EH6 - WGC, East of Welwyn				
OSNGR: 527149,212085	Area: 75.34ha		Majority Greenfield	
Flood Zone Coverage: *based on 2D Jflow modelling	**FZ3b** 3.09%*	**FZ3a** 4.65%*	**FZ2** 9.06%*	**FZ1** 83.20%*

Proposed Development Details:
1,350 homes, primary and secondary education, health, retail and green space

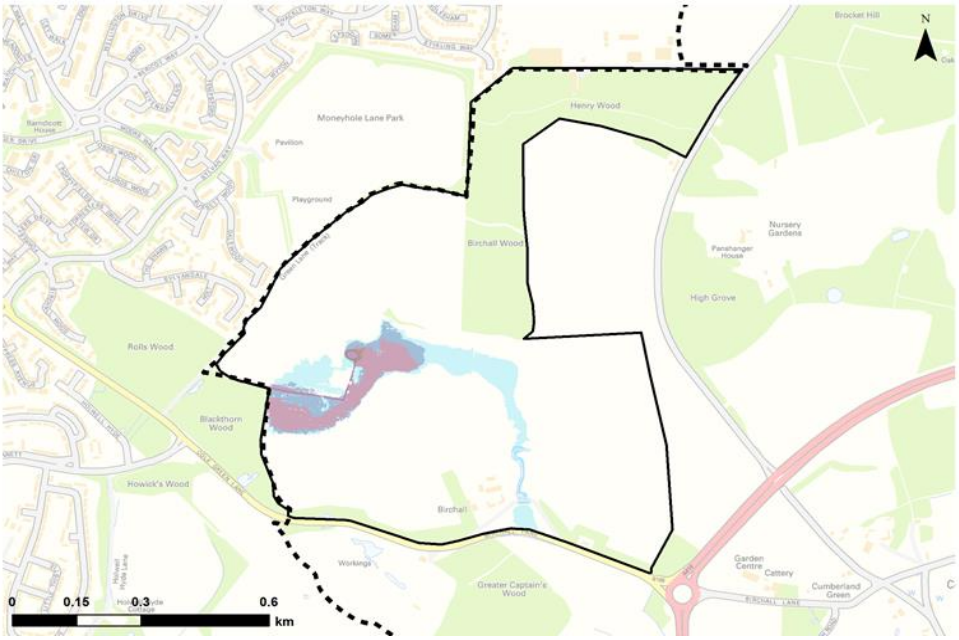
Exception Test Required?
Likely, as the flood risk from the unnamed drain intersects the site, which may constrain where development can be placed.
The Exception Test is needed if:
"More Vulnerable" and "Essential Infrastructure" development is located in FZ3a and for "Highly Vulnerable" development located in FZ2.
"Essential Infrastructure" development in FZ3b will also require the Exception Test.
"Highly Vulnerable" development should not be permitted within FZ3a and FZ3b.
"More Vulnerable" and "Less Vulnerable" development should not be permitted within FZ3b

NPPF Guidance:
• For development proposals on sites comprising one hectare or above in Flood Zone 1 the vulnerability of flooding from other sources as well as from river flooding should be incorporated into a FRA.
• The potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new developmenton surface water run-off should be considered.
• Developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond thrugh the layout and form of the development and through appropriate sustainable drainage techniques.

Sources of Flood Risk:

The vast majority of the site is located within Flood Zone 1 and is considered to be at low risk of fluvial flooding. Flood risk is present from an unnamed drain which which flows from the site's western edge, eastwards to a small pond. Whislt the drain is shown to end here, there may be overland flow routes following topography, such as in the more extreme flood events. Factoring in climate change at 25%, 35% and 70% does not significantly affect the area at risk of fluvial flooding. Surface water flooding is shown to occur following the drainage channel topography and a new overland flow route is seen from the north in the 1,000-year extent, with pockets of surface water flooding in the lower return periods.

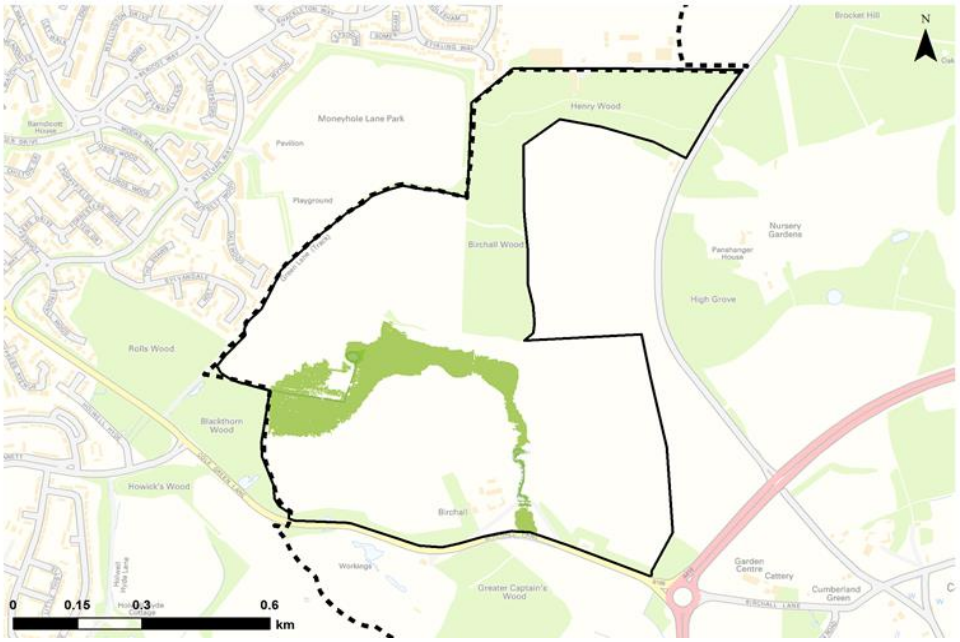
Flood Zone Map



This site was not represented in the Environment Agency's Flood Zones, but OS mapping showed a drain running through the site, therefore 2D generalised modelling using Jflow software has been undertaken to obtain indicative flood extents using the 20-year extent as FZ3b, the 100-year extent as FZ3a, and the 1,000-year extent as FZ2. Developers may need to consider undertaking more detailed hydraulic modelling at the site as part of a site-specific FRA.

Potential Site Allocations
Council boundary
Flood Zone 3b
Flood Zone 3a
Flood Zone 2

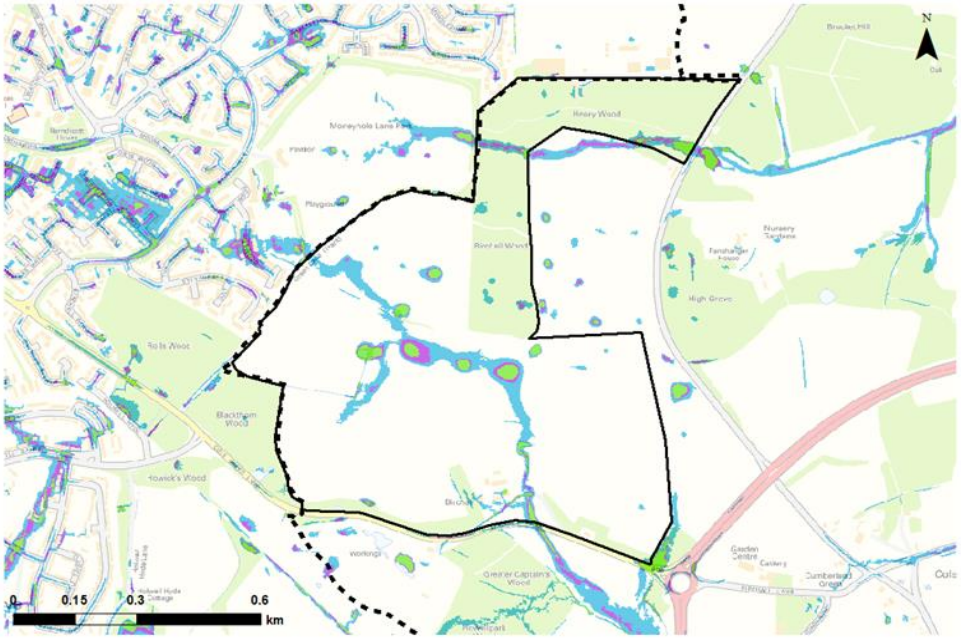
Climate Change Map



Climate change was modelled for the 2080s epoch, applying the following climate change factors to the 100-year flow: 25%, 35% and 70%.
The map above shows the 100-year + 70% climate change scenario, therefore representing a 'worst case'.

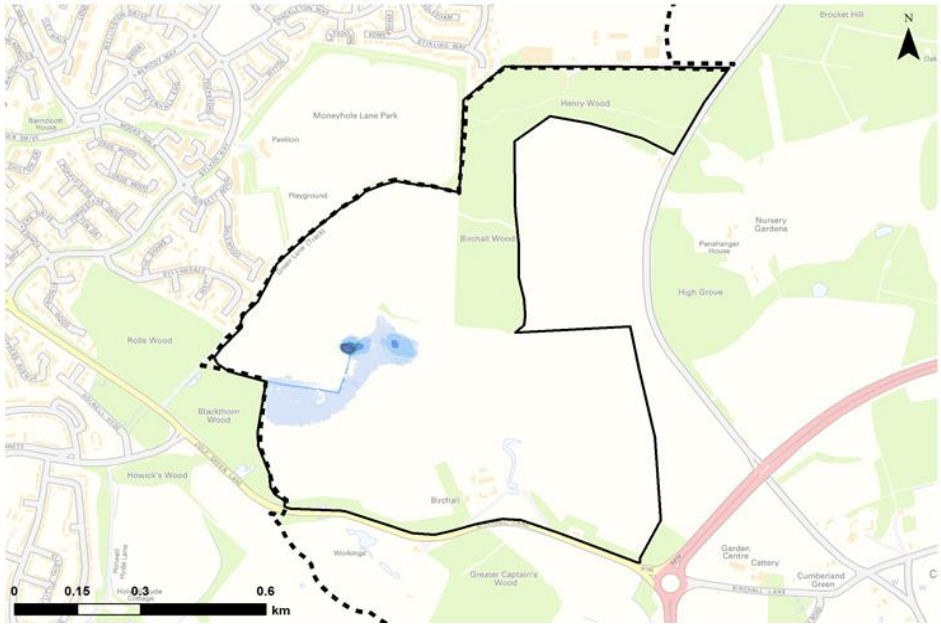
Potential Site Allocations
Flood Zone 3 with Climate Change
Council boundary

Surface Water Map



Potential Site Allocations
Council boundary
uFMfSW* 30-year Extent
uFMfSW* 100-year Extent
uFMfSW* 1,000-year Extent

Depth Map



Contains Ordnance Survey data. © Crown copyright and database rights 2016

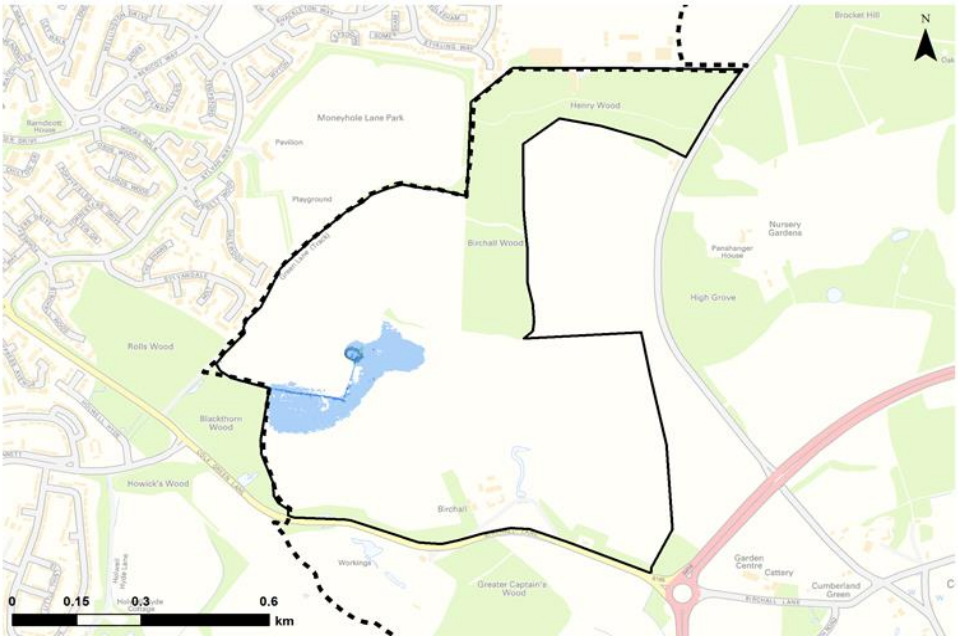
This depth map is an output from Jflow 2D generalised modelling, and represents the 100-year event

Potential Site Allocations
Council boundary

Depth (m)

0 - 0.10	0.50 - 1.00	2.00 - 2.50	3.50 - 4.00
0.10 - 0.50	1.00 - 1.50	2.50 - 3.00	>4.00
	1.50 - 2.00	3.00 - 3.50	

Velocity Map



Contains Ordnance Survey data. © Crown copyright and database rights 2016

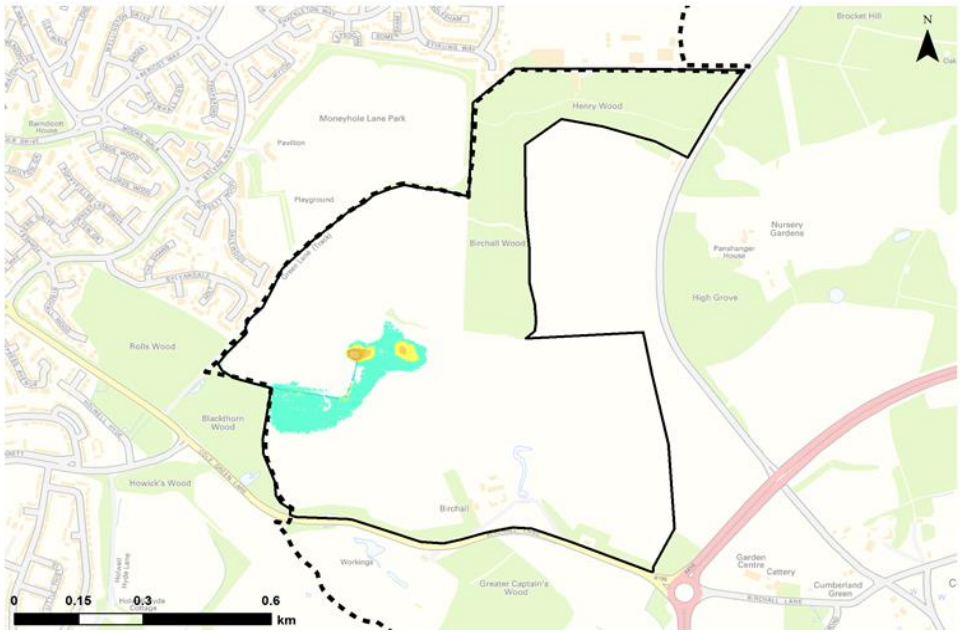
This velocity map is an output from Jflow 2D generalised modelling, and represents the 100-year event

Potential Site Allocations
Council boundary

Velocity (m/s)

0 - 0.2	0.2 - 0.5	1.0 - 2.0
	0.5 - 1.0	> 2.0

Hazard Map



This hazard map is an output from Jflow 2D generalised modelling, and represents the 100-year event

Potential Site Allocations
Council boundary

Hazard Rating

Very low hazard - caution
Danger for some
Danger for most
Danger for all

SuDS & the development site:		
SuDS Type	Suitability	Comments
Source Control		All forms of source control are likely to be suitable.
Infiltration		Mapping suggest the soils are fairly impermeable in this area. However, there is risk due to contaminated land located adjacent to site which may make infiltration unsuitable. Site investigations should be carried out to assess potential for drainage by infiltration.
Detention		This option may be feasible provided site slopes are < 5% at the location of the detention feature. If the site has contamination, due to its proximity to landfill, a liner will be required.
Filtration		Feasibility of filtration options should be assessed as part of a site specific assessment. If this feature is feasible it should be located where the depth to the water table is >1m, additionally a liner maybe required to prevent contamination at the site.
Conveyance		All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. If the site has contamination issues, a liner will be required.

This site has areas within its boundary designated by the Environment Agency as being a landfill site. A thorough ground investigation will be required as part of a detailed FRA to determine the extent of the contamination and the impact this may have on SuDS.

The site is located with a Source Protection Zone. As such infiltration techniques should only be used where there are suitable levels of treatment although it is possible that infiltration may not be permitted.

Drainage strategies should demonstrate that an appropriate number of treatment stages have been delivered. This depends on the factors such as the type of development, primary source of runoff and likelihood of contamination. Guidance should be sought from LLFA and other guidance documents such as the CIRIA SuDS Manual (C753).

Proposed SuDS should be discussed within relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.

Flood Defences: There are no flood defences at this site.
Flood Warning: There are currently no flood warning areas or flood alerts covering this site.
Access & Egress: Access and egress to the potential development site is via Birchall Lane (B195) and Station Road. These give acces to the south and north east of the site respectively. However, due to surface water and fluvial flooding in the north and south access may be restricted at the center of the site during a flood event. Consideration is needed to how safe access and egress can be achieved to the whole site in times of flood.
Climate Change: Climate change mapping indicates the following impacts for the future: • Increased storm intensities. • The increase in Flood Zone 3a outline with differing climate change allowances is minimal. • The floodplain of the unnamed drain appears, with 70% climate change allowance, very similar to Flood Zone 2. It may, however, increase the depth, velocty or hazard of flooding in the area affected. • Climate change may also increase the extent, depth and frequency of surface water flooding.
Implications for Development: •Use of the Sequential approach means, given the size of the site, development can be placed away from the Flood Zones, with the area affected by the Flood Zones left undeveloped. • The main access and egress routes are affected by surface water flooding in some places, therefore safe access and egress will be required by development, or safe refuge provided if evacuation is not possible during a flood. • Climate change may increase the extent of surface water and fluvial flooding in the future and have the potential to affect routes. • Development should also ensure that there is no increase in flood risk that may exacerbate flooding to routes •Broadscale assessment of suitable SuDS has indicated a number of different types may be possible; given the size of the site, the type of SuDS system used is less likely to be limited by the amount of land available for development. • The site is not covered by the Environment Agency's Flood Warning Service. However, if development is placed outside of the Flood Zones, then access to a Flood Warning would not be required. • The site is not known to benefit from any flood defences. Given the size and location of the site, it is possible the site could be used to implement strategic solutions to alleviate flood risk downstream from the drains; development should consider the feasibility of including any strategic flood risk solutions, depending on the land available.

Guidance for Developers:

• At the planning application stage, a site-specific Flood Risk Assessment will be required if any development is located within Flood Zones 2 or 3 or greater than 1ha in size. Other sources of flooding should also be considered.

• Consultation with the Local Authority and the Environment Agency should be undertaken at an early stage, to determine requirements for a FRA and to establish an approach to consider climate change in line with latest guidance.

• The peak flows of the unnamed watercourse should be considered when considering drainage.

• Resilience measures will be required if buildings are situated in the flood risk area.

• Safe access and egress will need to be demonstrated.

• Assessment for runoff should include allowance for climate change effects.

• New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff.

• New development must seek opportunities to reduce overall level of flood risk at the site, for example by:

  o Reducing volume and rate of runoff
  o Relocating development to zones with lower flood risk
  o Creating space for flooding.
  o Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.

• Onsite attenuation schemes would need to be tested against the hydrographs for any unnamed watercourses to ensure flows are not exacerbated downstream within the catchment.

• Developers may need to undertake more detailed investigations/ modelling of the unnamed watercourse to confirm flood risk at the site. The Jflow outputs present an indication of flood risk in the absence of Environment Agency Flood Zones; however, this does not incorporate channel/ structure topographic survey and assumes a channel capacity of QMED.