

Fews Lane, Longstanton

Drainage Review

On behalf of Greater Cambridge Shared Planning



GREATER CAMBRIDGE SHARED PLANNING

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Contents

1	Intro	duction	1
	1.1	Background Information	1
	1.2	Third Party Objections	4
2	Site I	Details and Background Information	5
	2.1	Location	5
	2.2	Local Hydrological Context	5
	2.3	Geological Information	7
	2.4	Existing drainage arrangement	8
3	Planı	ning Policy	9
	3.2	National Planning	9
	3.3	Regional and Local Planning Policy	11
	3.4	Local Plan	14
	3.5	Design Best Practice	16
4	Revie	ew of Drainage Information	18
	4.1	Foul Water Drainage Proposal	18
	4.2	Surface Water Drainage Proposal	18
	4.3	Objections and Drainage Review	19
5	Conc	lusion	26

Figures

Figure 1: Flood Map for Planning	5
Figure 2: SuDS Hierarchy	12
Figure 3 Drainage Layout Plan	18
Figure 4:Soakaway 5m offset from buildings	22

Tables

Table 1 – Infiltration Test Results	7
Table 2: Probable Expansion of clay as estimated from classification test data (from Holtz and Kova	cs
1981)	21

Appendices

Appendix A	Third Party Objections
Appendix B	Drainage Drawings
Appendix C	Geotechnical Report and Infiltration Test Report
Appendix D	Cambridge SPD completed Pro-Forma
Appendix E	Anglian Water Correspondence
Appendix F	Consultation Response with SCDC
Appendix G	Maintenance Plan
Appendix H	Greenfield Runoff Calculations
Appendix I	Manning's Equation for Watercourse
Appendix J	Micro-drainage Surface Water Calculations – submerged outfall



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1 Introduction

1.1 Capability Statement

1.1.1 The Authors of this report are Simon Darch and Stephanie Knowles, on behalf of Stantec Ltd.

Simon Darch, Director, Cambridge Office, Stantec

- 1.1.2 Simon is a Director in Stantec which is a development and infrastructure consultancy employing more than 22,000 staff and operating from 350 offices across 6 continents. Simon has a BEng (Hons) degree in Civil Engineering, and an MSc in Irrigation Engineering. He is a Chartered Civil Engineer, a Chartered Environmentalist and a Chartered Water and Environmental Manager. Simon is fellow of the Institution of Civil Engineers and Member of the Chartered Institution of Water and Environmental Managers. He has been working in the design and implementation of drainage and infrastructure required in residential and commercial developments of varying size in the UK since 1994, with previous experience of working in irrigation and agricultural communities in Australia, Tanzania and Indonesia.
- 1.1.3 Simon is a Technical Advisor to the Hobson's Conduit Trust (custodians of a heritage water body through Cambridge), and represents a number of Internal Drainage Boards in both a planning control context and the delivery of their capital works drainage projects and asset management. In this capacity he has been a member on the Northstowe Technical Liaison Group for Flood Risk and Drainage for the past 12 years, a planning steering group established to ensure a sustainable and exemplar approach on drainage issues arising from the proposed new town development to the north of Cambridge, and safeguarding the protection to the villages of Oakington, Longstanton and Swavesey.
- 1.1.4 Simon project managed one of DEFRA's nominated Integrated Urban Drainage Pilot studies, investigating the delivery mechanisms for sustainable drainage solutions at a strategic scale.
- 1.1.5 Simon was on the steering committee for the delivery of the original Cambridge Northern Fringe Water Cycle Strategy, and latterly is the Project Director for the Cambridge Water Cycle Strategy currently being developed.
- 1.1.6 He is also the framework manager for supply chain services to the Environment Agency's Next Generation Services Agreement, Collaborative Delivery Framework and is Stantec's national lead for the non-regulated water sector

Stephanie Knowles, Associate, Cambridge Office, Stantec

- 1.1.7 Stephanie is an Associate based in the Stantec Cambridge office. She has a BEng (Hons) degree in Civil Engineering and is currently working towards her chartership with the Institute of Civil Engineers.
- 1.1.8 She has over 20 years' experience in the engineering consulting industry. She has project managed a number of multidisciplinary schemes and has provided civil engineering, water and sustainability advice to a number of clients for a variety of schemes based in the UK and abroad.
- 1.1.9 Stephanie has been involved in assisting and preparing Flood Risk Assessments (FRAs), undertaking Flood Risk analysis, and drainage strategies including providing sustainable drainage solutions. She is experienced in producing ES Chapters and the production of strategic flood reports such as Strategic Flood Risk Assessments (SFRAs) and Surface Water Management Plans (SWMPs).



1.1.10 Stephanie has supported clients in her role as Sustainability Champion for a variant number of schemes for BREEAM, Code for Sustainable Homes (CfSH) and CEEQUAL. She is a qualified BREEAM AP and produces Sustainability Assessments to support projects through the planning process.

1.2 Background Information

- 1.2.1 This drainage review has been produced by Stantec on behalf of Greater Cambridge Shared Planning.
- 1.2.2 In 2019, the Planning Service considered and approved details of a scheme for the foul and surface water drainage to a new dwelling located in Fews Lane, Longstanton, Cambridgeshire, application Ref S/3215/19/DC. The site formed part of the formal garden for an existing dwelling (The Retreat).
- 1.2.3 The application (hereafter referenced as 'the site') is for a three-bedroom bungalow, which was initially made on October 2016 and subsequently refused on 4 September 2017 (S/2937/16/L), drainage did not form part of this objection. The application went to appeal, dated 06 September 2018. The appeal was subsequently allowed, and planning permission granted for the erection of the three-bedroom bungalow with conditions relating to foul and surface water drainage supplied. The planning information supplied by the applicant is to discharge these conditions and is addressed as part of this report, application S/3215/19/DC.
- 1.2.4 A separate application is to be submitted in relation to the demolition of the existing dwelling, (The Retreat), and its replacement by two proposed dwellings, application Ref S/0277/19/FL (hereafter referenced as the 'southern site'). This is to be a separate application and does not form part of this review.
- 1.2.5 An application for the erection of another two dwellings on land to the side of The Retreat (west of the site) was submitted on 12 June 2015 and subsequently approved on 6 January 2016, application reference S/1498/15/FL and S/1059/16/DC. These dwellings have since been constructed and are now occupied.
- 1.2.6 The applicant for the proposed development is Landbrook Homes Ltd (Mr Gerry Caddoo),hereafter referenced as the 'Applicant'.
- 1.2.7 This decision has been the subject of a judicial review from an interested third party who had wanted to submit technical comments on the proposed foul and surface water drainage scheme prior to the authority's consideration. In agreeing to the consent order to quash that decision, the Planning Authority has given an undertaking to allow the third party to submit their comments to the Local Planning Authority prior to re-consideration of the submission. The final decision on the reconsidered proposals will be taken by the South Cambridgeshire District Council Planning Committee.
- 1.2.8 The Council had previously sought advice on the application from its retained drainage consultant and these comments have been made publicly available and are referred to within this report.
- 1.2.9 In anticipation of the submission of technical comments from the third party, the Planning Authority has commissioned Stantec to independently review the application and third party submissions for the purposes of providing advice to the Local Planning Authority officers and Committee on the adequacy of the proposed scheme for foul and surface water drainage, having regard to published and acknowledged approaches and best practice.



- 1.2.10 The conditions for drainage which were discharged by the drainage consultant were in relation to:
 - Condition 4 –No construction work shall be commenced until full details of the proposed arrangements for foul water drainage have been submitted to the local planning authority and approved in writing.
 - Condition 5 No construction work shall be commenced until full details of the proposed arrangements for surface water drainage, both from the building itself and from the proposed driveway area, have been submitted to the local planning authority and approved in writing.
- 1.2.11 These conditions were set following the planning appeal relating to the site, APP/W0530/W/18/3197088, decided on 27 September 2018. The conditions relating to foul and surface water drainage were considered necessary by the inspector to prevent flooding and the need to take effect prior to commencement, to ensure an orderly sequence of works.

Information submitted to discharge conditions

- 1.2.12 The information provided on behalf of the applicant, by their appointed drainage consultant (Andrew Firebrace Partnership) in respect to application Ref S/3215/19/DC, to discharge, drainage conditions 4 and 5 are listed below. These have been reviewed to inform the production of this report.
 - Site Plan dated August 2019, Reference FLL-345-Site 01 by Simon Ward Architectural Design.
 - Marshalls Installation Details for Drivesett Tegula Priora Paving (superseded)
 - Drainage Layout Plan, dated 13/09/19 Reference 19/0321/100 Rev P3 by Andrew Firebrace Partnership (superseded)
 - Below Ground Construction Details, dated 30/08/19 Reference 19/0321/110 Rev P1 by Andrew Firebrace Partnership (superseded)
 - Ditch Plan and Section 1, dated 17/10/19 Reference 19/0321/101 Rev P1 by Andrew Firebrace Partnership (superseded)
- 1.2.13 It should be noted the Site plan and suite of drainage drawings issued by the applicant also relate to the southern site, associated with planning application reference S/0277/19/FL. The drainage for these two properties does not form part of this application and therefore this report addresses the drainage associated with the single new dwelling (the site), application Ref S/3215/19/DC only.
- 1.2.14 Other documents made available on the planning portal website for Ref S/3215/19/DC are listed below:
 - Sustainable Drainage Engineer Planning Consultation Response (Discharge of Conditions) dated 05/10/2019
 - Sustainable Drainage Engineer Planning Consultation Response (Discharge of Conditions) dated 26/10/2019
 - Neighbours Comments (Redacted), letter dated 08 October 2019
 - Parish Council Comments, dated 15/10/2019



- Neighbours comments (Redacted), dated 18/10/2019
- 1.2.15 Further information since instruction has been provided to Stantec following our initial review these are as follows:
 - Fews Lane Consortium Ltd is the third party and have provided their objections in a letter dated 02 June 2020 and 13 July 2020, 16 July 2020 and 13 August 2020.
 - Parish Council objections and comments dated 11 August 2020
 - Drainage Layout Plan, Reference 19/0321/100 Rev P7 (superseded), P8 (superseded) and P9 by Andrew Firebrace Partnership (illustrating an update to drainage strategy for the site)
 - Ditch Plan and Section drawing reference 19/0321/101 Rev P2 (superseded) and P3
 - Below Ground Construction Details, Reference 19/0321/110 Rev P2
 - Micro Drainage attenuation tank calcs (superseded) and attenuation tank calcs with surcharged outfall.
 - Plot 3 Greenfield Runoff Rates.
 - Completed Appendix F Surface Water Drainage Pro-Forma from the Cambridgeshire Flood and Water SPD.
 - Anglian Water response regarding discharge of conditions 4 and 5.
 - Below Ground Drainage Operation and Maintenance Strategy Report.
 - Ground Investigation Report dated January 2016, by Oakley Soils Surveys.
 - Infiltration Test Report dated April 2020
- 1.2.16 The relevant information provided by the applicant are detailed further in this report and the appended information. It should be noted some of the information initially issued to discharge the planning conditions have been superseded. Therefore, only the latest information has been used to inform this review.

1.3 Third Party Objections

1.3.1 Neighbours objections (Fews Lane Consortium) and Parish Council were initially received on the 08 October 2019 and 18 October 2019 respectively. Further objections from The Fews Lane Consortium were received on 02 June 2020, 13 July 2020, 16 July 2020 and 13 August 2020. Updated Parish Council Objections were received on 11 August. A copy of these objections are provided in Appendix A. The objections all relate to the discharge of both Conditions 4 and 5.



2 Site Details and Background Information

2.1 Location

- 2.1.1 The site is in Longstanton village, set back from the High Street and accessed via an unadopted access and public right of way, "Fews' Lane". The development abuts an existing ¹watercourse (ditch), located to the north of red line boundary, which outfalls into the Longstanton Brook.
- 2.1.2 The site is in Flood Zone 1, in accordance with the GOV.UK Flood Map for planning (see Figure 1) and is in an area of Low to Very Low flood risk from surface water flooding.



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Figure 1: Flood Map for Planning

2.2 Local Hydrological Context

- 2.2.1 Longstanton Brook has been extensively modelled as part of the assessment for the proposed new settlement of Northstowe. As part of the Northstowe works two new storage ponds located upstream of the village along Hatton's Road were proposed.
- 2.2.2 A review of the local Northstowe Planning information concludes existing flooding within the Longstanton village was primarily caused by lack of hydraulic capacity within the culverted sections of the Brook, as it flows through Longstanton Village and is compounded by the lack of maintenance. The new flood relief ponds located along Hattons Road are to work as offline flood relief mitigation to the existing Brook.

¹ A watercourse is defined as any channel through which water flows. It may range from a reasonable sized ditch with constant flow to nothing more than a depression which carries water infrequently.



- 2.2.3 Water levels have not been supplied for the existing watercourse, although refence on the drawings state Dry Ditch.
- 2.2.4 Ownership in respect to the watercourse along the redline boundary is assumed to apply to the applicant. This would be consistent with Cambridgeshire County Council, in their powers as Lead Local Flood Authority (LLFA) and the associated webpage titled Watercourse Management advice which states ²"*If you own land adjoining a watercourse you have certain rights and responsibilities. In legal terms you are a 'riparian owner'. Your rights have been established in common law for many years. The Riparian Owner factsheet.pdf outlines your rights and responsibilities as a riparian owner."*
- 2.2.5 The Cambridgeshire County Council document **The rights and responsibilities of a riparian owner** states "If you own land adjoining, above or with a watercourse running through it, you have certain rights and responsibilities. In legal terms you are a "riparian owner". If you rent the land you should agree with the owner who should manage these rights and responsibilities. Smaller watercourses, ditches and rains, known as "ordinary watercourses² play a crucial role in managing flood risk to people and property in Cambridgeshire. That is why it is important to ensure that they are well maintained and kept from debris, obstructions and do not become overgrown. Cambridgeshire County Council, under the Flood and Water Management Act (2010), is the Lead Local Flood Authority and responsible for regulating ordinary watercourses outside of Internal Drainage Board's rateable areas".
- 2.2.6 We have therefore assumed for the purpose of this review that the applicant has riparian responsibilities and rights associated with this watercourse. Any works to the watercourse itself (i.e outfall arrangements) is subject to ordinary watercourse consent. This does not form part of the drainage design review, but this will need to be undertaken and approval from the LLFA prior to any works.

² <u>https://www.cambridgeshire.gov.uk/business/planning-and-development/flood-and-water/watercourse-</u> management accessed on 30/07/2020



2.2.7 Cross sectional information has been issued associated with the proposed outfall arrangement for the surface water drainage into the existing watercourse (drawing 19/0321/1010 Rev P3). The cross section shows the watercourse to be at an approximate depth of 1.39m, on the bank side of the site, and 2.05m depth on the far north bank to the site. The width of the ditch has been measured as approximately 5.3m wide, at the top of bank, and 2m wide at the base of the watercourse. Refer to drawing 19/0321/1010 P3 in Appendix B.

2.3 Geological Information

- 2.3.1 The Ground Investigation Report, dated January 2016 by Oakley Soils, provides information on the underlying soils associated with the site. A borehole located in land to the west of the site, where the two occupied properties were constructed, provides an overview on the soil characteristics of the site. The borehole log shows the site to be underlined with clay and gravelly sands to a depth of 1.8m BGL and then dark, fissured clay to depths of 18.45m BGL. The clay is classified as inorganic clay of high to very high plasticity.
- 2.3.2 A review of the British Geological Website (BGS) also shows the site is in an area with no recorded information associated with the superficial deposits and an underlying bedrock of West Walton Formation and Ampthill Clay formation.
- 2.3.3 The above information would suggest limited potential for infiltration at the site where clay is present, but the superficial deposits may be able to support localised infiltration measures, subject to the results of infiltration tests in accordance with BRE365.
- 2.3.4 An infiltration report has been received, with soakaway tests conducted in three locations, one of which is applicable to the site (TP03) and two within the southern site (TP01 and TP02). The tests are stated within the report to have been undertaken in accordance with BRE365 and results are summarised in Table 1 below.

Trial Pit No	Depth (mbgl)	Test 1 Rate (m/s)	Test 2 Rate (m/s)	Test 3 Rate (m/s)	Design Infiltration Rate (m/s)
TP01	1.2m	1.64E-05	1.33E-05	1.13E-05	1.13E-05
TP02	1.2m	1.56E-05	1.40E-05	1.2E-05	1.2E-05
TP03	1.2m	6.97E-06	8.00E-06	8.10E-06	6.97E-06

Table 1 – Infiltration Test Results

- 2.3.5 The results from these reports and how these have been applied to the site drainage is further assessed in section 4 of this report.
- 2.3.6 Refer to Geotechnical information and infiltration test report in Appendix C.



2.4 Existing drainage arrangement

2.4.1 The site is an existing garden of an original dwelling (The Retreat). Existing drainage has not been confirmed within the submitted Cambridgeshire SPD ³pro-forma (refer to Appendix D) but it can be reasonably concluded, from the information submitted, that the parcel of land applicable to this review would likely infiltrate but still with hydrogeological connectivity to the local watercourse, due to the impervious nature of the geology at lower depths.

³ Pro-forma was submitted prior to discharge rate reduction to 1l/s. This is not a material change to the outcome of this review.

3 Planning Policy

- 3.1.1 Whilst it is acknowledged the objections received from Neighbours, the Fews Lane Consortium, are specific in relation to the failure to comply with the South Cambridgeshire adopted Local Plan (2018), a wider review specific to National and Regional policy has also been undertaken as part of this assessment. This follows the requirements of the client to undertake a peer review on all applicable drainage related policy and in response to the neighbours and the Parish Council objections.
- 3.1.2 Planning Policy is generated at two different levels:
 - i. National these are policies set by the Government through the National Planning Policy Framework.
 - ii. Local planning policies created by local planning authorities (such as LLFA, Parish, District and Local Plan, Neighbourhood Forums).

3.2 National Planning

National Planning Policy Framework (NPPF) and supporting Guidance Document

- 3.2.1 The National Planning Policy Framework (NPPF) sets out the government's planning policies for England and how these are expected to be applied. The current version was published in February 2019. Section 14 of the NPPF, 'Meeting the challenge of climate change, flooding and coastal change'; and the supporting PPG (published in March 2014), section 'Flood Risk and Coastal Change' and updated in February 2016 is applicable when assessing sites associated with flood risk. It is generally accepted that drainage will form part of the management of flood risk associated with a proposed development and therefore is also used to inform both regional and local planning policy.
- 3.2.2 The NPPF aims to ensure flood risk is considered at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk. In exceptional circumstances where new development is necessary in flood risk areas the policy also aims to ensure it is safe, without increasing flood risk elsewhere, and where possible reducing flood risk overall.
- 3.2.3 For sites less than 1ha in size and not at risk of flooding, a Flood Risk Assessment is not required, but nevertheless, the principles of ensuring the appropriate and sustainable management of drainage, to mitigate or prevent future flooding, should still form the basis for a sustainable drainage strategy and be used in support for the promotion of sustainable development.
- 3.2.4 Applicable references to drainage within the NPPF are as follows:
 - Para 163: 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 assessment⁴. Development should only be allowed in areas at risk of flooding where, in light of this assessment (and the sequential and exceptions tests, as applicable) it can be demonstrated that:

⁴ NPPF Footnote 50: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: site 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 it is development would introduce more vulnerable use.



- 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 resistant 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.
- Para 164. Applications for some minor development and changes of use⁵ should not be subject to the sequential or exception test but should still meet the requirements for sitespecific flood risk assessments set out in footnote 50.
- Para 165: Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:
 - a. Take account of advice from the lead local flood authority;
 - b. Have appropriate proposed minimum operational standards;
 - c. Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - d. Where possible, provide multifunctional benefits.

Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)

- 3.2.5 This document sets out the non-statutory technical standards for sustainable drainage systems and promotes the use of the document in conjunction of with the ⁶NPPF. This document is referenced within the neighbour's objections as evidence for reasons for refusal.
- 3.2.6 The then Secretary of State for Communities and Local Government made a ⁷statement on the 18 December 2014 in relation to the Non-Statutory Technical Standards for Sustainable Drainage Systems, text applicable to this review and taken from this statement are as follows:

"Today we are publishing our response to the consultation explaining how we will be strengthening existing planning policy. This will make clear that the Government's expectation is that sustainable drainage systems will be provided in new developments wherever this is appropriate.

To this effect, we expect local planning policies and decisions on planning applications relating to **major development - developments of 10 dwellings or more**; or equivalent non-

⁵ NPPF Footnote 51. This includes householder development, small non-residential extensions (with footprint of less than 250m²) and changes of use: except for changes of use to a caravan, camping or chalet site, or a mobile home of park home site, where the sequential and exceptions tests should be applied as appropriate.
⁶ https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards

⁷ https://www.parliament.uk/business/publications/written-questions-answers-statements/writtenetablement/Operations/written-questions-answers-statements/written-

statement/Commons/2014-12-18/HCWS161/



residential or mixed development (as set out in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010) - to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate."

Under these arrangements, in considering planning applications, local planning authorities should consult the relevant lead local flood authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development. The sustainable drainage system should be designed to ensure that the maintenance and operation requirements are economically proportionate.

To protect the public whilst avoiding excessive burdens on business, **this policy will apply to all developments of 10 homes or more and to major commercial development**. The Government will keep this under review, and consider the need to make adjustments where necessary. The current requirement in national policy that all new developments in areas at risk of flooding should give priority to the use of sustainable drainage systems will continue to apply.

These changes will take effect from 6 April 2015. For avoidance of doubt this statement should be read in conjunction with the policies in the National Planning Policy Framework. This statement should be taken into account in the preparation of local and neighbourhood plans, and may be a material consideration in planning decisions.

- 3.2.7 The assessment of the site in relation to this document has been discounted, as the site is for the construction of 1 dwelling, less than the 10 dwellings or more requirement, as stated by the then Secretary of State for Communities and Local Government.
- 3.2.8 The NPPF Practice Guidance also reinforces this statement by stating: Whether a sustainable drainage system should be considered **will depend on the proposed development and its** *location*, for example whether there are concerns about flooding. Sustainable drainage systems may not be practicable for some forms of development (for example, mineral extraction). New development should only be considered appropriate in areas at risk of flooding if priority has been given to the use of sustainable drainage systems. Additionally, and more widely, when considering **major development**, as defined in the ⁸Town and Country Planning (Development Management Procedure) (England) Order 2015, sustainable drainage systems should be provided unless demonstrated to be inappropriate.

3.3 Regional and Local Planning Policy

Cambridgeshire Flood and Water SPD

- 3.3.1 **The Cambridgeshire Flood and Water SPD**, adopted in November 2016, has been prepared by Cambridgeshire County Council (as the Lead Local Flood Authority) in conjunction with the other Cambridgeshire local planning authorities (including South Cambridgeshire District Council).
- 3.3.2 The SPD provides guidance on the approach that should be taken to design new developments to manage and mitigate flood risk and include sustainable drainage systems (SuDS). SuDS mimic natural drainage to manage surface water run-off and can also deliver wider benefits such as providing green areas for biodiversity and recreation.

⁸ Town and Country Planning (Development Management Procedure) England Order 2015, classifies Major Development as the provision of dwelling houses where— (i) the number of dwelling houses to be provided is 10 or more; or (ii) the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i);



- 3.3.3 Chapter 6 of the SPD is specific to the design of the Surface Water and Sustainable Drainage Systems. Many of the general principles within this chapter is recommended to be applied to traditional surface water drainage and states "*this chapter needs to be complied with on <u>all development sites</u>" and the provision of SuDS maximised".*
- 3.3.4 The SPD promotes the use of following the Surface water drainage hierarchy as illustrated in Figure 2 below.



Figure 2: SuDS Hierarchy

3.3.5 Relevant Paragraph references and extracts to this assessment are as follows:

6.3.18 "The potential for infiltration measures on a site should be considered at the outset. Careful consideration of the acceptability of infiltration drainage should be given particularly in relation to potable water sources (e.g drinking water) or land contamination issues."

6.3.19 The British Geological Survey can provide maps and records to support decisions with regards to the suitability of the subsurface for the installation of infiltration type SuDS type systems. The suitability for infiltration across an area should be based on:

- Existing constraints prior to planning infiltration SuDS;
- Drainage capacity and rate of infiltration into the ground;
- Potential for ground instability when water is infiltrated;
- Impact on groundwater quality as a result of infiltration;

Development on contaminated land or Source Protection Zones (SPZ) (vulnerable aquifers).

6.3.20 Infiltration should be assessed on-site using infiltration tests that follow the detailed SuDS design principles covered in **BRE365/CIRIA 156** procedure. SPZ's should be taken into account when considering infiltration and guidance provided by the EA should be consulted to determine infiltration constraints and requirements in these areas. Where infiltration drainage is proposed on previously developed land, contamination risk needs to be considered. This may not rule out the use of infiltrating SuDS but will require site investigations and information on remediation prospects which are outside the scope of this Supplementary Planning Document (SPD).

6.3.21 The maximum acceptable depth for an infiltration device is usually 2.0m below ground level, with a minimum of 1.2m clearance between the base of the feature and peak seasonal groundwater levels. In some areas of the Fens the maximum depth of infiltration (of 2.0m below ground level) is often not viable and in such areas 1.0m below ground level would be the best achievable depth. In these areas however, the possibility of incorporating shallow infiltration features such as trenches should be investigated. Deeper ('deep bore') soakaways

⁹ All Development Sites suggests there is no distinction between, minor or major development, brownfield or greenfield developments.



pose a serious pollution risk and are not acceptable, and it is expected they will become contrary to the European Union (EU) Water Framework Directive (WFD).

3.3.6 For developing a drainage strategy for the site, reference should be made to section 6.7 of the SPD which provides the following with regard to the requirements for full planning or reserved matter application.

Full planning application or reserved matter application

6.7.4 Many developments move straight to a full planning application following pre-application discussions with the relevant WMAs. At this stage applicants will also be expected to submit a detailed surface water drainage strategy with the planning application. Whilst most topics will have been covered to some degree in the outline drainage strategy (if applicable) the applicant will be expected to provide more detail at this stage. The strategy should demonstrate that opportunities to integrate SuDS have been maximised and where obstacles to their use do persist this should be fully justified within the report. Where proposing to discharge into a third party asset (such as a watercourse or public sewer), appropriate permissions and required consents should have been discussed with the asset owner.

6.7.5 The key information a surface water drainage strategy must contain includes:

- How the proposed surface water scheme has been determined following the drainage hierarchy;
- Pre-development runoff rates;
- Post development runoff rates with associated storm water storage calculations
- Discharge location(s);
- Drainage calculations to support the design of the system;
- Drawings of the proposed surface water drainage scheme including sub catchment breakdown where applicable;
- Maintenance and management plan of surface water drainage system (for the lifetime of the development) including details of future adoption;
- Completed drainage proforma the applicant must ensure that the surface water strategy contains the appropriate level of information in relation to the points covered in the proforma.

6.7.6 Note that the size and complexity of the site will determine how much information is included within the surface water drainage strategy however using the pre-application design checklist and drainage proforma in Appendix F will ensure the right matters are covered with the appropriate level of detail.

3.3.7 Pro-forma is supplied within the SPD to help guide applicants on the necessary information to be submitted.



3.4 Local Plan

- 3.4.1 The South Cambridgeshire Local Plan sets out the planning polices and land allocations to guide the future development of the district up to 2031. It includes policies on a wide range of topics and pertinent to this report is the policies relating to flood risk drainage design.
- 3.4.2 Applicable references within the **South Cambridgeshire Local Plan**, and also referenced by residents as grounds for objection, are as follows:
 - Policy CC/7: Water Quality

1. In order to protect and enhance water quality, all development proposals must demonstrate that:

- a. There are adequate water supply, sewerage and land drainage systems (including water sources, water and waste water infrastructure) to serve the whole development, or an agreement with the relevant service provider to ensure the provision of the necessary infrastructure prior to the occupation of the development. Where development is being phased, each phase must demonstrate sufficient water supply and waste water conveyance, treatment and discharge capacity;
- b. The quality of ground, surface or water bodies will not be harmed, and opportunities have been explored and taken for improvements to water quality, including re-naturalisation of river morphology, and ecology;
- c. Appropriate consideration is given to sources of pollution, and appropriate Sustainable Drainage Systems (SuDS) measures incorporated to protect water quality from polluted surface water runoff.

2. Foul drainage to a public sewer should be provided wherever possible, but where it is demonstrated that it is not feasible, alternative facilities must not pose unacceptable risk to water quality or quantity.

Policy CC/8: Sustainable Drainage Systems

Development proposals must incorporate appropriate sustainable surface water drainage systems (SuDS) appropriate to the nature of the site. Development proposals will be required to demonstrate that:

- a. Surface water drainage schemes comply with the Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems and the Cambridgeshire Flood and Water Supplementary Planning Document or successor documents;
- b. Opportunities have been taken to integrate sustainable drainage with the development, create amenity, enhance biodiversity, and contribute to a network of green (and blue) open space;
- c. Surface water is managed close to its source and on the surface where it practicable to do so;
- d. Maximum use has been made of low land take drainage measures, such as rainwater recycling, green roofs, permeable surfaces and water butts;



- e. Appropriate pollution control measures have been incorporated, including multiple component treatment trains; and
- f. Arrangements have been established for the whole life management and maintenance of surface water drainage systems.
- Policy CC/9: Managing Flood Risk
- 1. In order to minimise flood risk, development will only be permitted where:
 - a. The sequential test and exception tests established by the National Planning Policy Framework demonstrate the development is acceptable (where required).
 - b. Floor levels are 300mm above the 1 in 100 year flood level plus an allowance for climate change where appropriate and where appropriate and practicable also 300mm above adjacent highway levels.
 - c. Suitable flood protection / mitigation measures are incorporated as appropriate to the level and nature of flood risk, which can be satisfactorily implemented to ensure safe occupation, access and egress. Management and maintenance plans will be required, including arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime;
 - d. There would be no increase to flood risk elsewhere, and opportunities to reduce flood risk elsewhere have been explored and taken (where appropriate), including limiting discharge of surface water (post development volume and peak rate) to natural greenfield rates or lower, and
 - e. The destination of the discharge obeys the following priority order:
 - iii. Firstly, to the ground via infiltration;
 - iv. Then, to a water body;
 - v. Then, to a surface water sewer;
 - vi. Discharge to a foul water or combined sewer is unacceptable.

2. Site specific Flood Risk Assessments (FRAs) appropriate to the scale and nature of the development and the risks involved, and which takes account of future climate change, will be required for the following:

- f. Development proposals over 1ha in size;
- g. Any other development proposals in flood zones 2 and 3;
- h. Any other development proposals in flood zone 1 where evidence, in particular the Strategic Flood Risk Assessment or Surface Water Management Plans, indicates there are records of historic flooding or other sources of flooding, and/or a need for more detailed analysis.

3. FRAs will need to meet national standards and local guidance (including recommendations of the South Cambridgeshire and Cambridge City Strategic Flood Risk Assessment (2010) and the Phase 1 and 2 Water Cycle Strategy or successor documents).



- 3.4.3 In January 2020 the **Greater Cambridge Sustainable Design and Construction Supplementary Planning Document** was adopted. This update is an addendum to the wider 2016 Cambridgeshire Flood and Water SPD and specially addresses the updates needed following the publication of the South Cambridgeshire Local Plan (2018). The adoption of this document was after the application for the site and approval given by the council.
- 3.4.4 A review of the document has however been undertaken to assess if there is any material change to the policies which are applicable to this site. This document confirms in Section 3.7, specific to Sustainable Drainage Systems and flood risk, paragraph 3.7.2 that the Sustainable Design and Construction SPD focuses on guidance for the implementation of SuDS Policy in Cambridge Local Plan (2018). This guidance supplements the wider guidance on flooding and drainage provided for in the Cambridgeshire Flood and Water SPD. For applications in South Cambridgeshire, further guidance on policy implementation, alongside drainage checklists, is provided in the Cambridgeshire Flood and Water SPD. Therefore, it can be concluded there is no material change to the policy for assessment against this site.

3.5 Design Best Practice

- 3.5.1 The method for incorporating climate change is included within the document named 'Flood Risk Assessments: Climate Change Allowances' prepared by the EA in 2016. These proposals are for a residential development with an assumed design life of 100 years. In accordance with the EA advice, a 20% 40% increase in rainfall intensity should be included in the drainage assessment calculations.
- 3.5.2 The method of disposing of surface water is stipulated by the **'Building Regulations Approved Document H'**. It requires that rainwater from roofs and paved areas is collected from the surface to discharge to one of the following, listed in order of priority: i) an adequate soakaway or some other adequate infiltration system, or where this is not reasonable practicable, ii) watercourse, or where that is not practicable, iii) a sewer. This follows the requirements of Local Plan and Cambridgeshire SPD
- 3.5.3 It is acknowledged that Paragraph 3.2.5 of the Building Regulations Part H states infiltration drainage is not always possible and Infiltration devices should not be built within 5m of a building or road or in areas of unstable land (see Planning Policy Guidance Note 14 Annex 1).
- 3.5.4 The Building Regulations Part H require small soakaways draining impermeable area of 25m² or less to use a design rainfall of 10mm in 5 minutes as worst case. Soakaways serving an impermeable area of more than 25m² should determine the design rainfall in accordance with **BRE Digest 365**.
- 3.5.5 Good practice sustainable drainage systems design advice is given in **'The SuDS Manual** (C753)' released by CIRIA in 2015. The manual defines SuDS as 'drainage systems which are considered to be environmentally beneficial, causing minimal or no long term detrimental impact'. SuDS can be in a variety of forms, including infiltration basins, soakaways, swales and permeable surfaces.
- 3.5.6 **CIRIA report C753 'The SuDS Manual'** outlines the various types of SuDS, their benefits and limitations, and design considerations associated with each. Not all SuDS components/methods are feasible or appropriate for all developments; factors such as available space, ground conditions, and site gradient will influence the feasibility of different methods for a particular method.
- 3.5.7 **Chapter 25** of **The SuDS Manual** provides guidance on the suitability of using infiltration to dispose of surface water runoff, infiltration testing and design methods. This chapter notes a number of considerations which need to be fully evaluated before determining the extent to which infiltration can be used on site, as follows:



- Soil type and infiltration capacity
- Groundwater level beneath the site
- Risk of ground instability, subsidence or heave due to infiltration
- Risk of slope instability or solifluction (the slow creep of saturated soils down slopes due to infiltration
- Risk of pollution from mobilising existing contaminants on the site due to infiltration
- Risk of pollution from infiltrating polluted surface water runoff
- Risk of groundwater flooding due to infiltration
- Risk of groundwater leakage into the combined sewer due to infiltration
- 3.5.8 Whilst not a document produced on behalf of the area, Kent County Council have produced **The Soakaway Design Guide**, informed by other local Authorities, geotechnical consultants, and respected institutions including the Environment Agency (EA) and the Health and Safety Executive. Whilst it concentrates in sections of the report on the design requirements in chalk soils, it does also provide general guidance to the use of soakaways in all forms of strata. This document is therefore used within the industry to help inform soakaway designs. Chapter 2.9 of this document provides soakaway location guidance relating to distances between soakaways and the highway or dwelling. The general approach within this document is to locate conventional soakaway design no closer than 5m, or subject to the underlying soil characteristics or proximity to other infiltration and soakaway features this offset can be further.
- 3.5.9 The SuDS drain fact sheet "Using SuDS Close to Building", dated 2002 explores the options of locating infiltration systems within 5m of the proposed building foundations, subject to adequate testing and there being no risk to on-site and offsite flooding.
- 3.5.10 **Rainfall Management for developments, Report SC030219** dated October 2013, by the EA and DEFA, is a guide aimed at regulators, developers and local authorities to provide advice on the management of stormwater drainage for developments and in particular to assist in the sizing of storage elements for the control and treatment of stormwater runoff.



4 **Review of Drainage Information**

4.1 Foul Water Drainage Proposal

4.1.1 The proposal is illustrated on Drainage Layout Plan Ref 19/0321/100 Rev P9 (hereafter referenced as Drainage Layout Plan Rev P9) and shows the proposed dwelling will discharge foul drainage to an existing foul sewer in Fews Lane.

4.2 Surface Water Drainage Proposal

- 4.2.1 The Drainage Layout Plan Rev P9 shows the single dwelling is to discharge surface water to an attenuation tank located within the rear garden of the property.
- 4.2.2 The proposed tank is 1.5m x 7.0m x 0.4m and is stated in the Drainage Layout Plan Rev P9 as being capable of storing to up to the 1 in 100 year plus 40% climate change event. A hydrobrake flow control chamber is shown at the outfall to the proposed storage tank.
- 4.2.3 Supporting calculations supplied show the tank has been modelled to accommodate the storage required and the flow control is capable of limiting flow to the rate within the range of 1l/s. See Figure 3 below, which is a screen shot of the proposed drainage.



Figure 3 Drainage Layout Plan

- 4.2.4 The drainage plan shows the proposed driveway is a proposed gravel driveway operating as an infiltration feature. Refer to **Appendix B**.
- 4.2.5 Infiltration tests show infiltration rates within this location is at a rate of 6.97E-06 and therefore in accordance with **The SuDS Manual** is considered a suitable rate for use of infiltration. The geotechnical report also submitted in support of this design shows the land immediately to the west to be underlined with Clay Soil, the soil is classed as having a high to very high plasticity content. **Refer to Appendix C**.



4.2.6 The Drainage Layout Plan Rev 9 shows the proposed two new units, the southern site, and part of a separate planning application, are to use individual house soakaways within the rear gardens and porous paving in the driveway to discharge surface water runoff. The infiltration rates applicable to these two properties are a higher rate than the site.

4.3 **Objections and Drainage Review**

4.3.1 Objections have been submitted by both the Parish Council and the Fews Lane Consortium Ltd. The Fews Lane Consortium have provided detailed written correspondence received over the period of the drainage review for this report dated 02 June 2020, 13 July 2020, 16 July 2020 and 13 August 2020, most of points raised were relating to Condition 5. A copy of these objections is supplied in Appendix A. The objections have been reviewed and referenced in turn.

Condition 4: Foul Drainage and Objections Review

- 4.3.2 **Objection**: The application proposes discharge of foul water into the public sewerage system, but no evidence has been provided to demonstrate that the existing public sewerage system has the capacity for the additional flows from the proposed development or that discharge into the public sewerage system has been agreed with the relevant sewerage undertaker.
- 4.3.3 **Response**: CC/7 part 1a states "....development must demonstrate that: There are adequate water supply, sewerage and land drainage systems (including water sources, water and waste water infrastructure) to serve the whole development, or an agreement with the relevant service provider to ensure the provision of the necessary infrastructure prior to the occupation of the development".
- 4.3.4 As part of the consultation exercise with approving authorities the sewerage undertaker will take an assessment of the proposed discharge rate from the development proposals and the capacity of the receiving system. Written confirmation has been received from the approving authority (Anglian Water) who has confirmed recommendation for the discharge of Condition 4. Refer to Appendix E for a copy of the Anglian Water correspondence.
- 4.3.5 We therefore support the discharge of Condition 4 for this site.

Condition 5: Surface Water Drainage and Objections Review

- 4.3.6 **Objections**: The surface water drainage arrangements proposed in this application fail to comply with policies CC/7, CC/8 and CC/9 of the South Cambridgeshire Local Plan 2018. In particular, policy CC/9 states that development will only be permitted where the destination of surface water discharge obeys the following priority order: (1) infiltration to ground, (2) discharge to a body of water, (3) discharge to a surface water sewer.
- 4.3.7 **Response:** A review of policy CC/8 and CC/9 does not differentiate between the development of a single dwelling and that of major development, as defined within the NPPF. Therefore, the requirements of this policy are applicable to this application. The Chapter 6 of the Cambridge SPD also reinforces this through the statement "*this chapter needs to be complied with on <u>all development sites.</u>*
- 4.3.8 The Fews Lane Consortium makes refere to the Sustainable Drainage Systems: Non-Statutory technical standards for sustainable drainage systems in their reasons for refusal. It should be noted as detailed in paragraph 3.2.6 and as listed within the GOV.uk website, this technical standard is for development of **10 dwellings or more**, therefore this document is not applicable to this site.



- 4.3.9 A geotechnical investigation and the results from infiltration tests, have been undertaken and used to inform the design of the drainage for the site. The proposal is for the driveway to infiltrate and for the roof runoff to discharge to an attenuation tank, which has been designed to accommodate the 1 in 100 year plus 40% climate change event, and to discharge at a control rate of 1l/s to the adjacent watercourse.
- 4.3.10 The applicant has stated in consultation with the Local Planning Authority (LPA) on 26 June 2020 (Refer to Appendix F) that soakaway design for the roof runoff has been discounted for the site due to constricted space (this is in referce to previous consultation with the LPA at the planning application stage regarding a 5m offset from the proposed building foundations and the then subsequent proximity to the watercourse). This has been addressed further within this review.
- 4.3.11 A below ground drainage operation and maintenance strategy report, informed by the SuDS Manual, has been provided for the site and contained in Appendix G. This is a requirement of the SPD and CC/9.
- 4.3.12 A further review of the drainage is provided in this report, which will address whether it meets the requirements of CC/7, CC/8 and CC/9 of the local plan. However, it can be concluded, if the site cannot accommodate infiltration either by conventional soakaway or an alternative means of infiltration, then in accordance with the priority order of CC/9 the discharge to the local watercourse is the next suitable option.

Objection Text: No surface water drainage arrangements for the proposed driveway are shown on the submitted plans. It is unclear if it is intended that permeable pavement should be used to discharge the driveway surface water by infiltration. However, if this is the case, no evidence has been submitted to suggest that the site is suitable for infiltration. The minimum information required would typically include infiltration testing conducted according to BRE Digest 365 together with a site plan showing the locations where tests were conducted.

4.3.13 **Response**: Infiltration tests have been provided by the applicant and a gravel driveway is to be provided using infiltration at source. Soakaways have been discounted; this is assessed further within this review.

Objection Text: The Council's unnamed surface water drainage engineer also comments on the surface water drainage arrangements proposed under this application (S/3215/19/DC) in the response for application S/ 3875/19/DC, stating that, "the dwelling towards the north [the bungalow to which application S/ 3215/19/DC pertains] appears to be too close to the watercourse to enable soakaways to be positioned 5m from the dwelling without impacting on the hedge and bank of the watercourse".

However, there are numerous locations within the application site greater than 5 metres from the foundations of buildings. Furthermore, the 5-metre rule is simply a rough rule of thumb that can be assumed to be safe for any building site on any type of soil. With a proper geotechnical assessment, it may be possible in many soils to install infiltration features and traditional soakaways much closer to foundations

4.3.14 **Response**: A traditional soakaway will have an infiltration concentration ratio at the higher end of scale where it drains either a roof area, a road, or several houses. Therefore, it is a concentrated point source of water within the ground. These types of soakaways also allow water flows out sideways as well as through the base area of the feature. As a result, the risk of water affecting the soils under shallow foundations can be quite high if the soakaway is located close to buildings and this is confirmed by **Building regulations Part H**, which advises against soakaways within 5m of buildings and roads.



- 4.3.15 Based on the SuDS drain fact sheet "Using SuDS Close to Building", dated 2002 infiltration features close to buildings should normally be designed with a ratio of impermeable area to base area of less than 10:1 and the depth of the stored water should not be greater than 300mm. Thus, the flow of water from the base of the SuDS features is much less concentrated than in a normal soakaway. Because infiltration from a plane feature is much more dispersed, has a shallow height and has a short retention time there is less potential for flow to occur laterally in any significant quantities. Therefore, as an example, the use of porous paving and an underlying crate storage, which would need to be designed to be no greater than a depth of 0.3m, could allow for the roof runoff and parking to be infiltrated within a 5m of proposed building foundations. However, such a solution will need an attenuation volume made available to accommodate the 1 in 100 year plus climate change event and it is also subject to the underlying geology present at the site.
- 4.3.16 The results from the geotechnical information (Appendix C) shows clays with a high to very high plasticity index is present at the site. Clay -rich soil of high plasticity are more likely to be a risk of failure through the introduction of soakaways, due to their swelling and shrinkage characteristics. The proposed expansion of the soil, as estimated in the study by Holtz and Kovacs 1981 (Table 2 below) shows those with a plasticity index of greater than 35 will have a Very High degree of Expansion (i.e at higher risk from swelling and shrinkage). The Geotechnical report provided for the site, by Oakley Soils and Concrete Engineering Ltd, show the Plasticity Index for the clay to range between 42 -45 and will therefore sit in the Very High range for degree of Expansion. It is for this reason we would not recommend soakaways, or an infiltration feature accepting a concentrated runoff, to be located within 5m of the proposed building foundations or within proximity to the banks of the existing watercourse. This would therefore also discount a crate system below the driveway.

Degree of Expansion	Probable Expansion (as a percent of the total volume change) ¹	Colloidal Content (percent less than 1µm)	Plasticity Index	Shrinkage Limit
Very High	Greater than 30	Greater than 28	Greater than 35	Less than 11
High	20 - 30	20 - 31	25 - 41	7 - 12
Medium	10 - 20	13 - 23	15 - 28	10 - 16
Low	Less than 15	Less than 15	Less than 18	Greater than 15

Table 2: Probable Expansion of clay as estimated from classification test data (from Holtz and Kovacs 1981)

- 4.3.17 A 5m offset if applied to the footprint would therefore leave an area of approximately 2.5m distance from the bank of the existing watercourse. See Figure 4.
- 4.3.18 Locating soakaways adjacent to the watercourse is considered to result in a limited unsaturated zone, this would therefore do little to reduce rates into the watercourse, provide little water quality treatment and would therefore be contrary to **The Cambridgeshire SPD** and design best practice.





Figure 4:Soakaway 5m offset from buildings

- 4.3.19 It is noted there is space available along the frontage of the proposed property, outside of the 5m offset, as illustrated in Figure 4. However, locating a soakaway feature in this area would place it directly adjacent to the proposed two residential plots within the southern site, resulting in two soakaway features being within 3.5m of each other. This would further increase the potential risk from expansion of the soils. Levels within this area of the site are also higher than those within the rear of the property, requiring a deeper soakaway feature, making maintenance more of a challenge.
- 4.3.20 Relocating the future soakaways within the southern site to accommodate this solution (i.e relocate the proposed soakaways for the southern site to the front of the two proposed properties) would result in these features being within the 5m offset of the existing highway and therefore due to the risk from expansion, we recommend discounting this as an option. Having this site discharge via soakaway at the expense of removing the two soakaways within the southern site would also require a higher discharge rate into the existing watercourse.
- 4.3.21 Whilst it is agreed the 5m rule is not conclusive, it is considered that a soakaway should not be located closer than the 5m offset, in this instance, due to risk posed from the existing geology. The presence of a gravel driveway to accommodate runoff at source (i.e runoff generated by the driveway only) is however considered acceptable and in accordance with best practice. We therefore agree in accordance with the priority order of CC/9 the discharge to the local watercourse is the suitable option for the roof runoff for this site.

Objection Text: The following three material considerations preclude the discharge of Condition 5. Issue 1) The scheme proposes an increase on the surface water discharged from the site into Longstanton Brook from the pre-development discharge volume, thereby increasing the flood risk of nearby properties. This is contrary to the stated reason for the condition, which is to prevent flooding. Issue 2) The scheme positions the outfall of the surface water drainage outside the redline boundaries of the development site. An application to discharge a planning condition cannot be used to extend the boundaries of the land which the planning relates. Issue 3) The relevant policies of the development plan are a material



consideration and policies CC/8 and CC/9 of the Local Plan 2018 ¹⁰militate against the approval of the application.

- 4.3.22 **Response to Issue 1:** Greenfield discharge rates have been provided for the site as follows:
 - 0.1l/s for the 1 year
 - 0.2 l/s for Qbar
 - 0.4 l/s for 30 years
 - 0.6 l/s for 100 years
- 4.3.23 Refer to Appendix H for a copy of the Greenfield runoff rates supplied by the applicant.
- 4.3.24 The proposed discharge rate for the site has been set to 1l/s using a hydrobrake. This was considered the lowest acceptable discharge rate with limited maintenance requirements and therefore poses a lower flood risk from potential blockages.
- 4.3.25 It is acknowledged that the proposed development will exceed the existing greenfield runoff calculated for the site. However, a pragmatic approach and understanding on the principles of greenfield runoff rates and development proposals must be applied.
- 4.3.26 The site is for a single dwelling and therefore the equivalent greenfield runoff rates for such as scheme will always be minimal. To provide attenuation at the greenfield rates estimated (as listed above) would require the use of a control feature of such a small size that it would be at a high risk from blockages. This itself would be considered a flood risk.
- 4.3.27 **The Rainfall Runoff Management for Developments**, Interim National Procedure Policies states, in paragraph 17, as follows "*Minimum limit of discharge rate. A practicable minimum limit on the discharge rate from a flow attenuation device is often a compromise between attenuating to a satisfactorily low flow rate while keeping the risk of blockage to an acceptable level. This limit is set at 5 litres per second, using an appropriate vortex or other flow control device. Where sedimentation could be an issue, the minimum size of orifice for controlling flow from an attenuation device should normally be 150mm laid at a gradient not flatter than 1 in 150, which meets the requirements of Sewers for Adoption 7th Edition" A second minimum discharge limit based on 1l/s/ha for QBAR is also applied where soil types produce lower calculated values when estimating greenfield runoff rates. This limit is applied to prevent the size of storage systems becoming unacceptably large and expensive.*
- 4.3.28 The drainage pro-forma provided within **The Cambridgeshire SPD** also states *"Hydrobrakes to be used where rates are between 2l/s to 5l/s. Orifices may not work below 5l/s as the pipes may block. Pipes with flows < 2l/s are prone to blockage, but this can be overcome with careful product selection and SuDS design."*
- 4.3.29 Since the production of The Cambridgeshire SPD and the Rainfall Runoff Management for Development reports, manufacturers have now developed hydrobrakes which can operate at a rate of 1l/s. It is noted the applicant is proposing such a control at this site. We consider this to be the minimum viable rate for sustainable control with limited maintenance requirements imposed on the future resident.
- 4.3.30 We do however acknowledge the concerns raised by the Few Lane Consortium regarding the flood risk to the local watercourse and in accordance with the SPD a desire for all developments to discharge at greenfield runoff rates. Therefore, we have provided further assessment regarding the potential flood risk associated with a discharge rate of 11/s from the

¹⁰ We assume militate as written by the author of the Fews Lane Consortium Ltd is a typo and means mitigate.



site. The existing watercourse dimensions are illustrated on the supporting ditch profile drawing Ditch Plan and Section drawing reference 19/0321/101 Rev P3 (Appendix B) and using this information we can confirm the following:

- 1.39m in height at the lowest bank,
- 2m width at the base level,
- 5.3m width at the top of bank, and
- Lidar information for the area shows the channel slope is approximately 0.005.
- 4.3.31 Using Manning's formula, it has been possible to estimate the capacity associated with the existing watercourse and required capacity to accommodate a discharge rate of 11/s from the site. Refer to Appendix I. Using a worst case and conservative estimate, of 1:1 side slopes (assuming a top of bank width of 2m) and a bankfull depth of 1.24m, a Manning's n value of 0.05 and channel slope of 0.001, as a worst case assumption, it gives a bankfull flow capacity of the watercourse to be 2 m3/s. For a discharge rate of 11/s (0.001 m/s) this will only amount to 0.05% capacity of the watercourse to be utilised for the proposed site. Therefore, the site amounts to a negligible impact on levels and flows associated with the existing watercourse.
- 4.3.32 Calculations have also been provided by the applicant for the operation of the tank during a 100 year 60 minute winter storm plus 40% climate change, and because of the lack of water levels known within the watercourse it has been modelled with a fully submerged outfall scenario (Appendix J). This shows in a worst-case scenario the proposed drainage will not flood nor will it cause a detriment to offsite areas. This is in accordance with the requirements of the NPPF, SPD and Local Plan.
- 4.3.33 It is acknowledged that best practice is to ensure proposed development does not exceed existing greenfield runoff rates. However, such a requirement for individual properties is erroneous and such an approach would likely hinder the development of small-scale individual properties in future, to the benefit of larger major developments. The implementation of controls to reduce rates to greenfield below 1l/s is considered a higher potential flood risk due to the potential higher maintenance requirements and if left unmanaged a blockage would result in unattenuated flow rates into the receptor.
- 4.3.34 **Response to Issue 2**: The redline boundary and legal permissions have not formed part of this drainage review. It has however been assumed riparian responsibilities are applicable to the applicant, as referenced in section 2.2 of this review, and therefore Ordinary Watercourse consent will be undertaken with the LLFA. This consent would be undertaken following the approval process and would not form part of this review.
- 4.3.35 **Response to Issue 3.** It is agreed the relevant policies of the development plan are a material consideration and specifically CC/8 and CC/9 regarding the surface water drainage.
- 4.3.36 The site is not at flood risk and below 1ha in size, therefore the requirements for an FRA is not necessary and the site is not subject to the Sequential Tests. Therefore, the site accords to the requirements of CC/8 and CC/9.
- 4.3.37 A Maintenance plan for the attenuation tank has been submitted by the applicant and confirmation that this will form part of the Health and Safety File for the site. The responsibility for the future management of the drainage will need to be transferred to the future owner of the property. We would also recommend a covenant is in place to ensure the driveway remains permeable construction in future. This we deem is acceptable in accordance with CC/8 and CC/9 of the Local Plan.
- 4.3.38 It is noted reference has been made by the Fews Lane Consortium that the applicant owns other land immediately adjoining the site that could be used for infiltration. It should be noted



management of the infiltration features would fall to the future owners of the property and such an approach would therefore locate the soakaway feature outside the redline boundary, beyond the future resident's control. This could result in a potential flood risk and would be contrary to policy.

- 4.3.39 It has been concluded, due to the high plasticity values of the clay, the 5m rule is recommended at the site and therefore the site cannot accommodate infiltration by conventional soakaway or a shallower alternative means of infiltration. In accordance with the priority order of CC/9 the discharge to the local watercourse is the next suitable option.
- 4.3.40 Discharge rates have been set in accordance with best practice for the reasons previously stated. The increase in rates are not considered to be a flood risk to offsite areas.
- *4.3.41* Based on the latest information supplied by the applicant and following a review of the evidence we <u>support the discharge of Condition 5</u> for this site.



5 Conclusion

- 5.1.1 Based on the information submitted we find that it has been satisfactorily demonstrated that the scheme can provide a viable drainage strategy that will not increase flood risk elsewhere.
- 5.1.2 We conclude that the application would accord with Policy CC/7, for foul drainage.
- 5.1.3 We conclude the application would accord with CC/7, CC/8, CC/9 for surface water drainage.
- 5.1.4 We recommend the applicant undertakes ordinary watercourse consent prior to the installation of the outfall arrangement.
- 5.1.5 The future owner will need to be informed on the location of the underground storage tank, the maintenance responsibilities for the tank and covenant to ensure the driveway remains permeable in future.
- 5.1.6 The submission is considered consistent with the Cambridgeshire Flood and Water SPD for design of surface water drainage and paragraph 163 of the NPPF, which requires local planning authorities, when determining any planning applications, to ensure that flood risk is not increased elsewhere.
- 5.1.7 We therefore recommend the discharge to Conditions 4 and 5 for the site.



Appendix A Third Party Objections

Your ref no: sквsabah

This form was started at: $18/10/2019 \ 00: 25: 19$ This form was completed at: $18/10/2019 \ 00: 33: 30$ Internal form classification: N / A

Your ref no: sквsabah

Who are you

Mandatory fields are in bold



House Name / Number

The Elms

Street

Fews Lane

Town / City

Cambridge

County Cambridgeshire

Postcode

CB24 3DP

Comment Details

Please enter the planning reference number

S/3215/19/DC

Please tell us the address of the application you are commenting on

The Retreat, Fews Lane, Longstanton, Cambridge CB24 3DP

Commenter Type (optional) Member of Public

Nature of comment (optional) Object

Please limit your comments to 2 paragraphs. For longer representations please add as attachments.

Please ensure that no personal details (for example names, phone numbers) are included in your comment. For advice and guidance on how to compile your comment please visit our **website**.

You can also add photos and any other relevant documents.

Your comments

I reside immediately next to the site of the proposed development, and I object to the discharge of any part of condition No. 5 (surface water drainage). The details provided with this application are insufficient to assess whether the surface water scheme proposed complies with the relevant local and national planning policies.

Should the applicant submit further details, re-consultation should occur in order to allow consultees the opportunity to make representations on the application as amended.

UPLOAD FILE(S)

Declaration

Please open the PDF below to review all of your answers, if the answers displayed are correct please tick the declaration box.

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Declaration

Please tick the box below to confirm that the information you have provided on the form is accurate, and then click submit to send us your comment.

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Your ref no: VNPDXVSC

This form was started at: 15/10/2019 14: 26: 29 This form was completed at: 15/10/2019 14: 33: 08 Internal form classification: N / A
Your ref no: VNPDXVSC

Who are you

Mandatory fields are in bold

Title

Mrs

Forename / Initial (optional) Libby

Surname

White

Company Name (if applicable) (optional) Longstanton Parish Council

Telephone number (optional) 01954782323

Email address (optional) clerk@longstanton-pc.gov.uk

House Name / Number

Longstanton Village Hall

Street 24 High Street

Town / City Longstanton

County Cambridgeshire

Postcode CB24 3BS

Comment Details

Please enter the planning reference number

S/3215/19/DC

Please tell us the address of the application you are commenting on

The Retreat, Fews Lane, Longstanton CB24 3DP

Commenter Type (optional) Consultee

Nature of comment (optional) Object

Please limit your comments to 2 paragraphs. For longer representations please add as attachments.

Please ensure that no personal details (for example names, phone numbers) are included in your comment. For advice and guidance on how to compile your comment please visit our **website**.

You can also add photos and any other relevant documents.

Your comments

Having considered this application at the full council meeting held on 14th October 2019, Longstanton Parish Council members recommend this application for OBJECTION as it proposes to discharge the surface water drainage directly into the village watercourse which is in contravention of planning condition 5 requiring surface water drainage to be filtered through the soil. Longstanton Parish Council support the comments made to the planning authority by neighbours in the letter dated 8th October 2019.

UPLOAD FILE(S)

Declaration

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Declaration

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8 October 2019

Ms Katie Christodoulides South Cambridgeshire District Council South Cambridgeshire Hall Cambourne Business Park Cambourne Cambridge CB23 6EA

Dear Ms Christodoulides

Re: S/3215/19/DC – Discharge of conditions 4 (Foul Water Drainage) and 5 (Surface Water Drainage) of planning permission S/2937/16/FL at land the rear of The Retreat, Fews Lane, Longstanton, Cambridge CB24 3DP

The Fews Lane Consortium is a community action group based in Longstanton that supports sustainable development within the villages of South Cambridgeshire and transparency and accountability in local government.

The Consortium notes that condition No. 4 (foul water drainage) is only capable of being discharged in part at this time.

The Consortium also notes that condition No.5 (surface water drainage) is only capable of being discharged in part at this time.

The Consortium has no comment on the discharge of the pre-commencement part of condition No. 4 (foul water drainage).

The Consortium OBJECTS to the discharge of any part of condition No. 5 (surface water drainage) at this time. The details submitted by the applicant are insufficient to assess the proposal in regards to the relevant planning policies.

Given the history of community opposition in regards to the development of this site, the Consortium feels that in the public interest, and in the interests of all parties involved, the remaining applications to discharge conditions for applications S/2937/16/FL, S/2439/18/FL, and S/0277/19/FL should be subject to a brief 21-day period for public consultation, as has been the case with this discharge of conditions applications.

Kind regards



Fews Lane Consortium Ltd

The Elms Fews Lane Longstanton Cambridge CB24 3DP

2 June 2020

South Cambridgeshire District Council South Cambridgeshire Hall Cambourne Business Park Cambourne Cambridge CB23 6EA

Dear Sirs

Re: Planning application S/3215/19/DC

Condition 4 of the relevant planning permission states that, "No construction work shall be commenced until full details of the proposed arrangements for foul water drainage have been submitted to the local planning authority and approved in writing."

The application proposes discharge of foul water into the public sewerage system, but no evidence has been provided to demonstrate that the existing public sewerage system has the capacity for the additional flows from the proposed development or that discharge into the public sewerage system has been agreed with the relevant sewerage undertaker.

Condition 5 of the relevant planning permission states that, "No construction work shall be commenced until full details of the proposed arrangements for surface water drainage, both from the building itself and from the proposed driveway area, have been submitted to the local planning authority and approved in writing."

The surface water drainage arrangements proposed in this application fail to comply with policies CC/7, CC/8 and CC/9 of the South Cambridgeshire Local Plan 2018.

In particular, policy CC/9 states that development will only be permitted where the destination of surface water discharge obeys the following priority order: (1) infiltration to ground, (2) discharge to a body of water, (3) discharge to a surface water sewer.

No surface water drainage arrangements for the proposed driveway are shown on the submitted plans. It is unclear if it is intended that permeable pavement should be used to discharge the driveway surface water by infiltration. However, if this is the case, no evidence has been submitted to suggest that the site is suitable for infiltration. The minimum information required would typically include infiltration testing conducted according to BRE Digest 365 together with a site plan showing the locations where tests were conducted. If infiltration is suitable for the driveway area of the site, no explanation has been submitted as to why it is not being used to discharge the surface water from the building.

The surface water drainage consultation response published by the Council in regards to this application is wholly unreasonable as it fails to consider the relevant particulars of the development proposed, the applicable local and national development policies, and the basic principles of sustainable urban drainage system design.

The Council's unnamed surface water drainage engineer also comments on the surface water drainage arrangements proposed under this application (S/3215/19/DC) in the response for application S/ 3875/19/DC, stating that, "the dwelling towards the north [the bungalow to which application S/ 3215/19/DC pertains] appears to be too close to the watercourse to enable soakaways to be positioned 5m from the dwelling without impacting on the hedge and bank of the watercourse".

However, there are numerous locations within the application site greater than 5 metres from the foundations of buildings. Furthermore, the 5-metre rule is simply a rough rule of thumb that can be assumed to be safe for any building site on any type of soil. With a proper geotechnical assessment, it may be possible in many soils to install infiltration features and traditional soakaways much closer to foundations.¹

Kind regards

Daniel Fulton Director

¹Woods Ballard, B, et al. The SuDS Manual. 2015. Construction Industry Research and Information Association.

Fews Lane Consortium Ltd

The Elms Fews Lane Longstanton Cambridge CB24 3DP

13 July 2020

South Cambridgeshire District Council South Cambridgeshire Hall Cambourne Business Park Cambourne Cambridge CB23 6EA

Dear Sir/Madam

Re: Planning application S/3215/19/DC – The Retreat, Fews Lane, Longstanton, Cambridge CB24 3DP

- Planning application S/3215/19/DC seeks to discharge conditions 4 and 5 (foul and surface water drainage) of the planning permission issued for the erection of a 3-bedroom bungalow with parking at The Retreat, Fews Lane, Longstanton, Cambridge CB24 3DP pursuant to planning application S/2937/16/FL.
- (2) Condition 4 (foul water drainage) states that:

"No construction work shall be commenced until full details of the proposed arrangement for foul water drainage have been submitted to the local planning authority and approved in writing. The new dwelling shall not be occupied or brought into use until the foul water drainage system has been installed and made operational, in accordance with these approved details."

(3) Condition 5 (surface water drainage) states that:

"No construction work shall be commenced until full details of the proposed arrangements for surface water drainage, both from the building itself and form the proposed driveway area, have been submitted to the local planning authority and approved in writing. The new dwelling shall not be occupied or brought into use until the surface water drainage system has been installed and made operational, in accordance with these approved details."

- (4) The following three material considerations preclude the discharge of condition 5 (surface water drainage).
 - The scheme proposes an increase in the surface water discharged from the site into Longstanton Brook from the pre-development discharge volume, thereby increasing the flood risk of nearby properties. This is contrary to the stated reason for the condition, which is "to prevent flooding".
 - 2) The scheme positions the outfall for the surface water drainage system outside the red line boundaries of the development site. An application to discharge a planning condition can not be used extend the boundaries of the land to which a planning permission relates.
 - 3) The relevant policies of the development plan are a material consideration, and policies CC/8 and CC/9 of the Local Plan 2018 militate against the approval of the application.

Issue I: Proposal would increase the risk of flooding elsewhere

- (5) Planning conditions are to be interpreted in a common sense way, having regards to the underlying purpose for the condition as is demonstrated by the reasons stated for the imposition of the condition or conditions in question (*R* (Sevenoaks District Council) v Secretary of State [2004] EWHC 771 (Admin)).
- (6) The Appeal Decision granting permission in regards to application reference S/2937/16/FL states that, "in particular, conditions relating to foul and surface water drainage are necessary, to prevent flooding".
- (7) However, under the scheme submitted by the applicant, the risk of flooding to nearby properties would actually be increased because the runoff volume from the development to the nearby surface watercourse for nearly all rainfall events would exceed the runoff volume for the same event prior to redevelopment.
- (8) The increase in surface water proposed to be discharged from the site would flow into Longstanton Brook, which has an extensive history of flooding.
- (9) The relevant local and national planning policies indicate that development of brownfield sites should seek to reinstate greenfield runoff rates wherever possible and, in any case, that the post-development discharge rate should never exceed the rate of discharge from the development prior to redevelopment.

Issue 2: Application proposes work outside boundaries of land to which the planning permission relates

- (10) The land proposed to be used for the outflow of the surface water drainage system falls outside the red line boundary on the location plan identifying the land to which the planning permission relates.
- (11) No planning permission has been granted for any development to take place in, on, over, or under land outside of the boundaries of the application site.
- (12) If the applicant wishes to extend the red line boundaries of the application site to include the land proposed for the surface water outflow, an application must be submitted under section 73 of the 1990 Act.
- (13) The Council can not use an application to discharge a planning condition to effect the same result that would properly be effected through an application submitted under section 73 of the 1990 Act.

Issue 3: Application does not accord with relevant policies of the development plan

(14) Policy CC/8 of the Local Plan 2018 states that:

"Development proposals will be required to demonstrate that [...] surface water drainage schemes comply with Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems and the Cambridgeshire Flood and Water Supplementary Planning Document or successor documents."

(15) Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems states in paragraph S3 that:

"For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but **should never exceed the rate of discharge from the development prior to redevelopment** for that event."

(16) Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems states in paragraph S5 that:

"Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but **should never exceed the runoff volume from the development site prior to redevelopment** for that event."

(17) The Cambridgeshire Flood and Water Supplementary Policy Document states in paragraph 6.3.8 that:

"Brownfield (previously developed land) sites must reduce the existing runoff from the site as part of the redevelopment. Where possible, in order to provide betterment, redevelopments should look to reinstate greenfield runoff rates."

- (18) Under the scheme submitted by the applicant, the peak runoff rate of discharge from the development to the nearby surface watercourse would exceed the peak runoff rate of discharge of the site prior to redevelopment, which is contrary to policy CC/8 of the Local Plan 2018, contrary to paragraph S3 of Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems, and contrary to paragraph 6.3.8 of the Cambridgeshire Flood and Water Supplementary Policy Document.
- (19) Under the scheme submitted by the applicant, the runoff volume from the development to the nearby surface watercourse for the 1 in 100 year, 6 hour rainfall would exceed the runoff volume for the same event prior to redevelopment, which is contrary to policy CC/8 of the Local Plan 2018 and contrary to paragraph S5 of Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems.
- (20) Policy CC/9 of the Local Plan 2018 states that:

"In order to minimise flood risk, development will only be permitted where: [...] The destination of the discharge obeys the following priority order:

- i. Firstly to the ground via infiltration
- ii. Then, to a water body;
- iii. Then, to a surface water sewer;
- iv. Discharge to a foul water or combined sewer is unacceptable."
- (21) The information submitted by the applicant indicates that opportunities to use infiltration to discharge the surface water collected from the impermeable areas of the proposed development have not been adequately explored.
- (22) It is a material consideration that the applicant owns other land immediately adjoining the application site that could be used to discharge the collected surface water through infiltration. (See Section 72(1) of the Town and Country Planning Act 1990.)
- (23) Policy CC/9 of the Local Plan 2018 states that, "In order to minimise flood risk, development will only be permitted where: [...] there would be no increase to flood risk elsewhere".
- (24) The increase in surface water proposed to be discharged from the site would flow in Longstanton Brook, which has an extensive history of flooding. This would be contrary to policy CC/9 of the Local Plan 2018.

- (25) Policies CC/8 and CC/9 of the Local Plan 2018 clearly militate against the approval of the details submitted with this application.
- (26) Pursuant to section 38(6) of the Planning and Compulsory Purchase Act 2004, "If regard is to be had to the development plan for the purpose of any determination to be made under the planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise."
- (27) The applicant has not advanced any argument for why this application should be approved contrary to the policies of the development plan.
- (28) Accordingly, condition 5 (surface water drainage) should not be discharged at this time.

Kind regards

Daniel Fulton Director Fews Lane Consortium Ltd

The Elms Fews Lane Longstanton Cambridge CB24 3DP

16 July 2020

South Cambridgeshire District Council South Cambridgeshire Hall Cambourne Business Park Cambourne Cambridge CB23 6EA

Dear Sir/Madam

Re: Planning application S/3215/19/DC – The Retreat, Fews Lane, Longstanton, Cambridge CB24 3DP

- (1) The Fews Lane Consortium Ltd has received legal advice that residential gardens within built-up areas are classified as greenfield land for planning purposes, not brownfield land, as was implied in the Consortium's letter dated 13 July 2020.
- (2) Whilst this does not change the substance of the Consortium's objections to the proposed development, it does mean that different paragraphs of *Sustainable Drainage Systems: Non statutory technical standards for sustainable drainage systems* and the *Cambridgeshire Flood and Water Supplementary Policy Document* should have been quoted in the Consortium's representations.
- (3) Policy CC/8 of the Local Plan 2018 states that:

"Development proposals will be required to demonstrate that [...] surface water drainage schemes comply with Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems and the Cambridgeshire Flood and Water Supplementary Planning Document or successor documents."

(4) Sustainable Drainage Systems: Non statutory technical standards for sustainable drainage systems states in paragraph S2 that:

"For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event **should never exceed the peak greenfield runoff rate for the same event.**"

(5) Sustainable Drainage Systems: Non statutory technical standards for sustainable drainage systems states in paragraph S4 that:

"Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event **should never exceed the greenfield runoff volume for the same event.**"

(6) The Cambridgeshire Flood and Water Supplementary Policy Document states in paragraph 6.3.6 that:

"All new developments on greenfield land are required to discharge the runoff from the impermeable areas at the same greenfield runoff rate, or less than, if locally agreed with an appropriate authority or as detailed within the local planning policies of District and City Councils."

- (7) Under the scheme submitted by the applicant, the peak runoff rate of discharge from the development to the nearby surface watercourse would exceed the greenfield runoff rate for the 1 in 1 year and 1 in 100 year rainfall events, which is contrary to policy CC/8 of the Local Plan 2018, contrary to paragraph S2 of *Sustainable Drainage Systems: Non statutory technical standards for sustainable drainage systems*, and contrary to paragraph 6.3.6 of the *Cambridgeshire Flood and Water Supplementary Policy Document*.
- (8) Under the scheme submitted by the applicant, the runoff volume from the development for the 1 in 100 year, 6 hour rainfall event would exceed the greenfield runoff volume for that event, which is contrary to policy CC/8 of the Local Plan 2018 and contrary to paragraph S4 of Sustainable Drainage Systems: Non statutory technical standards for sustainable drainage systems.
- (9) Policy CC/9 of the Local Plan 2018 states that:

"In order to minimise flood risk, development will only be permitted where: [\ldots] The destination of the discharge obeys the following priority order:

- i. Firstly to the ground via infiltration
- ii. Then, to a water body;
- iii. Then, to a surface water sewer;
- iv. Discharge to a foul water or combined sewer is unacceptable."
- (10) The information submitted by the applicant indicates that opportunities to use infiltration to discharge the surface water collected from the impermeable areas of the proposed development have not been adequately explored.
- (11) It is a material consideration that the applicant owns other land immediately adjoining the application site that could be used to discharge the collected surface water through infiltration.
 (See Section 72(1) of the Town and Country Planning Act 1990.)
- (12) Policy CC/9 of the Local Plan 2018 states that, "In order to minimise flood risk, development will only be permitted where: [...] there would be no increase to flood risk elsewhere".
- (13) The increase in surface water proposed to be discharged from the site would flow in Longstanton Brook, which has an extensive history of flooding. This would be contrary to policy CC/9 of the Local Plan 2018.
- (14) Policies CC/8 and CC/9 of the Local Plan 2018 clearly militate against the approval of the details submitted with this application.
- (15) Pursuant to section 38(6) of the Planning and Compulsory Purchase Act 2004."If regard is to be had to the development plan for the purpose of any determination to be made under the planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise."
- (16) The applicant has not advanced any argument for why this application should be approved contrary to the policies of the development plan.
- (17) Accordingly, condition 5 (surface water drainage) should not be discharged at this time.

Kind regards

Director

Knowles, Stephanie

Subject:

Consultee Comments for Planning Application S/3215/19/DC

From: Planning cplanning@greatercambridgeplanning.org
Sent: 11 August 2020 12:06
To: Emma Ousbey cemma.ousbey@greatercambridgeplanning.org
Subject: Consultee Comments for Planning Application S/3215/19/DC

A consultee has commented on a Planning Application. A summary of the comments is provided below.

Comments were submitted at 12:05 PM on 11 Aug 2020 from Ms Libby White (<u>clerk@longstanton-pc.gov.uk</u>) on behalf of Parish - Longstanton.

Application Summary

Reference:S/3215/19/DCAddress:The Retreat Fews Lane Longstanton Cambridge
Cambridgeshire CB24 3DPProposal:Discharge of conditions 4 (Foul Water Drainage) and 5
(Surface Water Drainage) of planning permission
S/2937/16/FLCase Officer:Emma Ousbey

Click for further information

Comments Details

 Following a meeting of Longstanton Parish Council on Monday 10th August, Longstanton Parish Council continue to object to this application as it continues to propose discharge the surface water drainage directly into the village watercourse which is in contravention of policies CC8 and CC9 of the South Cambridgeshire Local Plan 2018.

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Fews Lane Consortium Ltd

The Elms Fews Lane Longstanton Cambridge CB24 3DP

13 August 2020

South Cambridgeshire District Council South Cambridgeshire Hall Cambourne Business Park Cambourne Cambridge CB23 6EA

Dear Sir/Madam

Re: Planning application S/3215/19/DC – The Retreat, Fews Lane, Longstanton, Cambridge CB24 3DP

The use of Sustainable Drainage Systems ("SuDS") and the ability to integrate appropriate SuDS features into any development should be considered from the earliest phases of site selection and design. When considered at the appropriate time early in the design process, even the smallest sites can effectively integrate SuDS features, which can provide benefits in terms of reduced flood risks and provide positive contributions in terms of landscaping, residential amenity, and opportunities to enhance biodiversity.

In the case of this development, no consideration was given to the issues of surface water drainage at the design phase, and as a result, the applicant has proposed to discharge the collected surface water into the village's watercourses.

The proposed rate of attenuation of discharge is insufficient and would result in an increased volume and rate of surface water discharge from the site, which would increase the risk of flooding elsewhere. This outcome is contrary to the inspector's stated reason for imposing the surface water condition, which was to prevent flooding.

The applicant has failed to consider any of the numerous options to discharge the collected surface water through infiltration.

The details submitted by the applicant are also, by objective measures, contrary to policies CC/8 and CC/9 of the development plan.

Having failed to consider appropriate SuDS solutions at the design phase, the applicant can not now reasonably expect the Council to approve details that are contrary to the relevant policies of the development plan and that would increase the risk of flooding. This application should therefore be refused by the Council.

Kind regards

Daniel Fulton Director



Appendix B Drainage Drawings





WAVIN AQUACELL SOAKAWAY/ATTENUATION TANK

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.

2. ANY GRID LINES, BUILDING LINES, ETC. ARE TO BE SET OUT IN ACCORDANCE WITH THE RELEVANT ARCHITECT'S PLAN.

3. DIMENSIONS ARE NOT TO BE SCALED FROM THIS DRAWING, EITHER MANUALLY OR ELECTRONICALLY.

4. DIMENSIONS MARKED * ARE SUBJECT TO CONFIRMATION BY SITE MEASUREMENT BEFORE CONSTRUCTION COMMENCES.

5. ANY DIMENSIONAL DISCREPANCIES ON THIS DRAWING ARE TO BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORK PROCEEDS.

DRAINAGE NOTES

1. ALL DRAINAGE CONSTRUCTION, MATERIALS AND WORKMANSHIP SHALL COMPLY WITH BUILDING REGULATIONS PART "H", BSEN 752, AND NHBC STANDARDS. ALL DRAINAGE PRODUCTS TO BE CE MARKED.

2. LOCATIONS OF ALL FW AND SW OUTLETS FROM BUILDINGS ARE TO BE CHECKED AGAINST THE ARCHITECTS DRAWINGS TO ENSURE COMPATIBILITY PRIOR TO THE SITE WORKS COMMENCING.

3. CONTRACTOR TO SCAN FOR AND EXPOSE ALL EXISTING UNDERGROUND SERVICES (GAS, WATER, ELECTRICITY, COMMUNICATIONS ETC.) PRIOR TO ANY EXCAVATION WORKS.

4. THE CONTRACTOR IS TO EXPOSE AND VERIFY THE EXISTING PIPE SIZES AND LEVELS AND CONFIRM TO THE ENGINEER ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF WORKS.

5. COVER LEVELS SHOWN ARE APPROXIMATE ONLY AND SHALL TIE INTO PROPOSED FINISHED SURFACE LEVELS.

6. PIPEWORK TO BE U-PVC TO BSEN 1401-1 OR CLAYWARE TO BSEN 295–1, FLEXIBLY JOINTED BY HEPWORTH OR EQUAL.

7. FW PIPEWORK TO BE LAID AT MINIMUM 1:60 GRADIENTS. SW PIPEWORK TO BE LAID AT MINIMUM 1:80 GRADIENTS UNLESS SHOWN OTHERWISE

8. ALL PIPEWORK IS TO BE 110mm DIA. UNLESS NOTED OTHERWISE

9. INSPECTION CHAMBERS NOTED ARE TO BE HEPWORTH POLYPROPYLENE INSPECTION CHAMBERS (PPIC), 300mm DIAMETER UP TO 600mm DP OR 475mm DIAMETER UP TO 1200mm DP INSTALLED WITH 150mm CONCRETE BED AND SURROUND TO MANUFACTURERS RECOMMENDATIONS. CHAMBERS TO HAVE ROUND, LOCKABLE DUCTILE IRON COVER AND FRAME TO SUIT LOADINGS.

10. MANHOLES TO BE PRECAST CONCRETE SECTIONS TO BS5911-1 AND BSEN 1916 INSTALLED ON 225mm THICK CONCRETE BASE WITH 150mm CONCRETE SURROUND. CONCRETE JOINTS TO BE SEALED WITH BUTYL RESIN SEALANT. STEP IRONS TO BE PROVIDED WHERE DEPTH IS GREATER THAN 1200mm. PRECAST CONCRETE COVER SLAB TO PROVIDE CLEAR OPENING FOR ACCESS COVER. INVERTS FORMED WITH CHANNEL PIPES. BENCHING TO SLOP 1:12 WITH A 20mm THK. HIGH STRENGTH CONCRETE TOPPING.

11. ROCKER PIPES (600mm LONG) TO BE PROVIDED AS CLOSE AS PRACTICABLE TO ALL CHAMBERS/MANHOLES AND FOUNDATIONS/WALLS.

12. LOADING GRADES FOR COVERS TO BSEN 124 TO BE A15 (PEDESTRIAN USE ONLY) B125 (LIGHT TRAFFIC USE) AND C250 (HEAVY TRAFFIC USE).

13. PIPEWORK BEDDING IN LANDSCAPE AREAS WHERE COVER IS LESS THAN 600mm AND IN TRAFFICKED AREAS WHERE COVER IS LESS THAN 900mm TO BE 150mm CONCRETE BED AND SURROUND OF GEN1 CONCRETE. PIPEWORK BEDDING IN LANDSCAPE AREAS WHERE COVER IS MORE THAN 600mm AND IN TRAFFICKED AREAS WHERE COVER IS MORE THAN 900mm TO BE 100mm GRANULAR BED AND SURROUND OF NOMINAL 10mm SIZE PEA GRAVEL.

14. WHERE PIPES PASS THROUGH STRUCTURES A FLEXIBLE JOINT SHALL BE PROVIDED WITHIN 150mm OF THE STRUCTURE EDGE WITH A SHORT ROCKER PIPE INSTALLED THEREAFTER. THE PIPE PENETRATION SHALL BE FORMED USING OVERSIZED PVC DUCTING WITH UNCOMPRESSED INSULATION MATERIAL PACKING THE VOID.

15. CONTRACTOR SHALL OBTAIN ALL APPROVALS AND INSPECTIONS FROM BUILDING CONTROL. ANGLIA WATER SERVICES (SECTION 106 PARTS 1 & 2 FOR PUBLIC SEWER CONNECTION) AND LOCAL HIGHWAY AUTHORITY (FOR WORKS IN PUBLIC HIGHWAY) PRIOR TO COMMENCING SITE WORKS.

16. ALL NEW DRAINAGE WORK TO BE AIR/WATER TESTED FOR INTEGRITY AS REQUIRED BY BUILDING CONTROL.

17. EXISTING SEWERS/DRAINS ARE TO BE KEPT OPERATIONAL AT ALL TIMES DURING THE WORKS.

18. REFER TO THE ARCHITECTS DRAWINGS FOR ADDITIONAL DRAINAGE REQUIREMENTS AND SETTING OUT.

		Δ	FD	ANDREW FIREBRACE PARTNERSHIP STRUCTURAL & CIVIL ENGINEERING CONSULTANTS
	STA	TUS		PRELIMINARY
	Rev	Date	Description	
	P1	30/08/19	ISSUED FOR COMMENT	
	P3	13/09/19	ISSUED FOR COMMENT	
Γ	P4	28/11/19	ISSUED FOR APPROVAL	
Γ	P5	08/04/20	ISSUED FOR APPROVAL	
	P6	09/04/20	ISSUED FOR APPROVAL	
	Ρ7	01/05/20	ISSUED FOR APPROVAL	
Γ	P8	11/06/20	ISSUED FOR APPROVAL	
	P9	27/07/20	ISSUED FOR APPROVAL	

CLIENT

PROJECT FEWS LANE, LONGSTANTON

DRAINAGE LAYOUT TITLE

drawn CV	checked MO	DRG No.	REV
scales 1:100@A1	DATE AUG 2019	19/0321/100	P9
Andrew Firebrace Partnership Limited	ACAD FILE No. 19.0321.100 P8.DWG		Ccopyright

(SCALE 1:100)

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SECTION 1 (SCALE 1:20)

<u>GENERAL NOTES</u>

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.

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5. ANY DIMENSIONAL DISCREPANCIES ON THIS DRAWING ARE TO BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORK PROCEEDS.

Р3	30/07/20	ISSUED FOR APPROVAL									
P2	11/06/20	ISSUED FOR APPROVAL									
P1	17/10/19	ISSUED FOR APPROVAL									
Rev	Date	Description									
STA	TUS		PR	ELIMII	NARY						
	ANDREW FIREBRACE PARTNERSHIP STRUCTURAL & CIVIL ENGINEERING CONSULTANTS Stable Barn, Park End, Swaffham Bulbeck, Cambridge CB25 ONA. Tel: 01223 811572 Fax: 01223 812719 E-mail: info@afpconsult.co.uk										
CLI	CLIENT										
PRC	DJECT F	FEWS LANE	, LONG	STANTON							
TIT	TITLE DITCH PLAN AND SECTION 1										
DR	AWN CV		CHECKED	MO	DRG No.	REV					
SCA	les 1:1	00@A1	DATE	AUG 2019	19/0321/101	P3					
And	Andrew Firebrace Partnership Limited ACAD FILE No. 19.0321.100 P9.DWG										

- 15. LAY 100MM OF COARSE SAND BETWEEN THE TRENCH WALLS AND THE AQUACELL UNITS AND COMPACT.
- 16. LAY 100MM BED OF COARSE SAND OVER THE GEOTEXTILE AND COMPACT. BACKFILL WITH SUITABLE MATERIAL.

17. NB: A STORAGE TANK MUST BE VENTED, AND IT IS RECOMMENDED THAT ONE VENT PIPE. 110MM IN DIAMETER IS PROVIDED PER 7.500 SQUARE METRES OF IMPERMEABLE CATCHMENT AREA ON A SITE, SEE GUIDANCE NOTE 3 FOR DESIGN.

OR RAINWATER PIPES (uPVC)

UNDER ACCESS COVER FOR MANUAL OPERATING AT GROUND LEVEL.

ACCESS COVER B125.

REQUIRED.

12. CONSTRUCTION JOINT.

14. MIX ST4 CONCRETE.

150-600

875-750

OF CHAMBER.

FOR ACCESS TO INVERT.

825+

27. CONCRETE BENCHING.

ANCHOR FIXING BOLTS.

3mm Generally

<u>DETAIL</u> A

MINIMUM DIMENSIONS OF CONCRETE SURROUND

A15

100

100

X | 100

-GRATING

B125

150

CHANNEL WALL

C250 150

150

Y Full Channel Height (Less Y2 where necessary)

D400*

PROVIDE UNIVERSAL SUMPS

AS SHOWN ON GA. SLOTTED

PAVEMENT OR

HAUNCH

LOAD CLASS

DIMENSIONS (mm)

DIMENSIONS (mm)

MINIMUM

MAXIMUN

DUCTILE IRON GRATING -

23408DL

WHERE RODDING POINT LIES IN -----BLOCK PAVED AREA, PROVIDED 600x600x150 THICK CONCRETE GEN3 SURROUND, PLACED ON Min. 150mm THICKNESS COMPACTED SUB-BASE MATERIAL.

RODDING POINT

*Note dashed line printed on edge rails 35mm below top.

Not suitable for carriageway of roads or industrial areas.

*e.g. parking areas for all types of road vehicle.

ACO CHANNEL DRAINAGE

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.

2. ANY GRID LINES, BUILDING LINES, ETC. ARE TO BE SET OUT IN ACCORDANCE WITH THE RELEVANT ARCHITECT'S PLAN.

3. DIMENSIONS ARE NOT TO BE SCALED FROM THIS DRAWING, EITHER MANUALLY OR ELECTRONICALLY.

4. DIMENSIONS MARKED * ARE SUBJECT TO CONFIRMATION BY SITE MEASUREMENT BEFORE CONSTRUCTION COMMENCES.

5. ANY DIMENSIONAL DISCREPANCIES ON THIS DRAWING ARE TO BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORK PROCEEDS.

DRAINAGE NOTES

1. ALL DRAINAGE CONSTRUCTION, MATERIALS AND WORKMANSHIP SHALL COMPLY WITH BUILDING REGULATIONS PART "H", BSEN 752. AND NHBC STANDARDS. ALL DRAINAGE PRODUCTS TO BE CE MARKED.

2. LOCATIONS OF ALL FW AND SW OUTLETS FROM BUILDINGS ARE TO BE CHECKED AGAINST THE ARCHITECTS DRAWINGS TO ENSURE COMPATIBILITY PRIOR TO THE SITE WORKS COMMENCING.

3. CONTRACTOR TO SCAN FOR AND EXPOSE ALL EXISTING UNDERGROUND SERVICES (GAS, WATER, ELECTRICITY, COMMUNICATIONS ETC.) PRIOR TO ANY EXCAVATION WORKS.

4. THE CONTRACTOR IS TO EXPOSE AND VERIFY THE EXISTING PIPE SIZES AND LEVELS AND CONFIRM TO THE ENGINEER ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF WORKS.

5. COVER LEVELS SHOWN ARE APPROXIMATE ONLY AND SHALL TIE INTO PROPOSED FINISHED SURFACE LEVELS.

6. PIPEWORK TO BE U-PVC TO BSEN 1401-1 OR CLAYWARE TO BSEN 295-1, FLEXIBLY JOINTED BY HEPWORTH OR EQUAL.

7. FW PIPEWORK TO BE LAID AT MINIMUM 1:60 GRADIENTS. SW PIPEWORK TO BE LAID AT MINIMUM 1:80 GRADIENTS UNLESS SHOWN OTHERWISE

8. ALL PIPEWORK IS TO BE 110mm DIA. UNLESS NOTED OTHERWISE

9. INSPECTION CHAMBERS NOTED ARE TO BE HEPWORTH POLYPROPYLENE INSPECTION CHAMBERS (PPIC), 300mm DIAMETER UP TO 600mm DP OR 475mm DIAMETER UP TO 1200mm DP INSTALLED WITH 150mm CONCRETE BED AND SURROUND TO MANUFACTURERS RECOMMENDATIONS. CHAMBERS TO HAVE ROUND, LOCKABLE DUCTILE IRON COVER AND FRAME TO SUIT LOADINGS.

10. MANHOLES TO BE PRECAST CONCRETE SECTIONS TO BS5911-1 AND BSEN 1916 INSTALLED ON 225mm THICK CONCRETE BASE WITH 150mm CONCRETE SURROUND. CONCRETE JOINTS TO BE SEALED WITH BUTYL RESIN SEALANT. STEP IRONS TO BE PROVIDED WHERE DEPTH IS GREATER THAN 1200mm. PRECAST CONCRETE COVER SLAB TO PROVIDE CLEAR OPENING FOR ACCESS COVER. INVERTS FORMED WITH CHANNEL PIPES. BENCHING TO SLOP 1:12 WITH A 20mm THK. HIGH STRENGTH CONCRETE TOPPING.

11. ROCKER PIPES (600mm LONG) TO BE PROVIDED AS CLOSE AS PRACTICABLE TO ALL CHAMBERS/MANHOLES AND FOUNDATIONS/WALLS.

12. LOADING GRADES FOR COVERS TO BSEN 124 TO BE A15 (PEDESTRIAN USE ONLY) B125 (LIGHT TRAFFIC USE) AND C250 (HEAVY TRAFFIC USE).

13. PIPEWORK BEDDING IN LANDSCAPE AREAS WHERE COVER IS LESS THAN 600mm AND IN TRAFFICKED AREAS WHERE COVER IS LESS THAN 900mm TO BE 150mm CONCRETE BED AND SURROUND OF GEN1 CONCRETE. PIPEWORK BEDDING IN LANDSCAPE AREAS WHERE COVER IS MORE THAN 600mm AND IN TRAFFICKED AREAS WHERE COVER IS MORE THAN 900mm TO BE 100mm GRANULAR BED AND SURROUND OF NOMINAL 10mm SIZE PEA GRAVEL.

14. WHERE PIPES PASS THROUGH STRUCTURES A FLEXIBLE JOINT SHALL BE PROVIDED WITHIN 150mm OF THE STRUCTURE EDGE WITH A SHORT ROCKER PIPE INSTALLED THEREAFTER. THE PIPE PENETRATION SHALL BE FORMED USING OVERSIZED PVC DUCTING WITH UNCOMPRESSED INSULATION MATERIAL PACKING THE VOID.

15. CONTRACTOR SHALL OBTAIN ALL APPROVALS AND INSPECTIONS FROM BUILDING CONTROL, ANGLIA WATER SERVICES (SECTION 106 PARTS 1 & 2 FOR PUBLIC SEWER CONNECTION) AND LOCAL HIGHWAY AUTHORITY (FOR WORKS IN PUBLIC HIGHWAY) PRIOR TO COMMENCING SITE WORKS.

16. ALL NEW DRAINAGE WORK TO BE AIR/WATER TESTED FOR INTEGRITY AS REQUIRED BY BUILDING CONTROL.

17. EXISTING SEWERS/DRAINS ARE TO BE KEPT OPERATIONAL AT ALL TIMES DURING THE WORKS.

18. REFER TO THE ARCHITECTS DRAWINGS FOR ADDITIONAL DRAINAGE REQUIREMENTS AND SETTING OUT.

P2	27/07/20	ISSUED FOR COMMENT								
P1	30/08/19	ISSUED FOR COMMENT								
Rev	Date	Description								
STA	ATUS		PRELIM	INARY						
ANDREW FIREBRACE PARTNERSHIP STRUCTURAL & CIVIL ENGINEERING CONSULTANTS Stable Barn, Park End, Swaffham Bulbeck, Cambridge CB25 0NA. Tel: 01223 811572 Fax: 01223 812719 E-mail: info@afpconsult.co.uk										
CLI	ENT									
PRO	DJECT F	EWS LANE	, LONGSTANTON							
TIT	le E	BELOW GRO	OUND CONSTRUC	FION DETAILS						
DR	awn CV		checked MO	DRG No.	REV					
SCA	les 1:1	00@A1	DATE AUG 2019	19/0321/	110 P2					
				\neg $10/0021/$						

2. COVER FRAME BEDDED ON AND HAUNCHED IN CLASS M1. M2 OR EPOXY MORTAR NO GREATER THAN 20mm THICK. APPROVED PACKING MATERIAL MAY BE USED IF

3. 10mm UNCOMPRESSED THICKNESS OF 'TOKSTIP' OR SIMILAR APPROVED COMPRESSIBLE SEALENT TO ALL HORIZONTAL JOINTS.

4. TYPE 2 COVER FRAME SEATING RINGS 600X600 CENTRAL ACCESS OPENING OR MIN TWO COURSES OF ENGINEERING BRICK. 5. TYPE 1 COVER FRAME SEATING RING WITH 600X600 ECCENTRIC OPENING

(BS752-3) BEDDED ON MORTAR. 6. REINFORCED PRECAST CONCRETE (SULPHATE RESISTING) HEAVY DUTY COVER SLAB TO BS5911; PART200 WITH 750X800 ACCESS OPENING, BEDDED ON MORTAR. 7. PRECAST CONCRETE (SULPHATE RESISTING) CHAMBER RINGS TO BS 5911:PART

8. MIX ST4 SULPHATE RESISTING CONCRETE SURROUND MIN 150 THICK. 9. POLYPROPYLENE ENCAPSULATED DOUBLE STEP RUNGS TO BS1247 PARTS 1& 2.

MIN WIDTH 280mm AT 250mm CTRS. 10. GRAND CONCRETE BENCHING (MIN 200mm THICK) TO BE BROUGHT UP TO DENSE SMOOTH FACE NEATLY SHAPED AND FINISHED TO ALL BRANCH CONNECTIONS. BENCHING SLOPE TO BE 1 IN 10 AND 1 IN 30.

11. BOTTOM CHAMBER SECTION TO BE BUILT INTO BASE CONCRETE MIN 750mm. 13. INVERT WITHIN THE CHAMBER TO BE FORMED USING A CHANNEL PIPE.

15. DISTANCE BETWEEN TOP OF PIPE AND UNDERSIDE OF PRECAST CHAMBER TO BE

16. PIPE DIA ROCKER PIPE LENGTH

600

1000

1250

17. ALL PIPES ENTERING OR LEAVING MANHOLES SHALL HAVE FLEXIBLE JOINT WITHIN 600mm OF THE INSIDE FACE OF THE MANHOLE.

18. SHORT LENGTH PIPE TO BE SIMILAR LENGTH TO ROCKER PIPE. 19. PIPE JOINT WITHIN THE CHANNEL TO BE LOCATED MIN 100mm FROM INSIDE FACE

20. TOE HOLES TO BE PROVIDED IN BENCHING OF SEWER GREATER THAN 450mmø

21. 150 MIN STANDARD CONCRETE MIX 'ST2' SURROUND TO SUMP AND TO 150MIN ABOVE OUTGOING PIPE INVERT. ALTERNATIVELY, 150 MIN STANDARD CONCRETE MIX ST2' CAST INSITU SUMP IN LIEU OF PRECAST CONCRETE CHAMBER RINGS. 22. 225 MIN INSITU CONCRETE BASE SLAB (STANDARD MIX ST4').

23. INLETS AND OUTLETS THOROUGHLY PACKED AND SEALED WITH MORTAR AROUND

24. 'HYDROBRAKE' FIXED TO CONCRETE MOUNTING BLOCK WITH MASONRY STUD

25. 'HYDROBRAKE FLOW CONTROL FITTED WITH PIVOTING BY-PASS DOOR. HYDRO-BRAKE® UNIT OPTIMUM REFERENCE MD-SHE-0054-1000-0500-1000 DESIGN HEAD (M) 0.500, DIAMETER (MM) 51, DESIGN FLOW (L/S) 1.0, INVERT LEVEL (M) 6.490. MANUFACTURED BY HYDRO INTERNATIONAL. 26. PIVOTING BY-PASS DOOR OPERATING STEEL ROPE WITH PULL HANDLE FIXED JUST

Appendix C Geotechnical Report and Infiltration Test Report

OAKLEY SOILS AND CONCRETE ENGINEERING LTD

REDE HALL FARM, REDE, BURY ST EDMUNDS, SUFFOLK, IP29 4UG Tel: 01284 850555 Fax: 01284 850345 email: oakley@soils.fsnet.co.uk

FACTUAL DATA REPORT JOB NO: AAA/79

GROUND INVESTIGATION: PROPOSED DEVELOPMENT

'THE RETREAT' FEWS LANE LONGSTANTON CAMBRIDGESHIRE CB24 3DP

JANUARY 2016

Contents

- 1. Cable Percussive Borehole Log
- 2. Insitu Standard Penetration Test (SPT) Results
- 3. Laboratory Testing:
- Moisture Content & Atterberg Limits
- Soluble Sulphate & pH
- o Unconsolidated Undrained Triaxial Tests
- 4. Borehole Location Plan and Site Photographs

<u>Client</u> Mr Gerry Caddoo Landbrook Homes The Retreat Fews Lane Longstanton Cambridgeshire CB24 3DP

<u>Consulting Engineers</u> Andrew Firebrace Partnership Ltd Stable Barn Park End Swaffham Bulbeck Cambridge CB5 0NA

AAA/79 Factual Data Report: Ground Investigation: Proposed Development: The Retreat, Fews Lane, Longstanton, CB24 3DP

OAKLEY SOILS AND CONCRETE ENGINEERING LTD SITE: 'THE RETREAT', FEWS LANE, LONGSTANTON, CAMBRIDGE, CB24 3DP

JOB NO: AAA/79

SITE LOCATION

OAKLEY SOILS AND CONCRETE ENGINEERING LTD SITE: 'THE RETREAT', FEWS LANE, LONGSTANTON, CAMBRIDGE, CB24 3DP JOB NO: AAA/79

'STREETVIEW' ACCESS TO FEWS LANE FROM THE HIGH STREET

1. Cable Percussive Borehole Log

) A	KL	ΞE	Y						BOREHOLE No:	BH1	
SOILS	AND CO	NCRETE EN	IGINEERIN	GLTD						Sheet 1 of	2 Job No:	AAA/79
Type o	f boring: f rig:	Cable Pero	cussive							Feature: The Retrea	at . Longstanton. Cambrid	ge, CB24 3DP
Dia of I	boring:	150mm to	18.0m							Ground Level:	, congstanton, cambrid	6024 501
Casing	details:	150mm di	a to 3.0m T							GPS Co-ordinates ±5m:	E N	
Date &	Depth & diam of	Ground	Commission	Samples &	Tests	Dorath	Reduced	Langer	Thisland	Strata		
(Time)	boring & (depth of	water	Samples	Depth	lest & instr	Depth	Level	Legend	Inickness	Description		
15.12.15	casing)				r	- 0.00		<u></u>	r			
	PII					0.25			0.25		oft to firm Tonsoil with	traces of Made
			D •	0.5		- 0.40			0.30	Ground - lead drillers description	n.	
			D •	0.8		0.70		XXXXX		MADE/REWORKED GROUND: Fi slightly gravelly clay with occasio	irm mid greyish brown onal black carbonaceou	slightly sandy _ s deposits, _
			1997 - 19			1.00		<u> </u>		gravel is f/m and occasional coa	rse subangular to subro	unded flint and
	150mm			1.2-1.65		-		Ľ.	1.10	Very loose light to mid brown sil	Ity to very silty slightly g	ravelly to
**			•	1.4	C √ N=2	- -		0 0		gravelly clay, gravel is f/m chalk	and subangular flint.	an grey siightiy -
				10		- 1.80		<u> </u>		Firm mid to dark gray CLAY with	occasional olive mottli	- - ng and traces of
				1.5		2.00				fine decayed roots.		
			U	2.0-2.45	9 blows	-		<u> </u>		D @ 1.9m HSV = 54kpa From 2.0-2.5m fine gypsum.		-
			D . •	2.5		-				D @ 2.5m HSV = 70kpa		-
	3.00					-						-
	(3.00)		D •	3.0-3.45		3.00		×		From 3.0m becoming firm to stif	ff fissured dark grey CL4	Y with
					S √ N=11	-				occasional olive mottling and tra	aces of fine decayed roc	ots.
			D•	3.6		-		×.		D @ 3.6m HSV = 78kpa: a rusty	brown silt parting.	•
						-						-
				40445	16 blours	- 4.00 -				4		-
15.12.15	4.50	DRY		4.0-4.45	TO DIOM?	-						- - -
16.12.15	(3.00)	DRY	• 0	4.5		_		171-	5.50	grey CLAY with rare olive mottlin	ng and rare shell fragme	ents.
(08.00)						-		1				-
			D •	5.1-5.55		- 5.00				From 5.1m becoming stiff fissure	ed thinly laminated darl	- c grey CLAY with -
					S N=14	-				occasional shell fragments.		
					Ψ N=14	-						-
			D •	6.0		- 6.00				D @ 6.0m HSV = 90kpa		-
						-		~		B E C.CHI HOV - SCRPA		-
			-			-		-+				
			U	6.5-6.95	20 blows	-						-
			D •	7.0		7.00		$\overline{\chi}$		D @ 7.0m HSV = 132kpa		-
						- - - 730						-
		seepage @ 7.4m	D •	7.4		-			0.30	LIMESTONE recovered as: Coars strong mid to dark grey limeston	se gravel and cobble siz ne.	ed medium –
						- 7.60		×		Stiff fissured dark grey CLAY with	n occasional shell fragm	ents. –
						8.00						-
			D •	8.1-8.55		-						-
					v N=18	-		1				
			n -			-		-/-	(10.85)			-
			•	0.9		9.00		$ \Lambda $		עשי ט אין איז א א פא איז א א א א א א א א א א א א א א א א א		4
												-
						-		X				- -
			U	9.6-10.05	32 blows							1
						10.00						
• C====!!		come!-		Remarks Service pla	: Ins reviewed a	nd inspect	ion pit exca	avated to 1	.2m.		Scale	1:50 metres
	disturbod	i sample		16.12.15 c	hiselling 7.3-7.	5m 08:30-	09:30 hrs.				Logged by: AV	1
	urhad Sa	mnla									Checked by: JBI	
- Granda	rd Penetr	ation Test									Date: 09	01.16
▲ Water	sample									ŀ	· · · ·	
X Hand	Shear Var	ne test (ki	oa)									
PP Pocket	t Penetro	meter (ka	g/cm²)	Det	4	12.15						
				Date starte Date finish	ed: 15. ed: 16.	12.15						

AAA/79 Factual Data Report: Ground Investigation: Proposed Development: The Retreat, Fews Lane, Longstanton, CB24 3DP

		KI	F	Y						BOREHOLE No:	BH1	
SOILS	AND CO	NCRETE EN		U IG LTD						Sheet 2 of	2 Job No:	AAA/79
Туре о	f boring:	Cable Per	cussive							Feature: The Retre	at	
Type o Dia of I	f rig: boring:	DANDO 20 150mm to	000 018.0m							Location: Fews Lan Ground Level:	e, Longstanton, Cam	bridge, CB24 3DP
Casing	details:	150mm di	a to 3.0m	l						GPS Co-ordinates ±5m:	E N	
Date &	Depth & diam of	Ground		Samples &	Tests		Deduced	r		Strata		
(Time)	boring & (depth of	Water	Samples	Depth	Test & instr	Depth	Level	Legend	Thickness	Description		
L	casing)					metres 10.00						
			D•	10.1		È				Stiff fissured dark grey CLAY wi D @ 10.1m HSV = >136kpa	th occasional shell fr	agments. –
						-		1				-
			D •	10.6		Ē						-
			D •	11.0-11.45		11.00						-
					s	-		- <i>t</i>				-
-					₩ N=21	- -		1				
			D •	11.8		-		17		D @ 11.8m HSV = >136kpa		-
						12.00		 - <i>f</i>				-
				12.5-		• -						-
			U	12.95	38 blows	Ē						
			D •	13.0		13.00				D @ 13.0m HSV = >136kpa From 13.0m becoming stiff to v	very stiff.	-
						F		×				-
						Ē		\				-
						14.00		1-7				
			•	14.0-14.45		-		4	(10.85)	. 6		-
					√ N=24	-						
			D •	14.6						D @ 14.6m HSV = >136kpa		-
						- 15.00		7-				-
								k				-
					19							
			U	15.5- 15.95	41 blows	-						-
			D -	16.0		16.00				D @ 16.0m HSV = >136kpa		•
						Ē		2				-
						-		- (-
												-
			D•	17.0-17.45		17.00		and and a second se				•
					∫ S √ N=28			-{×				-
						E I						د - -
16.12.15	18.00	18.0m*				- - 18.00						-
	(3.00)		D •	18.0-18.45		- 10.00						-
					√ N=31	18.45						
										LIND OF BOREHOLE		-
						19.00						ļ
												1
						El						1
												-
						20.00		<u></u>				
	-1'			Remarks *Water lev	: vel on complet	tion of bore	hole.				Scale	1:50 metres
● Small	disturbed	sample		Borehole b	backfilled with	arisings.					Logged bv:	AW
↓ Large	uisturbed	molo									Checked by:	JBI
+ Standa	ind Penetr	ation Test									Date:	09.01.16
▲ Water	sample											
X Hand	Shear Var	ne test (k	pa)									
PP Pocke	t Penetro	meter (k	g/cm²)	Date start	ad: 15	12 15						
				Date start	ed: 15. 16.	12.15						

AAA/79 Factual Data Report: Ground Investigation: Proposed Development: The Retreat, Fews Lane, Longstanton, CB24 3DP

2. Insitu Standard Penetration Test (SPT) Results

OAKLEY SOILS AND CONCRETE ENGINEERING LTD

SUMMARY OF STANDARD PENETRATION TEST RESULTS

SITE: THE RETREAT, FEWS LANE, LONGSTANTON, CAMBRIDGE, CB24 3DP JOB NO: AAA/79

Borehole	Depth	Spoon/	Seating Blows		Blow Count							
	(m)	Cone	150mm	75mm	75mm	75mm	75mm					
BH1	1.2	Cone	1	0	1	0	1	2				
	3.0	Spoon	2	2	2	3	4	11				
	5.1	Spoon	3	2	3	4	5	14				
	8.1	Spoon	4	4	4	5	5	18				
	11.0	Spoon	5	4	5	6	6	21				
	14.0	Spoon	6	5	6	6	7	24				
	17.0	Spoon	6	6	7	7	8	28				
	18.0	Spoon	7	6	7	8	10	31				

3. Laboratory Testing:Moisture Content & Atterberg Limits

Α	O A nd con	KLE ICRETE F	Y SO	I L S ring lti	D	Moisture Content & Atterberg Limits						
Job N	umber	AA	AAA/79		Site Location		THE RETREAT, FEWS LANE, LONGSTANTON, CB24 3DP					
Borehole/ Trial Pit Number	Sample Number	Sample Depth (m)	Moisture Content (%)	% Retained 425 Sieve	Liquid Limit	Plastic Limit	Plasticity Index	Casagrande Classification	Description			
							·					
BH1	D	0.5	23									
	D	1.4	22									
	D	1.9	37	0	73	28	45	CV	Inorganic clay of very high plasticity			
	D	2.5	36									
	SPT	3.0-3.45	34	0	76	29	47	CV	Inorganic clay of very high plasticity			
	SPT	5.1-5.55	29	0	68	26	42	СН	Inorganic clay of high plasticity			
	SPT	8.1-8.55	28									
	SPT	11.0-11.45	27	0	66	24	42	СН	Inorganic clay of high plasticity			
	SPT	14.0-14.45	27									
	SPT	15.0-15.45	26									
	SPT	18.0-18.45	26									
									·			
				'								

All samples tested in natural state. Determination of liquid limit by BS1377 1990 Part 2. Preferred method (Cone Penetrometer) *Denotes prewash through 425 micron sieve. © OAKLEY SOILS & CONCRETE ENGINEERING LTD - Tel: 01284 850555 Fax: 01284 850345 V 05/09 • Soluble Sulphate & pH

AND C	OAK CONCRE	LEY SC fe engin	DILS IEERING LTD	Chemical Test Results					
	Ş	Sulphate Cor	ntent of Soil and Grou	undwater: BS1377 Part 3 1990					
Job No	AA	A/79	Site Location	The Retreat Fews Lane, Longstanton, CB24 3DP					
Borehole/ Trial Pit Number	rehole/ Sample Sample ial Pit Number Depth umber (m)		Soluble (SO4) Sulphates in soil specimen finer than 2mm (g/l)	Percentage finer than 2mm in original sample (%)	Groundwater Sulphates (g/l)	рН	Class BRE Special Digest 1* 2005 Third Edition		
BH1	D	0.5	0.29	84 97		7.4 8.1			
	SPT	2.5 8.1-8.55	0.90	100		7.7			
							· · · · · · · · · · · · · · · · · · ·		
		·							

* Concrete in aggressive ground Part 1: Assessing the aggressive chemical environment. © OAKLEY SOILS & CONCRETE ENGINEERING LTD - Tel: 01284 850555 Fax: 01284 850345 10/2005 o Unconsolidated Undrained Triaxial Tests

А	O A ND CON	KLE CRETE E	Y SOI NGINEEF	L S ring lti)	Quick Undrained Triaxial Tests							
Job N	umber	AA	A/79	Site Location			THE RETREAT, FEWS LANE, LONGSTANTON, CB24 3DP						
Borehole/ Trial Pit Number	Sample Number	Sample Depth (m)	Cell Pressures kN/m ²	Failure Strain (%)	Deviator Stress kN/m²	Bulk Density kg/m³	Moisture Content (%)	Cohesion kN/m²	Angle of Friction (°) (Assumed)	Description			
BH1	U1	2.0-2.45	50	7.9	147.9	1928	36	74	-	Firm dark grey and olive mottled CLAY with traces of fine decayed roots. Fine gypsum and gypsum clusters.			
	U2	4.0-4.45	90	6.0	132.1	1961	35	66	-	Firm to stiff fissured dark grey CLAY with occasional olive mottling, traces of fine decayed roots.			
	U3	6.5-6.95	140	6.1	186.6	2014	28	95	-	Stiff fissured dark grey CLAY			
	U4	9.6- 10.05	200	7.2	201.4	1989	29	101	-	Stiff fissured dark grey CLAY, occasional shell fragments.			
	U5	12.5- 12.95	260	6.3	274.7	2017	27	137	-	Stiff to very stiff fissured dark grey CLAY.			
	U6	15.5- 15.95	320	5.5	255.5	2097	26	128	-	Stiff to very stiff fissured dark grey CLAY, occasional shell fragments.			

BS1377 Part 7 1990

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4. Borehole Location Plan and Site Photographs




OAKLEY SOILS AND CONCRETE ENGINEERING LTD

JOB NO: AAA/79

SITE: LAND ADJACENT TO 'THE RETREAT', FEWS LANE, LONGSTANTON, CB24 3DP

DATE: 26.11.15



VIEW FROM REAR (NORTHERN BOUNDARY) OF SITE ACROSS PLOTS 1 & 2



VIEW FROM FRONT (SOUTHERN BOUNDARY) OF SITE ACROSS PLOTS 1 & 2

AAA/79 Factual Data Report: Ground Investigation: Proposed Development: The Retreat, Fews Lane, Longstanton, CB24 3DP



INFILTRATION TEST REPORT FEWS LANE, LONGSTANTON

19/0321/PLS 08 April 2020



TABLE OF CONTENTS

Introduction	1
Site Conditions	1
Soil Infiltration Results	1
Conclusion	2

APPENDICES

Appendix A - Trial Pit Location Plan
Appendix B - Infiltration Rate Calculation Sheets
Appendix C - Infiltration Test Photos

INTRODUCTION

This report has been prepared for the proposed development at the Retreat, Few's Lane, Longstanton. The purpose of this assessment is to provide information relating to permeability of the ground for the proposed surface water drainage systems of the proposed new houses.

This testing has been undertaken in accordance with BRE Digest 365 to determine if the ground conditions are favourable to discharge the surface water via infiltration.

Three trial pits were dug across the site at the locations shown on the plan in Appendix A. The trial pit 1 was dug to 1.20m below ground level with the width of 0.7m and length of 1.5m. The trial pit 2 was dug to 1.20m below ground level with the width of 0.8m and length of 2.1m. The trial pit 3 was dug to 1.10m below ground level with the width of 0.8m and length of 1.6m

SITE CONDITIONS

The weather at the time of the investigation was dry. No rainfall occurred during the test.

The tests were undertaken at three different locations, the TP1 was located to the front of the plot 4&5, TP2 was located to the rear of the plot 4&5 and TP3 was located to the rear of plot 3. General soil characteristic across the site are varies from firm to loose slightly sandy dark clay.

Groundwater was not observed within the trail pits and also the recently completed borehole confirmed that the ground water is not found up to 18.45m below ground level.

SOIL INFILTRATION RESULTS

Infiltration testing was undertaken in general accordance with BRE Digest 365. Water filled rapidly but carefully into each pit, then the water level fall rate was measured from a datum point. Each test was carried out till the water in each pit emptied, in line with BRE Digest 365 procedure. The test was then repeated a 2^{nd} and 3^{rd} time.

Infiltration rates were calculated based on the data collected from the tests are summarised in the table below:

Trial Pit No	Depth (mbgl)	Test 1 Rate (m/s)	Test 2 Rate (m/s)	Test 3 Rate (m/s)	Design Infiltration Rate (m/s)
TP01	1.20m	1.64E-05	1.33E-05	1.13E-05	1.13E-05
TP02	1.20m	1.56E-05	1.40E-05	1.26E-05	1.26E-05
TP03	1.10m	6.97E-06	8.00E-06	8.10E-06	6.97E-06



Three number of tests were completed within all three pits. The test results presented in the above table show that the lowest infiltration rate was obtained in the last test in trial pit 1&2 and first test in trial pit 3. Therefore the lowest infiltration test will need to be used as the design infiltration rate.

Infiltration rate calculation sheets are included in Appendix B.

CONCLUSION

This report demonstrates that the surface water generated from the proposed development can be infiltrated into ground via sustainable drainage systems. The design infiltration rate for the proposed soakaways should be taken as 1.26×10^{-5} m/s.

APPENDIX A

Trial Pit Location Plan





APPENDIX B

Infiltration Rate Calculation Sheets

STRUCTURAL AND CIVIL ENGINEERING CONSULTANTS



STRUCTURAL AND CIVIL ENGINEERING CONSULTANTS



STRUCTURAL AND CIVIL ENGINEERING CONSULTANTS



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APPENDIX C

Infiltration Test Photos



















Appendix D Cambridgeshire SPD completed Pro-Forma

Appendix F Surface water drainage pro-forma

Applicants should complete this form and submit it to the LPA, referencing from where in their submission documents this information is taken. The proforma is supported by the <u>DEFRA/ EA guidance on Rainfall Runoff Management</u>. and uses the storage calculator on <u>www.UKsuds.com</u>. The proforma should be considered alongside other supporting SuDS Guidance, but focuses on ensuring flood risk is not made worse elsewhere. This proforma is based upon current industry standard practice.

1. Site details

Site	Plot 3 - Fews Lane, Longstanton
Address & post code or LPA reference	Fews Lane, Longstanton, CB24 3DP, S/3215/19/DC
Grid Reference	TL 39427 67259
Is the existing site developed or Greenfield?	Greenfield
Total Site Area served by drainage system (excluding open space) (Ha) ⁽¹⁾	0.050ha

1. The Greenfield runoff off rate from the development which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage from a site should be calculated for the area that forms the drainage network for the site whatever size of site and type of drainage technique. Please refer to the Rainfall Runoff Management document or CIRIA manual for detail on this.

2. Impermeable area

	Existing	Proposed	Difference (Proposed-Existing)	Notes for developers and Local Authorities
Impermeable area (ha)	0	0.017ha	0.017ha	If proposed > existing, then runoff rates and volumes will be increasing. Section 6 must be filled in. If proposed ≤ existing, then section 6 can be skipped & section 7 filled in.
Drainage Method (infiltration/sewer/watercourse)			N/A	If different from the existing, please fill in section 3. If existing drainage is by infiltration and the proposed is not, discharge volumes may increase. Fill in section 6.

3. Proposing to discharge surface water via

	Yes	No	Evidence that this is possible	Notes for developers and Local Authorities
Infiltration				e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse			There is a ditch	e.g. Is there a watercourse nearby?
To surface water sewer				Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above				e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.

4. Peak Discharge Rates⁽¹⁾

116

	Existing rates (I/s)	Proposed rates (I/s)	Difference (I/s) (Proposed-Existing)	Notes for developers and Local Authorities
Greenfield QBAR	0.2l/s	N/A	N/A	QBAR is approx. 1 in 2 storm event. Provide this if Section 6 (QBAR) is proposed.
1 in 1	0.1l/s	2l/s	1.9I/s	Proposed discharge rates (with mitigation) should be no greater
1 in 30	0.4l/s	2l/s	1.6l/s	discharging all flow from site at the existing 1 in 100 event
1 in 100	0.6l/s	2l/s	1.4l/s	increases nood fisk during smaller events.
1 in 100 + climate change	N/A	21/s	n/a	To mitigate for climate change the proposed 1 in 100 +CC must be no greater than the existing 1 in 100 runoff rate. If not, flood risk increases under climate change. 30% should be added to the peak rainfall intensity.

1. This is the maximum flow rate at which storm water runoff leaves the site during a particular storm event.

5. Calculate additional volumes for storage⁽¹⁾

	Existing volume (m ³)	Proposed volume (m ³)	Difference (m³) (Proposed-Existing)	Notes for developers and Local Authorities
1 in 1				Proposed discharge volumes (without mitigation) should be no
1 in 30				Any increase in volume increases flood risk elsewhere. Where
1 in 100				volumes are increased section 6 must be filled in.
1 in 100 + climate change	9.137m3	4.4m3	-4.737m3	To mitigate for climate change the volume discharge from site must be no greater than the existing 1 in 100 storm event. If not, flood risk increases under climate change.

1. The total volume of water leaving the development site. New hard surfaces potentially restrict the amount of storm water that can go to the ground, so this needs to be controlled so not to make flood risk worse to properties downstream.

6. Calculate attenuation storage⁽¹⁾

		Notes for developers and Local Authorities
Storage Attenuation volume (Flow rate control) required to retain rates as existing (m ³)	Attenuation tank and orifice flow control device will be used - 4.4m3	Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing

1. Attenuation storage is provided to enable the rate of runoff from the site into the receiving watercourse to be limited to an acceptable rate to protect against erosion and flooding downstream. The attenuation storage volume is a function of the degree of development relative to the greenfield discharge rate.

7. How is Storm Water stored on site?⁽¹⁾

118

			Notes for developers and Local Authorities
Infiltration	State the Site's Geology and known Source Protection Zones (SPZ)	No	Avoid infiltrating in made ground. Infiltration rates are highly variable and refer to Environment Agency website to identify and source protection zones (SPZ)
	Are infiltration rates suitable?	yes	Infiltration rates should be no lower than 1×10^{-6} m/s.
	State the distance between a proposed infiltration device base and the ground water (GW) level	grounwater level was not found in trial pits and boreholes	Need 1m (min) between the base of the infiltration device & the water table to protect Groundwater quality & ensure GW doesn't enter infiltration devices. Avoid infiltration where this isn't possible.
	Were infiltration rates obtained by desk study or infiltration test?		Infiltration rates can be estimated from desk studies at most stages of the planning system if a backup attenuation scheme is provided.
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.		Water should not be infiltrated through land that is contaminated. The Environment Agency may provide bespoke advice in planning consultations for contaminated sites that should be considered.
In light of the above, is infiltration feasible?	Yes/No? If the answer is No, please identify how the storm water will be stored prior to release	No,There is not enough space on site to discharg via soakaways	If infiltration is not feasible how will the additional volume be stored? The applicant should then consider the following options in the next section.

1. Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The idea is that the additional volume does not get into the watercourses, or if it does it is at an exceptionally low rate. You can either infiltrate the stored water back to ground, or if this isn't possible hold it back with on-site storage. Firstly, can infiltration work on site?

Storage requirements

The developer must confirm that either of the two methods for dealing with the amount of water that needs to be stored on site.

• Option 1 Simple:

Store both the additional volume and attenuation volume in order to make a final discharge from site at QBAR (Mean annual flow rate). This is preferred if no infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.

• Option 2 Complex:

If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2 l/sec/hectare. A combined storage calculation using the partial permissible rate of 2 l/sec/hectare and the attenuation rate used to slow the runoff from site.

		Notes for developers and Local Authorities
Please confirm what option has been chosen and how much storage is required on site.	Attenuation tank and orifice flow control device will be used- 4m3 storage required	The developer at this stage should have an idea of the site characteristics and be able to explain what the storage requirements are on site and how it will be achieved.

8. Please confirm

		Notes for developers and Local Authorities
Which SuDS measures have been used?	Attenuation tank and flow control device	SuDS can be adapted for most situations even where infiltration isn't feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C697.
Drainage system can contain in the 1 in 30 storm event without flooding	no flooding occurs in 1:30 year storm event	This a requirement for sewers for adoption & is good practice even where drainage system is not adopted.
Any flooding between the 1 in 30 & 1 in 100 plus climate change storm events will be safely contained on site.	no floding occurs in events up to and includir 1in 100 year plus 40% climate change	Safely: not causing property flooding or posing a hazard to site gusers i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased.
How are rates being restricted (hydrobrake etc)	orifice plate	Hydrobrakes to be used where rates are between 2l/s to 5l/s. Orifices may not work below 5l/s as the pipes may block. Pipes with flows < 2l/s are prone to blockage but this can be overcome with careful product selection and SuDS design.

		Notes for developers and Local Authorities
Please confirm the owners/adopters of the SuDS throughout the development. Please list all the owners.	Gerry Caddoo	If these are multiple owners then a drawing illustrating exactly what features will be within each owner's remit must be submitted with this Proforma.
How are the entire SuDS to be maintained?	will be maintained in accordance with the maintenance report	If the features are to be maintained directly by the owners as stated in answer to the above question please answer yes to this question and submit the relevant maintenance schedule for each feature. If it is to be maintained by others than above please give details of each feature and the maintenance schedule. Clear details of the maintenance proposals of all element of the proposed drainage system must be provided. Poorly maintained drainage can lead to increased flooding problems in the future.

9. Evidence

Pro-forma Section	Document reference where details quoted above are taken from:	Page Number
2	Site Plan	
3	Drainage Plan	
4	Microdrainage Greenfield Runoff rate and attenuation tank calcs	
5	Microdrainage Greenfield Runoff Volume and Attenuation Tank Calcs	
6	Drainage Plan and Microdrainage Attenuation Tank Calcs	
7	Below ground crate Attenuation Systems	

П

The above form should be completed using evidence from the Flood Risk Assessment where applicable, surface water drainage strategy and site plans. It should serve as a summary sheet of the drainage proposals and should clearly show that the proposed rate and volume as a result of development will not be increasing. If there is an increase in rate or volume, the rate or volume section should be completed to set out how the additional rate/volume is being dealt with.

This form is completed using factual information from the Flood Risk Assessment and Site Plans and can be used as a summary of the surface water drainage strategy on this site.

Form completed by:	Mehmet Ozdemir
Qualification of person responsible for signing off this pro-forma:	Civil Engineer MEng (Hons)
Company:	Andrew Firebrace Partnership Ltd
On behalf of (Client's details):	Gerry Caddoo
Date:	26.06.20



Appendix E Anglian Water Correspondence

From:	PlanningComments
To:	Emma Ousbey
Subject:	FW: Discharge of Condition
Date:	29 June 2020 10:33:05
Attachments:	image001.jpg
	image004.jpg
	image005.jpg

Emma - for your please and uploading.

Rose Mills | Technical Support Officer

?		

| e-mail Rose.Mills@greatercambridgeplanning.org Mobile phone no 07514921842 https://www.scambs.gov.uk/planning/ https://www.cambridge.gov.uk/planning

Greater Cambridge Shared Planning: a strategic partnership between Cambridge

From: no-reply-InFlow@anglianwater.co.uk <no-reply-InFlow@anglianwater.co.uk>
Sent: 26 June 2020 08:45
To: Planning <planning@greatercambridgeplanning.org>
Subject: Discharge of Condition



The Retreat Fews Lane Longstanton Cambridge Cambridgeshire CB24 3DP, S/3215/19/DC, PLN-0087321

Thank you for your enquiry to discharge condition relating to the above development site. Please find our comments below.

Foul Water Comments: The foul water drainage strategy is acceptable to Anglian Water, we can therefore recommend the discharge of condition 4 of planning reference S/2937/16/FL.

Surface Water Comments: The surface water drainage strategy does not involve discharge to Anglian Water owned assets, we therefore have no comments to make regarding the discharge of condition 5 of planning reference S/2937/16/FL.

Should you have any queries or comments regarding this please contact us at planningliaison@anglianwater.co.uk or 0345 60 66 087 Option 1 quoting reference PLN-0087321.

Kind Regards

Development Services Pre-Development Team

Not you or need help?

Call us on 0345 60 66 087



This is an automatically generated email, please do not reply to this message.

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Appendix F Consultation Response with SCDC
1. Geotechnical investigation and BRE 365 soakaway tests (full accordance of BRE 365);

As attached

2. Commentary on the consideration of the drainage hierarchy, and any justification for not deploying infiltration techniques;

Based on the SUDs hierarchy. it is not feasible to deliver a workable soakaway solution for the site on plot 3 due to constricted space

The proposed method for disposal of the surface water is to discharge in to the existing ditch. Due to the restricted discharge rate, on-site attenuation will be required to accommodate the excess storm water. It is proposed that the storage system be installed within the garden area to provide an off-line attenuation system.

3. Drainage discharge calculations for pre and post development design;

Qbar Greenfield runoff rate for the plot 3 is 0.2l/s which is not possible to achieve therefore 2/s has been used to avoid the blockages.

Climate change/future proofing has been taken into account and surface water systems has been designed for storm events up to and including 1 in 100 year plus 40% climate change.

See attached – Plot 3 Greenfield Runoff Rate

4. Attenuation calculations to confirm size of attenuation and sensitivity tests on a submerged outfall during the applicable design event;

See attached – Plot 3 Attenuation Tank Calcs

5. Third Party agreement confirmation for the discharge of foul water runoff to a sewer with sufficient capacity. (Note this is in relation to the CC/7 policy requirement. I imagine this agreement with the third party was part of the wider site planning application; however it should be submitted under this application also).

LPA to consult with Anglian Water

6. Confirmation on the riparian ownership to the existing ditch;

The riparian owner of the existing ditch is Mr G & Mrs F Caddoo

7. A Completed Drainage Pro-Forma (Appendix F of the SPD);

See attached

8. A maintenance and management plan of the proposed SuDS systems, addressing responsibilities.

Maintenance of the surface water system will be completed in accordance with the attached <u>Below Ground Drainage Maintenance Report</u>



Appendix G Maintenance Plan



Below Ground Drainage Operation and Maintenance Strategy Report

General

All of the measures described in this document will form part of the Health and Safety file. All of the measures and designs will need to be adhered to in order to maintain the design life and design capacity of the surface water drainage systems.

The below ground drainage network is designed in accordance with Building Regulations Part H 2015, BSEN 752-2008, LASOO Non Statutory Technical Standards for Sustainable Drainage 2015 and Ciria C753 – The SUDS Manual.

<u>General</u>

Inspection chambers and access points are provided which can be jetted / cleaned. General checking of the below ground drainage systems should be every three (3) months. General maintenance / cleaning of the below ground systems should be after each major storm event and on an annual basis. This applies to all pipes, inspection chambers, manholes, channels etc.

Attenuation Tanks

For maintenance requirements see extract from SUDS Manual C753 for Attenuation Tank. Attenuation Tanks should also be maintained in accordance with manufacturers recommendations.

Heavy vibrating rollers are definitely not recommended around plastic pipes or tanks due to the high pressures that they can generate. Thin layers with smaller plant are recommended. DfT (2009) should be referred to for guidance for plant and methods for achieving compaction. The manufacturers' recommendations usually limit plant size above geocellular units to no more than 2300 kg/m width. However, the loading resulting from this will still need to be checked in the design. If such plant is to be used adjacent to the units, the resulting compaction pressures need to be checked.

Any arch or flexible pipe structures depend on the even resistance provided from soil or aggregate on both sides of the arch/pipe for their structural capacity. Even slight differences in the level of filling on each side of the arch/pipe as it progresses could potentially cause uneven deflections and increase the stress within the structure above design values. Close supervision during backfilling is therefore vital. The backfill around geocellular tanks should also be brought up evenly around all sides.

Bedding directly below a concrete pipe should have minimal compaction. The fill at the side of the pipe should be well compacted to a level 300 mm above the crown of the pipe. Only light compaction should be applied to the backfill directly over the crown of the pipe to a point 300 mm above it. With reasonable workmanship and supervision, the bedding factors used in the design should be relatively conservative.

21.12.6 Wrapping

All storage tanks should be watertight in accordance with the relevant standards. Geocellular and similar structures using geomembranes to hold water should be sealed in accordance with waterproofing standards (ie welded joints rather than adhesive taped) and the integrity of the seal checked on site through the use of non-destructive testing, to ensure that it is leak-proof. Advice on appropriate integrity and seam tests for geomembranes, that could be adapted for testing membranes around storage tanks, is provided in Mallett *et al* (2014). Care needs to be taken during installation to protect against damage of both the tank structure and the geotextile and the geomembrane wrapping. Follow-on trades can also cause damage and put the integrity and performance of the structure at risk.

21.13 OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is required to ensure the effective long-term operation of belowground storage systems. Maintenance responsibility for systems should be placed with a responsible organisation. Table 21.3 provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required.

Maintenance Plans and schedules should be developed during the design phase, and will be specific to the type of tank that is adopted. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements. Further detail on the preparation of maintenance specifications and schedules of work is given in Chapter 32.

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

Generic health and safety guidance is provided in Chapter 36.

TABLE	Operation and maintenance requirements for attenuation storage tanks							
21.3	Maintenance schedule	Required action	Typical frequency					
	Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually					
		Remove debris from the catchment surface (where it may cause risks to performance)	Monthly					
		For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually					
		Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required					
	Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required					
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually						
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required						

21.14 REFERENCES

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Appendix H Greenfield Runoff Calculations

Andrew Firebrace Partnership		Page 1
Stable Barn Park End	Fews Lane	
Swaffham Bulbeck	Green field Runoff volume	L.
Cambridge CB25 ONA		Micco
Date 26/06/2020	Designed by MO	
File GREENFIELD RUNOFF RATE	Checked by	Diamaye
XP Solutions	Source Control 2017.1.2	

<u>Greenfield Runoff Volume</u>

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.000
Ratio R	0.450
Areal Reduction Factor	1.00
Area (ha)	0.050
SAAR (mm)	550
CWI	45.000
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%) 30.62 Greenfield Runoff Volume (m³) 9.137



Appendix I Manning's Equation for Watercourse

Appendix J

Manning Formula Uniform Trapezoidal Channel Flow at Given Slope and Depth

Ditch at rear of Fews Lane, Longstandon

Bankfull dimensions estimated from survey drawing. Conservative estimate for channel slope and Manning's roughness.

			Results			
			Flow area	4.0176	m^2	~
nputs			Wetted perimeter	5.5072	m	~
Bottom width	2	m v	Hydraulic radius	0.7295	m	~
Sido slopo 1 (boriz /vort)			Velocity, v	0.5125	m/s	~
Side slope 1 (nonz./verc.)	1	<u> </u>	Flow, Q	2.0591	m^3	/s •
Side slope 2 (horiz./vert.)	1		Velocity head, h _v	0.0134	m	~
Manning roughness, n ?	0.05		Top width, T	4.4800	m	~
Channel clane			Froude number, F	0.17		
Channel slope	0.001	rise/run 🗸	Shear stress (tractive force), tau	7.1536	N/m	^2 🗸
Flow depth	1.24	m 🖌	Implied design ? riprap size based on n	1.3788	m	~
Bend Angle? (for riprap sizing)	0		Required bottom angular riprap size, D50, Maricopa County	0.0100	m	~
Stone specific gravity (2.65)	0.05		Required side slope 1 angular riprap size, D50, Maricopa County	0.0141	m	~
Stone specific glavity (2.03)	2.65		Required side slope 2 angular riprap size, D50, Maricopa County	0.0141	m	~
			Required angular riprap size, D50, per Maynord, Ruff, and Abt (1989)	0.0049	m	~
			Required angular riprap size, D50, per Searcy (1967)	0.0058	m	~





Appendix J Micro-drainage Surface Water Calculations – submerged outfall

Andrew Firebrace Partnership	Page 1										
Stable Barn Park End	Surface Water Calcs for										
Swaffham Bulbeck	Plot 3 Fews Lane										
Cambridge CB25 ONA	Longstanton										
Date 27/07/2020	Designed by MO										
File SURCHARGED OUTFALL FOR	Checked by Urainage										
XP Solutions	Network 2017.1.2										
STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Storm Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - England and Wales Return Period (years) 2 Pine Sizes (mm) 20.000 Add Flow / Climate Change (%) 0 Ratio R 0.450 Maximum Rainfall (mm/hr) 50 Maximum Time of Concentration (mins) 30 Min Design Depth for Optimisation (m) 1.200											
Foul Sewage (l/s/ha) 0.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 0.750 Min Slope for Optimisation (l:X) 500 Designed with Level Soffits <u>Time Area Diagram for Storm</u> Time Area (mins) (ha) 0-4 0.000 Total Area Contributing (ha) = 0.000 Total Pipe Volume (m ³) = 0.050											
Network De	esign Table for Storm										
(m) (m) (1:X) (ha) (mix	E. Base & HYD DIA Section Type Auto ns) Flow (l/s) (mm) SECT (mm) Design										
\$1.0003.5980.020179.90.0003\$1.0012.7480.3807.20.0000	.00 0.0 0.600 o 100 Pipe/Conduit 💣 .00 0.0 0.600 o 100 Pipe/Conduit 💣										
<u>Network Results Table</u>											
PN Rain T.C. US/IL Σ I.A: (mm/hr) (mins) (m) (ha)	rea Σ Base Foul Add Flow Vel Cap Flow) Flow (l/s) (l/s) (l/s) (m/s) (l/s) (l/s)										
\$1.000 50.00 3.11 6.510 0.0 \$1.001 50.00 3.12 6.490 0.0	000 0.0 0.0 0.57 4.5 0.0 000 0.0 0.0 0.0 2.89 22.7 0.0										

Andrew Firebrace Partnership		Page 2
Stable Barn Park End	Surface Water Calcs for	
Swaffham Bulbeck	Plot 3 Fews Lane	L.
Cambridge CB25 ONA	Longstanton	Micco
Date 27/07/2020	Designed by MO	
File SURCHARGED OUTFALL FOR	Checked by	Dialitage
XP Solutions	Network 2017.1.2	

<u>Manhole Schedules for Storm</u>											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m) Diameter) (mm)	Bacl (1
STANK SHYDROBRAKE	7.300	0.790	Open Manhole Open Manhole	1200 1200	s1.000	6.510 6.490	100 100	S1.000	6.49	0 100	
S	7.200	1.090	Open Manhole	0		OUTFALL		S1.001	6.11	0 100	

Andrew Firebrace Partnership		Page 3
Stable Barn Park End	Surface Water Calcs for	
Swaffham Bulbeck	Plot 3 Fews Lane	Micro
Cambridge CB25 ONA	Longstanton	
Date 27/07/2020	Designed by MO	
File SURCHARGED OUTFALL FOR	Checked by	Diamaye
XP Solutions	Network 2017.1.2	

PIPELINE SCHEDULES for Storm

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
S1.000	0	100	STANK	7.300	<mark>6.510</mark>	0.690	Open Manhole	1200
S1.001		100	SHYDROBRAKE	7.300	6.490	0.710	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
S1.000	3.598 2.748	179.9	SHYDROBRAKE S	7.300	6.490 6.110	0.710	Open Manhole Open Manhole	1200

Andrew Firebrace Partnership		Page 4
Stable Barn Park End	Surface Water Calcs for	
Swaffham Bulbeck	Plot 3 Fews Lane	<u> </u>
Cambridge CB25 ONA	Longstanton	Micco
Date 27/07/2020	Designed by MO	
File SURCHARGED OUTFALL FOR	Checked by	Diamaye
XP Solutions	Network 2017.1.2	

<u>Area Summary for Storm</u>

Pipe Number	РІМР Туре	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.000	0.000	0.000

Surcharged Outfall Details for Storm

Outfall	Outfall	c.	Level	I.	Level		Min	D,L	W
Pipe Number	Name		(m)		(m)	Ι.	Level (m)	(mm)	(mm)
S1.001	S		7.200		6.110		6.110	0	0

Datum (m) 5.970 Offset (mins) 0

Time	Depth	Time	Depth	Time	Depth	Time	Depth	Time	Depth	Time	Depth
(mins)	(m)	(mins)	(m)	(mins)	(m)	(mins)	(m)	(mins)	(m)	(mins)	(m)
60	0 400	E 4 0	0 100	1020	0 400	1 5 0 0	0 100	1000	0 400	2460	0 400
60	0.400	540	0.400	1020	0.400	1500	0.400	1980	0.400	2460	0.400
120	0.400	600	0.400	1080	0.400	1560	0.400	2040	0.400	2520	0.400
180	0.400	660	0.400	1140	0.400	1620	0.400	2100	0.400	2580	0.400
240	0.400	720	0.400	1200	0.400	1680	0.400	2160	0.400	2640	0.400
300	0.400	780	0.400	1260	0.400	1740	0.400	2220	0.400	2700	0.400
360	0.400	840	0.400	1320	0.400	1800	0.400	2280	0.400	2760	0.400
420	0.400	900	0.400	1380	0.400	1860	0.400	2340	0.400	2820	0.400
480	0.400	960	0.400	1440	0.400	1920	0.400	2400	0.400	2880	0.400

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 1 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.450		

Andrew Fire	orace Par	tnership					Page 5
Stable Barn	Park En	d	Surfa	ce Water	Calcs for		
Swaffham Bul	lbeck		Plot	3 Fews La	ne		4
Cambridge (Micro						
Date 27/07/2	2020		Desig	ned by MC			
File SURCHAN	RGED OUTF	ALL FOR .	Check	ed by			Diamacje
XP Solutions	5		Netwo	rk 2017.1	.2		
Hydro-Brake	e® Optimu	<u>Onl</u> m Manhole	ine Contro	ols for S RAKE, DS/	<u>torm</u> 'PN: S1.00)1, Volum	e (m³): 0.9
	*						· · ·
		_	Unit Refere	nce MD-SHE	-0054-1000-	0500-1000	
		Des	esign Head ign Flow (1	(m) /s)		0.500	
		200	Flush-F	lo™	C	alculated	
			Object	ive Minim	ise upstrea	m storage	
			Applicat Sump Availa	10n ble		Surface Yes	
			Diameter (mm)		54	
		In	vert Level	(m)		6.490	
	Minimum (Suggest	outlet Pipe ced Manhole	Diameter (Diameter (mm) mm)		/5 1200	
		Contro	l Points	Head (m) Flow (1/:	s)	
	D	anian Daint				0	
	D	esign Poin	Flush-Fl	ea) 0.50 Lo™ 0.15	1 1	.0	
			Kick-Fl	Lo® 0.33	2 0	.8	
	М	ean Flow ov	ver Head Ran	nge	- 0	.9	
The hydrolog Hydro-Brake Hydro-Brake invalidated	gical calcu ® Optimum a Optimum® }	ulations ha as specifie de utilised	ve been bas d. Should then these	ed on the i another typ storage r	Head/Discha pe of contr outing calc	rge relation ol device o ulations w	onship for the other than a ill be
Depth (m) 1	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	1.200	1.5	3.000	2.2	7.000	3.4
0.200	1.0	1.400	1.6	3.500	2.4	7.500	3.5
0.300	0.9	1.600	1.7	4.000	2.6	8.000	3.6
0.500	1.0	2.000	1.9	5.000	2.8	9.000	3.8
0.600	1.1	2.200	1.9	5.500	3.0	9.500	3.9
0.800	1.2	2.400	2.0	6.000	3.1		
1.000	1.1	2.000	2.1	0.000	5.2		
			982-2017	(P Soluti	ons		
		91 1	ノリム "ムリエ/ ム	I DOTULT	6110		

Andrew Firebrace Partnership		E	Page 6
Stable Barn Park End	Surface Water Calcs	for	ب در
Swaffham Bulbeck	Plot 3 Fews Lane		Ч.
Cambridge CB25 ONA	Longstanton		~~~
Date 27/07/2020	Designed by MO		MICrO
File SURCHARGED OUTFALL FOR	Checked by		Drainage
XP Solutions	Network 2017 1 2		
	10000111 2017 • 1 • 2		
Storag	<u>ge Structures for Storm</u>		
<u>Cellular Storac</u>	ge Manhole: STANK, DS/PN	: S1.000	
Ir Infiltration Coefficie Infiltration Coefficie	ent Eavel (m) 6.510 Safet ent Base (m/hr) 0.00000 ent Side (m/hr) 0.00000	ty Factor 2.0 Porosity 0.95	
Depth (m) Area (m²) Inf.	Area (m ²) Depth (m) Area (m	²) Inf. Area (m²	²)
0.000 10.5 0.400 10.5	10.5 17.3	.0 17.	.3
<u>Time Area Diagra</u>	m at Pipe Number S1.001	for Storm	
	Fotal Area (ha) 0.017		
	Time (mins) Area From: To: (ha)		
	0 4 0.017		

Andrew Firebrace Partnership Page 7												
Stable Barn Park End Surface Water Calcs for												
Swaffha	m Bulbeck			Plot 3		4						
Cambrid	ae CB25 01	AL		Longst	anton			1 mm				
Date 27	/07/2020			Design		Micro						
Filo SI	PCHARCED OI	יידי דע	סר	Checker	d by			Drainage				
TILE SURCHARGED UUTFALL FUR CHECKED DY												
AF SOIU	MELWOIK ZUI/.I.Z											
1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)												
<u> ycur</u>	for Storm											
	_		Sin	nulation	<u>Criteria</u>							
	Areal	Reduction	Factor 1	000 <i>I</i>	Additional Fl	0W - % 0f ' 0r * 10m³/i	Fotal Flo	w 0.000				
	Hot	Start Leve	(m113)	0	MADD Fact	Inlet Co	effiecien	t 0.800				
Man	hole Headlos	s Coeff (G	lobal) ().500 Flo	w per Person	per Day (l/per/day) 0.000				
F	oul Sewage p	er hectare	(l/s) (0.000								
	Number	of Input	Hydroar	anhs () N	umber of Stor	rade Struct	ures 1					
	Numb	er of Onli	ine Cont:	rols 1 N	umber of Time	e/Area Diag	rams 1					
	Numbe	er of Offl	ine Cont:	rols 0 N	umber of Real	L Time Cont	rols 0					
			Suntho	tia Pain	fall Dotaile							
	R	ainfall M	odel	CIC Naill	FSR Ra	atio R 0.45	50					
		Re	gion Eng	land and	Wales Cv (Su	ummer) 0.75	50					
		M5-60	(mm)	:	20.000 Cv (Wi	inter) 0.84	10					
	Margin fo	r Flood R	isk Warn	ing (mm)			300	C				
	1101 9111 10	A	nalysis	Timestep	2.5 Second I	Increment (Extended)				
			DT	S Status			OI	N				
			DV	D Status			OF	F				
			Inerti	a Status			OF.	2				
	Durat	Profil	e(s)	15 20	60 120 190	Summer	and Wint	ter				
	Dura	LOII(5) (III	1115)	720,	960, 1440, 21	.60, 2880,	4320, 576	50, 50,				
						7200,	8640, 100	080				
	Return Pers	iod(s) (ye	ars)				1, 30, 3	LOO				
	Clima	ate Change	(응)				υ, υ,	40				
	US/MH	~ .	Return	Climate	First (X)	First (Y)	First (2	2) Overflow				
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflo	w Act.				
S1.000	STANK	15 Winter	1	+0%	30/15 Summer							
S1.001	SHYDROBRAKE	15 Winter	1	+0%	1/15 Summer							
		Water Su	rcharged	Flooded		Pipe						
	US/MH	Level	Depth	Volume	Flow / Overs	flow Flow		Level				
PN	Name	(m)	(m)	(m³)	Cap. (1/	s) (l/s)	Status	Exceeded				
S1 000	STANK	6.546	-0 064	0 000	0.12	0 5		OK				
s1.001	SHYDROBRAKE	6.625	0.035	0.000	0.06	1.0	SURCHARG	ED				
			@1000	2017 17								
1				LUL/ AB	: SOTALTOUS							

Andrew Firebrace Partner	shin				P	age 8					
Stable Parp Park End	ытр	Surface	- Wator Cal	as for		age o					
Stable Ball Falk End		Dlat 2	1	- I							
Swallham Bulbeck		PIOT 3	rews Lane			m m					
Cambridge CB25 UNA		Longsta	Micro								
Date 27/07/2020		Icainano									
FILE SURCHARGED OUTFALL FOR Checked by											
XP Solutions Network 2017.1.2											
XP Solutions <u>30 year Return Period Su</u> Areal Reduction Hot Start Hot Start Lev Manhole Headloss Coeff Foul Sewage per hectar Number of Inpu Number of Off Rainfall R M5-60	<u>mmary of</u> <u>Sim</u> Factor 1 (mins) rel (mm) (Global) 0 ce (1/s) 0 t Hydrogra line Contr line Contr <u>Synthe</u> Model egion Eng. (mm)	Networ: <u>for St</u> <u>ulation</u> .000 F 0 0.500 Flc 0.000 aphs 0 N cols 1 N cols 0 N <u>tic Rain</u> land and	k 2017.1.2 cal Results corm Criteria additional F1 MADD Fact w per Person umber of Stor umber of Stor umber of Real <u>fall Details</u> FSR Ra Wales Cv (Su 20.000 Cv (Wi	by Maxir ow - % of ' or * 10m ³ / Inlet Coo per Day (rage Struct Area Diag Time Cont atio R 0.45 immer) 0.75 inter) 0.84	num Level Fotal Flow ha Storage effiecient 1/per/day) ures 1 grams 1 rols 0 50 50	(Rank 1) 0.000 2.000 0.800 0.000					
Margin for Flood Risk Warning (mm) Analysis Timestep 2.5 Second Increment (Extended) DTS Status ON DVD Status Inertia Status Profile(s) Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200. 8640, 10080											
Climate Chang	Return	Climate	First (X)	First (Y)	0, 0, 4 First (Z)	Overflow					
PN Name Storm	Period	Change	Surcharge	Flood	Overflow	Act.					
S1.000 STANK 30 Winte S1.001 SHYDROBRAKE 15 Winte	er 30 er 30	+0% +0%	30/15 Summer 1/15 Summer								
Water S	urcharged	Flooded		Pipe							
US/MH Level	Depth	Volume	Flow / Over	Elow Flow		Level					
PN Name (m)	(m)	(m³)	Cap. (1/	s) (l/s)	Status	Exceeded					
S1.000 STANK 6.673 S1.001 SHYDROBRAKE 6.683	0.063 0.093	0.000 0.000	0.22 0.06	0.8 1.0	SURCHARGEI SURCHARGEI						
	©1982-	2017 XE	? Solutions								

Andrew Firebrace Partnership Page 9												
Stable Barn Park End Surface Water Calcs for												
Swaffha	m Bulbeck			Plot 3		L.						
Cambrid	lge CB25 01	NA		Longsta	anton			Micco				
Date 27/07/2020 Designed by MO												
File SURCHARGED OUTFALL FOR Checked by												
XP Solutions Network 2017.1.2												
100 year Return Period Summary of Critical Results by Maximum Level (Rank												
	<u>1) for Storm</u>											
	Areal	Reduction 1	<u>Sin</u> Factor 1	.000 A	<u>Criteria</u> Additional Fl	.ow - % of '	Fotal Flo	w 0.000				
	1	Hot Start	(mins)	0	MADD Fact	or * 10m³/1	na Storag	e 2.000				
	Hot	Start Leve	1 (mm)	0	_	Inlet Co	effiecien	t 0.800				
Mar I	hole Headlos: oul Sewage p	s Coeff (G. er hectare	lobal) ((1/s) ().500 Flc).000	ow per Person	per Day (.	L/per/day) 0.000				
			TT	and a constant								
	Number Numb	of Input er of Onli	Hydrogra .ne Cont	apns U N rols 1 N	umber of Stor umber of Time	rage Struct e/Area Diag	ures 1 rams 1					
	Numbe	er of Offli	ne Cont	rols 0 N	umber of Real	l Time Cont	rols 0					
			Synthe	tic Rain	fall Details							
	F	ainfall Mc	del	امتما متما	FSR Ra	atio R 0.45	0					
		кед M5-60 ((10n Eng (mm)	land and	Wales CV (St 20.000 Cv (W:	ummer) 0.75 inter) 0.84	0					
				. , ,				、 、				
	Margin fo	or Flood Ri Ar	lsk Warn Nalvsis	ing (mm) Timester	2 5 Second	Increment (300.(Extended))				
		111	DT	S Status	2.0 000014	Incremente (01	1				
			DV	D Status			OFI	7				
			Inerti	a Status			OFF					
		Profile	e (s)			Summer	and Wint	or				
	Durat	tion(s) (mi	ins)	15, 30,	60, 120, 180), 240, 360	, 480, 60	00,				
				720,	960, 1440, 21	160, 2880, 7200	4320, 576 8640 100	50 ,				
	Return Per:	iod(s) (yea	ars)			1200,	1, 30, 1	.00				
	Clima	ate Change	(%)				Ο, Ο,	40				
	US/MH		Return	Climate	First (X)	First (Y)	First (Z) Overflow				
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflo	w Act.				
S1.000	STANK	60 Winter	100	+40%	30/15 Summer							
S1.001	SHYDROBRAKE	60 Winter	100	+40%	1/15 Summer							
				_, , ,								
	US/MH	Water Sur Level	cnarged Depth	riooded Volume	Flow / Over	flow Flow		Level				
PN	Name	(m)	(m)	(m ³)	Cap. (1/	's) (1/s)	Status	Exceeded				
g1 000	ο Π λ ΝΤΖ	6 905	0 205	0 000	0 22	0 0	GIIDOUNDO	FD				
s1.000	STANK	6.906	0.295	0.000	0.22	1.0	SURCHARG	ED				
	©1982-2017 XP Solutions											