

Flood Risk Assessment

Pitts Farm, Sedgehill



Site Address:

Pitts Farm,
Sedgehill,
Shaftesbury,
SP7 9JB

Client:

Graham Stripe
Great Canney Developments Ltd
18 Roundwood grove
Shenfield
Essex
CM13 2NE

Thorpe Engineering Consultants Ltd

Consulting Civil and Structural Engineers



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Flood Risk Assessment

Date of Issue	Notes:	Revision
03/06/2026	Draft for Client Information	-
09/07/2026	Planning Submission	01
31/07/2026	Revised Architectural Layout	02

Property Address
Client

Pitts Farm, Sedgehill, Shaftesbury, SP7 9JB
Great Canney Developments Ltd

Our Ref.
Report Date

26202-FRA
03/06/2026

Prepared by

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<i>Purpose of Report:</i>	Propose appropriate Sustainable Drainage System for development.
<i>Area of Concern:</i>	Surface Water on access road.
<i>Recommended Actions:</i>	Infiltration drainage should be used where ground conditions permit. Surface water should be attenuated and discharged via wetlands to the ground.
<i>Conclusion</i>	The proposed works present no increased risk to downstream flooding and adjacent buildings. There are some mitigation measures that are required to control the risk of the works during construction operations.



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Introduction

Thorpe Engineering Consultants Ltd have been instructed by Great Canney Developments Ltd to provide civil engineering design services for the proposed residential development on the site of an existing barn on the edge of Pitts Farm.

The existing site is currently utilised as agricultural barn.

Both foul and surface drainage for this development will remain separate. The surface water will be collected and stored in an attenuation pond prior to discharge to a created wetland area via flow control device, which will drain into the ground. Foul drainage will be collected by a new lateral drain into a package sewage treatment plant and discharged into a constructed wetland and drainage field with overflow into a wetland scrape. Connection will be made using an existing manhole in surrounding roads.

The design criteria for the surface water drainage will be a 1-in-100-year storm event plus 45% Climate Change. Rainfall for this event will produce no flooding on site. In the event of a 1 in 100-year storm the site levels will be designed to accommodate exceedance flow, which will ensure no flooding of buildings, utility plant or neighbouring sites due to run off.

The residential and commercial development portions of land are all located within Flood Zone 1, which is the designation at least risk of flooding. There are areas of land within the development site that have a risk of surface water flooding; this affects the access road only and not the dwelling.

The site drainage will be designed as a Sustainable urban Drainage system, SuDs, which places an enhanced value on permeable surfaces and design features that slow water down to prevent downstream flooding.

The drainage layout will use the natural topography of the site where possible, to mitigate the potential for extensive earthworks. Open swales will act as carrier drains, which has benefits in terms of surface water treatment and storage. Water from roads and roofs will be discharged into the swales as close to source as possible. Attenuation Pond will be provided at the base of the slope; these will discharge into wetlands within the vegetative border of the site. This will mimic the "greenfield" form of the site and provide habitat for invertebrates and the birds that feed on them.



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Summary

DEVELOPMENT DESCRIPTION	EXISTING (PRE-DEVELOPMENT)	PROPOSED (POST-DEVELOPMENT)
Site Use	Agricultural	Residential
Development Use		Single dwelling to replace existing barn, plus formation of access from Mathill Road and associated public open space, drainage and other infrastructure on land at Mathill Road.
Use Design Life		100 years (epoch 2123)
Number of Dwellings	0	1
EA Vulnerability Classification	Less Vulnerable (ref: existing site vulnerability)	More Vulnerable (ref: proposed site vulnerability)
Development Class		Minor
Planning Authority	Dorset Council	
Local Sewer Authority	Wessex Water	
SITE CATCHMENT CHARACTERISTICS	DESCRIPTION	SOURCE
Management Catchment	Dorset	https://environment.data.gov.uk/catchment-planning
Nearest Major Water Body	Lodden	https://environment.maps.arcgis.com/apps/MapSeries/
KEY FLOOD RISK AND DATA SOURCES	DATA TYPE	SOURCE
EA Fluvial and Tidal Planning Data	UK Government Flood Maps for Planning (ref: FMP)	https://flood-map-for-planning.service.gov.uk/
EA Surface Water Data	DEFRA Risk of Flooding from Surface Water Sources GIS Data (ref: RoFSW)	https://environment.data.gov.uk/DefraDataDownload/?Mode=rofsw
EA Long term Flood Risk	UK Government Long term Flood Risk Maps (ref: LTFRM)	https://www.gov.uk/check-long-term-flood-risk
Environment Agency Product 4/5 Data	N/A (report ref: EA Product Data)	
Historic Flood Risk Data	DEFRA Historic Flood Outlines GIS Data	https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/HistoricFloodMap&Mode=spatial
Strategic Flood Risk Assessment Data	Bournemouth, Christchurch, East Dorset, North Dorset and Salisbury SFRA	Dorset Council
Local Flood Risk Assessment Data		Dorset Council
Topographic Information	DEFRA Opensource LIDAR Data	https://environment.data.gov.uk/DefraDataDownload/?Mode=survey
Surface Water Flood Risk present within site boundary	Low	Figure 7 - Surface Water Flooding Risk
River or Sea Flood Risk present within site boundary	High	Figure 8 - Rivers and Sea Flooding Risk
DESIGNATION	FLOOD RISK DESIGNATION	NOTE
Critical Design Flood Event (DFE)	River	Figure 9 - Flood map for planning



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Flood Risk Assessment

Site Appraisal

1. General
 - 1.1. The site comprises the site known as Pitts Farm (Figure 1). This report pertains to the demolition of Barn D and a proposed replacement dwelling.
2. Topography/Geology
 - 2.1. The British Geological Survey map depicts this area as comprising Kimmeridge Clay Formation – Mudstone (Figure 2).
 - 2.2. The site is on the side of a hill, parts of which slope steeply to the North. (Figure 3).
 - 2.3. A Watercourse borders the site on the western edge, which runs downhill to the River Lodden to the North of the site. The site is not protected by flood defences or benefiting from flood storage
3. Site Location:
 - 3.1. The site is situated in the Parish of Sedgehill and Semley within the unitary authority area of Wiltshire Council. The site is bounded by Pitts Lane to the South and agricultural fields on all other sides. (Figure 4 + Figure 5).
 - 3.2. The site postcode is SP7 9JB.
4. Description of existing site
 - 4.1. The site is currently part of Pitts Farm, an historic farmstead that was formerly part of the Fonthill Estate. The Farmhouse is Grade II Listed.
 - 4.2. The application site will be under 1 hectare in size.
 - 4.3. The site of the new dwelling is located within flood zone 1.
 - 4.4. A topographical survey was undertaken by Cole and Cole, which confirms the site falls from South to North, with a change in level from 104.46 meters above ordnance datum (mAOD) to 103.66mAOD.
 - 4.5. Overland runoff currently flows towards the existing watercourse via the natural slope of the ground.
 - 4.6. The topographical survey is included in Appendix A.
5. Proposed Development
 - 5.1. The proposed development will comprise the demolition of existing barn 'D', creation of new access to highway, construction of new 3 bed dwelling and change of use of land.

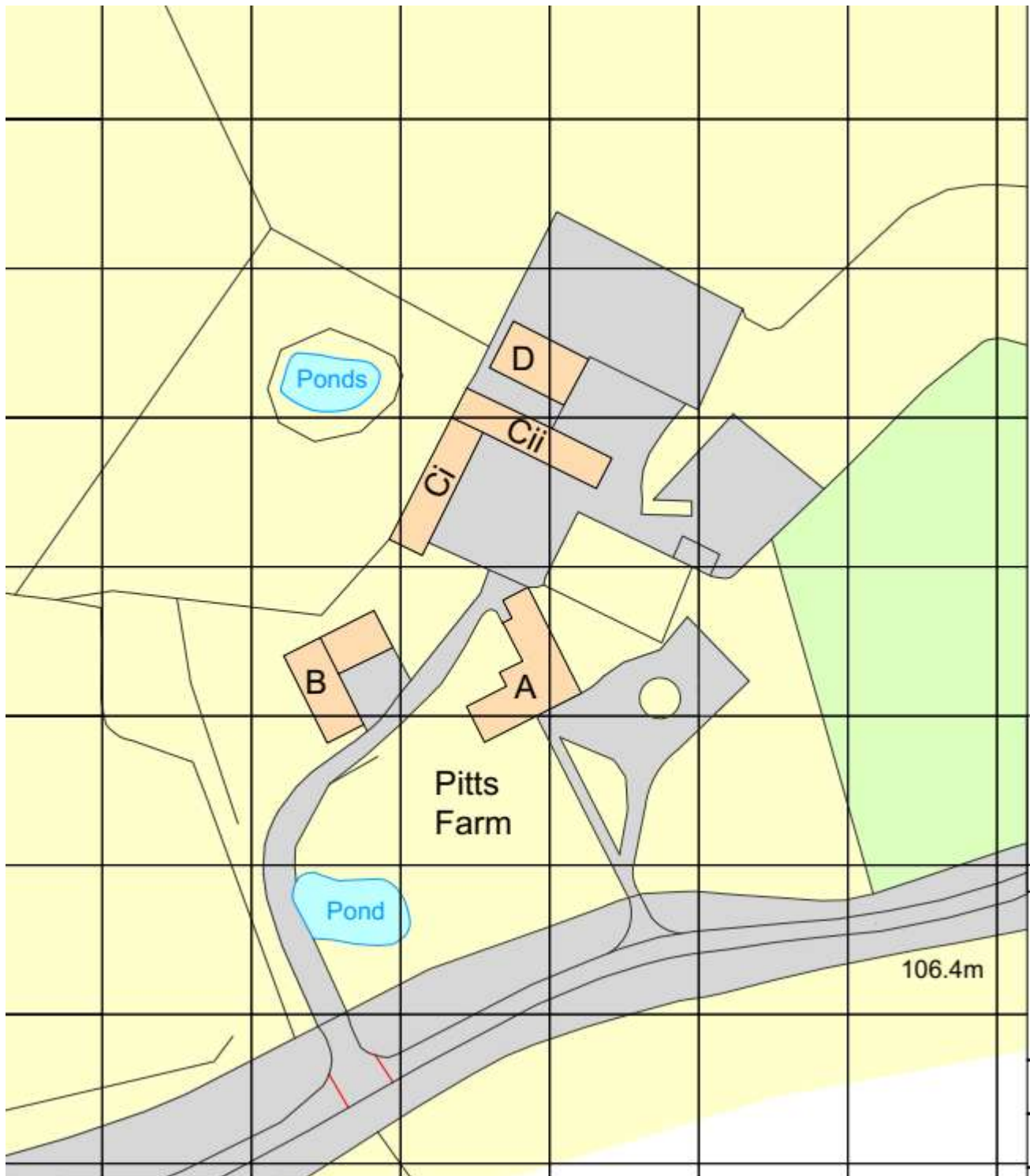


Figure 1 – Block Plan

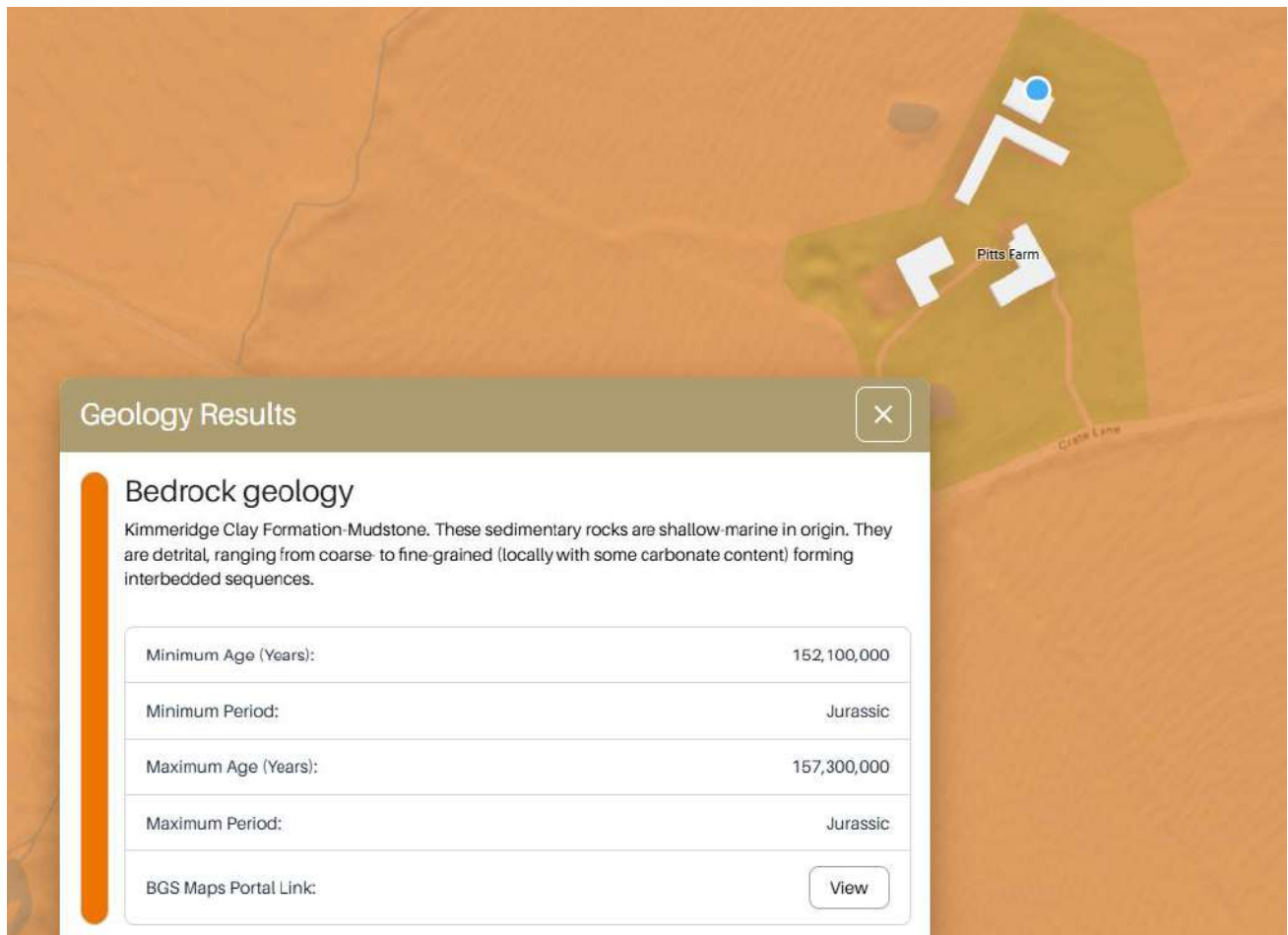


Figure 2 Geological Map from BGS Maps

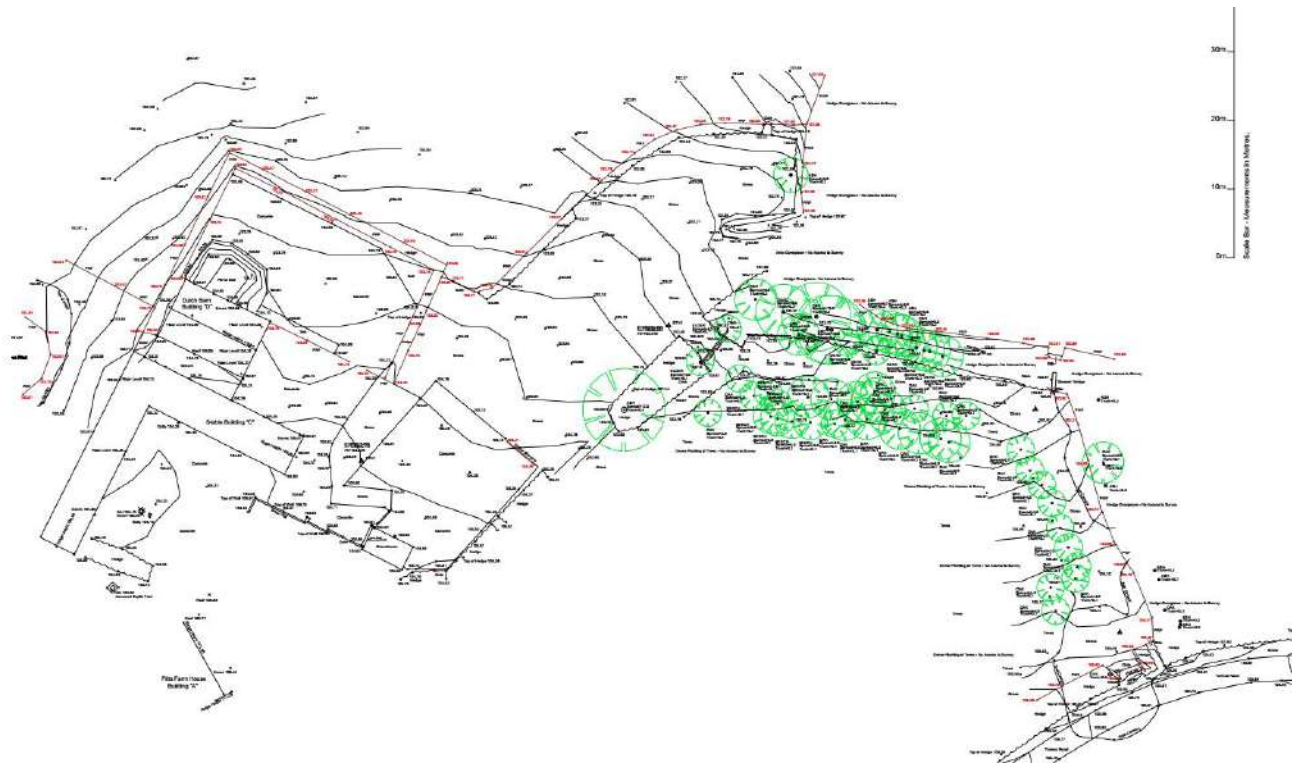


Figure 3 – Extract from topographic survey



Figure 4 – Aerial View from Google Maps



Figure 5 – Location Plan

Existing Drainage

6. The total area of the land is 0.115ha.
7. The area of the existing buildings is 126m².
8. Other impermeable surfaces (paving and walls) comprise a further 1026m².
9. Permeable surfaces comprise the remaining 0 m².
10. Overland runoff currently flows towards the existing watercourse via the natural slope of the ground.

Proposed Development

11. The proposed development will comprise the demolition of existing barn 'D', creation of new access to highway, construction of new 3 bed dwelling and change of use of land, see Architectural drawings for further information, an extract of which is shown in Figure 6.
12. The total area of the land is 0.115ha.
13. The area of the proposed buildings is 180m².
14. Other impermeable surfaces (paving and walls) comprise a further 114m².
15. Permeable surfaces comprise the remaining 856m².
16. Overland runoff currently flows towards the existing watercourse via the natural slope of the ground.

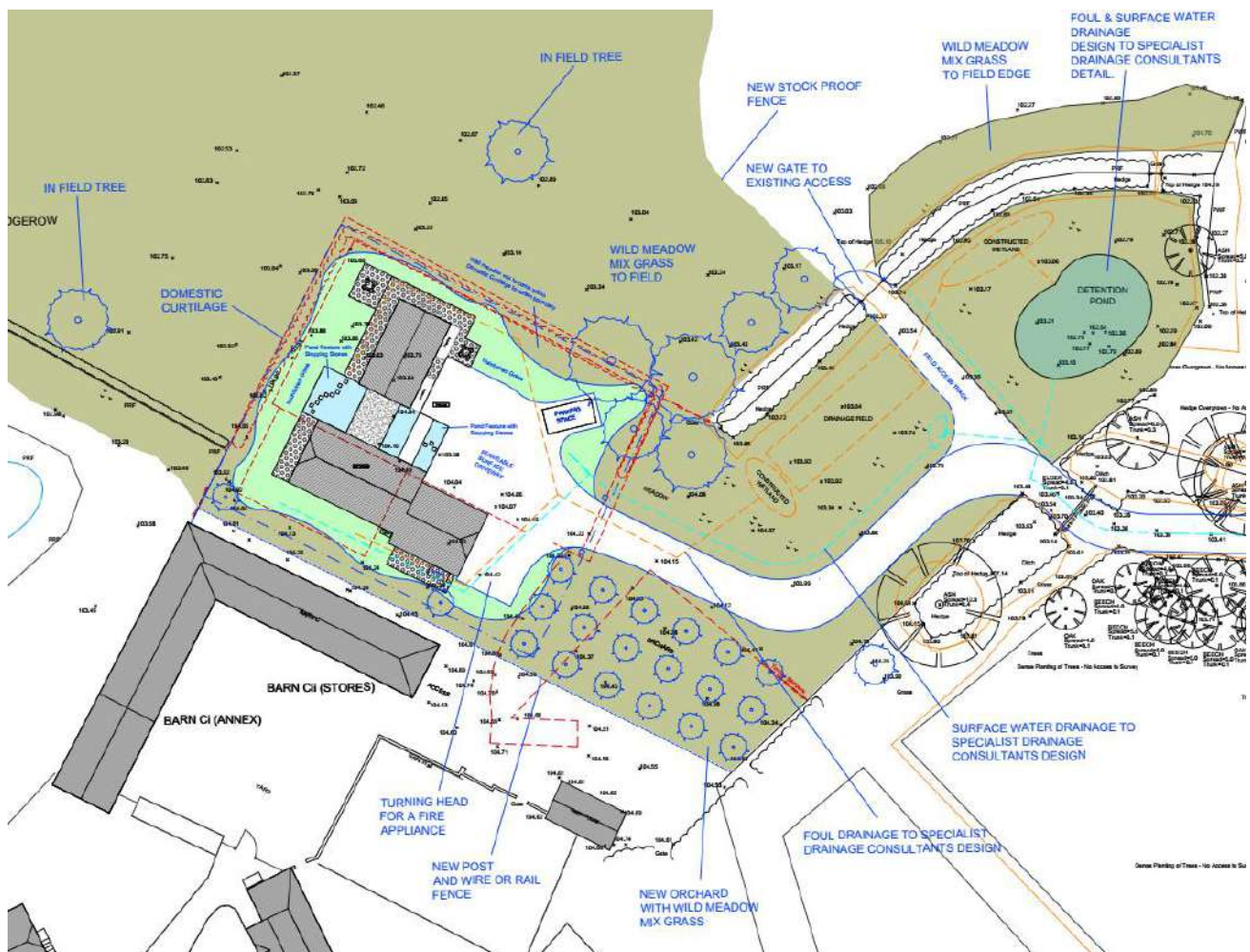


Figure 6 – Extract from drawing 2425136 13_E by WDA 'Proposed Site Plan'



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Flood Risk Vulnerability

17. Annex 3 of the NPPF Flood Risk Vulnerability Classification provides guidance on assigning development vulnerability. A summary of this information is provided in Table 1.

Table 1 – Extract from Annex 3 of the National Planning Policy Framework and Table 2: Flood risk vulnerability classification of PPG detailing Flood Risk Vulnerability Classification by use. Proposed Site-specific classification shaded blue.

ESSENTIAL INFRASTRUCTURE	HIGHLY VULNERABLE	MORE VULNERABLE	LESS VULNERABLE	WATER-COMPATIBLE
Essential transport infrastructure	Police and ambulance stations; fire stations and telecom installations	Hospitals	Police, ambulance and fire stations which are not required to be operational during flooding.	Flood control infrastructure.
Essential utility infrastructure which has to be located in a flood risk area for operational reasons	Emergency dispersal points.	Residential institutions such as residential care homes, prisons and hostels.	Buildings used for commercial purposes and of a non-residential nature	Water transmission infrastructure and pumping stations.
Wind turbines.	Basement dwellings.	Buildings used for dwelling houses and sleeping, drinking establishments	Land and buildings used for agriculture and forestry.	Sewage transmission infrastructure and pumping stations.
Solar farms.	Caravans, mobile homes and park homes intended for permanent residential use.	Non-residential uses for health services, nurseries and educational uses	Waste treatment (except landfill* and hazardous waste facilities).	Sand and gravel working.
	Installations requiring hazardous substances consent.	Landfill* and sites used for waste management facilities for hazardous waste.	Minerals working and processing (except for sand and gravel working).	Docks, marinas and wharves and Navigation facilities.
		Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.	Water treatment and Sewage treatment works which do not need to remain operational during times of flood.	Ministry of Defence installations.

18. The proposed use changes the vulnerability classification from Less Vulnerable (land and buildings used for agriculture) to 'More Vulnerable' residential development ('buildings used for dwelling houses').

Flood Risk Assessment Scope

19. Flood risk as defined by the NPPF, is a combination of the probability and the potential consequences of flooding. Areas at risk of flooding are those at risk of flooding from any source, now or in the future. Sources include rivers and the sea, direct rainfall on the ground surface, rising groundwater, overwhelmed sewers and drainage systems, reservoirs, canals and lakes and other artificial sources. Flood risk also accounts for the interactions between these different sources. This term is key to the application of the presumption in favour of sustainable development in paragraph 11 of the National Planning Policy Framework (NPPF).
20. The NPPF requires flood risk to be considered on all sites, however more detailed site-specific FRA's are required when one or more of the following criteria apply to the site:
 - Where a site is affected by the **Design Flood Event (DFE)** from any source (typically the 1% AEP) for all proposals of any new development (including minor development and change of use); or
 - Greater than 1 ha in size and located in Flood Zone 1; or
 - Located in Flood Zone 1 where there are critical drainage problems or within a designated Critical Drainage Area (CDA) as notified to the LPA by the Environment Agency; or
 - Subject to a change of use to a higher vulnerability classification which may be subject to other sources of flooding; or
 - A Major planning application (i.e., more than 10 residential dwellings).
21. The NPPF designates that the 'Design Flood Event' (DFE) is used to assess the suitability of a development proposal against the criteria of the NPPF. The design flood, is a flood event of a given annual flood probability, but is generally taken as:
22. River flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), typically shown as Flood Zone 3a as designated on the EA's Flood Map for Planning; or
23. Tidal flooding with a 0.5% annual probability (1 in 200 chance each year), typically shown as Flood Zone 3a as designated on the EA's Flood Map for Planning; or
24. Surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), typically shown as the Medium Risk of Surface Water flooding as designated on the EA's Long Term Flood Risk mapping,
25. In addition to assessing present day risk, the DFE also must be assessed to include and appropriate allowance for climate change where possible (refer to Section 5 for climate change allowances), based on the site's geographical location, vulnerability and design life.
26. For the purpose of this FRA, the worst case DFE (whether this be from tidal, river or surface water sources), has been used to steer the recommendations of this report. Consideration of extreme events above that of the DFE have not been considered further beyond identifying these as residual risks and providing mitigation measures where appropriate.
27. Table 1 of the NPPF provides definitions of the Flood Zones, from low to high probability of river and sea flooding and also in regards to surface water flood risk. These Flood Zone Classification for the purpose of this FRA are:
 - Flood Zone 1 - land assessed as having a less than a 1 in 1,000 annual probability (<0.1%);
 - Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river (1% – 0.1%), 1:100 year or greater of surface water flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year;

- Flood Zone 3 - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. Flood Zone 3b is land have greater than 1 in 20 to 1 in 30-year annual probability of flooding.
28. Following an assessment from the various sources of flood risk for the DFE, this site-specific FRA has applied the key principles for decision making when flood risk is a consideration and includes in order of importance:
- **Avoid** – This is to physically locating the development proposals to areas of lowest flood risk within the site and/or determined how to vertically place the proposals to such that more vulnerable uses are positioned above the design flood level (such as raising floor levels or placing more vulnerable uses on upper levels). Developers should refer to the BS 85500:2012-Flood resistant and resilient construction. Guide to improving the flood performance of buildings for applicable strategies);
 - **Control** - Planning authorities and developers can investigate measures to control the risk of flooding affecting the site (this may be through flood defences, flood gates, flood storage or other engineered solutions such as SUDS). This is rarely applied at the site level and is mostly address through strategic and county level flood defence strategies. At this site level, typically this will be through applying a Water Exclusion or Water Entry strategy when design a building or space.
 - **Mitigate** – Is the use of flood resistance and resilience measures to address any residual risks remaining after the use of the avoidance and control measures described above. Passive measures should be prioritised above active measures as they are likely to be more effective and more reliable. Flood Resilience is an approach to building design which aims to reduce flood damage and speed recovery and reoccupation following a flood. It uses a combination of flood resistance and recovery measures (referred to here as resilience measures), and is described in the industry-developed CIRIA Property Flood Resilience Code of Practice, which provides advice for both new-build and retrofit.
 - **Managing Residual Risk** – this will usually involve ensuring either safe access or egress is available from the site in a DFE. This could include Flood Warning Systems/Evacuation Plans, safe refuge on site during a DFE, or the building is designed to account for flood loadings etc.
 - **Flood Risk is not increased elsewhere** – assuming all the above items can be address, it is critical that the development does not increase flood risk elsewhere as a result. Typically this is addressed by ensuring flood waters are not displaced (in surface water or river flood affected areas, the loss of floodplain storage is less likely to be a concern in areas benefitting from appropriate flood risk management infrastructure or where the source of flood risk is solely tidal.) or appropriate hydraulic modelling is provided in support of an application to demonstrate that flood risk is not increased outside of a site (such as through on site flood compensation or detailed site specific hydraulic modelling).
29. It should be noted, where up-to date flood risk or climate change models are not available, best efforts have been made to assess these risks and extrapolate the available data where necessary. However, this approach may require further detailed modelling if deemed necessary by the reviewing authorities. Detailed 2D hydraulic modelling is deemed outside the scope of this report

Sequential Test

30. The risk based sequential test is applied at all levels of planning. The objective is to ensure that new development occurs in areas at least risk of flooding. The following pages will demonstrate that the development parcel allocated within this site are all within Flood Zone 1.

Pluvial Flood Risk

6. A review of the available flood risk mapping shows that the development site has a **Very Low** risk of surface water flooding (Figure 7), meaning that the chances of a yearly flooding from surface water are less than 0.1% within a 20m radius of this property. There are some areas that have a higher chance of flooding; all development will be outside these areas.

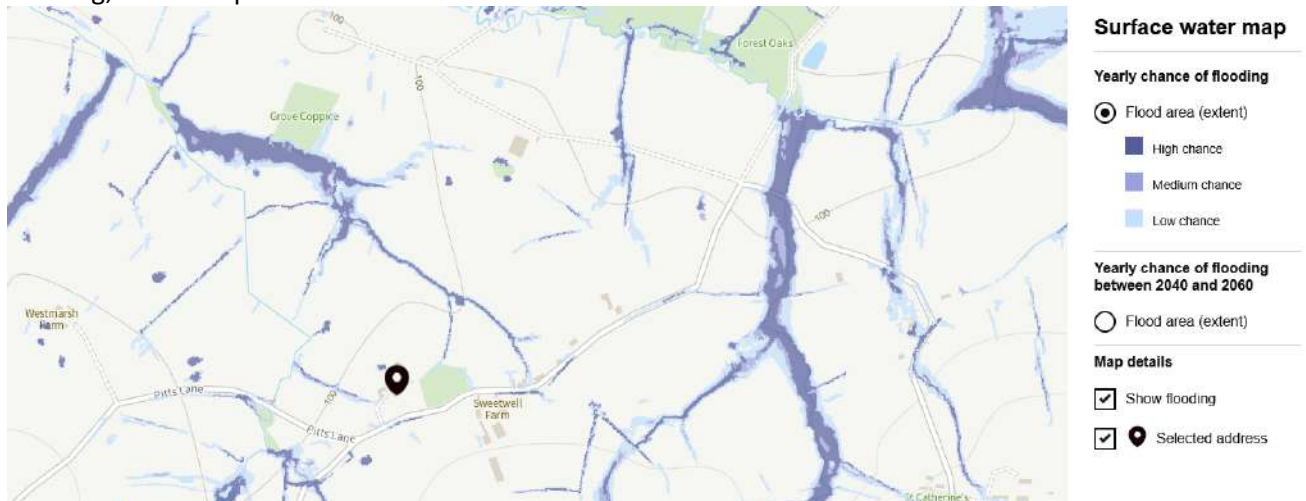


Figure 7 - Surface Water Flooding Risk

Fluvial Flood Risk

31. A review of the available flood risk mapping shows that the development area has a **Very Low** risk of flooding from Rivers and the Sea (Figure 8), meaning that the chances of a yearly flooding from rivers and sea is less than 0.1% within a 20m radius of this property. There are some portions of the land that have a higher chance of flooding; all development will be outside these areas

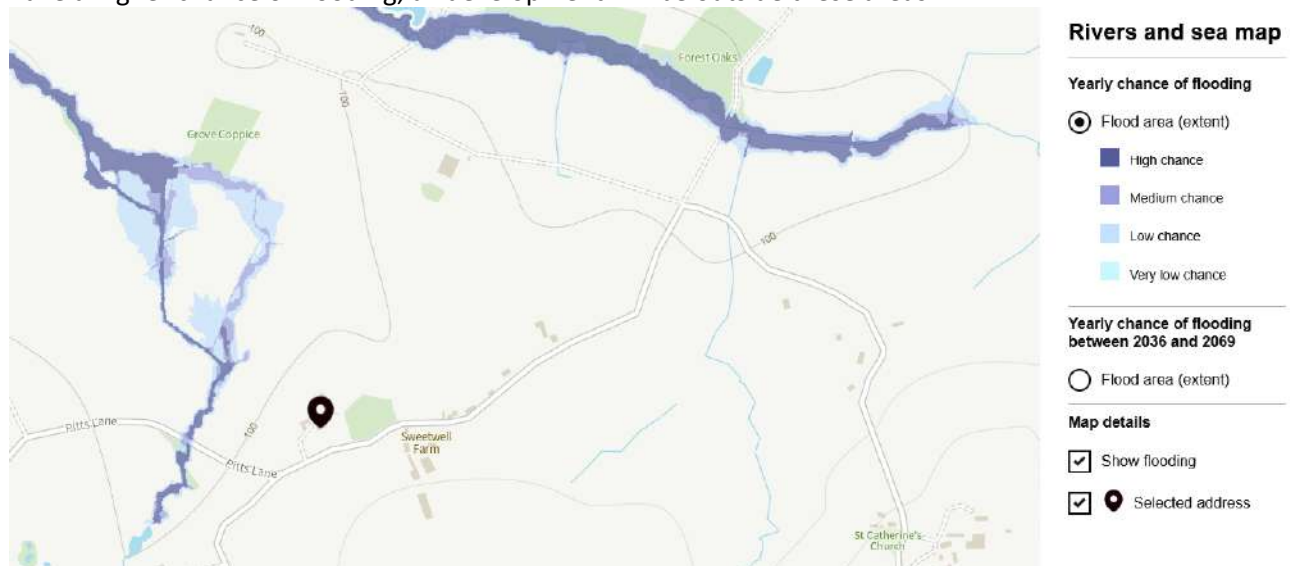


Figure 8 - Rivers and Sea Flooding Risk

32. The corridor of land either side of the watercourse to the West of the site is within Flood Zone 2 and 3, Figure 9. This zone is outside the portion of the land that has been identified as the development site. All development will be outside the area identified as being within the flood zone.

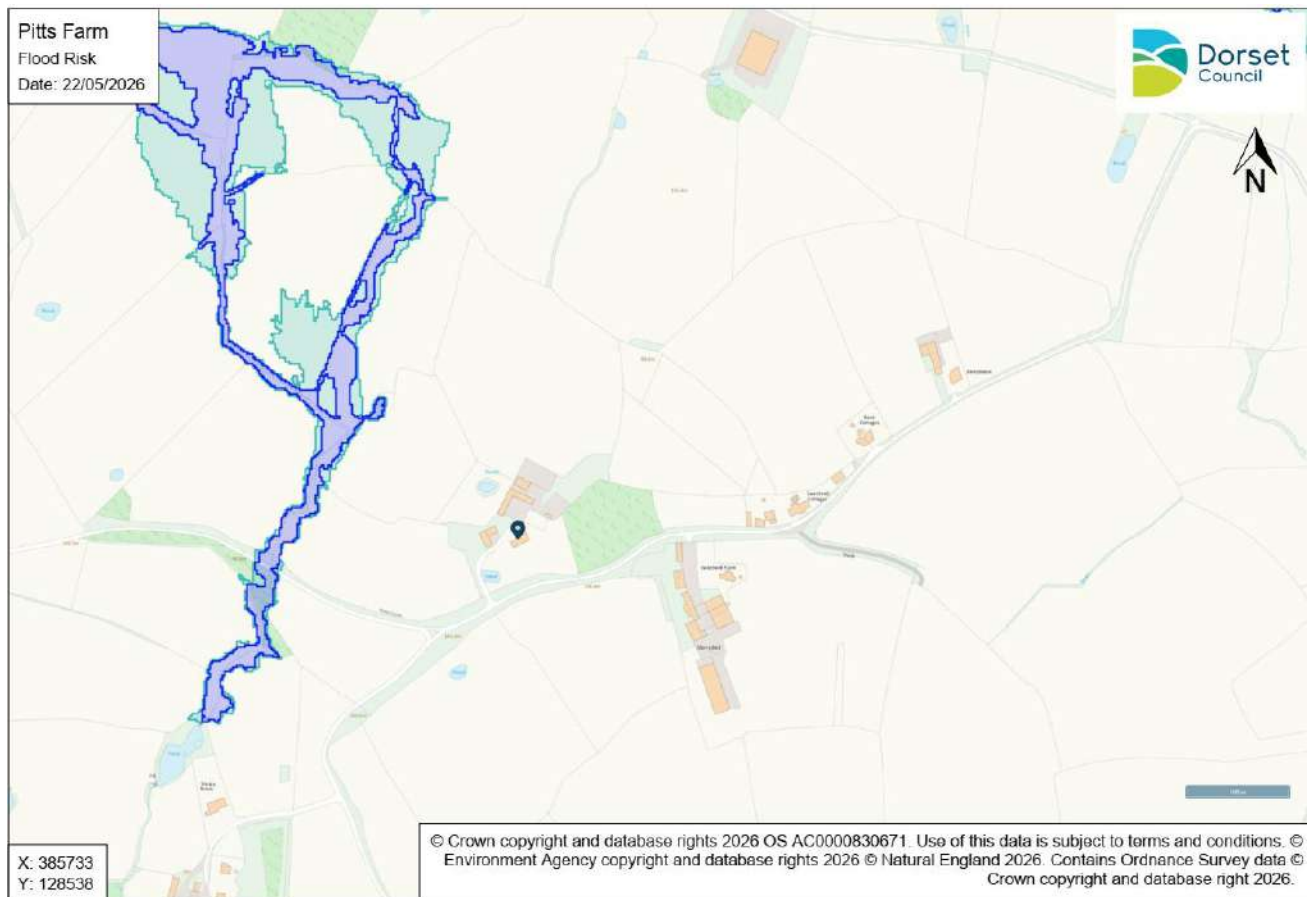


Figure 9 - Flood map for planning

Groundwater

33. Flooding from Groundwater is unlikely in this area.
34. Groundwater Source Protection Zones: The site does not lie within an Environment Agency Source Protection Zone regarding the protection of the quality of groundwater that is abstracted for potable supply.

Sewer Flooding

35. Sewer flooding is a risk in Gillingham, however, there are no existing sewers within this site.
36. The SFRA for North Dorset does not state this an area of concern

Historic Flooding

37. Major flooding has occurred in the past on the River Stour to the West of the development site.
38. The River Ladden has been subject to minor flooding in the past.
39. The development site will be several metres higher than the watercourse.

Flood Risk Mitigation

Pluvial Risk Summary

40. The development parcel is located within an area that has very low risk of surface water flooding. The sloping nature of the site means that surface water will naturally flow downhill away from the development. It will be essential that the detailed design of the development makes provision for the effective management of surface run-off.
41. The Flood Map for planning shows that the proposed location of access road has a risk of surface water flooding during a 1 in 1000-year storm event (Figure 10).

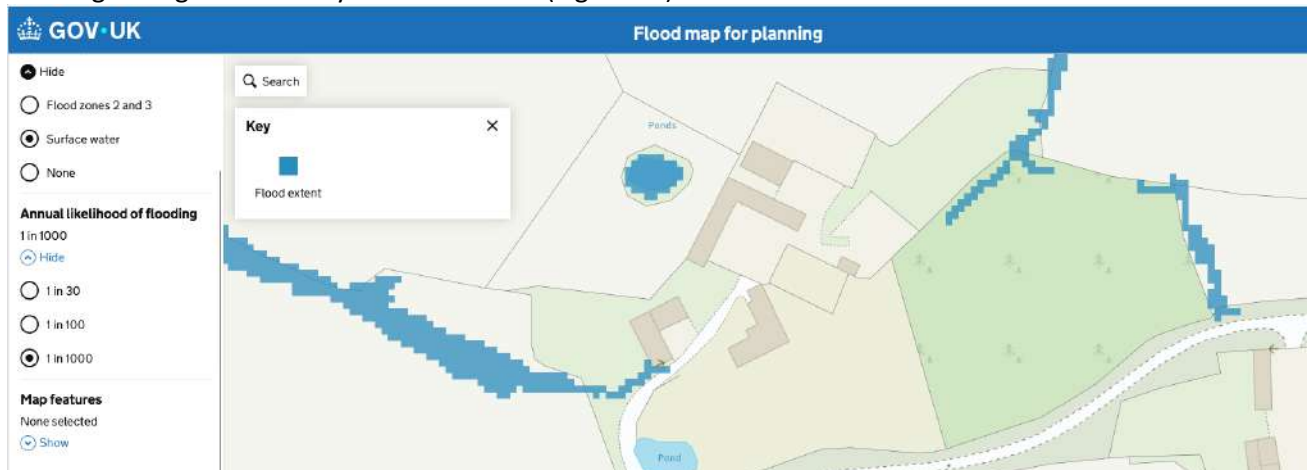


Figure 10 - Flood Map for Planning

42. The Dorset Explorer shows that the predicted depth of this flooding is generally less than 200mm (Appendix B: Surface Water Flooding).
 - 42.1. A small area of the land is predicted to have surface water flooding of between 200 and 300mm; this will be the edge of the road. It is noted that there is already a buried plastic pipe in this area..
 - 42.2. None of the development site will have flooding between 300 and 600mm deep.

Fluvial Risk Summary

43. The development parcel is located within an area that has very low risk of flooding from rivers or the sea. The watercourse is located at the base of the slope, away from the proposed development zone.
44. The site forms part of the catchment for the River Lodden Watercourse. It is essential that the surface runoff from this site does not increase the risk of downstream flooding. Effective solutions should be provided to provide effective flow control.

Estimated Flood level

45. The Dorset Explorer shows that the predicted level of surface water flooding is 103.1m (Existing site level = 102.8m + 0.3m surface water flooding (low risk) Appendix B: Surface Water Flooding).
46. The proposed Finished Floor Level is 104.00m which is 700mm above this.

Mitigation Recommendations

47. Providing that the development occurs within areas that are Flood Zone 1 then no mitigation measures are required for this site.
48. A surface water drainage strategy is provided on the following pages demonstrating how the site will be developed to mitigate the potential for downstream flooding.

Post-development Residual Risk Summary

Source of Potential Flooding to the Development Site	Flood Risk	Comments	Mitigation
Tidal	Low	The site is not at risk of Tidal Flooding.	No mitigation measures are required.
Fluvial	Low	The development parcels are in Flood Zone 1 and are not at risk of fluvial flooding.	No mitigation measures are required.
Pluvial	Low	The site is at low risk of pluvial flooding.	No mitigation measures are required.
Historic	Low	There are no recorded flooding incidents within the site.	No mitigation measures are required.
Groundwater	Low	No records indicate groundwater emergence or flooding issues within the vicinity of the site.	No mitigation measures are required.
Sewers	Low	No incidents of properties flooding from sewers in the postcode region of the site.	No mitigation measures are required.
Artificial	Negligible	Mapping data from the EA indicates no flooding extent from the reservoirs.	No mitigation is required.

Proposed Drainage Strategy

49. The drainage for the site must be suitable to manage the surface water run-off for a 1-in-100-year storm plus 45% Climate Change Allowance.
50. A review of the available geological data has shown that the site has limited potential for infiltration drainage. It will not be possible to effectively manage the surface water run-off using infiltration to the ground.
51. It will be necessary to provide Attenuation storage of rainfall prior to discharge to a constructed wetland area which shall overflow into a drainage mound and a downstream pond. The attenuation storage will be sized to receive water from the roofs and the surface water from the roads and pedestrian areas for the design storm.
52. It is proposed that the parking area and access road are installed in a permeable material, with filter drains at the base of the stone sub-base to carry excess water to a swale that will provide treatment and storage.
53. The attenuation volume will be calculated ignoring the potential for infiltration; as it is likely that during prolonged periods of rainfall the ground will become saturated, limiting the potential for infiltration. In this event the surface water will likely run over ground, or within the upper soil levels, until it reaches a swale. The swale will then carry the water down to the attenuation pond.

Foul Water:

54. Foul water discharge will be collected and discharged to the ground via a sewage treatment plant. As the infiltration rate of the ground is likely to be poor the sewage treatment plant will discharge to a constructed wetland area for secondary treatment which shall overflow into a drainage field and a downstream wetland scrape.

Geotechnical Summary

55. No intrusive investigation has been completed.
56. The site has the following geotechnical risks:
 - 56.1. Sloping ground.
 - 56.2. Anticipated poor infiltration characteristics.

Surface Water:

57. A hierarchical approach to the drainage strategy has been considered for this development and the surface water will all be retained on site and receive appropriate treatment prior to discharge into an adjacent watercourse.

Table 2 - SuDs Hierarchy

SUDS	Viability	Rationale
Onsite Storage and re-use	Partial	Rainwater butts to be provided for residential dwelling. Larger scale applications are not considered suitable.
Living Roofs	No	Not suitable for the site constraints (proximity to Listed Building)
Infiltration	Partial	Unsuitable ground conditions.
Ponds/Wetlands with discharge to watercourse	Yes	Attenuation swales will be provided at the perimeter of the road; these will discharge into ponds and wetlands within the vegetative border of the site. This will mimic the "greenfield" form of the site and provide habitat for invertebrates and the birds that feed on them.
Swales/Filter Drains	Yes	Open swales will act as carrier drains, which has benefits in terms of surface water treatment and storage. Water from roads and roofs will be discharged into the swales as close to source as possible.
Soakaways	No	Unsuitable ground conditions. Where infiltration is possible then infiltration rate is poor and so insufficient space will be available within residential gardens for 1:100-year storm.
Porous Paving (Infiltration)	Partial	Infiltration testing results are not available for the site. A hybrid system will be used with a permeable geotextile but a drainage pipe to carry excess water to a swale.
Porous Paving (Attenuation)	Partial	A hybrid system will be used with a permeable geotextile but a drainage pipe to carry excess water to a swale.
Attenuation/ Source Control with discharge to sewer	No	Not required, as runoff can be discharged to ground.

58. Surface water from roofs, roads and paved surfaces must be treated prior to discharge into the watercourse.
- 58.1. Surface water from the roof shall be collected from each rainwater pipe, at least 1 of the downpipes will be collected into rainwater butt with an overflow, and discharged into the permeable pavement, which will provide treatment and intercept the first 5mm of rainfall prior to discharge to the swales.
- 58.2. The primary treatment for paved surfaces will be the permeable pavement. The base of this area will not be lined to permit infiltration in this zone. Secondary treatment will also be provided by the swales. Suitable vegetation combined with the natural action of the sun will provide treatment of pollutants such as nitrate and heavy metals within the amenity area. The runoff flow will subsequently be conveyed to the attenuation pond. Stone Check dams will be provided to slow the runoff so that treatment can take place.
- 58.3. Exceedance flow from the paved surfaces will be directed towards the swale by sloping the ground.
- 58.4. The final step of the treatment train will be the attenuation pond and wetlands. This will be sized to accommodate run-off from all the impermeable area for a 1 in 100-year storm plus 45% climate change allowance.
59. Attenuation will be provided by the installation of a pond and wetlands. The pond shall be formed using site won material. The volume of the pond has been determined for the catchment area, a runoff coefficient of 1.0 and the site discharge rate of 1l/s.
60. Calculations show that no flooding will occur during the 30-year return period. There is a risk of surcharge during the 1-100 year +45% CCA storm. The exceedance flow will be contained in the raingardens and swales.
61. Prior to discharge to the surface water sewer a Hydro-brake Optimum, or similar discharge control, will be installed to limit the outflow. A hydro-brake is a vortex flow control device. Vortex devices mitigate the risk of blockage by inducing a vortex motion that is self-activating and operates without any mechanical components. Outlet clearances up to 6 times larger than an equivalent orifice plate, significantly reducing the risk of blockages and the associated maintenance costs.

Discussion

62. Geological maps indicate that infiltration is not suitable for the site.
63. Surface water run-off must therefore be attenuated prior to controlled discharge to a watercourse.
64. Greenfield Run-off rate for 0.115ha, 1–10-year storm = 1.1l/s. [Appendix A].
65. The attenuation volume will be calculated ignoring the potential for infiltration; as it is likely that during prolonged periods of rainfall the ground will become saturated, limiting the potential for infiltration. In this event the surface water will likely run over ground, or within the upper soil levels, until it reaches a swale. The swale will then carry the water down to the attenuation pond.
66. Hydraulic analysis has been completed and is included within Appendix B. The parameters of the design report have been set-out within this report.
 - 66.1. Rainfall has been determined using FEH-22 for a storm with a return period of 2 years; 10 years; 30 years + 30% CCA; and 100 years with 45% CCA.
 - 66.2. Pond 1:
 - 66.2.1. Impermeable Area of 0.115ha.
 - 66.2.2. Discharge rate of 1.1l/s
 - 66.3. Note: the drainage networks have been modelled using levels that have been determined from an indicative site layout. The site layout is subject to change will be finalised during the detailed design stage.
67. The ponds have been designed to be outside the flood zone that is identified in the Environment Agency data.

Water Quality:

The SuDS Manual (Ciria C753, November 2015) describes risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e., the pollution source)
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels
- The sensitivity of the receiving environment

The EA website indicates that the site does not lie within a Source Protection Zone. The recommended approaches for water quality risk management are given in the SuDS Manual Table 26.1 (reproduced below)

As per Table 26.1 Simple Index approach will be used as a design method for this site.

TABLE 26.1 Approaches to water quality risk management			
Design method	Hazard characterisation	Risk reduction	
		For surface water	For groundwater
Simple index approach	Simple pollution hazard indices based on land use (eg Table 26.2 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.3 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.4 or equivalent)
Risk screening ⁱ	Factors characterising traffic density and extent of infiltration likely to occur (eg Table 26.5 or equivalent)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (eg Table 26.5 or equivalent)
Detailed risk assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in event mean discharge concentrations and total annual load reductions delivered by the system	

Pollution Hazard Indices are given for different land uses in Table 26.2 of the SuDS manual (reproduced in). The land uses for the surface water drainage for this site are;

- Residential Roofs
- Residential parking areas

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. Therefore, the following must be achieved for the surface running off the site.

Total SuDS mitigation index $\geq$ pollution hazard index



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All surface water will be collected and pass conventional pipework with water butt and raingarden (**Error! Reference source not found.**); runoff will then be conveyed through swales into attenuation ponds and wetlands. From Table 26.3 (Figure 11) this will provide sufficient mitigation index for the roofs and access areas.

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
SUDs Component:	Treatment Mitigation Indices			
Permeable Pavement		0.7	0.6	0.6
Individual property driveways, residential car parks, low traffic roads (e.g., cull de sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., <300 traffic movements/day	Low	0.5	0.4	0.4
SUDs Component:	Treatment Mitigation Indices			
Permeable Pavement		0.7	0.6	0.6
Swale		0.5	0.6	0.6

Pollution hazard indices for different land use classifications table

Table 3 - CIRIA C753 Table 26.2

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g., cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., <300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail) all roads except low traffic roads and trunk roads/motorways, and roads that have more than 300 traffic movements daily	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g., haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates ¹	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.6 ⁴	0.5	0.6
A soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.8 ⁴	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Figure 11 - SuDS Mitigation indices.

Exceedance:

It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible, however, it is practicable to minimise the risk by careful design of the layout of the development such that internal flooding is avoided. Areas of hard standing can be laid to fall away from buildings to provide a significant volume of surface storage during extreme events with flows directed to areas where damage and disruption to operations will be minimised such as onto the access road then soft-landscaped areas.

Swales will be provided at the bottom of slopes and the perimeter of the site; these will not only act as carrier drains but also intercept overland flow that would leave the site without being captured if buried pipes were used.

Designing for Amenity:

- 68. Piped drainage prevents natural percolation of rainfall into groundwater resources that support summer river flows. It can lead to the concentration of nitrates and phosphates in rivers and wetlands, causing an increase in algal blooms, harming wildlife and reducing amenity value. The use of open channels and provision of ponds and wetlands will support the well-being of people and communities and increase the amenity value of developed land.
- 69. SuDS designed with people and wildlife in mind from the very beginning can result in wildlife-rich green space and therefore offer many other amenity benefits.

Designing for Biodiversity:

- 70. The contribution of biodiversity to sustainable development and 'liveability' agendas is fully recognised in national strategies, regional and local policies and programmes dealing with urban areas and development.
- 71. The use of SuDS features on this site will maximise wildlife, water and landscape benefits for people and support wider ecosystem function at the same time, see following pages.

Source control: Permeable Pavement

- 72. Description
 - 72.1. Gravel roadway and parking area to provide permeable surface
 - 72.2. Permeable sub-base stone with voids between large stones for water storage
- 73. Benefits
 - 73.1. *Environmental*
 - 73.1.1. reduces run-off and localised flooding
 - 73.1.2. groundwater recharge if geology suitable
 - 73.1.3. intercepts and filters pollutants at an early stage

Conveyance features: Swales

- 74. Description
 - 74.1. swales are linear, shallow channels that transport water from one part of the SuDS management train to the next
 - 74.2. shallow pools within swales can be create by using small check dams
- 75. Benefits
 - 75.1. *Environmental*
 - 75.2. slows run-off from hard surfaces
 - 75.3. allows natural infiltration into soil
 - 75.4. intercepts and filters pollutants
- 76. *Amenity*
 - 76.1. an informal soft landscaped edge to hard surfaces can enhance aesthetic appeal
 - 76.2. wildflower enhancement of grassland and ephemeral pools increases visual appeal
 - 76.3. ideal for informal recreation and relaxation. With some thought and creativity, opportunities for seating, interpretation, formal recreation can be incorporated.
- 77. *Wildlife*
 - 77.1. provides shelter, somewhere to forage and breed for invertebrates, birds and mammals
 - 77.2. can be planted with native wetland plants, taking care not to impede stormwater passage and visibility
 - 77.3. shallow pools upstream of check dams provide opportunities for wetland plants.

Site control: Retention basins and associated wetlands

78. Description

- 78.1. contain permanent water and other wetland habitats e.g. temporary pools, wet grassland, wet woodland and reedbeds
- 78.2. capacity to store storm run-off, releasing it at a controlled rate during and after the peak flow has passed
- 78.3. last stage in management train before release of clean water into receiving watercourse (or infiltration to ground).

79. Benefits

79.1. *Environmental*

- 79.1.1. extended retention period removes yet more pollutants before allowing water into catchment
- 79.1.2. links urban and suburban wetland habitats to the wider landscape
- 79.1.3. reduces flooding.

79.2. *Amenity*

- 79.2.1. attractive public open space
- 79.2.2. informal exercise, recreation and play, relaxation and learning

79.3. *Wildlife*

- 79.3.1. provides shelter, food and foraging and breeding opportunities for a variety of wildlife species including amphibians, plants, invertebrates, birds, bats and other mammals
- 79.3.2. opportunities to create wet woodland, reedbed, open water and wet grassland



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Maintenance Regime:

Management Arrangements:

The occupant of the property will be responsible for the management and maintenance of the drainage of all areas, including the parking areas and the access road.

As part of the overall management of the estate, a service charge account will be set up to include cover for the maintenance and management of the SuDS system in accordance with the site-specific maintenance regime adopted. The freeholder will put in place arrangements to draw on service charge contributions and intends to establish a reserve fund to cover the requirements arising for the replacement of major system components at the end of the manufacturers recommended design life.

General Drainage Maintenance Specification

Permeable Pavement

- Outlet structures such as rainwater downpipes should always be free from obstruction to allow free flow through the SuDS.

Inlet Structures and Inspection Chambers	
Monitoring	Frequency
Initial Inspection	Within 3 months of installation
Inspection for poor performance and silting	Annually
Regular Maintenance	Frequency
Outlet Structures Inspect silt-trap and outlet chamber, removing obstructions and silt as necessary. Check that there is no physical damage.	Annually
Pavement Sweeping surface to remove debris and contamination	1 -2 times a year, typically Spring and after leaf fall in Autumn
Occasional Maintenance Removal of weeds	As necessary
Remedial Work Remediate areas of rutting and depressions.	As required
Repair physical damage if necessary	As required
Rehabilitate surface with sweeping and reapplication of 2-4mm gritstone	As required



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Inlet Structures and Inspection Chambers

- Inlet structures such as rainwater downpipes, road gullies and channel drains should be free from obstruction at all times to allow free flow through the SuDS.
- Inspection Chambers and rodding eyes are used on bends or where pipes come together. They allow access and cleaning to the system if necessary.

Inlet Structures and Inspection Chambers	
Regular Maintenance	Frequency
Inlet Structures Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt as necessary. Check that there is no physical damage.	Monthly
Inspections Chambers and below ground control chambers Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in Autumn	Annually
Occasional Maintenance	As necessary
Remedial Work Repair physical damage if necessary	As required

Below ground drainage pipes

- Below ground drainage pipes convey water to the SuDS system. They should always be free from obstruction to allow free flow.

Below Ground Drainage Pipes	
Regular Maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required take remedial action.	Monthly for 3 months then annually
Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Remedial Work	
Repair physical damage if necessary	As required
Monitoring	
Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed.	Annually
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required



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Swales, Ponds & Wetlands

- The maintenance of swales, ponds and wetlands involves regular inspections, clearing of debris and ensuring proper vegetation health.
- By following these maintenance practices the water features can continue to function effectively, preventing overflow damage and supporting the health of the surrounding environment.

Swales, Ponds & Wetlands	
Regular Maintenance	Frequency
Remove accumulated sediments and collect litter and debris to maintain the capacity of the swale and prevent overflow. <i>Litter Picking</i> <i>Silt Management</i>	<i>12 visits per year</i> <i>1 visit per year</i>
Healthy Vegetation stabilises the soil and slows water velocity, reducing the risk of overflow. <i>Mow all dry swales, dry SuDS basins and margins to low flow channels and other SuDS features at 100mm with 150mm max.</i> <i>Cut wet swales or basins annually as wildflower areas</i>	4-8 Visits as required Seasonally or as required
Trim vegetation around structures and keep hard aprons free from silt and debris to ensure proper water flow.	Seasonally or as required
Remedial Work Repair physical damage if necessary	As required
Monitoring Regular Inspections: Conduct visual inspection to identify any signs of erosion or blockages, Monitor soil structure; regularly check for soil compaction or erosion in the embankments and the base of the water features.	1. At the start of each season 2. After heavy rainfalls 3. Following strong winds or storms 80. Annually, or as required

Vegetation Management (see also Landscape Architect's advice)

- Strim or mow grass within the swale annually in September – November removing cuttings to a wildlife pile or from site; allow vegetation to grow to at least 100mm or to full height annually in the low flow channel or stream bed.
- Mow the path verge and grass up to the swale.
- Allow grass beyond the swale to develop as meadow and cut at 100mm September – November removing cuttings to a wildlife pile or from site
- Cut meadow grass at 100mm September – November removing cuttings to a wildlife pile or from site
- Monitor how the pond edge develops and cut 30% of vegetation at 100mm each year during September – November, if required, removing cuttings to wildlife piles or from site
- Occasionally remove pond vegetation, if it spreads across the pond, by hand clearing, raking or machine clearance, using a 1 – 3 tonne tracked vehicle, with cuttings removed to wildlife piles or from site
- Check the outlet from the pond and the inlet on the other side of the bank are clear



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Appendix A: Greenfield Run-off Rate

Note; these values are also corroborated within the Flow output.



Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (<https://www.uksuds.com/>)

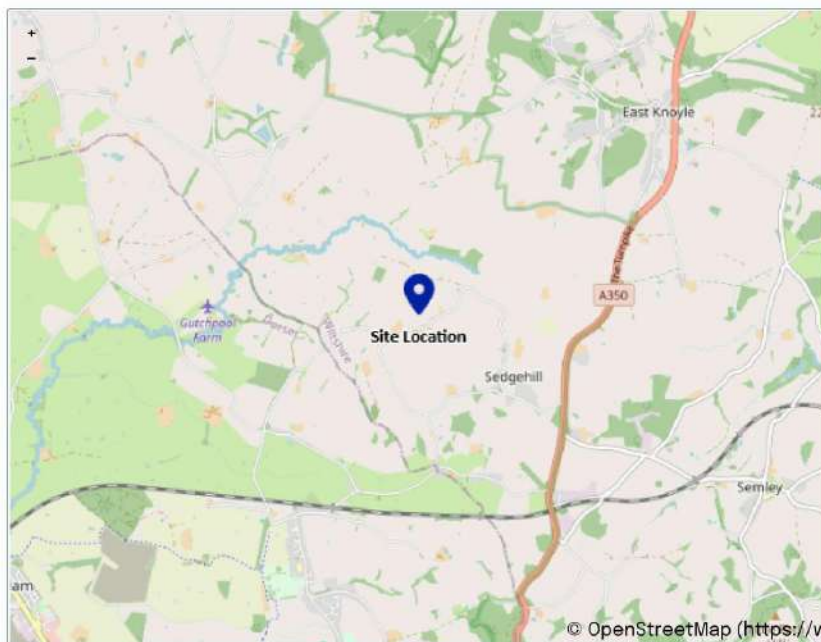
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	22/05/2026
Calculated by	RMT
Reference	
Model version	2.2.3

Location

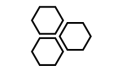
Site name	Pitts Farm
Site location	



Site easting (British National Grid)	385799
Site northing (British National Grid)	128419

Site details

Total site area (ha)	0.115	ha
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Greenfield runoff

Method

Method

IH124

IH124

SAAR (mm)

My value

849

mm

Map value

849

How should SPR be derived?

WRAP soil type

WRAP soil type

4

4

SPR

0.47

QBar (IH124) (l/s)

0.7

l/s

Growth curve factors

Hydrological region

My value

7

Map value

7

1 year growth factor

0.85

2 year growth factor

0.88

10 year growth factor

1.62

30 year growth factor

2.3

100 year growth factor

3.19

200 year growth factor

3.74

Results

Method

IH124

Flow rate 1 year (l/s)

0.6

l/s

Flow rate 2 year (l/s)

0.6

l/s

Flow rate 10 years (l/s)

1.1

l/s

Flow rate 30 years (l/s)

1.6

l/s

Flow rate 100 years (l/s)

2.2

l/s

Flow rate 200 years (l/s)

2.6

l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at [uksuds.com](https://www.uksuds.com/) (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

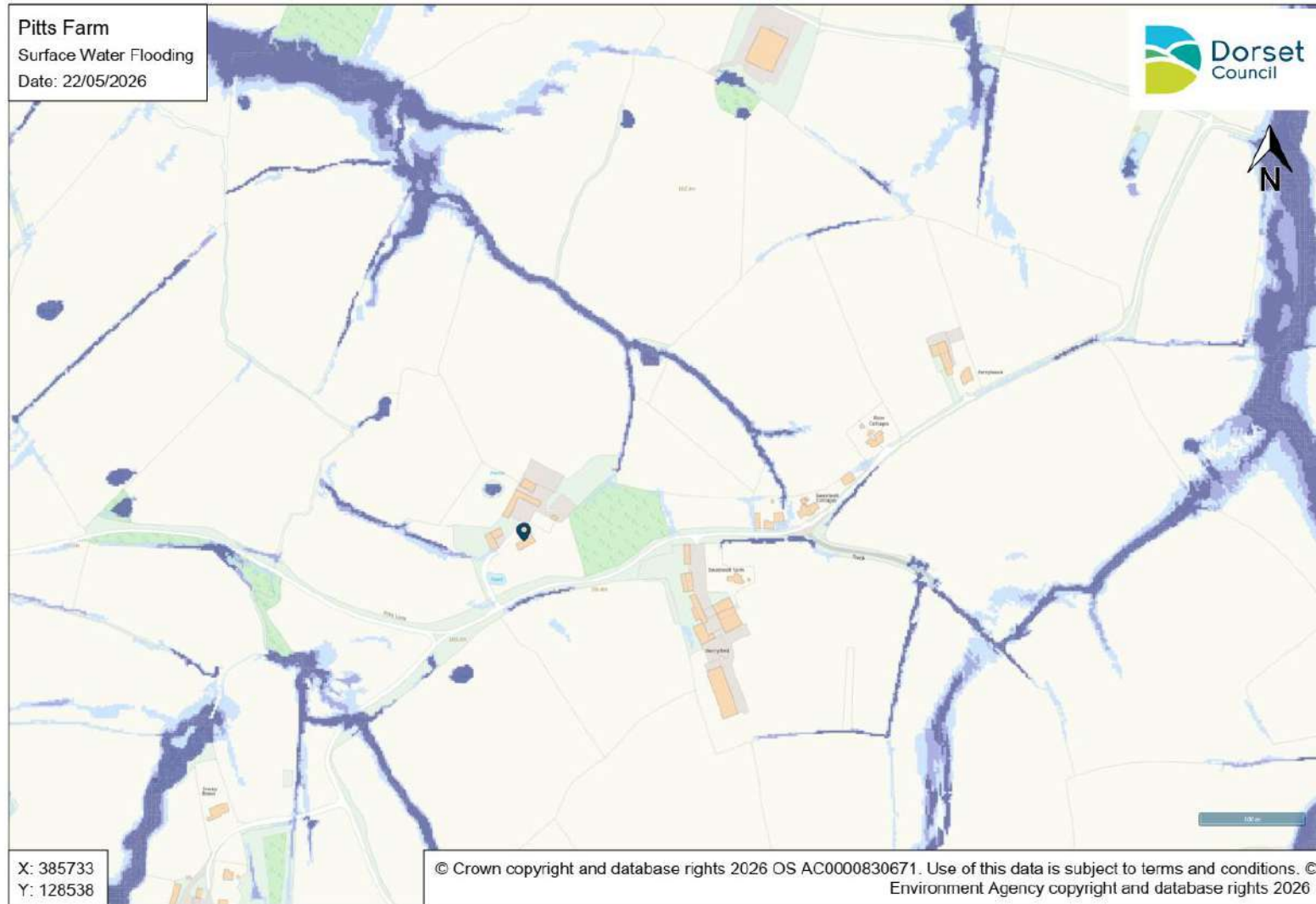


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Appendix B: Surface Water Flooding





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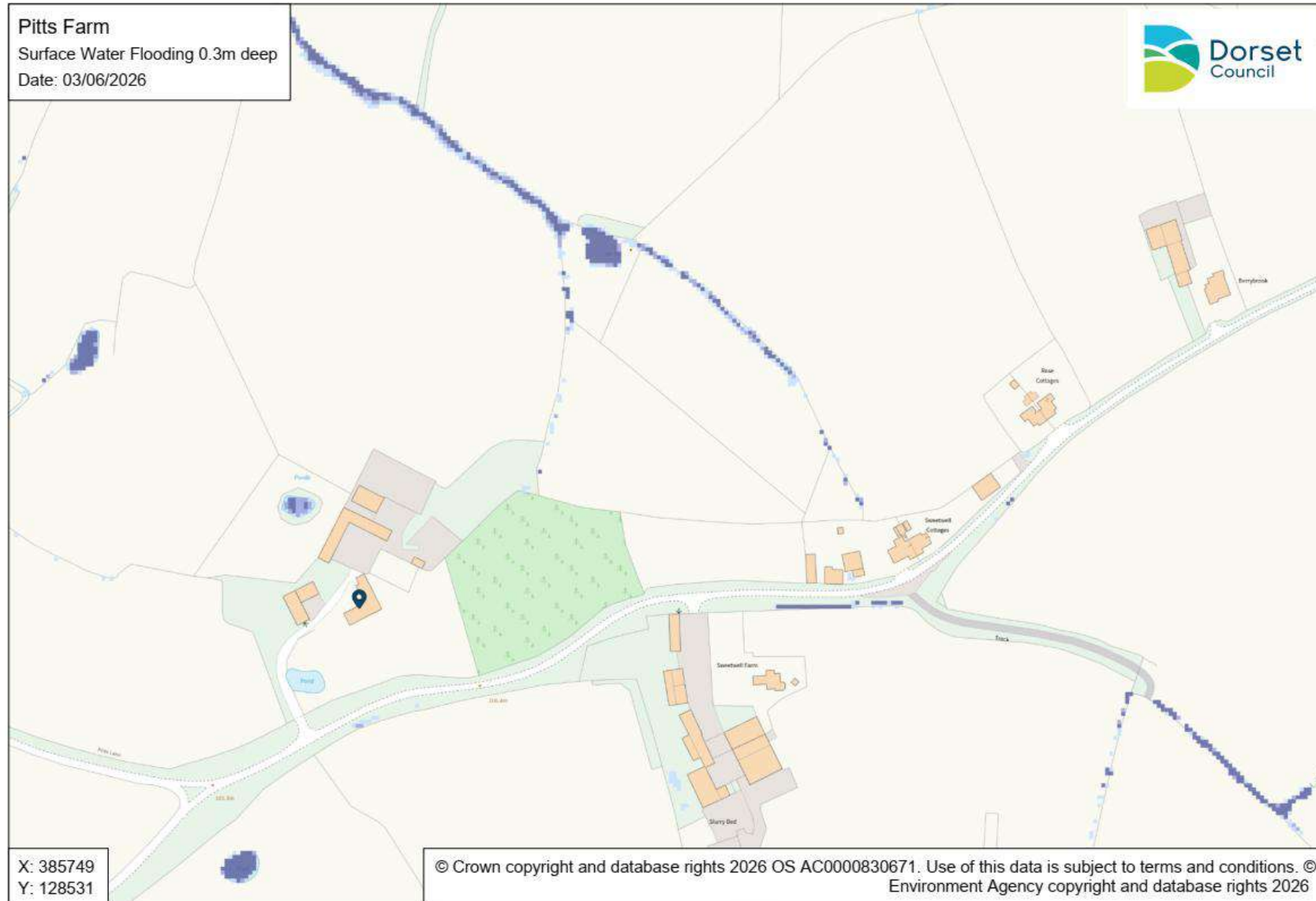




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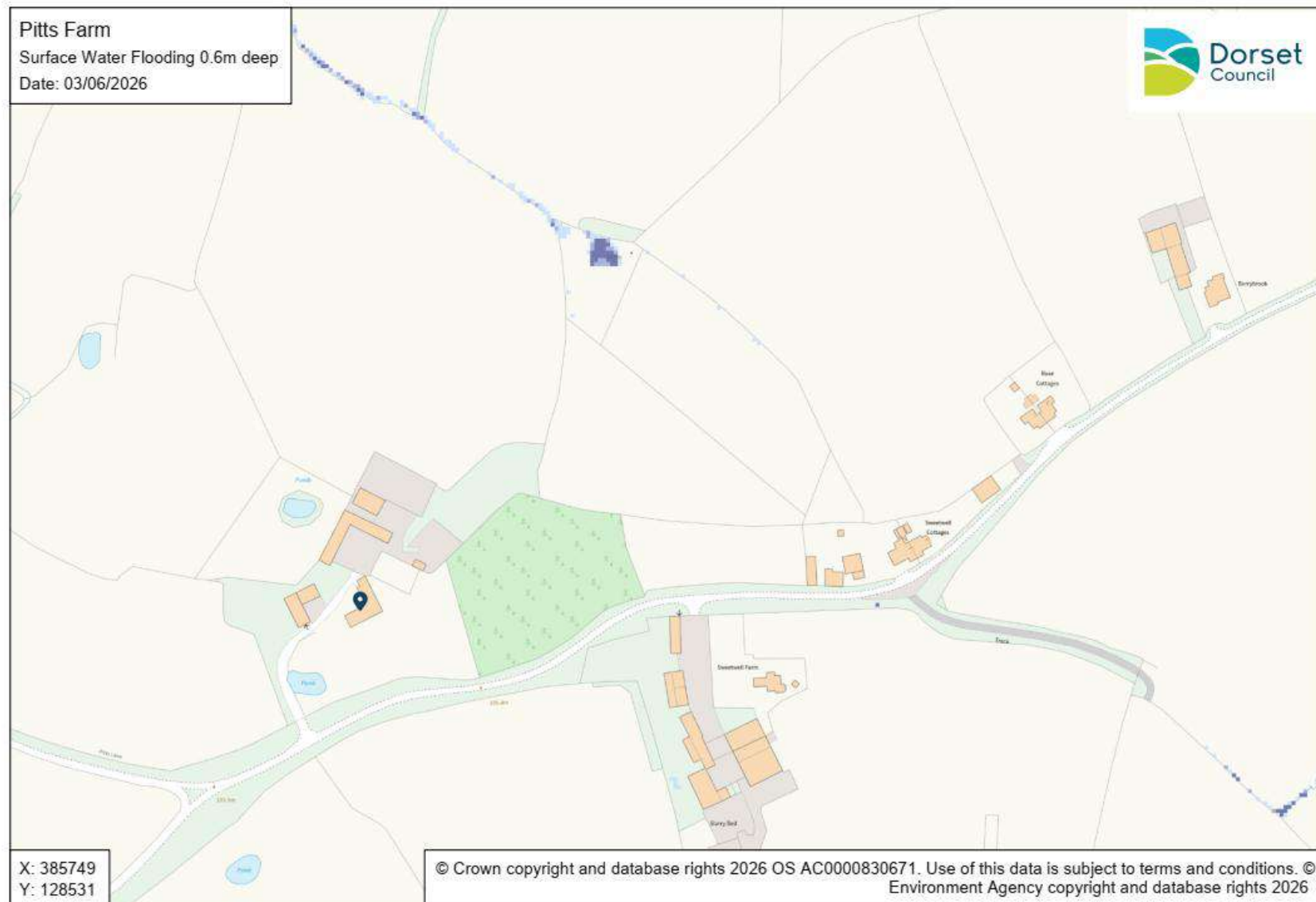




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Appendix C: Design Calculations