ABLEY LETCHFORD PARTNERSHIP
Consulting Engineers

NEWTOWN COURT FARM, NEWBURY

DRAINAGE STATEMENT

EDGE ARCHITECTURE

07 JULY 2021

Abley Letchford Partnership Limited
3 Tealgate
Charnham Park
Hungerford
RG17 0YT

T: 01488 684390
E: contact@alpce.co.uk
W: www.alpce.co.uk

Quality Management:

Prepared by:	Jonathan Shuttleworth
Authorised by:	Shaun Letchford
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Contents

Appendices

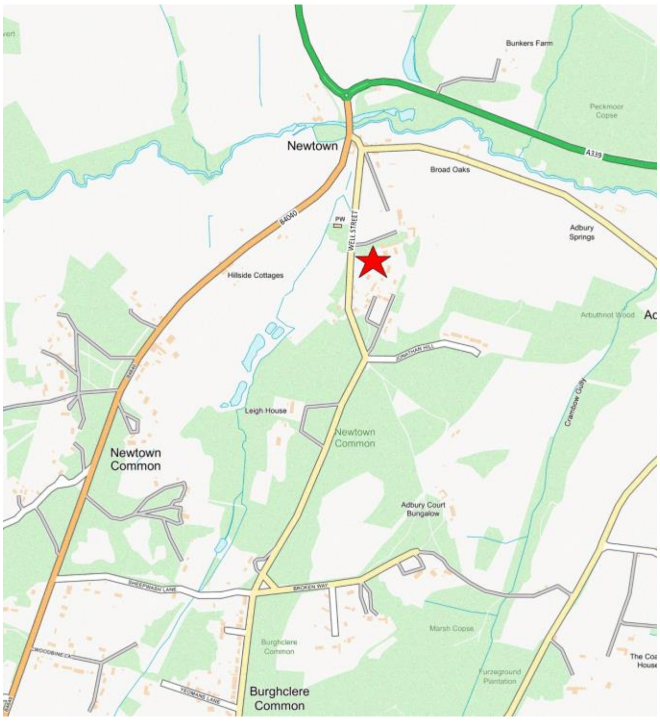
1.0 Introduction

Site Context

1.1. This report has been prepared by Abley Letchford Partnership Ltd, on behalf of Edge Architecture, in relation to a planning application for the proposed residential development on land southwest of Newtown Court Farm, Well Street, Newbury. The location of the site in its local geographical context is shown below.

1.2. Planning permission for a single dwelling accessed from the existing driveway was previously granted by Basingstoke and Deane Borough Council (BDBC) on land adjacent to the site in November 2020 (application ref: 20/01744/FUL).

Site Location Plan



Development Proposals

1.3. The proposals comprise the erection of three dwellings on land at Newtown Court Farm. The development would be accessed via the existing driveway, which will be improved and brought up to adoptable construction standards to allow access for a refuse vehicle and fire tender.

Requirement for a Flood Risk Assessment (FRA)

1.4. The requirement for a Flood Risk Assessment is set out in Section 14 of the revised National Planning Policy Framework (NPPF) as revised in February 2019.

1.5. The footnote accompanying Paragraph 163 states:

A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

1.6. The site is a Greenfield site in Flood Zone 1 and extends less than 1 hectare in total; therefore, a site-specific flood risk assessment is NOT required. However, to comply with a Planning Application, matters related to flood risk and drainage are addressed within this Drainage Statement report.

Report Aim and Formation

1.7. The principal aim of this report is to demonstrate the acceptability of the proposed development in respect to flood risk and drainage planning policy.

1.8. Consideration is given to the risks attributed to both the development itself and the users from all forms of flooding.

1.9. The report outlines the impacts the development could have on flood risk in the area by increasing flooding elsewhere resulting from increased surface water runoff, changes in flood routing or loss of flood plain storage and outlines the mitigation systems that will be implemented to minimise this risk.

1.10. The presented Drainage Strategy ensures that the guiding principles of Sustainable Drainage Systems (SuDS) are central to the disposal of surface water drainage from the proposed development ensuring a viable robust solution is implementable.

1.11. The report finishes by outlining provisions for wastewater disposal.

Report Structure

1.12. This report addresses the requirements of NPPF and considers the following aspects:

- Section 2: Policy and Sources of Information – a review of policy relevant to the assessment and sources of information.
- Section 3: Baseline Environmental Conditions – a description of the site location, its topography, geology and hydrology.
- Section 4: Flood Risk – the effect of flooding within the existing site layout from all sources.
- Sections 5 and 6: Drainage Strategy – offer appropriate mitigation measures to protect the site in the post development scenarios for surface and foul water drainage strategies.
- Section 7: Summary and Conclusions – a review of the suitability of the development proposals in the context of site vulnerability and the requirements of the NPPF.

2.0 Policy and Sources of Information

Introduction

2.1. This chapter provides a review of policy relevant to the assessment and sources of information

National Planning Policy

2.2. National Planning Policy in relation to Flood Risk is set out in Section 14 of the National Planning Policy Framework (NPPF) and Planning Practice Guidance ID:7 for Flood Risk and Coastal Change (PPG). Flood Risk is discussed in Paragraphs 155-165 of the NPPF.

2.3. Paragraphs 157-162 discuss the Sequential approach. Paragraph 158 refers to a Strategic Flood Risk Assessment (SFRA) that would form the basis of applying the Sequential Test for local authorities to allocate development, whilst Paragraphs 159-162 relates to the Exemption Tests.

2.4. Paragraph 163 discusses the determination of planning applications stating:

When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood risk assessment. Development should only be allowed in areas at risk of flooding where, in light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resilient and resilient;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

The Sequential Test, Exception Test and Sequential Approach

2.5. The sequential test is an approach used to enable new developments to be designed in areas at lower risk of flooding in preference to sites at higher risk. All opportunities to direct development to reasonably available areas with little or no flood risk should be explored prior to deciding to build in higher flood risk areas. For strategic sites, this is applied by the Local Planning Authority by means of a Strategic Flood Risk Assessment (SFRA).

2.6. Dependent upon the type of development under consideration, there may be a subsequent requirement to carry out the Exception Test as depicted within Figure 1 below. The Exception Test ensures that any new developments implemented within areas of flood risk will only occur where flood risk is clearly outweighed by other sustainability drivers and it will ensure that the development can be made safe from flooding and not increase the flood risk elsewhere. The test considers the vulnerability of the new development to flood risk and in order to 'pass', must demonstrate that:

- The development provides wider sustainability benefits to the community that outweigh the flood risk;
- The development is sited on previously developed land, or if this is not the case, there are no other reasonable alternative sites; and
- The development is safe, does not increase flood risk elsewhere and where possible will reduce flood risk overall.

Figure 1 – Flood Risk Vulnerability Classification Table 3 PPG ID 7

Flood Risk Vulnerability classification (see Table 1 PPG ID: 7)	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1 Low Probability	Yes	Yes	Yes	Yes	Yes
Zone 2 Medium Probability	Yes	Exception test required	Yes	Yes	Yes
Zone 3a High Probability	Exception test required	No	Exception test required	Yes	Yes
Zone 3b Functional Floodplain	Exception test required	No	No	No	Yes

Key: Yes: Development is appropriate, No: Development should not be permitted.

Climate Change

2.7. National Planning Policy (NPPF and PPG) make it a requirement to account for climate change within any proposed development proposal. Research has shown that expected climate change will increase the peak rainfall intensity and river flow, which could result in more frequent and severe flood events.

2.8. PPG ID:7 for Flood Risk and Coastal Change Table 2 sets out anticipated changes in peak rainfall intensity in small catchments (less than 5km^2), or urbanised drainage catchment (as found within towns and cities. This is depicted below as Figure 2.

Figure 2 – Peak rainfall intensity allowance in small catchments or urban drainage

(Table 2 PPG ID 7)

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

2.9. Underlying text supporting Table 2 states that Upper End climate change allowances should be used within the drainage design of all development types.

Environment Agency / GOV.UK

2.10. The Flood and Water Management Act 2010 provides the Environment Agency a strategic overview role for all forms of flooding and coastal erosion. They also have direct responsibility for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas. The Environment Agency is a statutory consultee with regards to flood risk and planning dependent upon criteria.

2.11. Environment Agency Standing Advice has been consulted and reviewed within this assessment.

2.12. The GOV.UK Flood Map for Planning, Long Term Flood Risk and Catchment Data Explorer websites have been interrogated in respect to flood risk extents and sources.

Local Authorities

2.13. The Site lies within the administrative area of Basingstoke and Deane Borough Council (BDBC).

2.14. Planning guidance published by BDBC regarding flood risk was consulted to assess the mitigation policies in place, including but not limited to; the Adopted Local Plan 2011-2029 and Supplementary Planning Documents (SPDs) and other planning guidance.

2.15. The BDBC Strategic Flood Risk Assessment (SFRA) dated January 2010 provides an overview of flood risk throughout the Borough, providing the framework within which future development planning applications are to be reviewed.

Thames Water

2.16. Thames Water is responsible for the disposal of waste water within the local area, and for the supply of clean water.

2.17. Information with regards to sewer and water main flooding contained within the SFRA has been consulted as part of this assessment. All Water Companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register.

Other Sources of Information

2.18. A desktop study of the Site was carried out using the following websites to ascertain local features, hydrology and soil characteristics:

- DEFRA's MAGIC portal,
- British Geological Survey (BGS) and
- Cranfield University Soilscapes portal.

2.19. A Site walkover conducted in 2021 allowed observation of existing topography, watercourses, and nearby drainage outfalls.

2.20. Guidance with respect to Sustainable Drainage Systems (SuDS) is contained within DEFRA document Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems March 2015, as well as CIRIA C753 The SuDS Manual, BS8582:2013 – Code of Practice for Surface Water Management for Development Sites and Approved Document H of the Building Regulations.

2.21. Additional guidance on development and flood risk is contained within CIRIA C624 Development and Flood Risk – Guidance for the Construction Industry which identifies several key aims for a development to ensure it is sustainable in flood risk terms.

3.0 Baseline Environmental Conditions

Introduction

3.1. This chapter provides for a description of the site location, its topography, geology and hydrology.

Site Location and use

3.2. The site lies to the south of Newbury on the way to Burghclere village, on land either side of the existing Newtown Court Farm dwelling with Well Street to the west. Other dwellings, forming part of the Newtown settlement are also located to the north and south.

3.3. Overall the site covers approximately 0.69 hectares (Ha) and is currently primarily open gardens, with an existing house and access drive.

Topography

3.4. The topography of the site is predominantly hilly in nature with flat terraces at the west and east, with levels fluctuating between 93.30m AOD in the west to 104.00m AOD in the east.

Existing Drainage

3.5. The site currently drains by predominantly overland flow with minimal infiltration, through informal low points. The existing house drains informally into the surrounding ground and overland flow routes.

3.6. There is a ditch within the east verge of Well Street which takes flow north towards the nearest watercourse. This ditch is piped through land in the west of the site before continuing in a ditch at a headwall adjacent to the site entrance. There are further ditches to the west of Well Street.

3.7. It is assumed surface water flows unrestricted from the site, with the only barriers to flow being the capacity of the existing ditches and the aforementioned pipe that cross the western land boundary.

Geology, Hydrology and Hydrogeology

3.8. British Geological Survey mapping indicates that the bedrock geology underlying the Site as London Clay Formation.

3.9. The Cranfield University Soilscapes maps indicates the soil to be slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, with an impeded drainage type.

3.10. Intrusive ground investigations, groundwater monitoring and soakage testing to BRE DG365 have not taken place to provide confirmation of the hydrogeology. However, due to the underlying clay and soil types, it is expected infiltration techniques will not be viable to accommodate the on-site run off, although this will be confirmed at a later date, by onsite testing, prior to any detailed design.

3.11. Environment Agency (EA) mapping confirms that the Site lies outside of any Groundwater Source Protection Zone (SPZ) and Principal aquifer designation.

3.12. The site lies in the catchment of the Burghclere Brook located to the North of the site. The Burghclere Brook is a tributary to the River Kennet which itself is a tributary to the River Thames.

4.0 Flood Risk

Introduction

4.1. This chapter assesses flood risk at the site from all sources including appropriate allowance for climate change required by relevant National and Local planning policy.

Flood Risk to the Site from Tidal Sources

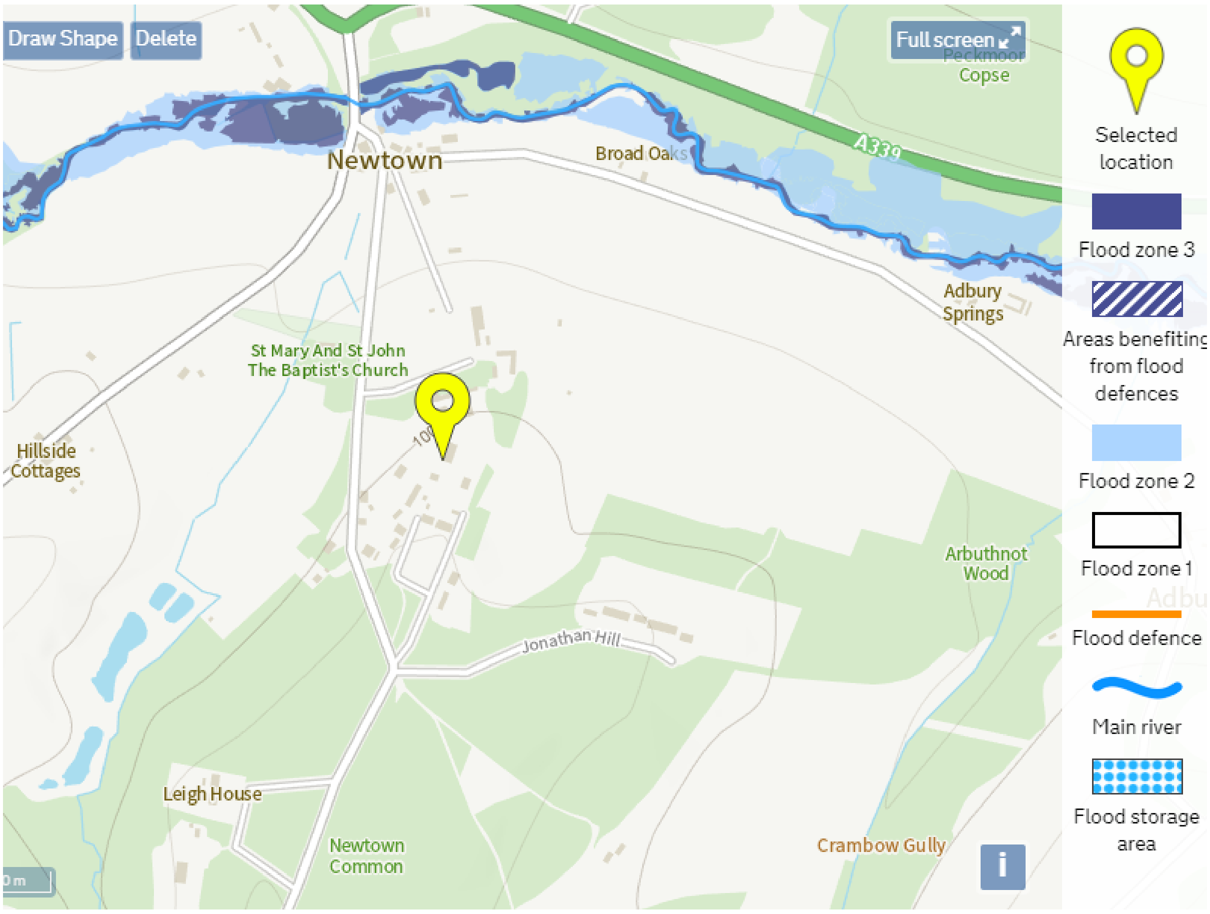
4.2. The site is at a low risk from tidal flooding due to its inland elevated location.

Flood Risk to the Site from Fluvial Flooding Sources

4.3. A review of the EA's Flood Map for Planning maps show the site to be located entirely within Flood Zone 1. This zone comprises land where flooding from rivers and the sea (fluvial) is very unlikely. There is less than a 0.1% (1 in 1000) chance of flooding occurring each year. The site is at a low risk of flooding from fluvial sources.

4.4. Extracts from the EA Flood Maps are included below.

Environment Agency's Flood Zone Map



Flood Risk to the Site from Pluvial Flooding Sources

4.5. The SFRA, EA and GOV.uk websites and local available documents indicate there is no history of flooding at the site from heavy rainfall events or overland flood routes with no risk of surface water flooding on the site.

Environment Agency's Surface Water Map

Flood Risk to the Site from Groundwater

4.6. Groundwater flooding has the potential to occur after prolonged periods of unusually high rainfall. During such periods, more water than usual infiltrates through the ground, raising the water table above its normal depth below the surface. Where the water table is at shallow depth in any case, the water table can reach the surface. This can cause ground water to merge with rainfall and cause localised flooding.

4.7. The SFRA indicates that for the entire site the risk of flooding from groundwater is low.

4.8. The low permeability of the underlying geology and the unproductive aquifers designation of the area also indicate that the site is unlikely to be affected by groundwater flooding.

4.9. Groundwater flooding tends to occur sporadically in both location and time. Surface groundwater flooding has not been a risk on the site and there is no reason to believe it would present a problem. However, further in situ tests should be carried out during detailed design.

Flood Risk to the Site from Other Sources

4.10. The SFRA, EA and GOV.uk websites and local available documents indicate there is no existing flood risk from: reservoirs, sewers, canals or other artificial sources.

4.11. The site is deemed of low risk of flooding from these sources.

The Sequential Test

4.12. In the context of PPG Flood Risk and Coastal Change ID: 7 (Table 2) the proposed development has been identified as 'residential' development and therefore is classified as 'More Vulnerable'.

4.13. The proposed development is situated wholly within Flood Zone 1.

4.14. By applying the Flood Risk Vulnerability compatibility matrix under PPG Flood Risk Coastal Change ID:7 (Table 3), all development types are deemed to be accepted in Flood Zone 1 as depicted.

Flood Risk Vulnerability Classification Table 3 PPG ID 7

Flood Risk Vulnerability classification (see Table 1 PPG ID: 7)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Yes	Exception test required	Yes	Yes
Zone 3a	Exception test required	Yes	No	Exception test required	Yes
Zone 3b 'Functional Floodplain'	Exception test required	Yes	No	No	No

Key: Yes: Development is appropriate, No: Development should not be permitted.

4.15. It is therefore considered that, within the context of Flood Risk, the Site passes the Sequential Test with respect to NPPF and is suitable for the type of development proposed.

Flood Risk Summary

4.16. An overall summary of the risk of flooding from all sources is provided below.

Flood Risk Summary

Source of Flooding	High	Medium	Low	Comments
Tidal			✓	The Site is elevated and inland.
Fluvial			✓	The Site is located wholly within Flood Zone 1.
Pluvial			✓	There is no overland flood routes to the Site
Groundwater			✓	EA/GOV.UK mapping does not indicate the Site to be at risk.
Sewers			✓	The Site has no exposure to existing sewer assets, with no evidence of flooding.
Reservoirs, canals and other artificial sources			✓	EA/GOV.UK mapping does not indicate the Site to be at risk.

4.17. Based upon the above information, the Site is deemed to be at **LOW RISK OF FLOODING**. The Proposed Site Plan is therefore in full accordance with National and Local planning policy concerning Flood Risk and as such is suitable for residential development.

5.0 Surface Water Strategy

Introduction

5.1. This chapter provides details on an indicative surface water drainage strategy and measures to drain the Development.

Overall Strategy

5.2. The proposed drainage strategy has been designed to exceed the requirements of the NPPF by providing a comprehensive drainage system which embraces the Sustainable Drainage Systems (SuDS) philosophy and key principles. The utilisation of SuDS not only provides the benefit of controlling waters at source and online treatment of collected surface water but also allows enhanced aesthetics through improved landscaping, biodiversity, and ecological opportunities.

5.3. These features offer a holistic treatment train and management system to the benefit of new residents, members of the wider community, downstream receptors and the environment.

5.4. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. Changes to land uses can have significant downstream impacts where existing drainage systems may not have sufficient capacity for any additional surface water flow.

5.5. A surface water management strategy is therefore required to manage and reduce the flood risk posed by the surface water runoff from the site. The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates to the pre-development scenario, unless specific off-site arrangements are made and result in the same net effect.

5.6. Sustainable water management measures (SuDS) should be introduced to control the surface water runoff from the proposed development site therefore, managing the flood risk to the site and surrounding areas from the surface water runoff.

5.7. The Construction Industry Research and Information Association, CIRIA's C690 states the following:

- **Prevention** – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing surfaces)
- **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting)
- **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one or several soakaways for the entire site)
- **Regional Control** – management of runoff from several sites, typically in a detention basin or wetland.

5.8. The SuDS Manual 2015 (C753) provides best practice guidance on the planning, design, construction, operation and maintenance of SuDS. This document provides guidance to ensure that SuDS are planned and designed to maximise the opportunities and benefits of surface water management.

5.9. The four main categories of benefits that can be achieved by SuDS, referred to as the four pillars of SuDS design, are:

- **Water quantity** – control the quantity of runoff to support the management of flood risk, and maintain and protect the natural water cycle;
- **Water quality** – manage the quality of the runoff to prevent pollution
- **Amenity** – create and sustain better places for people
- **Biodiversity** – create and sustain better places for nature.

5.10. Supplemental to CIRIA guidance, Document H of the Building Regulations 2015 sets out three possible options to discharge surface water runoff. Rainwater shall discharge to one of the following, listed in order of priority:

- An adequate soakaway or some other adequate infiltration system; or where that is not reasonably practicable,
- A watercourse; or where that is not reasonably practicable
- A sewer.

5.11. As infiltration is considered to be an unviable method of disposal, the surface water drainage proposals will be designed to attenuate runoff with controlled discharge to a nearby open watercourse. This drainage strategy will not rely on infiltration thereby ensuring that the drainage strategy will be robust. However, benefits of infiltration, even shallow, are not ruled out subject to further infiltration testing.

5.12. Implementation of SuDS will ensure that flood risk downstream is not increased due to the proposed development. These features will also provide positive improvements to the quality of surface water runoff.

5.13. The following SuDS components are deemed applicable to the Site:

- Pervious surfacing systems – structural surfaces that allow water to penetrate into a granular layer thus providing storage and treatment, e.g. pervious paving.
- Conveyance systems – components that convey flows to downstream storage systems, e.g. swales and filter drains.
- Storage systems – components that control flow, and possibly volumes, by storing water and releasing it slowly, e.g. geocellular units, attenuation basins and wetlands.
- Treatment systems – components that remove or facilitate the degradation of contaminants present in runoff, e.g. filter strips and proprietary treatment systems.

Pre and Post Development Rates / Areas

5.14. To quantify any potential increase in surface water runoff, the existing Greenfield/Pre-Development runoff rate from the Site must be determined. The rates of runoff have been determined using the current 'industry best practice' guidelines as outlined in the Interim Code of Practice for SuDS. The recommended methodology for sites up to 50 hectares in area is the ICP SuDS method.

5.15. An assessment of existing surface water runoff has been undertaken, to determine the potential surface water options and attenuation requirements for the site utilising the following parameters.

- Catchment Area: 1 ha (to determine a l/s/ha discharge rate)
- Average Annual Rainfall (SAAR): 769mm/year
- Soil: 0.400
- Region No.: 6

5.16. Greenfield run off calculations for the existing site provided in the appendix show the following discharge rates:

Pre-Development Runoff Rates/Volumes

Annual Probability	Greenfield/Pre-Development Runoff Rate per Hectare (l/s/ha)
1 in 1 year event	2.7
QBar	3.2
1 in 30 year event	7.4
1 in 100 year event	10.2

5.17. The existing site is predominantly Greenfield. Therefore, any development will increase the impermeable area and surface water run off.

5.18. As the site is less than 1ha with minimal impermeable area it is impractical to restrict discharge rates to flows less than the practical size of a flow discharge constraint or pipe size. Therefore, it is proposed all flows are restricted to 5l/s for all flows providing considerable benefit to discharge rates over long term especially when climate change is taken into account, and providing minimal impact to flow downstream of the discharge point.

Surface Water Proposals

5.19. A surface water management strategy for the proposed development has been developed to manage and reduce the flood risk posed by the surface water runoff from the site. The drainage system for the proposed development will manage and reduce the flood risk posed by the surface water runoff from the site.

5.20. It is proposed all roads and driveways will be finished in either bonded resign gravels or open graded gravels making them permeable and thus able to soak into the underlying ground as current Greenfield conditions. These have been excluded from the calculations. This provides filtration at source and also to remove any contaminants as the rainfall works its way through the ground layers or overland flow.

5.21. It is proposed to provide a network of pipes and Sustainable Drainage (SuDS) features to collect the surface water runoff from impermeable areas such as roofs. The traditional system will work in combination with such features as permeable paving, as described previously, roadside swales and attenuation features to provide attenuation storage and high-quality water benefits.

5.22. The layout of receiving ditches are unaffected and therefore existing outfall points will remain as is, with new headwalls being constructed within the site as required.

5.23. The development could utilise Source Control techniques (such as swales and permeable paving) which assist with the reduction of larger attenuation storage features. This should be embraced and investigated as the project progresses.

5.24. The main attenuation will be cellular storage under car parks and in open space controlled throughout the development to slow flows and restrict the ultimate discharge. Underground cellular storage is deemed acceptable due to the sloping nature of the site meaning open surface features are unviable. However, in the last attenuation area a swales can be placed above the cellular storage to fill in times of heavy rainfall, thus providing ecological and biodiversity benefits.

5.25. Proposed discharge rates will be restricted to 5 l/s for all storm events up to and including the 1 in 100 year storm event plus 40% allowance for climate change. This would negate the requirement for Long Term Storage and flows would be attenuated on site and discharged utilising an on-site flow control device such as a Hydrobrake.

5.26. All conveyance systems will be designed to cater for the 1:30 year storm event, in accordance with industry standard, with all attenuation features designed to allow for the 1 in 100 year storm event plus 40% climate change allowance.

5.27. The proposals draw reference to the DEFRA document Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems March 2015, as well as CIRIA C753 The SuDS Manual.

5.28. This proposal identifies the principal components of the surface water strategy and is subject to further detailed localised investigations as part of the subsequent Reserved Matters applications. These assumptions are subject to evolution as the design develops.

Exceedance Flood Routing

5.29. Flows in excess of the above design storms, which may flood from the network, will be kept within the internal road network and landscaping, until such time as they can be directed into adjacent landscaping areas. This ensures that onsite or offsite residential units are afforded an increased level of protection from flood waters until such time as the rain events become significant.

SuDS Maintenance Strategy

5.30. For the water treatment effects of SuDS features to remain effective, a comprehensive maintenance strategy should be implemented.

5.31. During construction, maintenance of SuDS features should be undertaken by the Contractor. Upon completion, the assets should be passed over to the Management Company, statutory authority, or community group commissioned to maintain the features in perpetuity.

5.32. As part of the strategy, a regular maintenance regime will be created, which consists of several primary measures required to ensure the longevity of the system. These should be undertaken on a regular basis to ensure consistent performance. Typical maintenance activities consist of:

- Inspecting and reporting; relatively regular review of the condition identifying issues and providing resolutions. Periodic review from the maintenance contractor;
- Litter and debris removal;
- Grass trimming, overall cutting and localised strimming preventing blockages;
- Weed and evasive plant control;
- Shrub management;
- Aquatic and shoreline vegetation management;
- Sweeping pervious surfaces; and
- Oil removal from proprietary systems.

5.33. A remedial maintenance schedule would be recommended as part of the handover of the SuDS features, remedial maintenance is required to provide repairs to the system and monitor long term damage ensuring the system remains consistently productive. the schedule could consist of;

- Structure rehabilitation and repair;
- Infiltration surface rehabilitation;
- Scarifying to remove "Thatch";
- Spiking or Tining the soil, which assists with aeration;
- Air pressure treatment.

5.34. The maintenance schedule contents and timing will depend upon multiple factors including usage, contents of water utilising the system, location and biology. To this end, it is suggested that the schedule be finalised as part of detailed design; ensuring the most comprehensive maintenance schedule is incorporated for the phase in hand.

5.35. Community outreach can be undertaken as part of the development, which will raise awareness on the importance of SuDS to both flood risk and water quality in the local area. Imparting the new residents with knowledge on the risks associated with pollution to the surface water drainage system is key, as is the direct effect their actions may have on water quality and biodiversity in the area.

Adoption and Ownership

5.36. The drainage system is designed to the appropriate standards including the new Sewerage Sector Guidance (SSG), the Building Regulations and the requirement of the National Planning Policy Framework

5.37. The intention of adoption and ownership of drainage and SuDS is as follows:

- Surface water sewers within development parcels to be offered for adoption to Thames Water under the Section 104 process of the Water Industry Act.
- Surface water highway drains, gullies and leads within adopted roads to be maintained by the Highway Authority.
- Above ground attenuation (i.e. swales and basins) within development parcels to be offered for adoption to either the Local Authority or ownership under a management company, or individual ownership.
- SuDS features serving single properties, for example, permeable paved driveways to single dwellings, will be owned and maintained by the owner of that property.

6.0 Foul Water Drainage

Introduction

6.1. This chapter provides details on the proposed foul water drainage strategy and measures to convey effluent.

Overall Strategy

6.2. Due to the topography of the site and location of the existing foul sewer point of connection, wastewater from the Site will require individual private receptors as there are no Thames Water foul sewers within the area.

6.3. It is proposed individual properties will have individual package treatment planys emptied on a private commercial basis. This is in line with the existing properties in the area, so an established network of suppliers and contractors are available.

7.0 Development Suitability

Introduction

7.1. This chapter assesses the suitability of the development proposals in the context of on and off-site vulnerability.

Assessment

7.2. This Drainage Assessment demonstrates that the Development satisfies the requirements of NPPF and can be justified in the proposed location by:

- meeting the criteria set out in NPPF;
- assessing the risk posed to the site from flood events;
- assessing the risk posed to the site from the site storm water generation and the site storm water runoff management; and
- assessing the risk the site poses to increase in flooding elsewhere.

7.3. Specifically, it has demonstrated:

- The detailed Fluvial flood map, for fluvial sources, provided by the GOV.UK's Flood Map for Planning indicate that the site area is entirely located with Flood Zone 1; assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%).
- The detailed flood map provided by GOV.UK indicates no pluvial flooding within the site.
- That a detailed review of available data indicates a low risk from secondary flooding sources, such as groundwater, sewers, reservoirs or canal.
- Through the provision of a positive drainage network attributed to the Development, pluvial flooding to offsite receptors will be significantly controlled over time greater than existing.
- Exceedance flows can be safely accommodated within the Development.

Conclusion

7.4. The proposed surface water drainage strategy will manage the flood risk posed by uncontrolled surface water runoff from the Site. Any increase in surface water run-off can be managed using SuDS source control techniques as well as attenuation features to provide storage in extreme storm events.

7.5. All surface water drainage systems will be designed to restrict discharge rates and store the balance of water for all events up to and including the 1 in 100 year event including allowance for a 40% increase in rainfall intensities as a result of climate change.

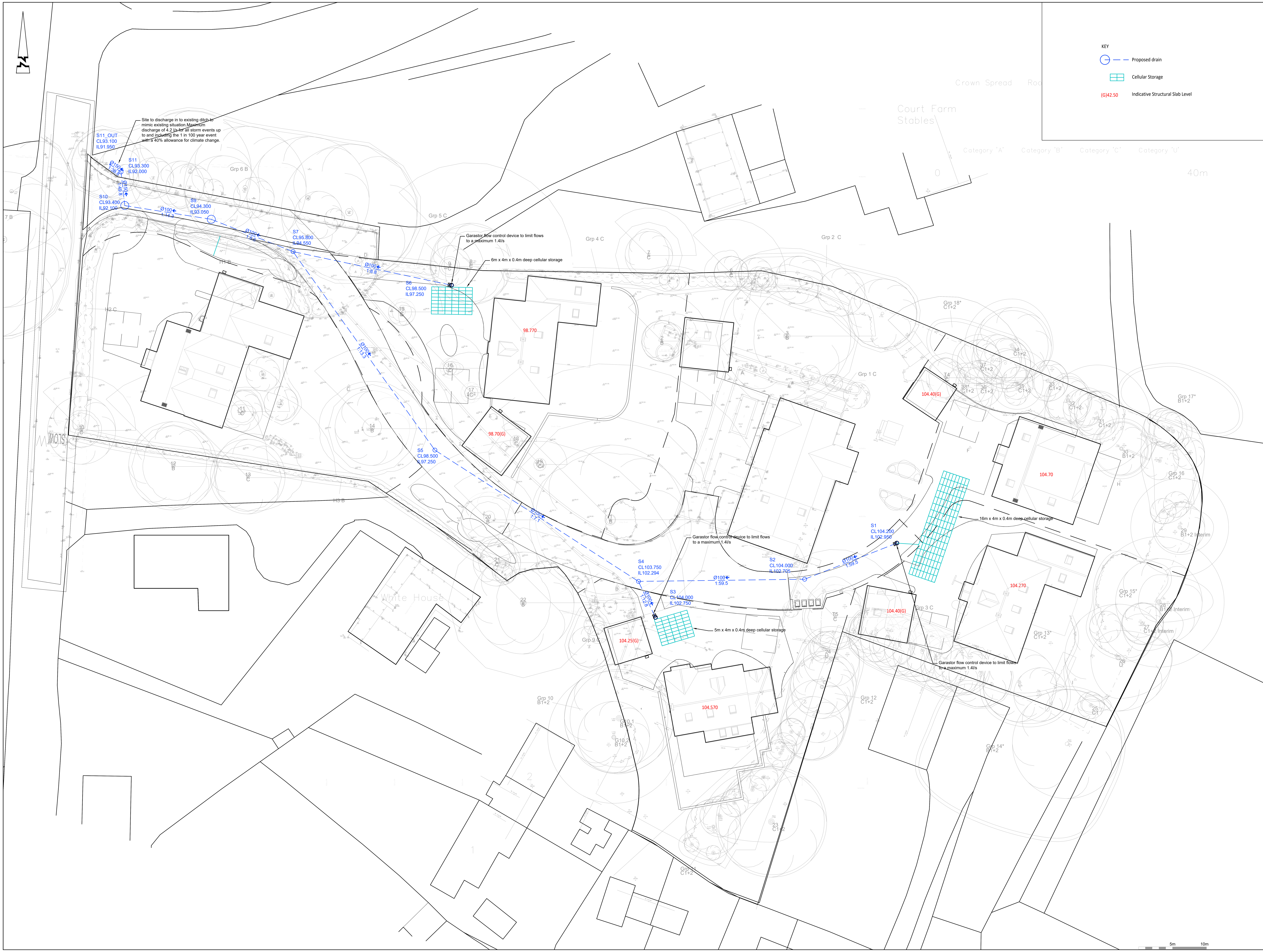
7.6. The proposed foul water drainage strategy presents a robust, viable method of conveyance of effluent to the public sewerage system.

Overall, the Site should not be precluded on flood risk grounds as the Development will not be at risk from existing sources and will not result in an increase in flooding downstream.

Appendices

Appendix 1 - Drawings

Preliminary Drainage Strategy



GENERAL NOTES:

1. Do not scale.
2. This drawing is to be read in conjunction with and checked against all other drawings, Engineering details, Specification and any structural, Geotechnical or other specialist document provided.
3. Any anomaly or contradiction between any of the above is to be reported to the Engineer.

Rev	Date	Description	Drawn	Checked
P2	07/21	Updated to suit revised layout	JS	SL
P1	05/21	First Issue	JS	SL

ABLEY LETCHFORD PARTNERSHIP
Consulting Engineers
3 Tealgate, Charnham Park
Hungerford, Berkshire RG17 0YT
www.alpce.co.uk Tel: 01488 684390

Client
Edge Architecture

Project
Newtown Court Farm
Newtown

Title
Surface Water Drainage Strategy

Status
Preliminary

Scale	Date	Drawn	Checked
1:250 @ A1	May 21	JS	SL

Drawing No	Revision
A345-002	P2

Appendix 2 - Calculations

Qbar Calculation

Attenuation Volume Calculation

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Shaun Letchford
Site name:	Newtown Court Farm
Site location:	Newbury

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.

Site Details

Latitude:	51.36910° N
Longitude:	1.31549° W
Reference:	652141248
Date:	May 10 2021 16:53

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 1

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	3	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.37	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm):	769	769
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	3.21	3.21
1 in 1 year (l/s):	2.73	2.73
1 in 30 years (l/s):	7.38	7.38
1 in 100 year (l/s):	10.23	10.23
1 in 200 years (l/s):	11.99	11.99

Design Settings

Rainfall Methodology	FSR
Return Period (years)	1
Additional Flow (%)	0
FSR Region	England and Wales
M5-60 (mm)	20.000
Ratio-R	0.400
CV	0.750
Time of Entry (mins)	5.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	50.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Soffits
Minimum Backdrop Height (m)	9.999
Preferred Cover Depth (m)	1.150
Include Intermediate Ground	✓
Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.052	5.00	104.200	500	447784.247	163565.163	1.250
2			104.000	600	447770.673	163559.847	1.295
3	0.023	5.00	104.000	500	447748.711	163554.232	1.250
4			103.750	600	447746.217	163559.532	1.456
5			98.500	600	447716.254	163578.856	1.250
6	0.026	5.00	98.500	500	447718.701	163603.124	1.250
7			95.800	600	447695.369	163608.074	1.250
9			94.300	1200	447683.340	163612.827	1.250
10			93.400	1200	447670.609	163614.845	1.300
11			93.300	600	447670.061	163619.795	1.300
11_OUT			93.100		447668.452	163620.879	1.150

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	14.578	0.600	102.950	102.705	0.245	59.5	100	5.24	50.0
1.001	2	4	24.458	0.600	102.705	102.294	0.411	59.5	100	5.65	50.0
2.000	3	4	5.857	0.600	102.750	102.294	0.456	12.8	100	5.05	50.0
1.002	4	5	35.654	0.600	102.294	97.250	5.044	7.1	100	5.85	50.0
1.003	5	7	35.915	0.600	97.250	94.550	2.700	13.3	100	6.13	49.8
3.000	6	7	23.851	0.600	97.250	94.550	2.700	8.8	100	5.15	50.0
1.004	7	9	12.934	0.600	94.550	93.050	1.500	8.6	100	6.22	49.5
1.005	9	10	12.890	0.600	93.050	92.150	0.900	14.3	100	6.32	49.1
1.006	10	11	4.980	0.600	92.100	92.000	0.100	49.8	150	6.38	48.9
1.007	11	11_OUT	1.940	0.600	92.000	91.950	0.050	38.8	150	6.40	48.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.000	7.9	7.0	1.150	1.195	0.052	0.0	74	1.130
1.001	1.000	7.9	7.0	1.195	1.356	0.052	0.0	74	1.130
2.000	2.167	17.0	3.2	1.150	1.356	0.023	0.0	29	1.661
1.002	2.926	23.0	10.2	1.356	1.150	0.075	0.0	46	2.835
1.003	2.129	16.7	10.2	1.150	1.150	0.075	0.0	57	2.236
3.000	2.616	20.5	3.5	1.150	1.150	0.026	0.0	28	1.945
1.004	2.648	20.8	13.5	1.150	1.150	0.101	0.0	59	2.821
1.005	2.052	16.1	13.4	1.150	1.150	0.101	0.0	70	2.293
1.006	1.429	25.2	13.4	1.150	1.150	0.101	0.0	78	1.449
1.007	1.620	28.6	13.4	1.150	1.000	0.101	0.0	72	1.591

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	14.578	59.5	100	PH1	104.200	102.950	1.150	104.000	102.705	1.195
1.001	24.458	59.5	100	PH1	104.000	102.705	1.195	103.750	102.294	1.356
2.000	5.857	12.8	100	PH1	104.000	102.750	1.150	103.750	102.294	1.356
1.002	35.654	7.1	100	PH1	103.750	102.294	1.356	98.500	97.250	1.150
1.003	35.915	13.3	100	PH1	98.500	97.250	1.150	95.800	94.550	1.150
3.000	23.851	8.8	100	PH1	98.500	97.250	1.150	95.800	94.550	1.150
1.004	12.934	8.6	100	PH1	95.800	94.550	1.150	94.300	93.050	1.150
1.005	12.890	14.3	100	PH1	94.300	93.050	1.150	93.400	92.150	1.150
1.006	4.980	49.8	150	PH1	93.400	92.100	1.150	93.300	92.000	1.150
1.007	1.940	38.8	150	PH1	93.300	92.000	1.150	93.100	91.950	1.000

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	500	Manhole	Adoptable	2	600	Manhole	Adoptable
1.001	2	600	Manhole	Adoptable	4	600	Manhole	Adoptable
2.000	3	500	Manhole	Adoptable	4	600	Manhole	Adoptable
1.002	4	600	Manhole	Adoptable	5	600	Manhole	Adoptable
1.003	5	600	Manhole	Adoptable	7	600	Manhole	Adoptable
3.000	6	500	Manhole	Adoptable	7	600	Manhole	Adoptable
1.004	7	600	Manhole	Adoptable	9	1200	Manhole	Adoptable
1.005	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
1.006	10	1200	Manhole	Adoptable	11	600	Manhole	Adoptable
1.007	11	600	Manhole	Adoptable	11_OUT		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	447784.247	163565.163	104.200	1.250	500	0	1.000	102.950	100
2	447770.673	163559.847	104.000	1.295	600	1	1.000	102.705	100
						0	1.001	102.705	100
3	447748.711	163554.232	104.000	1.250	500	0	2.000	102.750	100
4	447746.217	163559.532	103.750	1.456	600	1	2.000	102.294	100
						2	1.001	102.294	100
						0	1.002	102.294	100
5	447716.254	163578.856	98.500	1.250	600	1	1.002	97.250	100
						0	1.003	97.250	100
6	447718.701	163603.124	98.500	1.250	500	0	3.000	97.250	100
7	447695.369	163608.074	95.800	1.250	600	1	3.000	94.550	100
						2	1.003	94.550	100
						0	1.004	94.550	100
9	447683.340	163612.827	94.300	1.250	1200	1	1.004	93.050	100
						0	1.005	93.050	100
10	447670.609	163614.845	93.400	1.300	1200	1	1.005	92.150	100
						0	1.006	92.100	150
11	447670.061	163619.795	93.300	1.300	600	1	1.006	92.000	150
						0	1.007	92.000	150
11_OUT	447668.452	163620.879	93.100	1.150		1	1.007	91.950	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0
100	40	10	0

Node 1 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 102.950

Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.150	0.800	0.225	1.000	0.300	1.160	0.400	1.400

Node 3 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 102.750

Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.150	0.800	0.225	1.000	0.300	1.160	0.400	1.400

Node 6 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 97.250

Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.150	0.800	0.225	1.000	0.300	1.160	0.400	1.400

Node 9- Online StormBrake™ Control

Flap Valve	x	Design Flow (l/s)	5.0
Replaces Downstream Link	✓	Product Code	FPM-SB1-01690-00500-1100
Invert Level (m)	92.662	Min Outlet Diameter (m)	0.150
Design Depth (m)	1.690	Min Node Diameter (mm)	1200

Node 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	102.950
Safety Factor	2.0	Time to half empty (mins)	226

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	64.0	0.0	0.400	64.0	0.0	0.401	0.0	0.0

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	102.750
Safety Factor	2.0	Time to half empty (mins)	88

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	20.0	0.0	0.400	20.0	0.0	0.401	0.0	0.0

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.250
Safety Factor	2.0	Time to half empty (mins)	98

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	24.0	0.0	0.400	24.0	0.0	0.401	0.0	0.0

Node 8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	92.750
Safety Factor	2.0	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	0.0	0.0	0.400	0.0	0.0	0.401	0.0	0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	160	103.344	0.394	7.6	24.3491	0.0000	SURCHARGED
180 minute winter	2	172	102.735	0.030	1.4	0.0085	0.0000	OK
60 minute winter	3	53	103.495	0.745	7.6	8.0332	0.0000	SURCHARGED
120 minute winter	4	104	102.318	0.024	2.8	0.0067	0.0000	OK
120 minute winter	5	104	97.278	0.028	2.8	0.0078	0.0000	OK
120 minute winter	6	92	97.753	0.503	5.1	9.4366	0.0000	SURCHARGED
120 minute winter	7	100	94.580	0.030	4.2	0.0086	0.0000	OK
120 minute winter	9	100	93.086	0.036	4.2	0.0404	0.0000	OK
120 minute winter	10	100	92.144	0.044	4.2	0.0501	0.0000	OK
120 minute winter	11	100	92.042	0.042	4.2	0.0118	0.0000	OK
120 minute winter	11_OUT	100	91.989	0.039	4.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	1	Head/Flow	2	1.4				
180 minute winter	2	1.001	4	1.4	0.851	0.176	0.0408	
60 minute winter	3	Head/Flow	4	1.4				
120 minute winter	4	1.002	5	2.8	1.755	0.120	0.0563	
120 minute winter	5	1.003	7	2.8	1.469	0.165	0.0676	
120 minute winter	6	Head/Flow	7	1.4				
120 minute winter	7	1.004	9	4.2	1.842	0.200	0.0292	
120 minute winter	9	1.005	10	4.2	1.688	0.258	0.0318	
120 minute winter	10	1.006	11	4.2	0.999	0.165	0.0207	
120 minute winter	11	1.007	11_OUT	4.2	1.099	0.145	0.0073	48.2

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	128	104.200	1.250	8.3	25.7367	1.4403	FLOOD
360 minute winter	2	312	102.735	0.030	1.4	0.0086	0.0000	OK
120 minute winter	3	80	104.000	1.250	5.1	8.3683	0.5760	FLOOD
120 minute winter	4	90	102.318	0.024	2.8	0.0067	0.0000	OK
120 minute winter	5	90	97.278	0.028	2.8	0.0079	0.0000	OK
120 minute winter	6	84	98.500	1.250	5.6	9.9414	0.3479	FLOOD
120 minute winter	7	92	94.581	0.031	4.2	0.0087	0.0000	OK
120 minute winter	9	92	93.086	0.036	4.2	0.0406	0.0000	OK
120 minute winter	10	92	92.145	0.045	4.2	0.0504	0.0000	OK
120 minute winter	11	92	92.042	0.042	4.2	0.0119	0.0000	OK
120 minute winter	11_OUT	92	91.989	0.039	4.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	1	Head/Flow	2	1.4				
360 minute winter	2	1.001	4	1.4	0.873	0.178	0.0409	
120 minute winter	3	Head/Flow	4	1.4				
120 minute winter	4	1.002	5	2.8	1.762	0.122	0.0568	
120 minute winter	5	1.003	7	2.8	1.475	0.167	0.0682	
120 minute winter	6	Head/Flow	7	1.4				
120 minute winter	7	1.004	9	4.2	1.847	0.202	0.0295	
120 minute winter	9	1.005	10	4.2	1.692	0.261	0.0320	
120 minute winter	10	1.006	11	4.2	1.001	0.166	0.0209	
120 minute winter	11	1.007	11_OUT	4.2	1.102	0.147	0.0074	51.0

development planning
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site appraisal
flood risk assessment
travel plans
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ABLEY LETCHFORD PARTNERSHIP LTD
3 Tealgate · Charnham Park · Hungerford · RG17 0YT
T: 01488 684 390 E: contact@alpce.co.uk W: www.alpce.co.uk