



Flood Risk Assessment and Foul and Surface Water Drainage Strategy for Planning

Prepared for:

Sam Loveridge & Co

Location:

Land west of Allington Business Centre

Allington Lane

West End

SO50 7DE

June 2024

Our reference:

93307-WhitePlanning-AllingtonLane v1.1



Document Issue Record

Location:	Land west of Allington Business Centre, Allington Lane, West End, SO50 7DE				
Application:	Change of use of land for the creation of 10no. Gypsy/Traveller pitches comprising the siting of 10no. Mobile Homes, 14no. Touring Caravans, the erection of 10no. dayrooms, and 4no. stable type storage buildings				
Prepared for:	Sam Loveridge & Co				
Title:	Flood Risk Assessment and Foul and Surface Water Drainage Strategy for Planning				
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Commercial in Confidence

1. Introduction

- 1.1. This Flood Risk Assessment and Foul and Surface Water Drainage Strategy has been prepared by Unda Consulting Limited on behalf of Sam Loveridge & Co, in support of a planning application for the Change of use of land for the creation of 10no. Gypsy/Traveller pitches comprising the siting of 10no. Mobile Homes, 14no. Touring Caravans, the erection of 10no. dayrooms, and 4no. stable type storage buildings at the land west of Allington Business Centre, Allington Lane, West End, SO50 7DE. This report assesses the flood risk and surface water drainage for the proposed development.
- 1.2. The proposed planning application is for the change of use of land for the creation of 10no. Gypsy/Traveller pitches comprising the siting of 10no. Mobile Homes, 14no. Touring Caravans, the erection of 10no. dayrooms, and 4no. stable type storage buildings. Post development the roof areas of all buildings (excluding tourers) will cover approximately 2,180m².
- 1.3. In order to mitigate flood risk posed by post development runoff, adequate control measures will be required within the site. This will ensure that surface water runoff is dealt with at source and the flood risk off site is not increased.

2. Existing Site:

- 2.1. The site is currently occupied by Gypsy/Traveller pitches.
- 2.2. The surrounding area is predominantly characterised by fields and industrial units.



Figure 1: Aerial View (Source: Google Earth)

Site Topography:

- 2.3. A topography survey has been conducted and supplied by the applicant for use within this report. The topographic survey indicates that levels onsite range from approximately 8.61mAOD to 10.53mAOD.

Existing Ground Conditions:

- 2.4. The 1:50,000 BGS map shows the site to be located upon the bedrock of Wittering Formation - Sand, Silt and Clay.
- 2.5. According to BGS mapping, the site is underlined by superficial deposits of Alluvium - Clay, Silt, Sand and Gravel.
- 2.6. The soil type taken from the BGS UKSO Soil Map Viewer, shows a soil parent material of Deep Riverine Clay and Floodplain sands and gravel with a soil texture of clay to sandy loam.
- 2.7. No BGS boreholes are located within the site extents.
- 2.8. The published Environment Agency Groundwater Source Protection Zone map shows the site is not located within an area classified as a Groundwater Source Protection Zone.

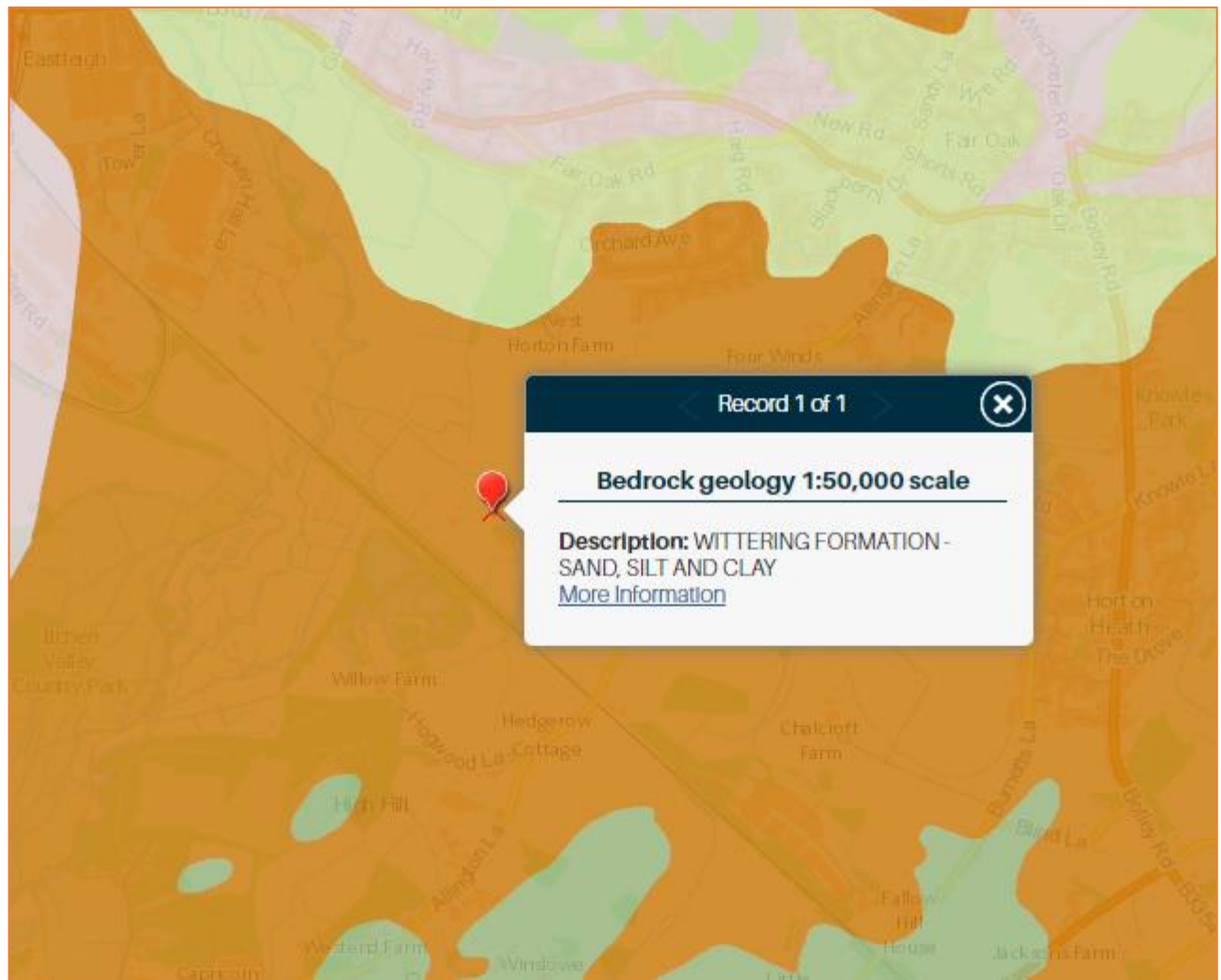


Figure 2: BGS Bedrock Geology (Source: BGS)

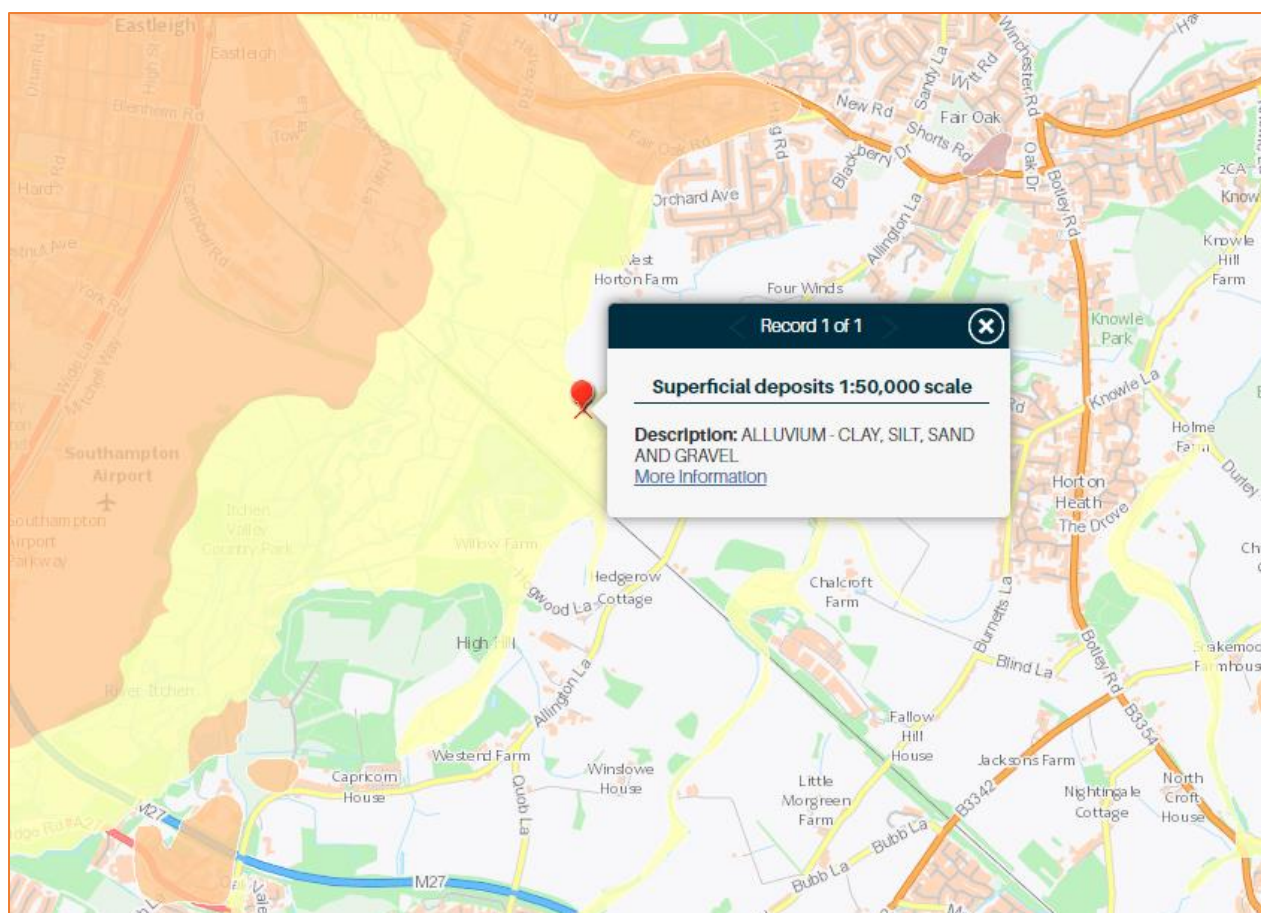


Figure 3: BGS Superficial Deposits (Source: BGS)

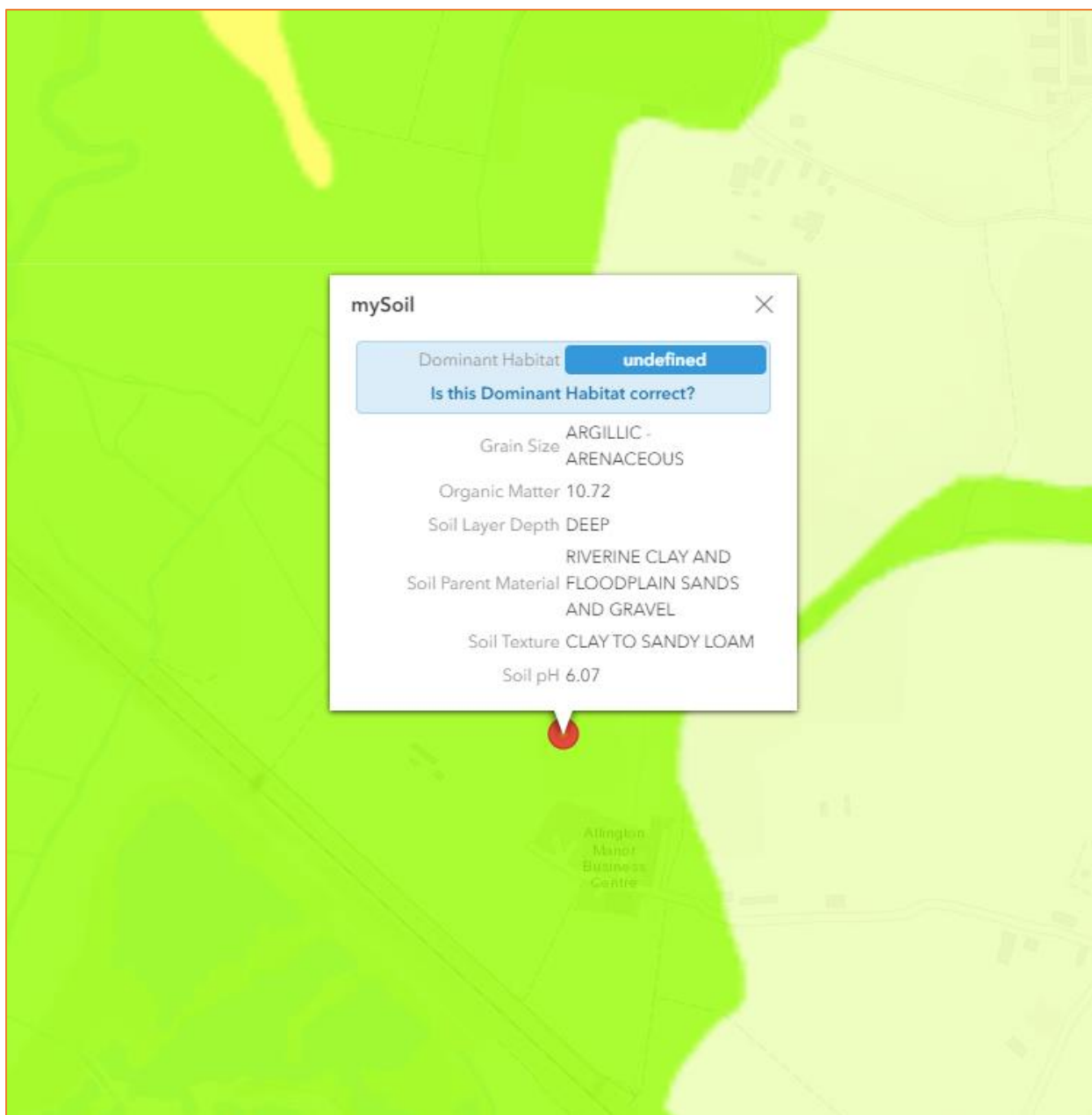


Figure 4: Soil Map (Source: UK Soils, BGS)

Nearby Watercourses / Drainage Features:

- 2.9. The River Itchen is located directly north of the site.

Existing Drainage:

- 2.10. It is understood that the surface water onsite currently discharges via infiltration and runoff. The foul water currently discharges via sewage treatment plants/ septic tanks into soakaways.

3. Development Proposals:

Proposed Development:

- 3.1. The proposed planning application is for the change of use of land for the creation of 10no. Gypsy/Traveller pitches comprising the siting of 10no. Mobile Homes, 14no. Touring Caravans, the erection of 10no. dayrooms, and 4no. stable type storage buildings. Post development the roof areas of all buildings (excluding tourers) will cover approximately 2,180m².
- 3.2. Therefore, the SuDS sizing within the strategy has been based on all roof areas (excluding tourers).



Figure 5: Proposed Site Layout Plan (Source: Provided by the applicant)

Vulnerability to flooding:

- 3.3. The NPPF classifies property usage by vulnerability to flooding. The site will be “highly vulnerable”, as the development is for a change of use of land for the creation of 10no. Gypsy/Traveller pitches comprising the siting of 10no. Mobile Homes, 14no. Touring Caravans, the erection of 10no. dayrooms, and 4no. stable type storage buildings.
- 3.4. Accordingly, it is considered that the vulnerability of the site as a whole will increase post development.

4. Flood Risk Assessment:

Flood Zones:

- 4.1. Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's website.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 640 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 640 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 640 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

- 4.2. The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

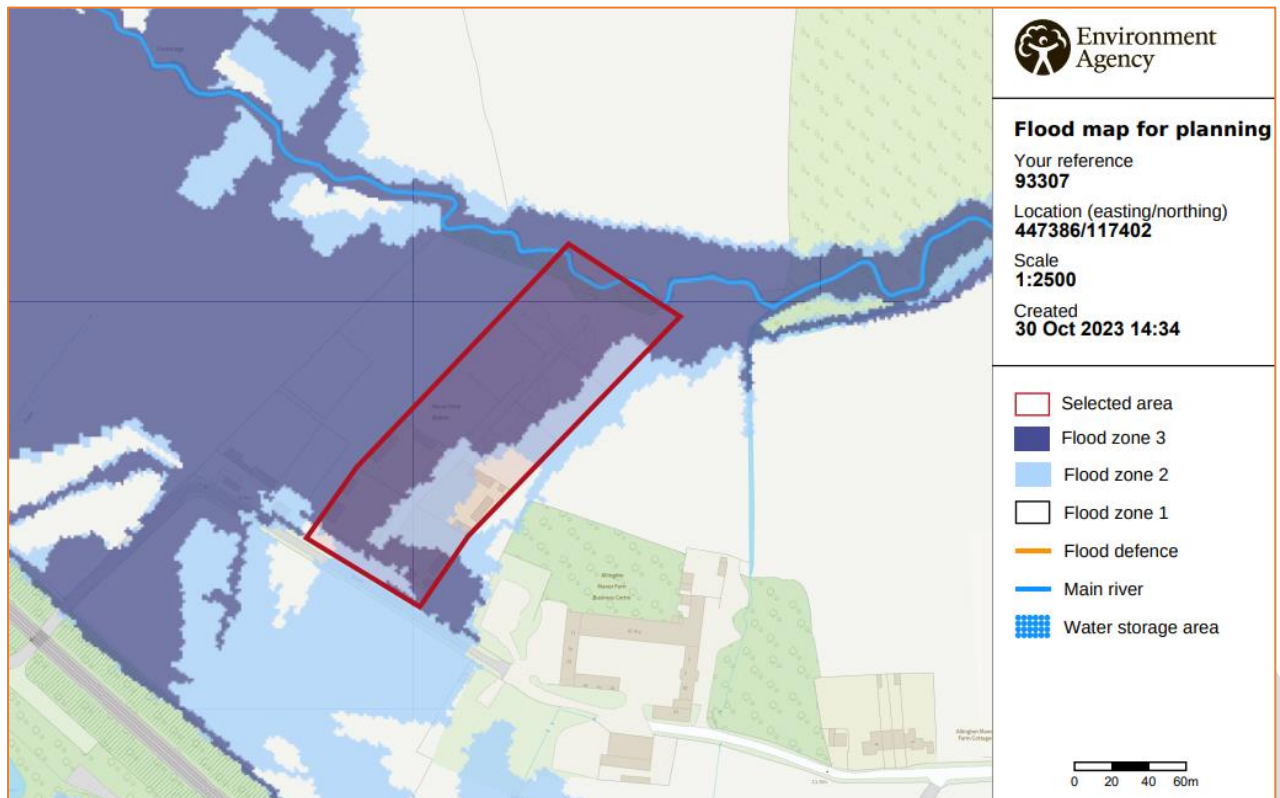


Figure 6: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

- 4.3. The site is located partially within Flood Zone 3 (High Probability), which means it is defined as land having a 1 in 100 or greater annual probability of fluvial flooding and partially within Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1:100 and 1:1000 annual probability of fluvial flooding and Flood Zone 1 (Low Probability), which means it is defined as land having a less than 1:1000 annual probability of fluvial flooding.

Detailed flood modelling:

- 4.4. Modelled flood levels and flood extents have been requested from the EA. The EA have provided The Itchen Tributaries Modelling study 2019 for use within this report.
- 4.5. According to the data provided the whole site is above the 1:100 year flood level. However, when comparing the flood levels for the 1:1000 year flood event with the topographic survey for the area of the development, the maximum flood depth onsite is 0.13m.
- 4.6. The site is located within Flood Zone 3 and is classified as “highly vulnerable”. The Flood Risk Assessments: climate change allowances guidance – updated May 2022, states that the Central climate change allowance should be applied. The site falls within the Test and Itchen Management Catchment, where the Central climate change allowance for the 2080’s is a 35% increase in river flows.
- 4.7. As such, the most suitable modelled flood data provided in the Itchen Tributaries modelling is a 35% increase in flows, and as such this will be used for this assessment.
- 4.8. When comparing the flood levels for the 100 year plus 35% allowance for climate change event with the topographic survey for the area of the development, the maximum flood depth onsite is 0.09m.

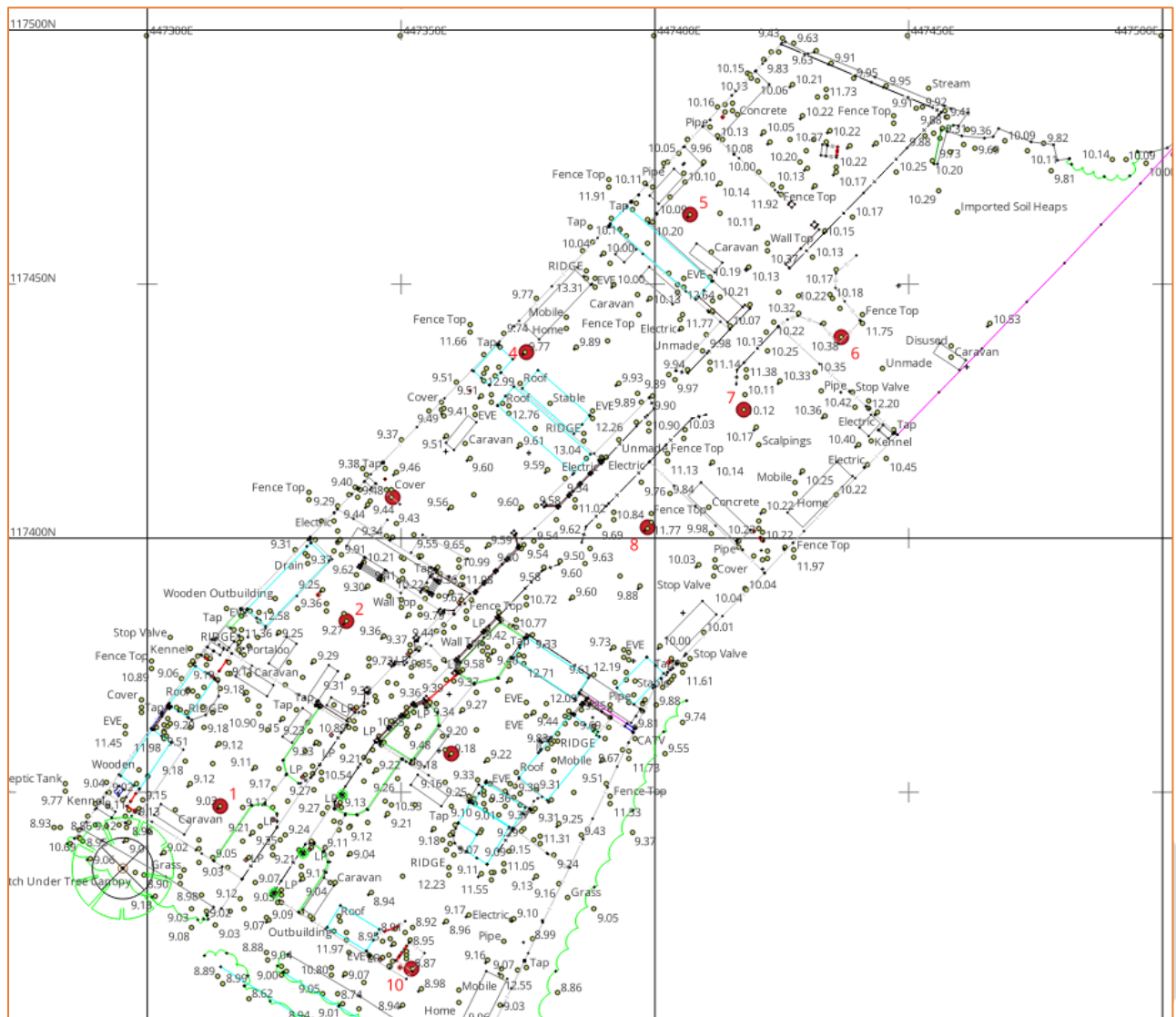


Figure 10: Node location across site (Source: topographic survey provided by the applicant)

ID#	Location (x y)	Topographic Level	1:100 year flood level	1:100 year flood depth	1:100 + 35% CC flood level	1:100 + 35% CC flood depth
1	447314 117346	9.03mAOD	8.96mAOD	0m	9.00mAOD	0m
2	447339 117383	9.27mAOD	9.09mAOD	0m	9.11mAOD	0m
3	447348 117407	9.32mAOD	9.17mAOD	0m	9.22mAOD	0m
4	447374 117436	9.77mAOD	9.49mAOD	0m	9.46mAOD	0m
5	447407 117463	10.09mAOD	9.80mAOD	0m	9.83mAOD	0m
6	447436 117439	10.38mAOD	10.11mAOD	0m	10.12mAOD	0m
7	447417 117425	10.12mAOD	9.84mAOD	0m	9.85mAOD	0m
8	447398 117401	9.82mAOD	9.56mAOD	0m	9.56mAOD	0m
9	447360 117357	9.18mAOD	Outside	N/A	9.03mAOD	0m
10	447352 117315	8.87mAOD	8.80mAOD	0m	8.96mAOD	0.09m

Table 3: Itchen Tributaries Moorgreen Brook Model (Source: EA)

Flood Defences:

- 4.9. Flood defences are typically raised structures that alter natural flow patterns and prevent floodwater from entering property in times of flooding. They are generally categorised as either 'formal' or 'informal' defences. A 'formal' flood defence is a structure that was built specifically for the purpose of flood defence, and is maintained by its respective owner, which could be the Environment Agency, Local Authority, or an individual. An 'informal' flood defence is a structure that has not been specifically built to retain floodwater, and is not maintained for this specific purpose, but may afford some protection against flooding. The structural integrity and design standard is unknown for these types of defences, and their existence cannot always be guaranteed for the lifetime of a proposed development. These defences can include boundary walls, industrial buildings, railway embankments and road embankments situated immediately adjacent to rivers.
- 4.10. According to the EA there are no flood defences located adjacent to the site.

Residual risk (breach or overtopping of flood defences):

- 4.11. Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.
- 4.12. Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.
- 4.13. There remains a residual risk in the incidence of failure. Wave overtopping is one of the principal mechanisms of flooding for the coastal frontage. Allowing for wave-overtopping increases the extent of flooding.

Pluvial:

- 4.14. Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.
- 4.15. In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method

and representation of the risk of flooding. The modelling techniques and data used are considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

- 4.16. The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):
- 1:30 (3.3%)
 - 1:100 (1%)
 - 1:1000 (0.1%)
- 4.17. The mapping below shows the Risk of Flooding from Surface Water with the site located approximately 57m west of the crosshair. Please note that the EA do not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.
- 4.18. The EA Risk of Flooding from Surface Water Map suggests that the entire site lies within an area at “High” to “Very Low” risk of flooding from surface water.



Figure 7: Extract from Environment Agency RoFSW map (Source: EA)

Historical flooding

- 4.19. According to the EA the site is not in an area that has previously flooded.

Groundwater:

- 4.20. Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

- 4.21. Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.
- 4.22. According to the Partnership for Urban South Hampshire Strategic Flood Risk Assessment the site is located within an area with moderate bedrock permeability.
- 4.23. No further information has been provided to suggest that the site is subject to groundwater flooding.

Sewer:

- 4.24. Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.
- 4.25. All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.
- 4.26. No information has been provided to indicate that any sewer flood incidents have occurred within vicinity to the site.

Other Sources:

- 4.27. The EA Risk of Flooding from Reservoirs Map suggests that the site lies outside the "Maximum extent of flooding" from reservoir failure. The EA also advise on their website that reservoir flooding is extremely unlikely. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. These inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial flooding to occur.
- 4.28. No further information has been provided to suggest the site is susceptible to from the failure of reservoirs, canals or other artificial infrastructure from the risk of flooding.

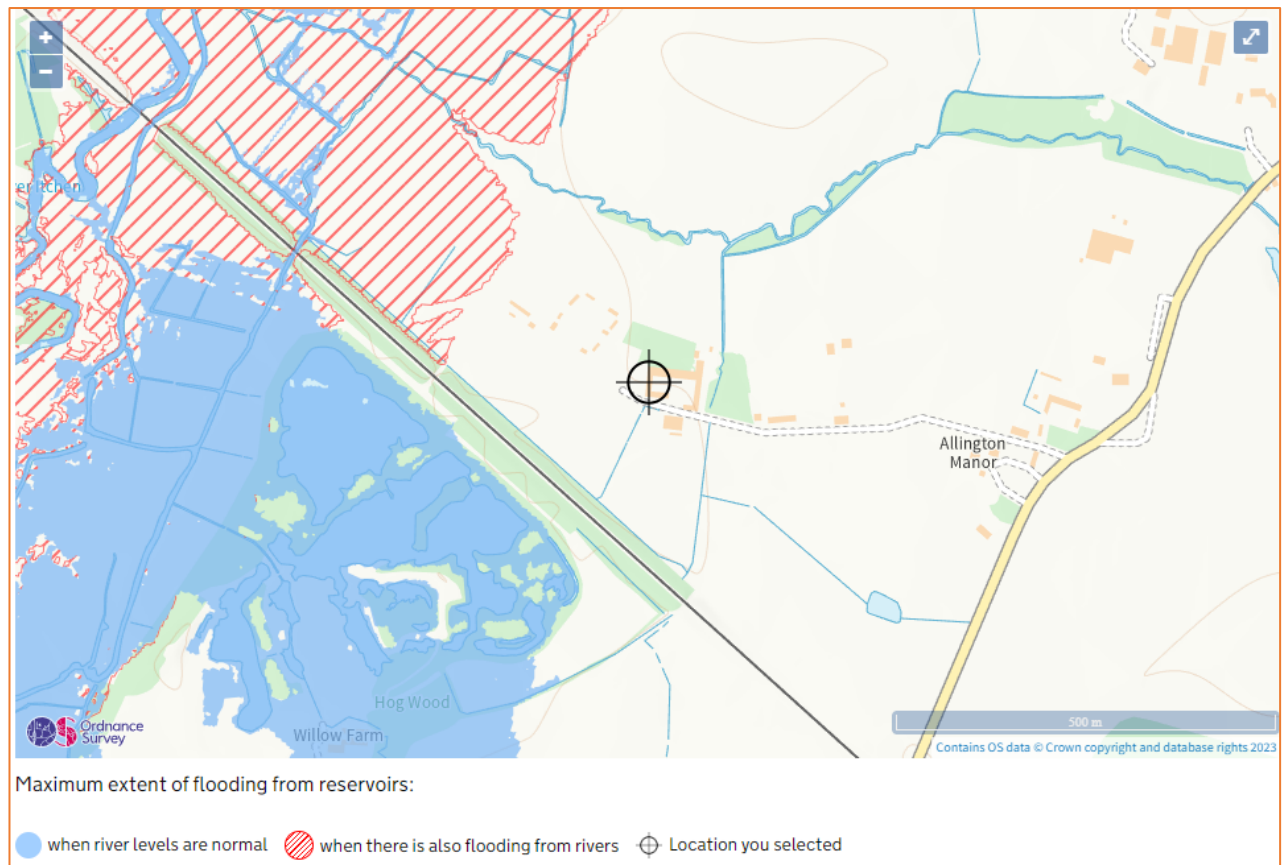


Figure 8: Extract from Environment Agency Flood Risk from Reservoirs map (Source: EA)

5. Surface Water Drainage Strategy:

- 5.1. In order to mitigate flood risk posed by post development runoff, adequate control measures will need to be considered within the site. This will ensure that surface water runoff is dealt with at source and flood risk is not increased elsewhere.

Drainage Hierarchy:

- 5.2. The drainage strategy for the site has been prepared according to the drainage discharge hierarchy from CIRIA C753 The Suds Manual, as follows:
- Infiltration to the maximum extent that is practical;
 - Discharge to surface waters;
 - Discharge to surface water sewer.

Infiltration Potential:

- 5.3. Records from the BGS indicate that the site is located upon the bedrock of Wittering Formation - Sand, Silt and Clay.
- 5.4. The applicant has undertaken infiltration testing with a minimum infiltration rate of 1.1×10^{-6} m/s.
- 5.5. There was no ingress of groundwater into the trial pit when it was dug.

Proposed Discharge Rate:

- 5.6. Greenfield runoff rates for all areas being attenuated has been calculated as 0.4 l/s for the 1:1 annual runoff event, 1.1 l/s for the 1:30 year event and 1.5 l/s for the 1:100-year event. Refer to calculations in appendix.
- 5.7. Runoff from all roof areas (excluding tourers) will discharge to soakaways located within each plot.
- 5.8. All ground surfaces will either be of permeable construction or discharge to permeable areas with permeable paving utilised for any trafficked areas.

Proposed SuDS:

Cellular Storage Soakaway for Plot 1:

- 5.9. The proposed roof area (excluding tourers) within plot 1 will amount to approximately 172m².
- 5.10. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (172m²) gives a value of 189.2m². Therefore, all drainage calculations within this assessment have been made based on an area of 189.2m².
- 5.11. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 58m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 189.2m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.12. Preliminary calculations indicated that some 19.84m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.13. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.14. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*

Cellular Storage Soakaway for Plot 2:

- 5.15. The proposed roof area (excluding tourers) within plot 2 will amount to approximately 234m².
- 5.16. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (234m²) gives a value of 257.4m². Therefore, all drainage calculations within this assessment have been made based on an area of 257.4m².

- 5.17. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 78m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 257.4m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.18. Preliminary calculations indicated that some 26.68m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.19. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.20. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*
Cellular Storage Soakaway for Plot 3:
- 5.21. The proposed roof area (excluding tourers) within plot 3 will amount to approximately 222m².
- 5.22. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (222m²) gives a value of 244.2m². Therefore, all drainage calculations within this assessment have been made based on an area of 244.2m².
- 5.23. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 75m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 244.2m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.24. Preliminary calculations indicated that some 25.65m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.25. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.26. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*
Cellular Storage Soakaway for Plot 4:
- 5.27. The proposed roof area (excluding tourers) within plot 4 will amount to approximately 227m².
- 5.28. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (227m²) gives a value of 249.7m². Therefore, all drainage calculations within this assessment have been made based on an area of 249.7m².
- 5.29. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 75m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 249.7m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.30. Preliminary calculations indicated that some 25.65m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.31. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.32. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*
Cellular Storage Soakaway for Plot 5:
- 5.33. The proposed roof area (excluding tourers) within plot 5 will amount to approximately 336m².
- 5.34. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (336m²) gives a value of 369.6m². Therefore, all drainage calculations within this assessment have been made based on an area of 369.6m².

- 5.35. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 107m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 301.4m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.36. Preliminary calculations indicated that some 36.594m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.37. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.38. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*
Cellular Storage Soakaway for Plot 6:
- 5.39. The proposed roof area (excluding tourers) within plot 6 will amount to approximately 130m².
- 5.40. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (130m²) gives a value of 143m². Therefore, all drainage calculations within this assessment have been made based on an area of 143m².
- 5.41. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 45m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 301.4m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.42. Preliminary calculations indicated that some 15.39m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.43. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.44. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*
Cellular Storage Soakaway for Plot 7:
- 5.45. The proposed roof area (excluding tourers) within plot 7 will amount to approximately 180m².
- 5.46. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (180m²) gives a value of 198m². Therefore, all drainage calculations within this assessment have been made based on an area of 198m².
- 5.47. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 60m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 198m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.48. Preliminary calculations indicated that some 20.52m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.49. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.50. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*
Cellular Storage Soakaway for Plot 8:
- 5.51. The proposed roof area (excluding tourers) within plot 8 will amount to approximately 162m².
- 5.52. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (162m²) gives a value of 178.2m². Therefore, all drainage calculations within this assessment have been made based on an area of 178.2m².

- 5.53. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 58m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 178.2m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.54. Preliminary calculations indicated that some 19.84m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.55. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.56. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*
Cellular Storage Soakaway for Plot 9:
- 5.57. The proposed roof area (excluding tourers) within plot 9 will amount to approximately 285m².
- 5.58. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (285m²) gives a value of 313.5m². Therefore, all drainage calculations within this assessment have been made based on an area of 313.5m².
- 5.59. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 95m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 313.5m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.60. Preliminary calculations indicated that some 32.49m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.61. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.62. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*
Cellular Storage Soakaway for Plot 10:
- 5.63. The proposed roof area (excluding tourers) within plot 10 will amount to approximately 232m².
- 5.64. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to the impermeable areas to take into account future urban creep. Applying a 10% allowance to the relevant roof area (232m²) gives a value of 255.2m². Therefore, all drainage calculations within this assessment have been made based on an area of 255.2m².
- 5.65. Preliminary calculations indicate that a cellular storage soakaway with dimensions of 78m² x 0.36m deep x 0.95 (voids) will be sufficient to accommodate all runoff from 255.2m² of impermeable areas arising from the critical 1:100 year + 45% climate change event.
- 5.66. Preliminary calculations indicated that some 26.68m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.67. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 5.68. *All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to the appendix.*

Water Quality:

- 5.69. Water quality has been assessed in line with the Simple Index approach from Chapter 26 of CIRIA C753 The SuDS Manual:
Step 1 – Allocate suitable pollution hazard indices for the proposed land use.
Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.
- 5.70. The highest pollution hazard level for the proposed land use is Low (residential car parks and low trafficked roads). The pollution hazard indices for this land use are shown in Table 3 below.

Total suspended solids (TSS)	Metals	Hydrocarbons
0.5	0.4	0.4

Table 3: Pollution Hazard Indices for the proposed site (from Table 26.2 of CIRIA C753 The SuDS Manual)

- 5.71. All SuDS components are assessed for their effectiveness in pollutant removal prior to discharge in Table 26.3 in CIRIA C753 The SuDS Manual. The pollution mitigation indices for permeable pavements are show in Table 4 below.

Total suspended solids (TSS)	Metals	Hydrocarbons
0.7	0.6	0.7

Table 4: Pollution Mitigation Indices for permeable pavements (from Table 26.3 of CIRIA C753 The SuDS Manual)

- 5.72. The Pollution Mitigation Indices for permeable pavement are greater than the Pollution Hazard Indices for car parks and low trafficked roads. Therefore, permeable pavements will provide sufficient water quality treatment prior to discharge.
- 5.73. Runoff from roof areas is considered to be uncontaminated and does not warrant any form of treatment process to improve water quality. Nevertheless, it is suggested to include debris / sediment traps on any new drainage.

Design Exceedance:

- 5.74. Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. In the event of the drainage system failure, the runoff flow can be managed through detailing the new external levels to direct water away from structures.

Adoption and Maintenance:

- 5.75. The proposed SuDS will be privately maintained by the end users.
- 5.76. A draft Maintenance Schedule is outlined in the Table below.

Permeable Paving

- 5.77. Permeable surfaces need to be regularly cleaned of silt and other sediments to preserve their infiltration capability. A brush and suction cleaner, which can be a lorry-mounted device or a smaller precinct sweeper, should be used and the sweeping regime should be as follows:

1. End of winter (April) – to collect winter debris.
2. Mid-summer (July/August) – to collect dust, flower and grass-type deposits.
3. After autumn leaf fall (November).

- 5.78. If reconstruction is necessary, the following procedure should be followed:

1. Lift surface layer and laying course.
2. Remove any geotextile filter layer.
3. Inspect sub-base and remove, wash and replace if required.
4. Renew any geotextile layer.
5. Renew laying course, jointing material and concrete block paving.

- 5.79. Materials removed from the voids or the layers below the surface of the paving may contain hazardous substances such as heavy metals and hydrocarbons which may need to be disposed of as controlled waste.

Cellular Storage:

- 5.80. It is not envisaged that silt build up within the cellular crate systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits and inspection chambers on a regular basis. Notwithstanding this, a suitable maintenance regime for the systems will comprise of routine inspection and silt removal (as necessary). Inspection should be undertaken using CCTV equipment offered up the inspection tunnels located within the crate system. Camera access can be gained via inspection chambers and inlet pipework located at each end of the tunnels.

- 5.81. Silt removal can be achieved by jetting the inspection tunnels. Jetting should be undertaken in accordance with current jetting guidelines, in particular the Code of Practice for Sewer Jetting published by The Water Research Centre. Jetting at 150bar at 300l/min should be more than adequate in removing any build-up of material within the tunnel. The crate system will take higher pressures. However, unlike regular jetting which relies heavily on high pressure to remove hardened deposits on the inner bore of pipes, effective cleansing of a crate system relies more on the delivery flow rate to flush solids back through the system.
- 5.82. A standard jet head with rear facing nozzles should be used. The head should be fed to the far end of the crate tunnel via the nearest inspection chamber, activated and retracted. As the nozzle is removed, debris will be swept back into the inspection chamber where it can then be removed with the use of a standard gully sucker. This method will ensure the effective removal of gross solids (carrier bags, cans, leaf litter etc.) from the system. Whilst 100% removal cannot be guaranteed, it has been shown that this jetting method will also remove an element of finer material which would otherwise be 'lost' within the system.

Pipework and Catchpits

- 5.83. It is not envisaged that silt build up within the pipework systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits on a regular basis. Notwithstanding this, a suitable maintenance regime for the systems will comprise of routine inspection (every three months) and silt removal (as necessary).

Drainage Element	Maintenance Requirement	Frequency
Gutters & downpipes	Inspect and remove silt/ debris	To be inspected every three months and silt/ debris removed as necessary.
Inspection Chambers and Catch Pits	Inspect and remove silt	To be inspected every three months and silt/ debris removed as necessary. Flow control to be checked for blockages.
Cellular Storage	Inspect and remove debris	CCTCV inspection following first storm event. Monthly CCTV inspections for first 3 months. 6 monthly CCTV inspections thereafter. Jetting to remove silt as necessary.
Permeable Paving	Sweeping/vacuuming to remove build-up of silt or other sediments	Three times a year or as necessary
	- Removal of weeds - Replacement of cracked paving blocks - Remedial work to cracks and depressions	As required

Table 5: Suggested Maintenance Regime for Elements of the Drainage Infrastructure

Note: In addition to the above maintenance requirements, it is recommended that all drainage elements are inspected:

- Following the first storm event;
- Monthly for the first 3 months following commissioning.

6. Flood Risk Mitigation:

Physical Design Measures:

- 6.1. The NPPF requires new residential floor levels to be set at least 300mm above suitable modelled 1:100 year plus allowance for climate change flood levels.
- 6.2. When comparing the flood levels for the 100 year plus 35% allowance for climate change event with the topographic survey for the area of the development, the maximum flood depth onsite is 0.09m.
- 6.3. Therefore, the caravans will be raised by axle stands as high as feasibly possible. In addition, touring caravans will be removed from the site when a flood warning is issued.
- 6.4. The applicant has agreed to implement flood resistant design measures where practical and achievable into the development in consultation with the Local Authority building control department.
- 6.5. These measures can include the following:
 - Solid concrete ground floor, with waterproof membrane;
 - Waterproof screed used on floors;
 - Closed-cell foam used in wall cavities;
 - Waterproof ground floor internal render;
 - External walls rendered resistant to flooding to first floor level;
 - Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers;
 - Ground floor electrical main ring run from first floor level; and on separately switched circuit from first floor;
 - Electrical incomer and meter situated at first floor level or above;
 - Boilers, control and water storage / immersion installed at first floor level or above;
 - Gas meter installed at first floor level or above;
 - Plumbing insulation of closed-cell design;
 - Non-return valves fitted to all drain and sewer outlets;
 - Manhole covers secured;
 - Anti-syphon fitted to all toilets;
 - Kitchen units of solid, water resistant material;
 - Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
 - Stairs of solid hardwood construction with wood faces treated to resist water penetration.
- 6.6. To stop the caravans / mobile homes from potentially floating away and becoming a debris hazard during an extreme flood event, they will be secured to the ground by a number of mounting points.
- 6.7. The applicant should also consider the use of demountable flood defence barriers to defend ground level doorways and low windows.

Safe Escape:

- 6.8. The NPPF requires a route of safe escape for all residents and users to be provided from residential properties in Flood Zone 3. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm.
- 6.9. As the site lies within the Flood Zone 3 area, a Site Specific Flood Warning and Evacuation Plan (FWEP) will be required which must be maintained for the life time of the development.

Flood Warning:

- 6.10. The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.
- 6.11. Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.
- 6.12. The EA issue flood warnings to specific areas when flooding is expected. It is recommended that the applicant registers online with the free Environment Agency Floodline Warnings/Alert Direct service at <https://fwd.environment-agency.gov.uk/app/olr/register> to receive flood warnings by phone, text or email.

6.13. The site is located within both flood warning and flood alert areas.

6.14. The flood warning service has three types of warnings that will help you prepare for flooding and take action:

Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 3: Flood Warnings

Flood Plan:

6.15. It is recommended that the applicant and future owners, occupiers and Landlords of the property prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.
- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture, or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.

- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

Fluvial floodplain storage:

- 6.16. The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.
- 6.17. In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.
- 6.18. For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.
- 6.19. To reduce the impact on fluvial floodplain storage any fencing will be hit and miss. In addition, to stop the caravans / mobile homes from potentially floating away and becoming a debris hazard during an extreme flood event, they will be secured to the ground by a number of mounting points.

7. Foul Water Drainage Strategy:

Foul Drainage Hierarchy:

- 7.1. The drainage strategy for the site has been prepared according to the drainage discharge hierarchy from the NPPF, as follows:
- Connection to public sewer;
 - Installation of a package sewage treatment works;
 - Installation of a septic tank.

Proposed foul drainage:

- 7.2. The site will continue to be served by each plot's individual septic tank/ sewage treatment plant. These then discharge via soakaways. Details of the septic tanks/ sewage treatment plants used on each plot have been provided by the applicant, where available. *Refer to the appendix.*
- 7.3. Sewer records indicate that there are no Southern Water within the vicinity of the site. *Refer to the appendix.*

Adoption and Maintenance:

- 7.4. The sewers will be designed to sewers for adoption standard (if feasible).

8. Discussion and Conclusions:

- 8.1. This Flood Risk Assessment and Foul and Surface Water Drainage Strategy has been prepared by Unda Consulting Limited on behalf of Sam Loveridge & Co, in support of a planning application for the Change of use of land for the creation of 10no. Gypsy/Traveller pitches comprising the siting of 10no. Mobile Homes, 14no. Touring Caravans, the erection of 10no. dayrooms, and 4no. stable type storage buildings at the land west of Allington Business Centre, Allington Lane, West End, SO50 7DE. This report assesses the flood risk and surface water drainage for the proposed development.
- 8.2. A topography survey has been conducted and supplied by the applicant for use within this report. The topographic survey indicates that levels onsite range from approximately 8.61mAOD to 10.53mAOD.
- 8.3. The proposed planning application is for the change of use of land for the creation of 10no. Gypsy/Traveller pitches comprising the siting of 10no. Mobile Homes, 14no. Touring Caravans, the erection of 10no. dayrooms, and 4no. stable type storage buildings. Post development the roof areas of all buildings (excluding tourers) will cover approximately 2,180m².
- 8.4. Therefore, the SuDS sizing within the strategy has been based on all roof areas (excluding tourers).
- 8.5. The 1:50,000 BGS map shows the site to be located upon the bedrock of Wittering Formation - Sand, Silt and Clay.
- 8.6. According to BGS mapping, the site is underlined by superficial deposits of Alluvium - Clay, Silt, Sand and Gravel.
- 8.7. The soil type taken from the BGS UKSO Soil Map Viewer, shows a soil parent material of Deep Riverine Clay and Floodplain sands and gravel with a soil texture of clay to sandy loam.

Flood Risk Discussion

- 8.8. The site is located partially within Flood Zone 3 (High Probability), which means it is defined as land having a 1 in 100 or greater annual probability of fluvial flooding and partially within Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1:100 and 1:1000 annual probability of fluvial flooding and Flood Zone 1 (Low Probability), which means it is defined as land having a less than 1:1000 annual probability of fluvial flooding.
- 8.9. Modelled flood levels and flood extents have been requested from the EA. The EA have provided The Itchen Tributaries Modelling study 2019 for use within this report.
- 8.10. According to the data provided the whole site is above the 1:100 year flood level. However, when comparing the flood levels for the 1:1000 year flood event with the topographic survey for the area of the development, the maximum flood depth onsite is 0.13m.
- 8.11. The site is located within Flood Zone 3 and is classified as “highly vulnerable”. The Flood Risk Assessments: climate change allowances guidance – updated May 2022, states that the Central climate change allowance should be applied. The site falls within the Test and Itchen Management Catchment, where the Central climate change allowance for the 2080’s is a 35% increase in river flows.
- 8.12. As such, the most suitable modelled flood data provided in the Itchen Tributaries modelling is a 35% increase in flows, and as such this will be used for this assessment.
- 8.13. When comparing the flood levels for the 100 year plus 35% allowance for climate change event with the topographic survey for the area of the development, the maximum flood depth onsite is 0.09m.
- 8.14. The EA Risk of Flooding from Surface Water Map suggests that the entire site lies within an area at “High” to “Very Low” risk of flooding from surface water.
- 8.15. According to the Partnership for Urban South Hampshire Strategic Flood Risk Assessment the site is located within an area with moderate bedrock permeability.
- 8.16. No further information has been provided to suggest that the site is subject to groundwater flooding.
- 8.17. No information has been provided to indicate that any sewer flood incidents have occurred within vicinity to the site.
- 8.18. Flood risk mitigation measures will be included as appropriate.

- 8.19. As the site lies within the Flood Zone 3 area, a Site Specific Flood Warning and Evacuation Plan (FWEP) will be required which must be maintained for the life time of the development.
- 8.20. To reduce the impact on fluvial floodplain storage any fencing will be hit and miss. In addition, to stop the caravans / mobile homes from potentially floating away and becoming a debris hazard during an extreme flood event, they will be secured to the ground by a number of mounting points.

Surface Water Drainage Discussion

- 8.21. Records from the BGS indicate that the site is located upon the bedrock of Wittering Formation - Sand, Silt and Clay.
- 8.22. The applicant has undertaken infiltration testing with a minimum infiltration rate of 1.1×10^{-6} m/s.
- 8.23. There was no ingress of groundwater into the trial pit when it was dug.
- 8.24. Greenfield runoff rates for all areas being attenuated has been calculated as 0.4 l/s for the 1:1 annual runoff event, 1.0 l/s for the 1:30 year event and 1.4 l/s for the 1:100-year event. Refer to calculations in appendix.
- 8.25. Runoff from all roof areas (excluding tourers) will discharge to soakaways located within each plot.
- 8.26. All ground surfaces will either be of permeable construction or discharge to permeable areas with permeable paving utilised for any trafficked areas.
- 8.27. The soakaway sizes for each plot can be found within section 5 of the report.
- 8.28. Runoff from roof areas is considered to be uncontaminated and does not warrant any form of treatment process to improve water quality. Nevertheless, it is suggested to include debris / sediment traps on any new drainage.
- 8.29. Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. In the event of the drainage system failure, the runoff flow can be managed through detailing the new external levels to direct water away from structures.

Foul Water Drainage Discussion

- 8.30. The site will continue to be served by each plot's individual septic tank/ sewage treatment plant. These then discharge via soakaways.
- 8.31. This drainage strategy has been undertaken in accordance with the principles set out in NPPF. We can conclude that providing the development adheres to the conditions advised above, the said development proposals can be accommodated without increasing flood risk within the locality in accordance with objectives set by Central Government and the EA.

Unda Consulting Limited

June 2024

9. Appendix

A - Plans by others:

- Proposed Plans – Provided by the applicant.
- Topographic Survey - Provided by the applicant.

B – Causeway Calculations:

- IH124 Pre-Development Greenfield Runoff Calculations for the area of the site being attenuated;
- Cellular Storage Soakaway Calculations.

C - Plans:

- Proposed Drainage Layout.

D - Other:

- Infiltration testing results – Results provided by the applicant;
- Southern Water Asset records – Southern Water.
- Septic Tank/ Sewage Treatment Plant details - Provided by the applicant.