

GROUNDWATER FLOOD RISK ASSESSMENT

Site: The Cricket Field, St Barnabas Church, Beanacre, SN12 7PT

OS Grid Reference: ST 903 659 (Easting 390307, Northing 165957)

Overview:

This site is located west of St Barnabas Church, Beanacre, sits in a geologically sensitive area near the River Avon. While the structure is a wooden pavilion for sports use, the "Groundwater Emergence" constraint is to be considered in accordance with the Wiltshire Council Strategic Flood Risk Assessment (SFRA) .

The application is for a sports pavilion, this is classified under the National Planning Policy Framework (NPPF) as "Less Vulnerable." This allows for a more "proportionate" approach compared to residential developments.

1. Flood Risk Analysis: The Three Pillars

For Beanacre, a proportionate Flood Risk Assessment (FRA) must address three primary sources:

A. Groundwater Emergence (The Primary Constraint)

The British Geological Survey (BGS) and Wiltshire's SFRA (updated in 2024) identify this area as having a risk of groundwater flooding.

- **Cause:** The site likely sits on a boundary between permeable River Terrace deposits and less permeable mudstones (Forest Marble). During high-rainfall winters, the water table can rise rapidly through the gravels.
- **Impact:** This risk affects the "subsurface" (foundations). A wooden structure is lightweight, but "emergence" means water could actually pool on the surface around the pavilion, potentially rotting the timber base or making the area inaccessible.

B. Fluvial (River) Flooding

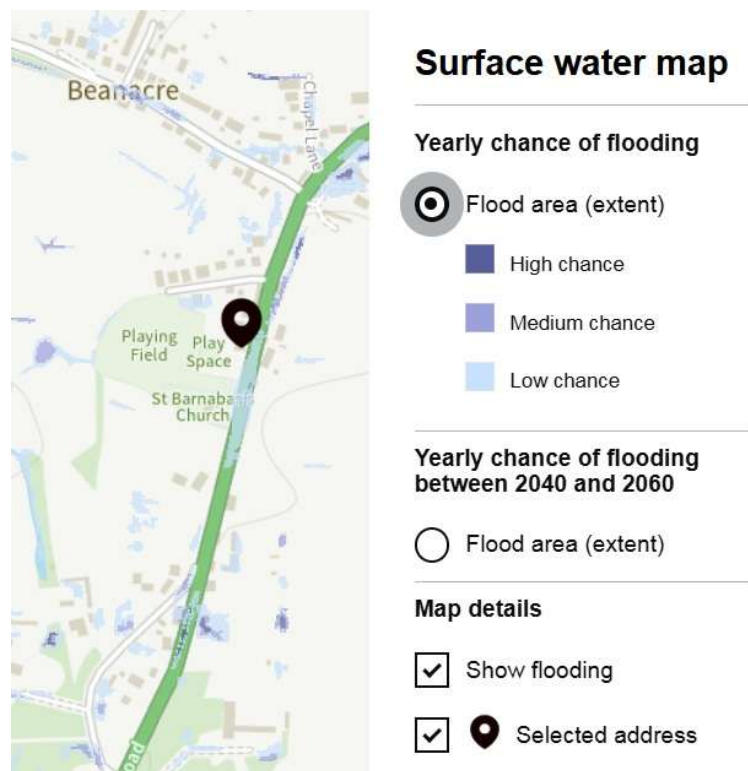
The site is approximately 400m west of the River Avon.

- **Risk:** While the main church site is slightly elevated, the western periphery of the field (near the grid ref) begins to slope toward the Avon. The site falls within **Flood Zone 1** (Low Risk).

C. Surface Water (Pluvial)

The Environment Agency (EA) maps show localized surface water ponding in the fields around Beanacre.

- **Risk:** Often caused by heavy downpours overwhelming the soil's infiltration capacity.
- **Requirement:** It is considered that the pavilion's roof runoff won't increase flooding elsewhere (e.g., using water butts or a simple soakaway).



2. Updated Climate Change Guidance (2026 Update)

You mentioned the 2016 guidance, but to ensure your application isn't rejected by the Lead Local Flood Authority (LLFA), you should use the **March 2026 EA Update**.

For the **Bristol Avon Management Catchment**, the "Less Vulnerable" classification typically requires the "**Central**" allowance.

- **Peak Rainfall Intensity:** You should now account for a **20–40% increase** in rainfall intensity to future-proof the design.
- **Peak River Flows:** If your site is within the fluvial flood zone, you must assess how the 1 in 100-year event (+ climate change) affects the building's lifespan (estimated at 25–50 years for a wooden structure).
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3. Wiltshire Council Requirements & "Proportionate" Strategy

This application is for a small sports facility the FRA includes:

- **Vulnerability:** the use is "Less Vulnerable" and "infrequently used."
- **Finished Floor Levels (FFL):** It is recommended that the floor be raised **300mm above ground level**. Since this is a wooden pavilion, it is proposed to use **ground screw method** (piled supports) with suspended wooden floor above rather than a solid concrete slab. This allows groundwater and surface water to flow *underneath* the structure without displacing it.
- **Resilience measures:** Use pressure-treated timber and ensure all electrical sockets are raised at least 600mm above the floor.
- **Infiltration:** Confirm that the pavilion replaces an equal or smaller area of permeable grass, maintaining a "neutral impact" on runoff.

Conclusion:

"Given the 'Less Vulnerable' nature of the development and its intermittent use for sports, the residual risk is considered **Low**. The proposed use of raised pier foundations directly mitigates the identified 'Groundwater Emergence' risk by allowing sub-surface fluctuations and surface ponding to occur without impacting the structural integrity or increasing flood risk to third parties."

Additional supporting information:

Sequential Test

Project: Proposed Wooden Changing Pavilion

Location: Land West of St Barnabas Church, Beanacre (Grid Ref: ST 903 659)

Development Type: Less Vulnerable (Ancillary to Outdoor Sports)

1. Purpose and Functional Requirement

The proposed development is a modest wooden changing pavilion designed specifically to serve the existing cricket field at Beanacre. The nature of the development is functionally linked to the land on which it sits. For the pavilion to fulfill its purpose: providing changing facilities, equipment storage, and shelter for players and officials it must be located in immediate proximity to the cricket pitch.

2. Search Area and Availability of Alternative Sites

The "Search Area" for this Sequential Test is restricted to the boundaries of the cricket field and the immediate land under the applicant's control.

- **Off-site alternatives:** Relocating the pavilion to outside the site boundaries (e.g., further into the village) would render the facility useless for its intended sporting purpose, as players cannot realistically commute between a more remote changing facility and the field during play.
- **On-site alternatives:** The site has been analyzed to identify the area of lowest relative risk within the field's periphery. The proposed location at the western periphery (ST 903 659) has been selected to minimize the impact on the playing surface while remaining accessible. Any movement within the field would likely encounter the same "Groundwater Emergence" zone identified by the council, meaning no sequentially superior location exists within the functional area of the sports ground.

3. Vulnerability Classification

Under the **National Planning Policy Framework (NPPF) Annex 3**, the development is classified as "**Less Vulnerable**" (buildings used for shops; financial, professional and other services;... and outdoor sports and recreation).

- According to the **Flood Risk Vulnerability Classification Table**, "Less Vulnerable" uses are considered appropriate in Flood Zones 1 and 2.
- The primary constraint here is "Groundwater Emergence." This is a localized risk that does not preclude development but requires specific design mitigation (detailed in the FRA), rather than relocation.

4. Summary

The Sequential Test is passed on the grounds of **functional necessity**. There are no reasonably available alternative sites at a lower risk of flooding that could accommodate the required facility. The risk identified will instead be managed through "proportionate" design measures, including raised floor levels and permeable foundation designs, ensuring the development remains safe without increasing risk elsewhere.

Surface water drainage

Surface Water Drainage Strategy this has been designed to be "proportionate" as well as addressing possible Groundwater Emergence by moving away from deep underground soakaways (which can fail if the water table rises) toward shallow, nature-based solutions.

1. Drainage Hierarchy Assessment

In accordance with the Wiltshire Council Drainage Betterment Strategy (2024) and Building Regulations Part H, the following hierarchy has been applied:

1. **Rainwater Harvesting:** Proposed. Rainwater will be collected for pitch maintenance/irrigation.
2. **Infiltration (Soakaways):** Limited. Due to the "Groundwater Emergence" constraint, deep soakaways are deemed unsuitable as they may bypass the unsaturated soil zone and interact directly with rising groundwater.
3. **Watercourse:** Not proposed (to avoid unnecessary piping across the cricket field).
4. **Sewer:** Not proposed.

2. Proposed Strategy: "Shallow & Slow"

To manage runoff while respecting the high groundwater table, the following system is proposed:

- **Source Control (Water Butts):** High-capacity water butts (e.g., '2 x 200L) will be installed at the downpipes. This provides immediate attenuation and a sustainable water source for the cricket club.
- **Shallow Rain Garden / Infiltration Strip:** Overflows from the water butts will discharge into a **shallow rain garden** or a **gravel-filled infiltration trench** (no more than 300mm to 500mm deep) located at least 5metres from the pavilion. *Shallow features utilize the top layer of soil, which remains "unsaturated" longer than deeper layers, allowing for better treatment and slower infiltration even when groundwater levels are elevated.*
- **Raised Floor Design:** The pavilion will be constructed on Ground screw piled type method with timber floor construction secured to the ground screws. This allows the area beneath the building to remain permeable grass/soil, ensuring no "net loss" of infiltration area.

3. Climate Change Allowance (2026 Update)

While the application notes the 2016 guidance, this strategy adopts the Environment Agency's March 2026 updated allowances for the Bristol Avon catchment to ensure robustness:

- **Design Standard:** 1 in 100-year storm event.
- **Climate Change Factor:** A +40% allowance for peak rainfall intensity (Upper End estimate for the 2050s epoch) has been applied to the sizing of the gutters and the shallow infiltration strip.
- **Impact:** Even with a 40% increase in rainfall, the total impermeable area (the roof) is small (approx. 68sq.m.) meaning the volume of water is easily managed within a small-scale rain area within the site.

4. Groundwater Emergence Mitigation

The "Groundwater Emergence" constraint indicates that water may rise to the surface. Traditional SuDS can become "back-filled" by rising groundwater, rendering them useless.

- **Mitigation:** By keeping the drainage components above-ground or shallow, the system remains functional for surface water management even if the deep subsurface is saturated.
- **Flood Resilience:** All timber components within the "splash zone" (the bottom 600mm of the structure) will be pressure-treated to withstand temporary dampness from emergence.

5. Maintenance

The strategy is designed for low maintenance by the Cricket Club:

- **Monthly:** Check gutters and water butt inlets for leaves/debris.
- **Annually:** Inspect the rain garden/trench for siltation and ensure the overflow path is clear.

Conclusion

This strategy represents a **neutral impact** development. It does not increase the risk of flooding to the site or third parties and uses sustainable, low-tech methods appropriate for a rural sports facility.

To support the above calculated runoff volumes for the proposed 68 m² pavilion are given below. These figures are based on the Rational Method ($V = C \times i \times A$), using representative rainfall depths for the Wiltshire/Bristol Avon catchment area and incorporating the updated March 2026 Environment Agency climate change allowances.

Estimated Surface Water Runoff Volumes

Site Area (Roof): 68 m²

Surface Type: Flat Roof (impermeable)

Runoff Coefficient (C): 0.95 (Assumes 5% initial abstraction/evaporation)

Storm Event Probability	Rainfall Depth (mm)	Total Runoff (m3)	Total Runoff (Litres)
1 in 1 Year (Annual)	15mm	0.97m3	970L
1 in 30 Year (Design)	40mm	2.58m3	2,584L
1 in 100 Year (Extreme)	55mm	3.55m3	3,553L
1 in 100 Year + 40% CC	77mm	4.98m3	4,975L

**Rainfall depths are estimated for a 1-hour critical duration storm event for the SN12 postcode area.*

Key Assumptions & Notes:

- **Climate Change Allowance:** In line with the 2026 EA Update, a +40% increase in peak rainfall intensity has been applied to the 1 in 100-year event to account for the anticipated lifespan of the structure.
- **Attenuation Requirement:** To achieve a "neutral impact" on the cricket field, the drainage system (water butts + rain garden) should be sized to manage approximately 5m³ of water during an extreme event.
- **Groundwater Interaction:** Because the volume is relatively low (under 5m³), the proposed shallow infiltration method (Rain Garden) is preferred over deep soakaways. This ensures that even if groundwater "emerges" to within 0.5m of the surface, the surface water can still be managed in the upper, aerobic soil layers.

Design Recommendation

To manage the 4,975 Litres generated in an extreme 1 in 100-year (+CC) storm, recommendation proposed:

1. **Storage:** 4 X 250L water butts (1,000L total storage).
2. **Infiltration:** A rain garden or gravel trench with a footprint of approximately 12 to 15 square metres (at 0.4m depth) to handle the remaining volume through infiltration and temporary ponding.

End