local Planning Authority and LLFA to show you have provided all information and the Proforma to the LLFA to summarise the details of the proposed development.

Erection of flow control structures or any culverting of an ordinary watercourse requires consent from the appropriate authority, which in this instance is Hertfordshire Lead Local Flood Authority and the Local Council (if they have specific land drainage bylaws). It is advised to discuss proposals for any works at an early stage of proposals.

Both FEH13 and FEH22 are currently accepted to support drainage modelling calculations. For the avoidance of doubt the use of FSR and FEH1999 data has been superseded and therefore, use in rainfall simulations are not accepted.

Yours sincerely,

Alex Jones

SuDS and Watercourses Team
Growth and Environment

Appendix C – Thames Water Correspondence

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

St Albans City & District Council Our DTS Ref: 75318
District Council Offices, Planning & Bldg Control Your Ref: 5/2025/0645
Civic Centre, St Peter's Street
St Albans
Herts
AL1 3JL

3 April 2025

Dear Sir/Madam

Re: NORTH HEMEL HEMPSTEAD DEVELOPMENT, HEMEL HEMPSTEAD ROAD,
REDBOURN , HEMEL HEMPSTEAD, HERTFORDSHIRE , HP2 7RG

Waste Comments

Thank you for giving Thames Water the opportunity to comment on the above application. Thames Water are the statutory sewerage undertaker for the area and would like to make the following comments: The EIA Regulations 2017 set out in Schedule 4 that water and wastewater issues may need to be covered in an EIA. Thames Water consider the following issues should be considered and covered in either the EIA or planning application submission: 1. The developments demand for Sewage Treatment and network infrastructure both on and off site and can it be met 2. The surface water drainage requirements and flood risk of the development both on and off site and can it be met. 3. Build – out/ phasing details to ensure infrastructure can be delivered ahead of occupation. 4. Any piling methodology and will it adversely affect neighbouring utility services. Should the developer wish to obtain information on the above issues they should contact our Developer Services department on 0800 0093921

Water Comments

With regard to water supply, this comes within the area covered by the Affinity Water Company. For your information the address to write to is - Affinity Water Company The Hub, Tamblin Way, Hatfield, Herts, AL10 9EZ - Tel - 0845 782 3333.

Yours faithfully
Development Planning Department

Development Planning,
Thames Water,
Maple Lodge STW,
Denham Way,

Rickmansworth,
WD3 9SQ
Tel:020 3577 9998
Email: devcon.team@thameswater.co.uk

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Visit us online www.thameswater.co.uk , follow us on twitter www.twitter.com/thameswater or find us on www.facebook.com/thameswater. We're happy to help you 24/7.

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From: [DEVELOPER.SERVICES@THAMESWATER.CO.U](mailto:DEVELOPER.SERVICES@THAMESWATER.CO.UK)
<DEVELOPER.SERVICES@THAMESWATER.CO.UK>

Sent: 07 May 2025 12:09

To: Evans, Caitlin <caitlin.evans@rps.tetrattech.com>

Subject: RE: RE: Foul Sewer and Potable Water Supply Check: Hemel North DS6137403

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Caitlin

Site Address: Hemel North- Land off Holtsmere Lane, Hemel Hamstead, HP2 7HP
Wastewater Pre-Planning Ref: DS6137403

Please find attached a Capacity Concerns letter.

Proposed site: development of green field site for 1560 general housing, 690 pupil primary school, 60 bed care home and 1000m² of commercial property.

Proposed foul water: proposed connection via pumped at 77.92 l/s to TL0809**2802** to the 300mm foul water sewer

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.

We've assessed your **foul water** proposals and concluded that unfortunately we're unable to meet the needs of your **full** development at this time.

In order to ensure we make the appropriate upgrades – or 'off-site reinforcement' – to serve the remainder of your development, we'll need to carry out modelling work, design a solution and build the necessary improvements. This work is done at our cost.

What do you need to tell us before we start modelling?

We will only carry out modelling once we're confident that your development will proceed. In order to have this confidence, we'll need to know that you **own the land and have either outline or full planning permission**. Please email this information to us as soon as you have it.

If you've any further queries please don't hesitate to get in touch.

Gemma Connolley
Adoptions & Pre-Planning Engineer
Service Delivery
Help Desk number – 0800 009 3921

Get advice – make your sewer connection correctly - [Plumbing and drainage misconnections | Water UK](#)

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at [Developer services | Thames Water](#)



It's everyone's water

Original Text

From: "DEVELOPER.SERVICES@THAMESWATER.CO.UK"
<DEVELOPER.SERVICES@THAMESWATER.CO.UK>
To: caitlin.evans@rps.tetrattech.com
CC:
Sent: 03.04.25 12:03:03
Subject: RE: Foul Sewer and Potable Water Supply Check: Hemel North

Hi Caitlin

Site Address: Hemel North- Land off Holtsmere Lane, Hemel Hamstead, HP2 7HP
Wastewater Pre-Planning Ref: DS6137403

Thank you for providing information in support of your Pre-planning enquiry (DS6137403) for the development at the above location.

Your foul water application has now been passed on to our Asset Planning team for consultation. We will aim to get back to you with a formal response in 7 working days.

My Clean Water colleagues will process your Clean Water application under DS6137402.

If you've any further queries please don't hesitate to get in touch.

Gemma Connolley
Adoptions & Pre-Planning Engineer
Service Delivery
Help Desk number – 0800 009 3921

Get advice – make your sewer connection correctly - [Plumbing and drainage misconnections | Water UK](#)

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at [Developer services | Thames Water](#)



It's everyone's water

Original Text

From: "Evans, Caitlin" <Caitlin.Evans@rps.tetrattech.com>
To: developer.services@thameswater.co.uk <developer.services@thameswater.co.uk>
CC:
Sent: 27.03.25 14:20:01
Subject: Foul Sewer and Potable Water Supply Check: Hemel North

This e-mail originated from outside of Thames Water. Do not click links, open attachments or reply, unless you recognise the sender's e-mail address and know the content is safe. If in doubt, contact the Digital Service Desk. Report Phishing via the Report Message option.

Hello,

Can the attached Foul and Potable water capacity checks be undertaken?

Please also see attached information required.

Please also note estimates have been used for phasing and peak water supply, this is yet to be confirmed.

Any queries, please don't hesitate to get in touch.

Best wishes,
Caitlin

CaitlinEvans

Graduate Consultant-Hydrology
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From: [DEVELOPER.SERVICES@THAMESWATER.CO.U](mailto:DEVELOPER.SERVICES@THAMESWATER.CO.UK)
<DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 07 May 2025 12:09
To: Evans, Caitlin <caitlin.evans@rps.tetrattech.com>
Subject: RE: RE: Foul Sewer and Potable Water Supply Check: Hemel North DS6137403

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Hi Caitlin

Site Address: Hemel North- Land off Holtsmere Lane, Hemel Hamstead, HP2 7HP
Wastewater Pre-Planning Ref: DS6137403

Please find attached a Capacity Concerns letter.

Proposed site: development of green field site for 1560 general housing, 690 pupil primary school, 60 bed care home and 1000m2 of commercial property.

Proposed foul water: proposed connection via pumped at 77.92 l/s to TL0809**2802** to the 300mm foul water sewer

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.

We've assessed your **foul water** proposals and concluded that unfortunately we're unable to meet the needs of your **full** development at this time.

In order to ensure we make the appropriate upgrades – or 'off-site reinforcement' – to serve the remainder of your development, we'll need to carry out modelling work, design a solution and build the necessary improvements. This work is done at our cost.

What do you need to tell us before we start modelling?

We will only carry out modelling once we're confident that your development will proceed. In order to have this confidence, we'll need to know that you **own the land and have either outline or full planning permission**. Please email this information to us as soon as you have it.

If you've any further queries please don't hesitate to get in touch.

Gemma Connolley
Adoptions & Pre-Planning Engineer
Service Delivery
Help Desk number – 0800 009 3921

Get advice – make your sewer connection correctly - [Plumbing and drainage misconnections | Water UK](#)

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Original Text

From: "[DEVELOPER.SERVICES@THAMESWATER.CO.U](mailto:DEVELOPER.SERVICES@THAMESWATER.CO.UK)"
<DEVELOPER.SERVICES@THAMESWATER.CO.UK>
To: caitlin.evans@rps.tetrattech.com
CC:
Sent: 03.04.25 12:03:03
Subject: RE: Foul Sewer and Potable Water Supply Check: Hemel North

Hi Caitlin

Site Address: Hemel North- Land off Holtsmere Lane, Hemel Hamstead, HP2 7HP
Wastewater Pre-Planning Ref: DS6137403

Thank you for providing information in support of your Pre-planning enquiry (DS6137403) for the development at the above location.

Your foul water application has now been passed on to our Asset Planning team for consultation. We will aim to get back to you with a formal response in 7 working days.

My Clean Water colleagues will process your Clean Water application under DS6137402.

If you've any further queries please don't hesitate to get in touch.

Gemma Connolley
Adoptions & Pre-Planning Engineer
Service Delivery
Help Desk number – 0800 009 3921

Get advice – make your sewer connection correctly - [Plumbing and drainage misconceptions | Water UK](#)

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Original Text

From: "Evans, Caitlin" <Caitlin.Evans@rps.tetrattech.com>
To: developer.services@thameswater.co.uk <developer.services@thameswater.co.uk>
CC:
Sent: 27.03.25 14:20:01
Subject: Foul Sewer and Potable Water Supply Check: Hemel North

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Hello,

Can the attached Foul and Potable water capacity checks be undertaken?

Please also see attached information required.

Please also note estimates have been used for phasing and peak water supply, this is yet to be confirmed.

Any queries, please don't hesitate to get in touch.

Best wishes,
Caitlin

CaitlinEvans

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