APPENDIX 9.1
FLOOD RISK ASSESSMENT

COTSWOLD TRANSPORT PLANNING

Rosconn Strategic Land

Land South of Radwinter Road (East of Griffin Place), Saffron Walden

Flood Risk Assessment

July 2021

DOCUMENT REGISTER

CLIENT:	**ROSCONN STRATEGIC LAND**
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1 Introduction

Background

1.1 Cotswold Transport Planning has been appointed by Rosconn Strategic Land (herein referred to as "the Applicant") to produce a Flood Risk Assessment (FRA) for an outline residential proposal of up to 233 dwellings on Land South of Radwinter Road (East of Griffin Place), Saffron Walden.

1.2 The purpose of this FRA is to assess the risk of flooding to the proposed development and where possible provide sufficient mitigation to demonstrate that the future users of the development would remain safe throughout its lifetime, that the development would not increase flood risk on site and elsewhere and, where practicable, that the development would reduce flood risk overall.

National & Local Policies

1.3 The National Planning Policy Framework (NPPF)[1] sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Planning Practice Guidance (PPG) is also available online[2].

1.4 The PPG sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

1.5 New applications will require a surface water drainage scheme submitted to accompany all planning applications and will be required to demonstrate the use of SuDS within the design and should be in line with the requirements as set out within PPG.

1.6 The NPPF states that a site-specific Flood Risk Assessment will be required for proposals:

i) that are greater than 1 hectare in area within Flood Zone 1;
ii) for all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3;
iii) in an area within Flood Zone 1 which has critical drainage problems; and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

[1] https://www.gov.uk/government/publications/national-planning-policy-framework--2
[2] https://www.gov.uk/guidance/flood-risk-and-coastal-change

iv) in an area within Flood Zone 1 identified in a Strategic Flood Risk Assessment as being at increased flood risk in the future.

v) in an area in Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

1.7 This FRA aims to provide sufficient flood risk information to satisfy the requirements of the NPPF, PPG and regional/local government plans and policies.

1.8 This assessment considers the risks of all types of flooding to the site including tidal, fluvial, surface, groundwater, sewer and artificial sources and provides mitigation measures to ensure that the flood risk to the site is minimised and that flood risk off-site is not increased.

1.9 This FRA has been based on the following sources of information:

- NPPF
- NPPF-PPG
- Site Layout Plan
- OS Explorer Series mapping
- Site Topographical Survey
- DEFRA Magic mapping
- Environment Agency mapping
- Lead Local Flood Authority Guidance
- Uttlesford Strategic Flood Risk Assessment (May 2016)
- Site visit undertaken by Cotswold Transport Planning
- Web Based Soil Mapping
- British Geological Survey Drift & Geology Maps
- Anglian Water Sewer Records

2 Existing Site and Hydrology Characteristics

Site Location and Composition

2.1 The site is located off Radwinter Road, east of the town of Saffron Walden. The approximate site co-ordinates for the centre of the site are E: 555837; N: 238256, with the nearest post code of CB10 2LB.

2.2 The site is located on land classified as Greenfield, with a current arable farmland use, with an approximate area of 18.3 hectares. The site is accessed off Radwinter Road (B1053) which forms part of the site northern boundary.

2.3 The site is located east of a residential development off Leverett Way, while agricultural, arable fields surround the southern and eastern areas of the site, bordered by hedgerows.

2.4 A minor watercourse flows west through the northern section of the site alongside the existing track present. A small barn is present on the site within the north, located south of the watercourse (see **Appendix A**).

2.5 The site location is shown outlined in red in **Figure 2.1**.

Topography

2.6 A detailed topographic survey was carried out during March 2021, a copy of which is included within **Appendix A**.

2.7 The topographical survey shows ground levels on the site gradually falling to the north west. The highest elevation encountered is 105.17 metres Above Ordnance Datum (mAOD) in the south-eastern corner of the site, and the lowest elevations are around 74.43mAOD in the north-western area of the greenfield element of the site to be built upon, so excluding Radwinter Road.

Ground Conditions

2.8 Geological data held by the British Geological Survey (BGS)[3] shows that the bedrock geology underlying the site is Chalk. Superficial deposits of Lowestoft Formation Diamicton are present within the south east of the site (blue area) as shown on **Figure 2.2**.

[3] http://mapapps.bgs.ac.uk/geologyofbritain/home.html

2.9 The nearest borehole log is immediately north of the site on the opposite side of the carriageway of Radwinter Road to the site, obtained via online BGS maps. The borehole log reference number is TL53NE9. The log identifies the presence of a shallow depth of sandy clay with underlying chalk.

2.10 Soilscapes mapping[4] indicates the underlying soil as freely draining lime-rich loamy soils.

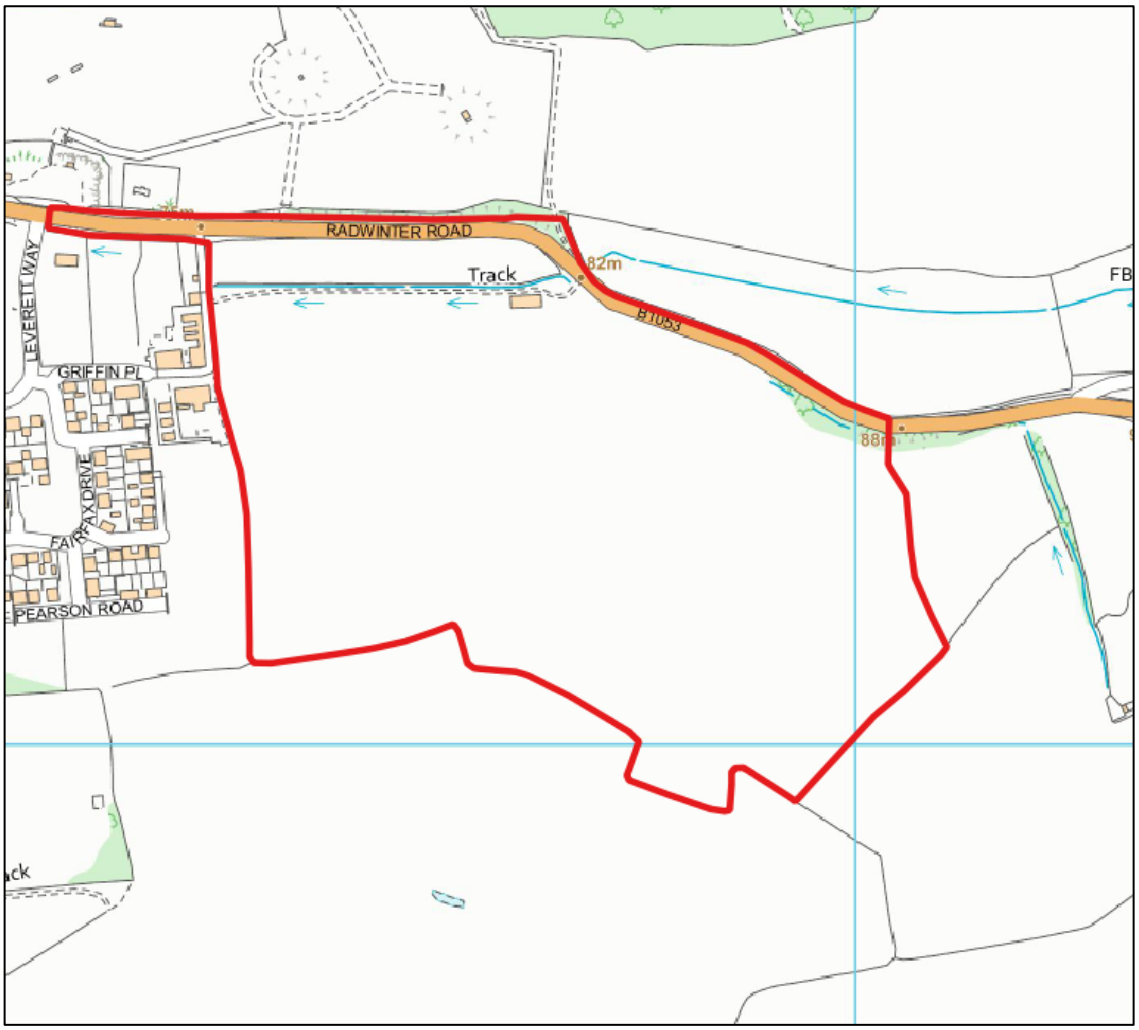


Figure 2.1: Site Location

2.11 Soakaway testing was undertaken during January 2021 by Soils Limited (see **Appendix D**). A total of two soakaway test pits were established and testing was undertaken in accordance with BRE 365 'Soakaway Design' methodology guidance.

[4] http://www.landis.org.uk/soilscapes/

2.12 The test pits were excavated to depths of 2.000 and 3.400 metres below ground level (mbgl). The borehole logs confirm the soils and geology as depicted by the soils and geology mapping.

2.13 Soakaway testing demonstrated low infiltration potential. Groundwater ingress was not encountered, and all sides were stable in both soakaway test pits.

2.14 Department for Environment, Food & Rural Affairs (DEFRA) Magic Service Mapping[5] shows the site is located in a groundwater Source Protection Zone (SPZ). The site is located within the 'Total Catchment' (Zone 3).

2.15 These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. Where infiltration-based SuDS are proposed to manage surface water from a development, then direct discharge into groundwater would not be permissible. Therefore, the elevation of the groundwater table with respect to the base of the soakaway is critical, and there must be an unsaturated zone in the aquifer unit.

[5] https://magic.defra.gov.uk/MagicMap.aspx

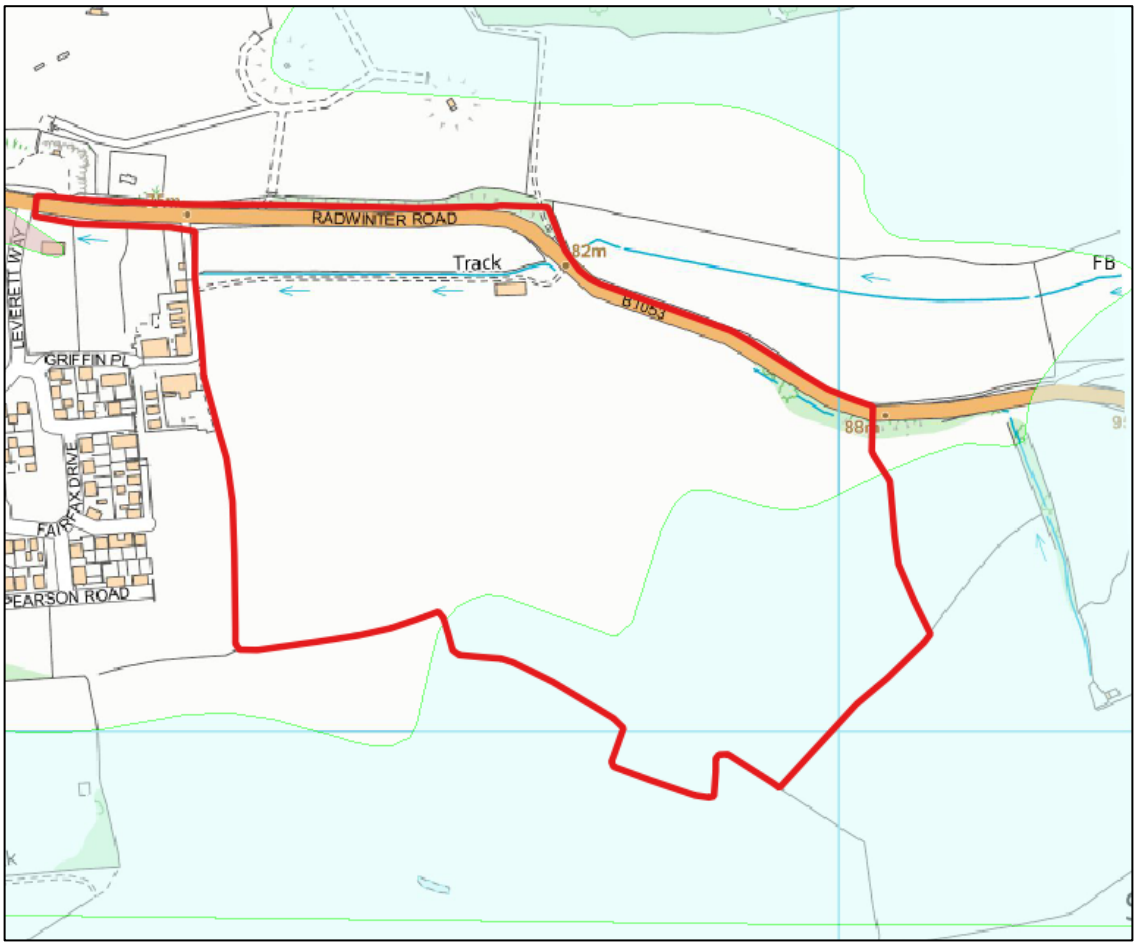


Figure 2.2: Superficial Deposits

Existing Drainage and Hydrology

2.16 The closest section of Environment Agency designated Main River (eastern arm of The Slade) is located 567m west of the site. The Slade flows west through Saffron Walden to its confluence with the River Cam approximately 2 miles west of the site at Home Farm.

2.17 As mentioned in paragraph 2.4 and shown on **Figure 2.2** above, a minor watercourse flows west through the north of the site. This watercourse issues to the north of Seward's End, circa 743m east of the site and flows west through open farmland before crossing Radwinter Road in culvert and then flowing through the site in open channel. The watercourse then enters an access track culvert before flowing west along the southern side of the carriageway of Radwinter Road as shown on OS mapping to the west of the site.

2.18 A further minor watercourse is located 121m to the east of the site, directing flows towards it and then through a narrow area wooded area along the site northern boundary. This watercourse flows into the watercourse crossing the north of the site with the confluence immediately downstream of the Radwinter Road culvert.

2.19 Anglian Water asset maps show there is a Foul sewer, 180mm diameter, running east to west along Radwinter Road and then through the northern area of the site, at manhole references 7301, 7302, 6300 and 5300, respectively. Anglian Water sewer records are contained in **Appendix B**.

2.20 As the site is classified as Greenfield, it will drain via natural infiltration rates.

2.21 The DEFRA Magic Map (England and Wales) shows there are no designated sites (SSSIs) in or close to the site including downstream (from a flood risk and drainage perspective).

3 Proposed Development

Site Proposals

3.1 The proposal seeks outline planning permission for the erection of up to 233 residential dwellings including affordable housing, with public open space, landscaping and sustainable drainage system (SuDS) with vehicular access point from Radwinter Road. All matters reserved except for means of access.

3.2 A copy of the proposed development drawings is included within **Appendix C**.

4 Development Vulnerability and Flood Zone Classification

National Planning Policy Framework (NPPF)

4.1 Local Planning Authorities, (LPA) have a statutory obligation to consult the Environment Agency, (EA) on all applications in flood risk zones. The EA will consider the effects of flood risk in accordance with the NPPF.

4.2 NPPF requires that, as part of the planning process:

- A 'site specific' Flood Risk Assessment will be undertaken for any site that has a flood risk potential.
- Flood risk potential is minimised by applying a 'sequential approach' to locating 'vulnerable' land uses.
- Sustainable drainage systems are used for surface water disposal where practical.
- Flood risk is managed through the use of flood resilient and resistant techniques.
- Residual risk is identified and safely managed.

4.3 Table 1 of NPPF, categorises flood zones into:

- Zone 1- Low probability (< 1 in 1000 years)
- Zone 2- Medium probability (1 in 1000 - 1 in 100 years)
- Zone 3a- High probability (> 1 in 100 years)
- Zone 3b- The functional floodplain (>1 in 20 years)

4.4 The site is located within Flood Zone 1 as shown on the Environment Agency Flood Map for Planning[6] and **Figure 5.1**. This is the area shown to be at low risk of river flooding.

4.5 The proposed development is considered to be 'more vulnerable' in terms of its land use type flood risk vulnerability as shown in Table 2 of the PPG[7].

4.6 The NPPF sets out a matrix indicating the flood risk vulnerability types of development that are acceptable in different flood zones based upon the Flood Map for Planning as shown in **Table 4.1**.

[6] https://flood-map-for-planning.service.gov.uk/
[7] https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	×	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	×	×	×	✓

Table 4.1: Land Use Vulnerability & Flood Zone Compatibility

Sequential and Exception Test

4.7 The development proposals are classed as 'more vulnerable' within Flood Zone 1 and therefore the Exception Test and Sequential Test are not applicable.

5 Site Specific Flooding

National Planning Policy Framework (NPPF)

5.1 In accordance with the National Planning Policy Framework, this Flood Risk Assessment considers all sources of flooding including:

- Fluvial flooding – from rivers and streams;
- Pluvial flooding – overland surface water flow and exceedance;
- Groundwater flooding – from elevated groundwater levels or springs;
- Flooding from sewers – exceedance flows from existing sewer systems; and
- Artificial sources – reservoirs, canals etc.

Historic Flooding

5.2 The Strategic Flood Risk Assessment (SFRA) indicates that Saffron Walden has experienced historical flooding, with sources being mainly fluvial and pluvial from The Slade. Bridge Street has been the location of previous flooding incidences as written in the Saffron Walden Reporter[8].

5.3 Saffron Walden has been identified as a Tier 2 area of local flood risk by the Local Lead Flood Authority (Essex County Council), due to the risk presented by surface water flooding[9].

5.4 Historic records of flooding as reported as far back as 1875 for Saffron Walden, with other flood events occurring in 1917, 1960, 2001 and 2014.

5.5 Flooding from sewers historically has not presented a high risk, with two properties on the sewer flooding register in Saffron Walden.

5.6 The historic flood map available as Open Data from the Environment Agency shows the site is well removed from these historic flood areas.

5.7 Consultation undertaken with Essex County Council for flooding information relevant (see **Appendix E**) identifies there are no records of the site being affected by flooding or a 250m surrounding area.

[8] Flooding issues in Saffron Walden | Saffron Walden Reporter

[9] JBA Consulting (uttlesford.gov.uk)

Fluvial Flooding

5.8 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

5.9 The Environment Agency Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, since these can be breached, overtopped and may not be in existence for the lifetime of a development.

5.10 The site is located within Flood Zone 1 as shown on **Figure 5.1**. This is the area shown to be at low risk of river flooding associated with the River Cam and The Slade.

5.11 Environment Agency online flood mapping shows that the site does not benefit from flood defences. Although the nearby town of Saffron Walden has historically experienced fluvial flooding, the site is not in a location of historic fluvial flooding, and therefore it is assessed to be at a **low** risk of this flooding source.

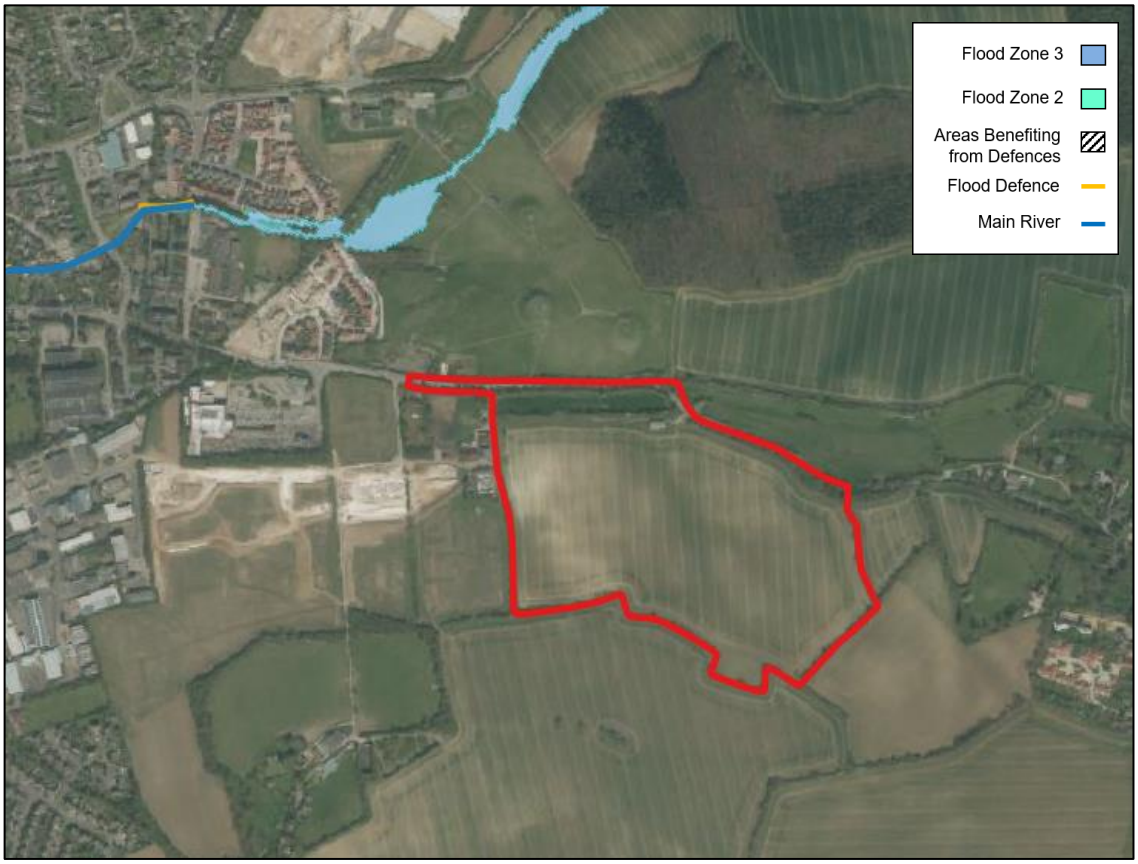


Figure 5.1: Flood Map for Planning

Pluvial Flooding

5.12 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

5.13 Risk of flooding from surface water mapping has been prepared[10], this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.

5.14 The Surface Water (Pluvial) Flood map provided by the Environment Agency (**Figure 5.2**) indicates that the site is predominantly at very low risk of pluvial flooding.

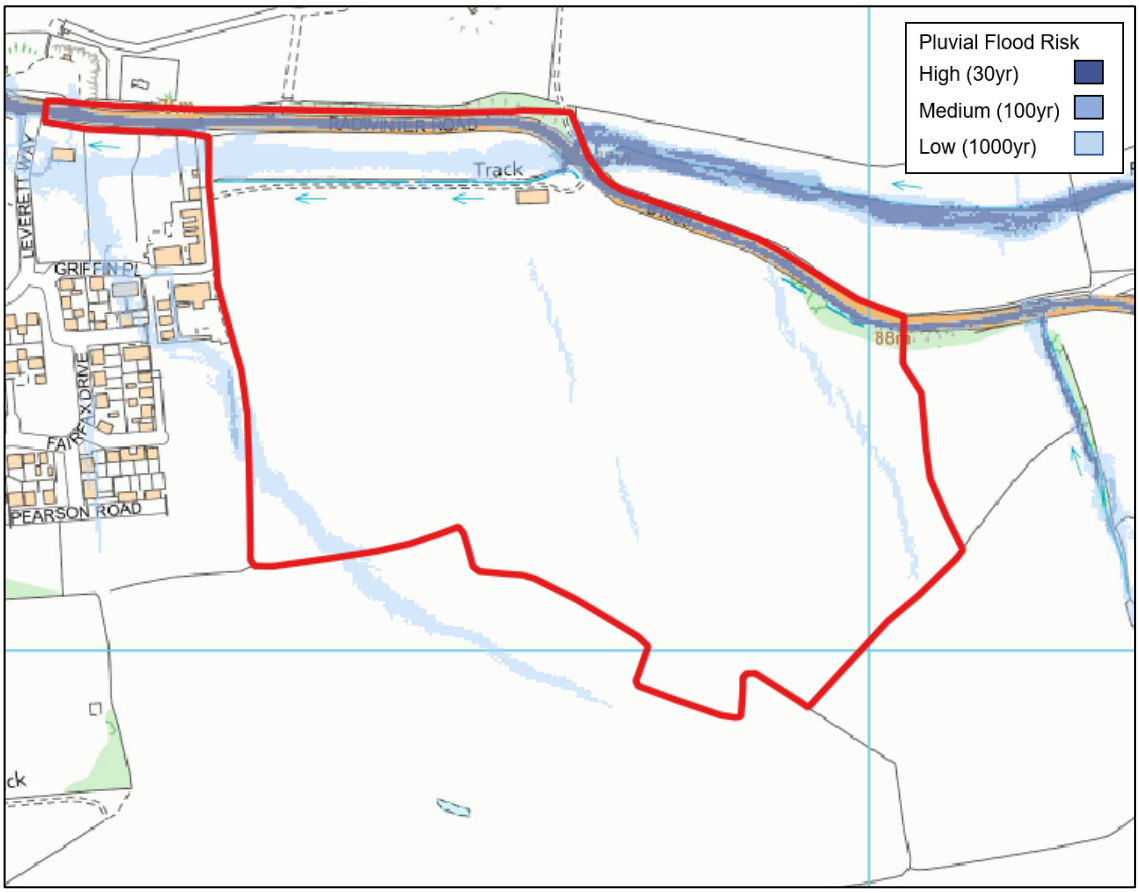


Figure 5.2: Environment Agency Surface Water Flooding Map

5.15 Some areas of potential low risk are shown within the site. Most notably within the north associated with the minor watercourse present.

[10] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

5.16 Overland flow routes (low risk) are present within the south west and east of the site. Shallow depths of flooding (less than 150mm) could occur. To account for this the design of the development at the detailed stage will include for landscaping and road areas to enable the flow paths to remain.

5.17 Radwinter Road is identified to be at high risk of pluvial flooding outside the site. Depths of flooding that could potentially be experienced are identified to be circa 300mm. It appears the mapping accounts for the risk of flooding from the minor watercourse culvert crossing surcharging or overtopping onto the carriageway of the road and being directed west and away from the site. The topographical survey displays ground levels to be higher on the site than the adjacent Radwinter Road, which would encourage overland flows on Radwinter Road to flow away from or be contained by the carriageway as opposed to being directed on to the site.

5.18 The pluvial maps do not fully represent any underground drainage systems and therefore any flooding entering the site from existing roads is likely to be intercepted by road gullies and discharged into the local drainage network.

5.19 Pluvial flood risk for the proposed development is considered to be **low**.

5.20 As detailed in Section 7 of this report, the proposed development will not increase surface water flood risk to adjacent land. This is because a surface water drainage strategy has been designed in accordance with Essex County Council guidance and drainage officer liaison.

5.21 Whilst it is acknowledged the proposals would result in an increase in runoff generated due to the introduction of impermeable and hardstanding surfaces, the requirement to ensure the rate of runoff discharged from the site is to be restricted to the existing greenfield annual rate. To achieve this onsite storage is proposed within four basins (see **Appendix G**). The strategy will provide an improvement to flood risk by intercepting and controlling runoff from annual to high risk magnitude storm events currently allowed to drain to downstream land at an unrestricted rate.

Groundwater Flooding

5.22 Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology. This may be regional scale chalk or sandstone aquifers, or localised deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

5.23 Mapping available from the Department for Environment, Food & Rural Affairs (DEFRA) Magic Mapping Service[11] shows that the site is located in a Principal Bedrock Aquifer, and a Secondary (undifferentiated) Superficial Drift Aquifer.

5.24 A Principal Aquifer consists of layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

5.25 A Secondary Undifferentiated aquifer is assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

5.26 The SFRA contains no reference to groundwater flooding at Saffron Walden or close to the area of the proposed development.

5.27 Despite the chalk bedrock present in view of the lack of flood history, and the elevation of the site in relation to the wider area, the risk of flooding from groundwater at this stage is considered to be **low**.

Flooding from Sewers

5.28 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

5.29 Anglian Water records indicate there is a 180mm diameter foul water sewer located running east to west, on Radwinter Road and through the north of the proposed site, as shown in sewer records within **Appendix B**.

[11] https://magic.defra.gov.uk/MagicMap.aspx

5.30 In Saffron Walden, 2 properties on the Anglian Water Sewer Flooding Register are recorded at risk. The SFRA provides no further detail of previous sewer flooding close to the proposed development and as such it can be assumed this source does not contribute a significant risk.

5.31 The risk of sewer flooding to the site is therefore considered to be **low.**

Flooding from Artificial Sources

Reservoirs

5.32 Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

5.33 To help identify this risk, reservoir failure flood risk mapping has been prepared[12], this shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst case scenario and is only intended as a guide.

5.34 The EA flood mapping indicates reservoir flooding presents no risk to the site.

5.35 The development is considered to be at **negligible** risk of flooding from reservoirs.

[12] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

6 Flood Mitigation Measures

6.1 It is important to demonstrate that future users will not be at risk from flood hazards during the lifetime of the development, as well as ensuring that flood risk is not increased elsewhere.

6.2 This assessment has identified that the site is located within Flood Zone 1, which is land assessed as having a less than 1 in 1000 annual probability of fluvial flooding and at low risk. Flood Zone 1 locations are suitable for residential developments as is proposed.

Finished Floor Levels (FFLs)

6.3 It is recommended that FFLs be set a minimum of 150-300mm above the proposed ground levels to provide protection against flooding from surface water runoff.

Ground Levels

6.4 Ground levels should be profiled to remove hollows/depressions within the site topography and the area of potential risk of pluvial flooding.

6.5 Ground levels should be finished so that existing overland flow routes are preserved, and overland runoff is encouraged to flow away from the proposed new buildings and be directed to the nearest on site drainage system runoff collection point.

Access and Egress

6.6 Safe pedestrian access/egress is available onto Radwinter Road in order to access the wider road/street network to the north of the site. This is due to the Flood Zone 1 designation of the site and surrounding adjacent land.

6.7 It is acknowledged that pluvial flooding could pose a risk, however, the depths that could be encountered during a high risk event are shallow, with a maximum potential depth of 300mm and could be waded through if required.

Groundwater

6.8 The potential for shallow groundwater should also be considered during the construction phase of the development, particularly during the excavations. It is recommended that groundwater levels are monitored during the construction phase, and where groundwater is encountered appropriate dewatering should be employed.

Drainage

6.9 To mitigate the proposed developments impact on the current runoff regime through the increased rate of runoff that would result due to the impermeable areas to be introduced; it is proposed to incorporate surface water attenuation and storage as part of the development proposals as discussed in paragraphs 5.20-5.21. The proposed drainage strategy is further detailed in Section 7.

Consents

6.10 It is recognised that as a new access crossing is proposed, a Land Drainage Consent from the Lead Local Flood Authority is likely to be required through the terms of the Land Drainage Act, 1991 (Section 23) for works affecting the flow of 'ordinary watercourses'. This is an approval process that is separate to obtaining planning approval.

7 Proposed Drainage Strategy

7.1 Consideration of flood issues is not confined to the floodplain. This is recognised in the NPPF and associated guidance. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in a catchment, particularly flooding downstream; and replacing permeable vegetated areas with low permeability roofs, roads and other paved areas will increase the speed, volume and peak flow of surface water runoff.

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

7.3 An assessment of the surface water runoff rates was undertaken to determine the surface water options and attenuation requirements for the site and is discussed below.

Surface Water Management

7.4 Sustainable drainage system measures (SuDS) should be used to control the surface water runoff from the proposed development site, thereby managing the flood risk to the site and surrounding area from surface water runoff. These measures will also improve the quality of water discharged from the site.

7.5 The SuDS hierarchy demands that surface water runoff should be disposed of as high up the following list as practically possible:

- Into the ground (infiltration) and re-use, or then;
- To a surface water body, or then;
- To a surface water sewer, highway drain or another drainage system, or then;
- To a combined sewer.

7.6 The underlying bedrock geology of the site is Chalk. Whilst Chalk is considered to be permeable in nature, infiltration testing conducted on the site confirmed the use of soakaway drainage is not a viable solution for surface water disposal (see **Appendix D**).

7.7 It is therefore proposed to discharge flows of generated surface water runoff into the minor watercourse flowing west, located within the north of the site.

Greenfield Runoff and Required Storage Volumes

7.8 Greenfield rates calculated from MicroDrainage Source Control (see outputs included within **Appendix F**) for the proposed developable area (6.52ha) are as follows:

Return Period (Yrs)	Runoff Rate (l/s)
1	20.8
QBAR	23.9
30	57.5
100	85.1

Table 7.1: Greenfield Runoff Rates

7.9 It is recognised Essex County Council as the LLFA for the area require flow restriction to the 1 in 1 year greenfield rate.

Proposed Drainage

7.10 The introduction of hardstanding associated with the proposed development will introduce a developable area totalling 6.52ha, which will increase the amount of runoff generated and could increase flood risk elsewhere unless managed in accordance with Essex County Council guidance.

7.11 Based on the proposed restriction to the 1 in 1 year runoff rate, an attenuation volume of approximately 2700m^3 is required, calculated on the assumption that 65% of the developable area would become impermeable surfacing with positive drainage. This figure accounts for an assumed 55% impermeable area with 10% to account for future urban creep.

7.12 The primary attenuation and sustainable drainage (SuDs) features proposed comprise of four basins attenuated via final controls and throttle pipes, with a maximum water level of 1.2m. A Hydro-brake control chamber is also proposed to restrict flows out of attenuation basin 4 to 20.8l/s. There are also three SuDS corridors proposed, which will include for swales, two of which, will follow the line of the existing oil pipelines present crossing the site.

7.13 To demonstrate that the necessary storage volumes can be accommodated on the site an illustrative drainage layout has been prepared and has been included as **Appendix G**. Supporting drainage calculations are included in **Appendix F**. Details of the proposed

drainage approach and storage requirements are also summarised within **Appendix H** and the completed technical appendix proforma required to support the planning application.

7.14 The final layout and design of the surface water drainage network will be determined at the detailed design stage as the development masterplan evolves.

Exceedance Events

7.15 The detention basins will be designed with a capacity up to a 1 in 100-year (plus 40% climate change) event, with a +300mm freeboard allowance, based on the 28.8l/s restricted discharge rate. This provides a betterment (reduction) in runoff when compared to existing undeveloped conditions, where runoff is uncontrolled across all return periods.

7.16 A storm event in excess of this design standard would be extreme and would cause the detention basin to overtop (with no sudden deluge) and would then shed overland following the topography of the site, as per existing conditions.

7.17 Finished floor levels of new dwellings will be set above external levels, which will mitigate the residual risk of overtopping.

Water Quality

7.18 It is acknowledged that SuDS can be incorporated into the stormwater strategy to provide water quality measures. It is intended that surface water will be drained via a traditional gravity system and directed to SuDS features. The concept is for surface water to navigate through two or more SuDS features to provide water quality treatment and attenuate.

Foul Water Management

7.19 Foul water from the development shall be collected through a traditional gravity drainage system and directed to a connection with the 180mm diameter foul sewer on Radwinter Road, as confirmed by Anglian Water.

Maintenance Regime

7.20 Maintenance of SuDS features are essential to ensure that the surface water drainage system operates effectively and that flooding of the site and surrounding areas is prevented.

7.21 The responsibility of maintaining the private surface water and foul water drainage components would lie with the landowner of the site, who may delegate responsibility to an appointed external private management company.

7.22 For all drainage aspects a full maintenance regime should be carried out (see **Table 7.2**) to ensure that drainage systems remain operational in accordance with manufacturer's guidelines and drainage features maintenance requirements as set out in the SuDS Manual (C753).

Drainage Component	Required Action	Typical Frequency
Pipework, manholes, flow control chambers, catch pits and silt traps	Stabilise adjacent areas	As required
	Remove weeds	As required
	Clear any poor performing structures.	As required
	Inspect all structures for poor operation	Three monthly, 48 hours after large storms in first six months
	Monitor inspection chambers. Inspect silt accumulation rates and determine silt clearance frequencies	Annually
Attenuation Tank	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
	Inspect inlets, outlets, banksides, structures, Repair/rehabilitate inlets, outlet, overflows and vents	As Required
	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.

Table 7.2: Initial Operation and Maintenance Plan

8 Summary and Conclusion

8.1 Cotswold Transport Planning were appointed by Rosconn Strategic Land to produce a Flood Risk Assessment (FRA) for an outline residential proposal of up to 233 dwellings on Land South of Radwinter Road (East of Griffin Place), Saffron Walden.

8.2 This assessment has considered the risks of all types of flooding to the site including tidal, fluvial, surface, groundwater, sewer and artificial sources and provides mitigation measures to ensure that the flood risk to the site is minimised and that flood risk off-site is not increased.

8.3 The proposed development is classified as 'more vulnerable' and is located within a site identified to be within Flood Zone 1 and therefore does not require application of the Sequential or Exception Tests.

8.4 The site is considered to be at low risk of flooding from fluvial, pluvial, groundwater and sewer sources.

8.5 The site is considered to be at negligible risk of flooding from artificial sources.

8.6 Safe pedestrian access and egress is available onto Radwinter Road in order to access the wider road/street network to the north of the site and land outside the floodplain.

8.7 Surface water runoff generated by the proposal will be stored on site using attenuation basins and SuDS corridors, before discharging into the existing watercourse via a Hydro-brake control chamber to the west of the site. This formalised approach to controlling runoff will assist in reducing downstream flood risk.

8.8 Foul drainage is proposed to connect into the existing public foul sewer on Radwinter Road, confirmed by Anglian Water.

8.9 In compliance with the requirements of the National Planning Policy Framework, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk.

Appendix A

Topographical Survey

Survey Key: –

BO	Bollard
BB	Bellisha Beacon
BT	BT Cover
CB	Telephone Control Box
CH	Coal Hole
CO	Unidentified Cover
Conc	Concrete
EP	Electricity Pole
FH	Fire Hydrant
FT	Face Profile Target
FW	Foul Water Drain Cover
GU	Drainage Gully Cover
GV	Gas Valve
Gas	Gas Cover
IC	Inspection Chamber Cover
LB	Letter Box
LP	Lamp Post
MC	Metal Drainage Channel
MH	Manhole Cover (round)
MP	Marker Post
Rwp	Rain Water Pipe
SV	Water Stop Valve
SW	Storm Water Drain Cover
TCB	Telephone Call Box
TL	Traffic Light
TP	Telegraph Pole
TV	Cable TV Cover
WM	Water Meter Cover

STN 57.08	Survey Control Station
TP 154.87	Trial Pit
BH 154.87	Borehole
WL 154.87 21/01/10.	Water Level (with date measured)
154.87	Spot Level
154.87	Tree (spread to scale)

Linetypes

	Fenceline
	Electricity Transmission Line
	Hedge
	Rock Face
	Embankment Slope
10.00	Contour Lines
	Gas Pipeline
	Water Pipeline

Building Internals – Specific Codes

Ceil 154.87	Structural Ceiling Level
F-Ce 154.87	False / Suspended Ceiling Level
154.87	Floor Level
usb 154.87	Underside of Beam / Openings Level

Some of these symbols may not appear on this drawing

Notes :–

Survey is tied to Ordnance Survey grid and level by GPS Smartnet

Contours are shown at 0.5m intervals and highlighted at 2m intervals

BeaconLandSurveys
The Lodge
Greenhough Road
Lichfield
Staffs. WS13 7AU
Tel : 01543 417399
Mob: 07764 585084
email :–
office@beacon-lichfield.co.uk

Project:
Land off Radwinter Road
Saffron Waldon,
Essex.

Drawing:
Land Detail & Level Survey

Scales: 1:1000	Drawn/Sheet Size: mjs/A1
Date: March 2021	Drawing No: 20–103–21–02

Appendix B

Anglian Water Sewer Records

(c) Crown copyright and database rights 2020 Ordnance Survey 100022432 | Date: 14/11/20 | Scale: 1:1250 | Map Centre: 555481,238307 | Data updated: 31/10/20 | Our Ref: 459393 - 1 | Wastewater Plan A0

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

kris@cotswoldtp.co.uk
CTP-20-1142

love every drop
anglianwater

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0200	556052	238263	F	90.28	87.89	2.39
0401	555022	238473	F	67.26	65.4	1.86
0402	555088	238455	F	67.93	65.959	1.971
0403	555090	238449	F	69.21	66.1	3.11
0404	555039	238415	F	72.58	69.32	3.26
0405	555097	238453	F	67.93	66.99	0.94
0500	555027	238559	F	-	-	-
0501	555007	238525	F	-	-	-
0502	555031	238546	F	-	-	-
0600	555086	238690	F	-	-	-
0601	555065	238696	F	-	-	-
0602	555018	238693	F	-	-	-
0603	555031	238613	F	-	-	-
0700	555001	238714	F	-	-	-
0701	555001	238744	F	-	-	-
0702	555005	238756	F	-	-	-
0703	555006	238765	F	-	-	-
0704	555093	238737	F	-	-	-
0705	555068	238743	F	-	-	-
0706	555045	238748	F	-	-	-
1200	556176	238270	F	92.77	90.861	1.909
1201	556169	238284	F	93	89.361	3.639
1400	555130	238442	F	69.47	66.804	2.666
1401	555169	238479	F	-	-	-
1402	555177	238496	F	-	-	-
1403	555167	238442	F	-	-	-
1500	555194	238508	F	-	-	-
1600	555104	238689	F	-	-	-
1601	555102	238684	F	-	-	-
1602	555175	238664	F	-	-	-
1603	555155	238663	F	-	-	-
1604	555142	238666	F	-	-	-
1700	555108	238787	F	-	-	-
1701	555125	238787	F	-	-	-
1702	555165	238785	F	-	-	-
1703	555177	238785	F	-	-	-
1704	555195	238714	F	-	-	-
1705	555186	238708	F	-	-	-
1706	555153	238711	F	-	-	-
1707	555133	238721	F	-	-	-
1708	555120	238727	F	-	-	-
1709	555111	238710	F	-	-	-
2400	555248	238418	F	71.2	68.563	2.637
2401	555229	238441	F	69.99	67.82	2.17
2402	555268	238497	F	-	-	-
2500	555223	238518	F	-	-	-
2501	555227	238532	F	-	-	-
2502	555246	238556	F	-	-	-
2503	555230	238572	F	-	-	-
2504	555253	238563	F	-	-	-
2505	555260	238575	F	-	-	-
2506	555235	238507	F	-	-	-
2507	555253	238507	F	-	-	-
2600	555238	238659	F	-	-	-
2601	555221	238656	F	-	-	-
2602	555206	238657	F	-	-	-
3400	555330	238412	F	71.86	69.5	2.36
3401	555305	238496	F	-	-	-
4400	555483	238403	F	75.2	72.413	2.787
5300	555503	238356	F	77.15	73.038	4.112
6300	555601	238356	F	78.16	73.705	4.455
7002	554764	238095	F	78.07	74.79	3.28
7101	554753	238121	F	78.3	75.29	3.01
7102	554768	238126	F	79.6	78.17	1.43
7300	555794	238377	F	82.14	78.944	3.196
7301	555776	238357	F	81.75	77.044	4.706
7302	555701	238356	F	79.82	75.372	4.448
7502	554788	238515	F	63.24	60.83	2.41
7503	554777	238515	F	63.25	60.96	2.29
7504	554774	238550	F	-	61.14	-
7505	554770	238589	F	-	61.43	-
7506	554752	238519	F	-	-	-
7507	554750	238533	F	-	-	-
7603	554781	238604	F	-	61.55	-
7604	554782	238619	F	-	61.64	-
7605	554797	238640	F	-	61.81	-
7606	554762	238665	F	-	63.65	-
7607	554770	238676	F	-	64.02	-
7608	554766	238691	F	-	65.23	-
7703	554755	238780	F	72.66	70.68	1.98
7704	554758	238753	F	70.55	68.76	1.79
7801	554781	237853	F	77.48	75.97	1.51
7802	554776	237857	F	77.24	75.75	1.49
7803	554798	237864	F	79.32	77.94	1.38
7804	554773	237860	F	76.72	75.42	1.3
7810	554760	237859	F	-	-	0.92
7811	554752	237850	F	-	-	1.045
8101	554841	238108	F	83.99	82.28	1.71
8102	554839	238156	F	82.48	79.98	2.5
8103	554833	238175	F	81.31	80.21	1.1
8201	554862	238255	F	76.6	74.12	2.48
8202	554832	238242	F	77.21	74.65	2.56
8203	554894	238270	F	76.17	73.51	2.66
8204	554815	238290	F	74.49	72.84	1.65
8205	554807	238287	F	74.59	72.98	1.61
8301	554883	238321	F	73.61	71.61	2
8302	554853	238318	F	73.84	72.11	1.73
8303	554812	238304	F	74.28	72.74	1.54
8304	554869	238325	F	73.59	71.84	1.75
8501	554879	238516	F	64.93	61.22	3.71
8600	554829	238617	F	-	62.07	-
8601	554849	238630	F	-	62.22	-
8602	554868	238635	F	-	62.32	-
8603	554800	238658	F	-	-	-
8604	554821	238672	F	-	62.8	-
8605	554818	238637	F	-	-	-
8701	554838	238772	F	-	-	-
8702	554813	238700	F	-	64.85	-
8802	554868	237891	F	84.3	83.09	1.21
8803	554854	237883	F	83.22	82.24	0.98
8901	554880	237907	F	85.89	84.63	1.26
9300	555934	238313	F	85.5	83.49	2.01
9301	554947	238358	F	73.16	70.78	2.38
9302	554996	238389	F	72.83	70	2.83
9303	554939	238394	F	-	-	-
9401	554973	238494	F	66.36	61.59	4.77
9402	554978	238491	F	66.43	-	-
9403	554927	238478	F	-	-	-
9404	554929	238472	F	-	-	-
9405	554964	238434	F	-	-	-
9406	554938	238434	F	-	-	-
9407	554984	238434	F	-	-	-
9408	554936	238460	F	-	-	-
9409	554930	238498	F	-	-	-
9500	554931	238504	F	-	-	-
9501	554959	238578	F	-	-	-
9502	554959	238565	F	-	-	-
9503	554971	238506	F	-	-	-
9504	554978	238526	F	-	-	-
9600	554990	238690	F	-	-	-
9601	554999	238689	F	-	-	-
9602	554926	238648	F	-	-	-
9603	554957	238649	F	-	-	-
9604	554958	238619	F	-	-	-
9901	554909	237904	F	88.01	86.75	1.26
0351	555021	238388	S	73.371	71.371	2
0352	555021	238385	S	73.371	71.379	1.992
0451	555084	238418	S	74.121	70.276	3.845
0452	555035	238418	S	72.371	71.096	1.275
0453	555021	238407	S	73.09	71.39	1.7
0454	555018	238411	S	-	-	-
0650	555090	238686	S	-	-	-
0651	555064	238693	S	-	-	-
0652	555016	238695	S	-	-	-
0653	555002	238695	S	-	-	-
0750	555004	238769	S	-	-	-
0751	555003	238754	S	-	-	-
0752	555039	238747	S	-	-	-
0753	555070	238742	S	-	-	-
0755	555044	238772	S	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0756	555040	238751	S	-	-	-
0757	555090	238736	S	-	-	-
0758	555091	238740	S	-	-	-
0759	555003	238739	S	-	-	-
0760	555002	238706	S	-	-	-
1351	555106	238397	S	73.4	70.89	2.51
1451	555130	238419	S	74.121	70.276	3.845
1452	555189	238422	S	72.566	69.709	2.857
1453	555175	238497	S	-	-	-
1454	555167	238481	S	-	-	-
1455	555166	238463	S	-	-	-
1550	555196	238512	S	-	-	-
1650	555177	238661	S	-	-	-
1651	555158	238661	S	-	-	-
1652	555138	238665	S	-	-	-
1653	555101	238687	S	-	-	-
1750	555194	238727	S	-	-	-
1751	555179	238707	S	-	-	-
1752	555151	238710	S	-	-	-
1753	555129	238721	S	-	-	-
1754	555138	238777	S	-	-	-
1755	555139	238741	S	-	-	-
1756	555136	238735	S	-	-	-
1757	555116	238723	S	-	-	-
1758	555110	238713	S	-	-	-
1759	555101	238773	S	-	-	-
1760	555111	238730	S	-	-	-
1761	555167	238788	S	-	-	-
1762	555117	238786	S	-	-	-
1763	555116	238777	S	-	-	-
1764	555105	238743	S	-	-	-
1765	555107	238789	S	-	-	-
1766	555121	238725	S	-	-	-
2451	555212	238423	S	71.021	69.492	1.529
2452	555239	238407	S	-	-	-
2453	555246	238434	S	70.571	69.197	1.374
2550	555234	238513	S	-	-	-
2551	555234	238538	S	-	-	-
2552	555246	238553	S	-	-	-
2553	555256	238563	S	-	-	-
2554	555214	238583	S	-	-	-
2650	555233	238683	S	-	-	-
2651	555234	238672	S	-	-	-
2652	555219	238658	S	-	-	-
2653	555204	238655	S	-	-	-
2750	555217	238706	S	-	-	-
7051	554768	238095	S	78.19	77.24	0.95
7052	554772	238086	S	78.26	73.71	4.55
7152	554790	238165	S	80.59	78.51	2.08
7251	554794	238218	S	77.78	76.17	1.61
7654	554784	238625	S	-	-	-
7655	554764	238666	S	-	63.65	-
7656	554772	238677	S	-	63.95	-
7657	554768	238693	S	-	65.15	-
7658	554798	238655	S	-	62.15	-
7659	554796	238644	S	-	62.09	-
8051	554844	238093	S	84	82.38	1.62
8052	554822	238091	S	82.2	80.97	1.23
8053	554829	238061	S	82.67	81.35	1.32
8054	554822	238064	S	-	-	-
8151	554836	238137	S	82.94	82.13	0.81
8152	554808	238169	S	80.66	78.85	1.81
8153	554829	238179	S	81.06	79.45	1.61
8154	554805	238140	S	80.62	78.39	2.23
8251	554873	238256	S	76.57	75.29	1.28
8252	554895	238265	S	76.23	75.05	1.18
8253	554844	238244	S	76.8	75.64	1.16
8254	554813	238299	S	74.29	72.88	1.41
8255	554814	238288	S	74.44	73.11	1.33
8351	554881	238322	S	73.62	72.39	1.23
8352	554871	238322	S	73.65	72.53	1.12
8353	554848	238315	S	74.08	72.62	1.46
8354	554829	238306	S	74.21	72.79	1.42
8651	554830	238619	S	-	61.65	-
8652	554807	238666	S	-	62.5	-
8653	554817	238674	S	-	62.6	-
8751	554810	238703	S	-	64.8	-
9351	554995	238387	S	72.885	71.585	1.3
9352	554937	238392	S	-	-	-
9451	554926	238473	S	-	-	-
9452	554933	238462	S	-	-	-
9453	554983	238435	S	-	-	-
9454	554926	238494	S	-	-	-
9455	554934	238456	S	-	-	-
9456	554935	238435	S	-	-	-
9457	554966	238435	S	-	-	-
9458	554984	238424	S	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix C

Proposed Development Plans

DEFINE

Radwinter Road

Views to St Mary's Church

Views to Plumtree Wood

Viewing Point

LEGEND

- Site Boundary
- 2M Contours
- Public Open Space
- Wetland
- Parkland
- Semi-natural Green Corridor
- SuDS
- Neighbourhood Greens
- Urban Square
- Green Links
- Trees along Green Links / Church Corridor Framing Neighbourhood Greens
- Existing Trees / Woodland / Hedgerows
- Proposed Trees / Woodland / Hedgerows
- Street Trees
- Residential
- Development Blocks
- Proposed Pedestrian/Cycle Links
- Existing Public Footpath
- Primary Vehicular Route
- Vehicular Site Access Point
- Retained Agricultural Access
- Agricultural Track
- Play
- Viewing Point

SCALE 1:2,000

0m 10 20 30 50 100

N

M	Rev
DE_436-005	Drg No
Rosconn Ltd	Client
Saffron Walden	Project
Illustrative Masterplan	Title
1:2,000@A2	Scale

Appendix D

Soakaway Testing Results

Soakaway Calculations

Soakaway Test No.	INF 01
Contract:	Saffron Waldon
Contract No.	18948

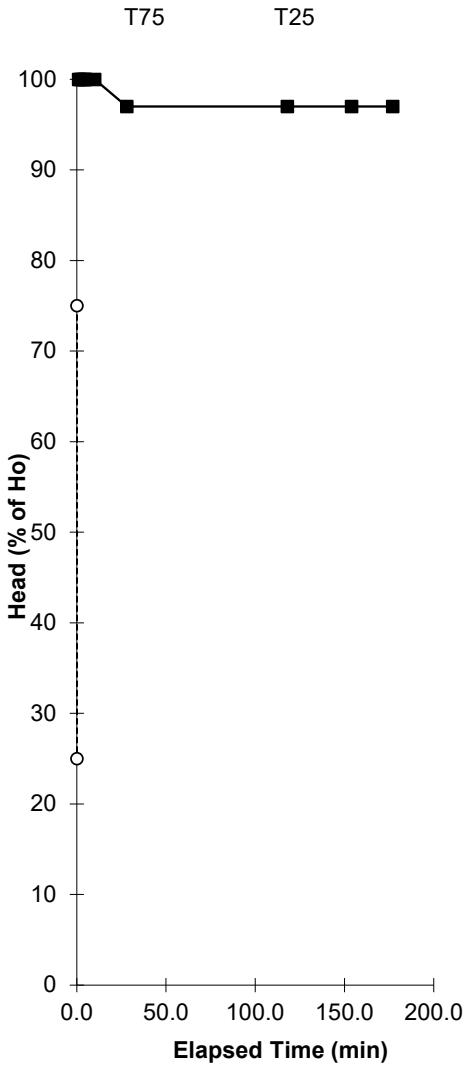
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	2.00	m
Width of Pit	0.60	m
Length of Pit	2.50	m
Depth of Pit Soaked	0.80	m
ap50	3.98	m2
Vp75-25	0.6	m3
t75-25	0.0	min
water used	1.2000	m3
f	#DIV/0!	m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
1.00	0	100	1
1.00	1.0	100	1.00
1.00	2.0	100	1.00
1.00	3.0	100	1.00
1.00	4.0	100	1.00
1.00	5.0	100	1.00
1.00	10.0	100	1.00
1.03	28.0	97	0.97
1.03	118.0	97	0.97
1.03	154.0	97	0.97
1.03	177.0	97	0.97



T75	0.000	75
T25	0.000	25
T75-25	0.000	Derived from Best Fit

Comments

Extrapolated past 120mins

SOILS LIMITED
Newton House, Cross Road, Tadworth
Surrey, KT20 5SR
Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	Groundwater Pit
Contract:	Saffron Waldon
Contract No.	18948

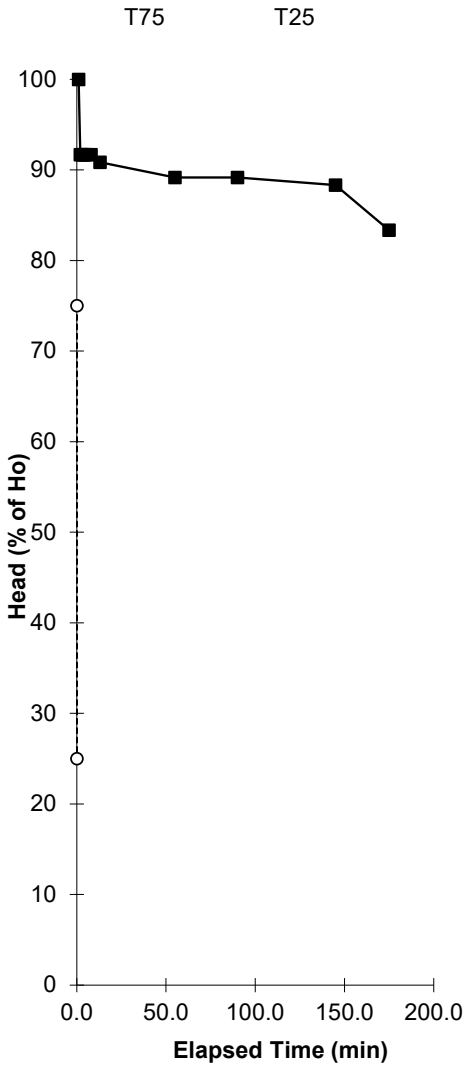
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	3.40	m
Width of Pit	0.60	m
Length of Pit	2.60	m
Depth of Pit Soaked	0.80	m
ap50	4.12	m2
Vp75-25	0.624	m3
t75-25	0.0	min
water used	1.2480	m3
f	#DIV/0!	m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
2.20	0	100	1.2
2.20	1.0	100	1.20
2.30	2.0	92	1.10
2.30	3.0	92	1.10
2.30	4.0	92	1.10
2.30	5.0	92	1.10
2.30	8.0	92	1.10
2.31	13.0	91	1.09
2.33	55.0	89	1.07
2.33	90.0	89	1.07
2.34	145.0	88	1.06
2.4	175.0	83	1.00



T75	0.000	75
T25	0.000	25
T75-25	0.000	Derived from Best Fit

Comments

Extrapolated past 120mins

SOILS LIMITED
Newton House, Cross Road, Tadworth
Surrey, KT20 5SR
Telephone: 01737 814 221
Facsimile: 01737 812 557

Soils Limited
Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Trial Pit Log

Trial Pit No. **Groundwater**
Sheet 1 of 1

Project Name: Saffron Waldon	Project No.: 18948	Method:	Hole Type: TP
Location: Saffron Waldon		Plant: 5 Ton Swingshovel	Scale: 1:25
Client: c/o Cotswold Tranport and Planning	Trial Pit Length: 2.60m	Support: Trial Pit Width: 0.60m	Logged By: KC
Dates: 18/01/2021	Level:	Co-ords:	

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (mAOD)	Legend	Stratum Description
	0.25	D		0.20			Brown slightly sandy SILT with frequent rootlets. (Topsoil)
	0.50	D		0.60			Firm brown slightly andy slightly gravelly CLAY. Sand is fine to medium. Gravel is subrounded to round, medium of various lithologies. (Head)
	1.00	D					Firm brown slightly sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse, subrounded of flint. (Head)
	1.50	D					
	2.00	D		2.20			Dense CHALK with fine to coarse, sub-angular to sub-rounded GRAVEL of flint.
	3.00	D		3.40			End of Pit at 3.400m

1 2 3 4 5

General Remarks:
Groundwater not encountered. All sides stable.

Groundwater Remarks:

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

Soils Limited
Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Trial Pit Log

Trial Pit No.
INF01
Sheet 1 of 1

Project Name: Saffron Waldon	Project No.: 18948	Method:	Hole Type: TP
Location: Saffron Waldon		Plant: 5 Tone Swingshovel	Scale: 1:25
Client: c/o Cotswold Tranport and Planning	Trial Pit Length: 2.50m	Trial Pit Width: 0.60m	Logged By: JO
Dates: 18/01/2021	Level:	Co-ords:	

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (mAOD)	Legend	Stratum Description
				0.20			Brown slightly sandy SILT with frequent rootlets. (Topsoil)
	0.25	D		0.20			Firm brown slightly andy slightly gravelly CLAY. Sand is fine to medium. Gravel is subrounded to round, medium of various lithologies. (Head)
	0.50	D					Firm brown slightly sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse, subrounded of flint. (Head)
	1.00	D					
	1.50	D					
	2.00	D		2.00			End of Pit at 2.000m

1
2
3
4
5

General Remarks:
Groundwater not encountered. All sides stable.

Groundwater Remarks:

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

Appendix E

Essex County Council Flooding Information

Essex County Council
Environment and Planning
Flood and Water Management Team
E3 County Hall
Chelmsford
CM1 1QH

Ben Fleming

Date: 30/04/2021

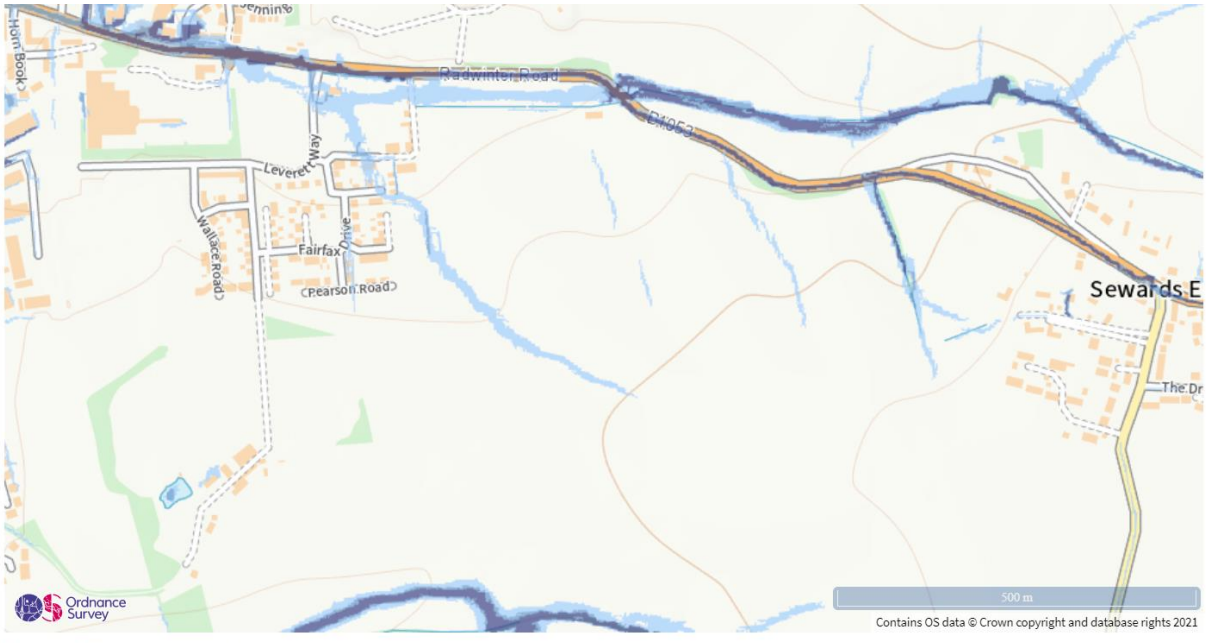
Dear Mr Fleming,

Basic information request for data held by LLFA - Land south of Radwinter Road Saffron Walden CB10 2LB

Thank you for contacting us for information held on the above site. I have checked our records for reported surface water flooding in the area you have provided on your plans.

The majority of the site in question is shown to be at a very low risk of surface water flooding with small areas of low risk around the ordinary watercourse within you site, according to the gov.uk 'flood risk from Surface Water' map. Further information can be found on the Gov.uk website: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map.

Figure 1: Flood risk from surface water – Land south of Radwinter Road Saffron Walden CB10 2LB



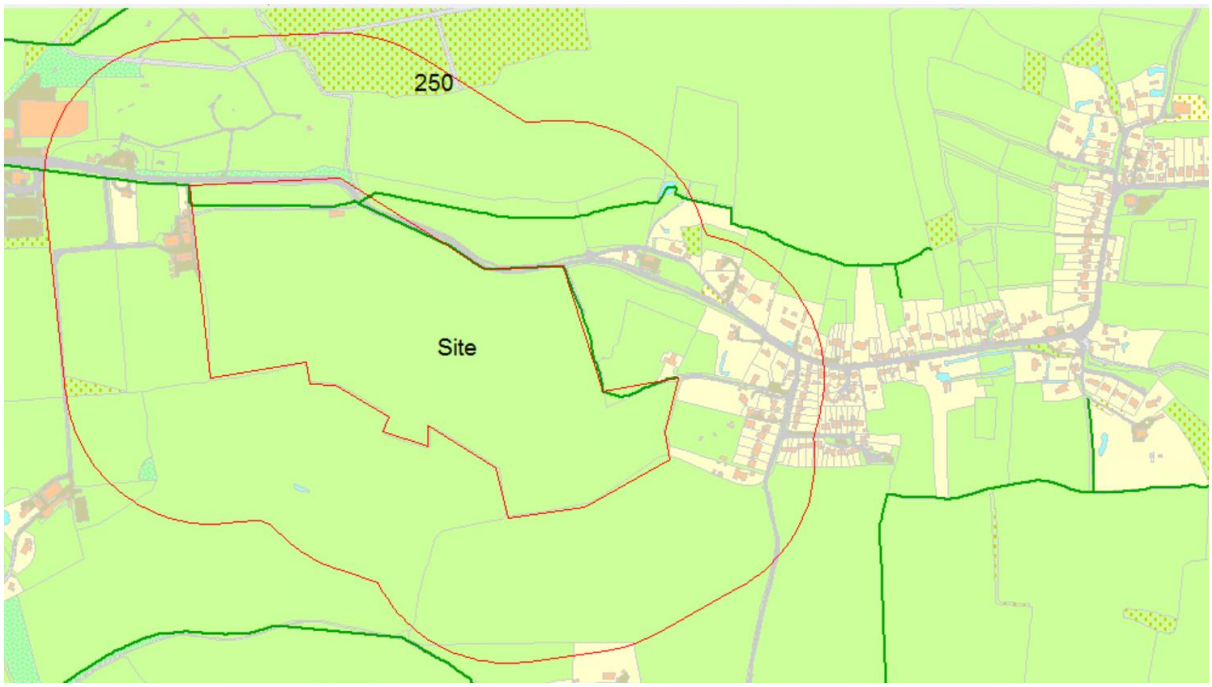
Surface Water Management Plans

The Surface Water Management Plan (SWMP) produces more detailed modelling and identifies Critical Drainage Area's (CDA); highlighting areas most at risk. Essex County Council has not yet completed a SWMP including your site.

Watercourses and rivers

Analysis has been completed using all of our data sets to a distance of 250m from the aforementioned site and within the site boundaries itself, as detailed in Figure 2 below.

Figure 2: Site plan including 250m 'buffer zone'



0 metre 450

The search has confirmed that there are two ordinary watercourses within your site as shown in figure 2 with the green line. It is situated along the northern boundary of your site and runs west to east. For any information on main rivers you should contact the environment agency on the email below: enquiries@environment-agency.gov.uk

It should be noted that smaller watercourses are not always mapped, therefore site investigation should be carried out to verify information supplied.

If proposed works entail temporary or permanent alterations to a watercourse, consent will be required. Essex County Council does offer a pre-application advice facility whereby one of our engineers will review your proposed works and offer engineering advice should it be required. Further information can be found on our website using the following link:

http://flood.essex.gov.uk/change-a-watercourse/apply-for-a-watercourse-consent/

Flood risk assets

Our database has confirmed that there are no flood assets within your site and the 250m buffer zone. As with smaller watercourses, not all flood risk assets will be mapped so further investigation is advised.

Flood Incidents and Investigations

Our database has confirmed that there are no records of any flood incidents within your site and the 250m buffer zone.

In respect of Sustainable Drainage, we have not received any sustainable drainage consultations within your site or the 250m buffer zone. For further drainage and discharge information, please visit https://flood.essex.gov.uk/new-development-advice/apply-for-suds-advice/.

- We have no records of any historic flooding in this area.
- For information regarding sewers and groundwater, please contact the Environment Agency.

I would note however that we only have a limited number of records as we have only been a Lead Local Flood Authority since 2010. Whilst we are working to build a comprehensive database of flood incidents, unlike main rivers we have no formal system of monitoring water levels and being aware when flooding occurs. We rely on reports from residents and in particular district councils to report flood incidents to us. As such all we can provide is an indication of the flood history that we have available to us, if we have no recorded incidents then it does not necessarily mean that flooding has never occurred there, merely that it has not been reported to us.

I hope that the above assists you with your enquiry.

Yours sincerely,

Amanda Rossell
Essex County Council
Flood and Water Management Team

Please reply to: Flood & Water Management Team
Email: floods@essex.gov.uk
Internet: www.essex.gov.uk/flooding

Appendix F

Drainage Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 600 Urban 0.000
Area (ha) 6.520 Soil 0.450 Region Number Region 5

Results l/s

QBAR Rural 23.9
QBAR Urban 23.9

Q100 years 85.1

Q1 year 20.8
Q30 years 57.5
Q100 years 85.1

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	78.430	0.430	20.8	1103.5	O K
30 min Summer	78.547	0.547	20.8	1420.9	O K
60 min Summer	78.658	0.658	20.8	1729.2	O K
120 min Summer	78.757	0.757	20.8	2009.8	Flood Risk
180 min Summer	78.805	0.805	20.8	2147.4	Flood Risk
240 min Summer	78.832	0.832	20.8	2224.8	Flood Risk
360 min Summer	78.857	0.857	20.8	2297.8	Flood Risk
480 min Summer	78.866	0.866	20.8	2325.2	Flood Risk
600 min Summer	78.866	0.866	20.8	2324.4	Flood Risk
720 min Summer	78.859	0.859	20.8	2306.1	Flood Risk
960 min Summer	78.837	0.837	20.8	2239.8	Flood Risk
1440 min Summer	78.790	0.790	20.8	2105.2	Flood Risk
2160 min Summer	78.727	0.727	20.8	1923.5	Flood Risk
2880 min Summer	78.664	0.664	20.8	1746.5	O K
4320 min Summer	78.547	0.547	20.8	1420.9	O K
5760 min Summer	78.447	0.447	20.8	1149.3	O K
7200 min Summer	78.361	0.361	20.8	918.3	O K
8640 min Summer	78.288	0.288	20.8	726.8	O K
10080 min Summer	78.230	0.230	20.8	576.3	O K
15 min Winter	78.481	0.481	20.8	1239.5	O K
30 min Winter	78.611	0.611	20.8	1597.2	O K
60 min Winter	78.735	0.735	20.8	1946.1	Flood Risk
120 min Winter	78.846	0.846	20.8	2266.9	Flood Risk
180 min Winter	78.901	0.901	20.8	2427.8	Flood Risk
240 min Winter	78.933	0.933	20.8	2521.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	142.716	0.0	1132.8	30
30 min Summer	92.222	0.0	1464.3	45
60 min Summer	56.713	0.0	1801.4	74
120 min Summer	33.722	0.0	2141.8	132
180 min Summer	24.576	0.0	2341.8	192
240 min Summer	19.534	0.0	2482.4	250
360 min Summer	14.061	0.0	2680.5	368
480 min Summer	11.142	0.0	2832.0	486
600 min Summer	9.297	0.0	2953.6	604
720 min Summer	8.015	0.0	3055.9	722
960 min Summer	6.338	0.0	3164.9	922
1440 min Summer	4.546	0.0	3118.1	1146
2160 min Summer	3.257	0.0	3726.2	1540
2880 min Summer	2.568	0.0	3916.6	1944
4320 min Summer	1.836	0.0	4200.1	2724
5760 min Summer	1.445	0.0	4409.1	3464
7200 min Summer	1.200	0.0	4576.1	4184
8640 min Summer	1.031	0.0	4717.3	4856
10080 min Summer	0.906	0.0	4837.6	5552
15 min Winter	142.716	0.0	1268.8	30
30 min Winter	92.222	0.0	1616.7	44
60 min Winter	56.713	0.0	2017.9	74
120 min Winter	33.722	0.0	2399.9	130
180 min Winter	24.576	0.0	2623.2	188
240 min Winter	19.534	0.0	2780.0	246

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
360 min Winter	78.965	0.965	20.8	2616.6	Flood Risk
480 min Winter	78.979	0.979	20.8	2660.5	Flood Risk
600 min Winter	78.983	0.983	20.8	2671.9	Flood Risk
720 min Winter	78.980	0.980	20.8	2663.4	Flood Risk
960 min Winter	78.963	0.963	20.8	2611.0	Flood Risk
1440 min Winter	78.906	0.906	20.8	2443.6	Flood Risk
2160 min Winter	78.830	0.830	20.8	2219.0	Flood Risk
2880 min Winter	78.751	0.751	20.8	1992.0	Flood Risk
4320 min Winter	78.577	0.577	20.8	1504.3	O K
5760 min Winter	78.425	0.425	20.8	1089.5	O K
7200 min Winter	78.299	0.299	20.8	757.1	O K
8640 min Winter	78.204	0.204	20.7	511.7	O K
10080 min Winter	78.139	0.139	20.2	346.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
360 min Winter	14.061	0.0	3002.1	362
480 min Winter	11.142	0.0	3171.8	476
600 min Winter	9.297	0.0	3254.3	590
720 min Winter	8.015	0.0	3291.7	704
960 min Winter	6.338	0.0	3277.0	924
1440 min Winter	4.546	0.0	3161.8	1296
2160 min Winter	3.257	0.0	4172.1	1644
2880 min Winter	2.568	0.0	4387.2	2112
4320 min Winter	1.836	0.0	4704.5	2948
5760 min Winter	1.445	0.0	4939.2	3696
7200 min Winter	1.200	0.0	5127.0	4400
8640 min Winter	1.031	0.0	5282.9	5016
10080 min Winter	0.906	0.0	5418.7	5560

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.439	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 4.238

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	1.059	4	8	1.060	8	12	1.059	12	16	1.060

Model Details

Storage is Online Cover Level (m) 79.000

Tank or Pond Structure

Invert Level (m) 78.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2450.0	1.000	3004.7

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0201-2080-1100-2080
Design Head (m)	1.100
Design Flow (l/s)	20.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	201
Invert Level (m)	77.900
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	20.8	Kick-Flo®	0.777	17.6
Flush-Flo™	0.360	20.8	Mean Flow over Head Range	-	17.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.9	0.800	17.9	2.000	27.7	4.000	38.6	7.000	50.6
0.200	19.0	1.000	19.9	2.200	29.0	4.500	40.9	7.500	52.4
0.300	20.7	1.200	21.7	2.400	30.2	5.000	43.0	8.000	54.0
0.400	20.7	1.400	23.3	2.600	31.4	5.500	45.1	8.500	55.6
0.500	20.4	1.600	24.9	3.000	33.6	6.000	47.0	9.000	57.2
0.600	20.0	1.800	26.3	3.500	36.2	6.500	48.9	9.500	58.7

Appendix G

Drainage Strategy

APPROXIMATE LOCATION OF FINAL CONTROL OUTLET. CHAMBER TO CONTAIN HYDROBRAKE RESTRICTING FLOWS TO Q1 YEAR - 20.8 l/s

BASIN 4
INVERT LEVEL: 75.00m AOD
MAX WATER DEPTH 1m
300mm FREEBOARD
APPROX. ATTENUATION VOLUME: 754m³
FOR BATTER: CUT 1:3, FILL 1:20

SHOULD ROUNDABOUT ACCESS BE REQUIRED, ISLAND TO BE UTILISED AS A SUDS BASIN/POND TO DRAIN CIRCULATORY CARRIAGEWAY.

BASIN 3
INVERT LEVEL: 76.70m AOD
MAX WATER DEPTH 1.2m
300mm FREEBOARD
APPROX. ATTENUATION VOLUME: 736m³
FOR BATTER: CUT 1:3, FILL 1:15

BASIN 1
INVERT LEVEL: 78.05m AOD
MAX WATER DEPTH 1m
300mm FREEBOARD
APPROX. ATTENUATION VOLUME: 690m³

er Road

OUTFALL TO EXISTING DITCH

SUDS CORRIDOR

SUDS CORRIDOR

SUDS CORRIDOR

BASIN 2
INVERT LEVEL: 77.80m AOD
MAX WATER DEPTH 1m
300mm FREEBOARD
APPROX. ATTENUATION VOLUME: 849m³
FOR BATTER: CUT 1:3, FILL 1:15

Agricultural / light industrial units

Neighbouring Housing

INDICATIVE

NOTES:

1. DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS ARE IN METRES, UNLESS STATED OTHERWISE.
2. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER 5 WORKING DAYS IN ADVANCE OF UNDERTAKING ANY WORK.

KEY

INDICATIVE STORMWATER SEWER ROUTE

CALCULATIONS

IMPERMEABLE AREA BASED ON 65% OF DEVELOPABLE AREA REFERENCED ON DE436 DRAFT FRAMEWORK PLAN REVISION L (6.52 Ha)

IMPERMEABLE AREA: 4.24 Ha
SOIL FACTOR 0.45 DUE TO PRESENCE OF CLAY AS PER INFILTRATION TESTING CONDUCTED ON 18/01/21.

GREENFIELD RATES BASED ON DEVELOPABLE AREA (6.52 Ha):

Q1	-	20.8 l/s
Q30	-	57.5 l/s
Q100	-	85.1 l/s
QBAR	-	23.9 l/s

Rev	Date	Details	Drawn by	Checked by
E	14/07/21	MASTERPLAN UPDATED	CG	KT
D	19/06/21	UPDATED TO INCLUDE LATEST MASTERPLAN, DRAINAGE ROUTES & GREENFIELD RATES UPDATED	NT	KT
C	01/06/21	BASIN 3 REVISED TO AVOID RPZ	NT	KT
B	22/02/21	BASIN NUMBER REDUCED, SUDS CORRIDORS REVISED, GREENFIELD RATES UPDATED	NT	KT
A	17/02/21	UPDATED TO INCLUDE ROUNDABOUT & POTENTIAL SUDS CORRIDORS	NT	KT
-	19/01/21	FIRST ISSUE	NT	KT

COTSWOLD TRANSPORT PLANNING

CLIENT:
ROSCONN STRATEGIC LAND

PROJECT:
LAND SOUTH OF RADWINTER ROAD
(EAST OF GRIFFIN PLACE)
SAFFRON WALDEN

TITLE:
PROPOSED SUDS AND CONSTRAINTS PLAN

STATUS:
PLANNING

SCALE @ A1:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:500	19/01/21	NT	KT	KT

JOB NO:	DRAWING NO:	REVISION:
CTP-20-1142	C100	E

APPROXIMATE LOCATION OF FINAL CONTROL OUTLET. CHAMBER TO CONTAIN HYDROBRAKE RESTRICTING FLOWS TO Q1 YEAR - 20.8 l/s

BASIN 4
INVERT LEVEL: 75.00m AOD
MAX WATER DEPTH 1m
300mm FREEBOARD
APPROX. ATTENUATION VOLUME: 754m³
FOR BATTER: CUT 1:3, FILL 1:20

SHOULD ROUNDABOUT ACCESS BE REQUIRED, ISLAND TO BE UTILISED AS A SUDS BASIN/POND TO DRAIN CIRCULATORY CARRIAGEWAY.

BASIN 3
INVERT LEVEL: 76.70m AOD
MAX WATER DEPTH 1.2m
300mm FREEBOARD
APPROX. ATTENUATION VOLUME: 736m³
FOR BATTER: CUT 1:3, FILL 1:15

BASIN 1
INVERT LEVEL: 78.05m AOD
MAX WATER DEPTH 1m
300mm FREEBOARD
APPROX. ATTENUATION VOLUME: 690m³
FOR BATTER: CUT 1:3, FILL 1:15

SITE ACCESS ARRANGEMENTS TBC

Radwinter Road

OUTFALL TO EXISTING DITCH

BASIN 2
INVERT LEVEL: 77.80m AOD
MAX WATER DEPTH 1m
300mm FREEBOARD
APPROX. ATTENUATION VOLUME: 849m³
FOR BATTER: CUT 1:3, FILL 1:15

SUDS CORRIDOR

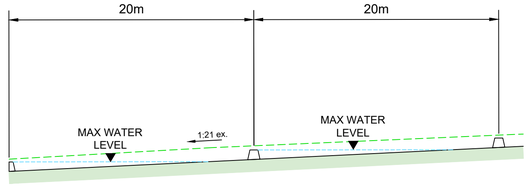
SUDS CORRIDOR

SUDS CORRIDOR

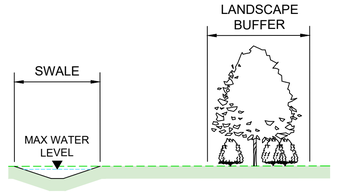
SUDS CORRIDOR

Views to Mary's Church

Views to Palace Wood



TYPICAL SWALE LONG SECTION
(WITH CHECK DAMS AT 20m)
SCALE: N.T.S



TYPICAL SWALE CROSS SECTION
SCALE: N.T.S

INDICATIVE

NOTES:

1. DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS ARE IN METRES, UNLESS STATED OTHERWISE.
2. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER 5 WORKING DAYS IN ADVANCE OF UNDERTAKING ANY WORK.

KEY

—→— INDICATIVE STORMWATER SEWER ROUTE

CALCULATIONS

IMPERMEABLE AREA BASED ON 65% OF DEVELOPABLE AREA REFERENCED ON DE436 DRAFT FRAMEWORK PLAN REVISION L (6.52Ha)

IMPERMEABLE AREA: 4.28 Ha
SOIL FACTOR 0.45 DUE TO PRESENCE OF CLAY AS PER INFILTRATION TESTING CONDUCTED ON 18/01/21.

GREENFIELD RATES:

Q1	-	20.8 l/s
Q30	-	57.5 l/s
Q100	-	85.1 l/s
QBAR	-	23.9 l/s

Rev	Date	Details	Drawn by	Checked by
B	14/07/21	MASTERPLAN UPDATED	CG	KT
A	19/06/21	BASIN NUMBER REDUCED, SUDS CORRIDORS AMENDED. GREENFIELD RATES UPDATED	NT	KT
-	18/02/21	FIRST ISSUE	NT	KT

COTSWOLD TRANSPORT PLANNING

CLIENT:
ROSCONN STRATEGIC LAND

PROJECT:
RADWINTER ROAD
(EAST OF GRIFFIN PLACE)
SAFFRON WALDEN

TITLE:
DRAINAGE CONCEPT & SUDS PLAN

STATUS:
PLANNING

SCALE @ A1:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:1000	18/02/21	NT	KT	KT

JOB NO:	DRAWING NO:	REVISION:
CTP-20-1142	C300	B

Appendix H

SuDs Water Quantity & Quality - LLFA Technical Appendix Proforma

Essex County Council

SuDS Water quantity and Quality – LLFA Technical Assessment Proforma

Introduction

This proforma identifies the information required by Essex LLFA to enable technical assessment the Designers approach to water quantity and water quality as part of SuDS design approach in compliance with Essex SuDS Design Guide.

Completion of the proforma will also allow for technical assessment against Non-statutory technical standards (NSTS) for Sustainable Drainage. The proforma will accompany the site specific Flood Risk Assessment and Drainage Strategy submitted as part of the planning application.

Please complete this form in full for full applications and the coloured sections for outline appllications. This will help us identify what information has been included and will assist with a smoother and quicker application.

Instructions for use

Use the units defined for input of figures

Numbers in brackets refer to accompanying notes.

Where ……m^3 .....m^3/m^2 *are noted – both values should be filled in.*

Site details

1.1	Planning application reference (if known)		
1.2	Site name	Land South of Radwinter Road, Saffron Walden	
1.3	Total application site area (1)	18.30	ha
1.4	Predevelopment use (4)	Greenfield	
1.5	Post development use	Residential	
	If other, please sepcify		
1.6	Urban creep applicable	Yes	if yes, factor applied: 10%
1.7	Proposed design life / planning application life	60 years (residential)	
1.8	Method(s) of discharge: (5)		

☐ *Reuse* ☐ *Infiltration* ☐ *Hybrid* ☑ *Waterbody* ☐ *Storm sewer* ☐ *Combined sewer*

1.9	Is discharge direct to estuary / sea	No
1.10	Have agreements in principle (where applicable) for discharge been provided	No

Essex County Council

SuDS Water quantity and Quality – LLFA Technical Assessment

Calculation inputs

2.1	Area within site which is drained by SuDS (2)	65200	m^2
2.2	Impermeable area drained pre development (3)	0	m^2
2.3	Impermeable area drained post development (3)	42800	m^2
2.4	Additional impermeable area (2.3 minus 2.2)	42800	m^2
2.5	Method for assessing greenfield runoff rate	ICPSUDS Source Control	
2.6	Method for assessing brownfield runoff rate	n/a	
2.7	Coefficient of runoff (Cv) (6)	0.750 Summer, 0.	
2.8	Source of rainfall data (FEH Preferred)	FSR	
2.9	Climate change factor applied 40	%	

Attenuation (positive outlet)

2.10 Drainage outlet at risk of drowning (tidal locking, elevated water levels in watercourse/sewer)
Note: Vortex controls require conditions of free discharge to operate as per manufacturers specification.

2.11 Invert level at final outlet 74.75 mAOD

2.12 Design level used for surcharge water level at point of discharge (16) 1.00 mAOD

Infiltration (Discharge to Ground)

2.13 Have infiltration tests been undertaken Yes

2.14 If yes, which method has been used BRE365

2.15 Infiltration rate (where applicable) n/a m/s

2.16 Depth to highest known ground water table mAOD

2.17 If there are multiple infiltration features please specify where they can be found in the FRA n/a

2.18 Depth of infiltration feature n/a mAOD

2.19 Factor of safety used for sizing infiltration storage n/a

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Calculation outputs

Sections 3 and 4 refer to site where storage is provided by full attenuation or partial infiltration. Where all flows are infiltrated to ground go straight to Section 6.

3.0	**Greenfield runoff rates** (incl. Urban Creep)				
3.1	1 in 1 year rainfall		l/s/ha, 20.8		l/s for the site
3.2	1 in 30 year rainfall		l/s/ha, 57.5		l/s for the site
3.3	1 in 100 year rainfall + CCA		l/s/ha, 85.1		l/s for the site
4.0	**Brownfield runoff rates** (incl. Urban Creep)				
4.1	1 in 1 year rainfall		l/s/ha, n/a		l/s for the site
4.2	1 in 30 year rainfall		l/s/ha, n/a		l/s for the site
4.3	1 in 100 year rainfall + CCA		l/s/ha, n/a		l/s for the site
5.0	Proposed maximum rate of runoff from site (incl. Urban Creep) (7)				
5.1	1 in 1 year rainfall	20.8	l/s/ha, 20.8		l/s for the site
5.2	1 in 30 year rainfall	20.8	l/s/ha, 20.8		l/s for the site
5.3	1 in 100 year rainfall + CCA	20.8	l/s/ha, 20.8		l/s for the site
6.0	Attenuation storage to manage flow rates from site (incl. **Climate Change Allowance** (CCA) and Urban Creep)				
6.1	Storage - 1 in 100 year + CCA (9)	2700	m^3 0.90		m^3/m^2
6.2	50% storage drain down time 1 in 30 years	9			hours
7.0	Controlling volume of runoff from the site(10)				
7.1	Pre development runoff volume(12) (development area)		815.20		m^3 for the site
7.2	Post development runoff volume (unmitigated) (12)		3260		m^3 for the site
7.3	Volume to be controlled (5.2 - 5.1)		3260		m^3 for the site

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7.4	Volume control provided by:				
	- Interception losses[13]	0	m^3		
	- Rain harvesting [14]	0	m^3		
	- Infiltration	0	m^3		
	- Attenuation	2700	m^3		
	- Separate volume designated as long term storage[15]			0	m^3
7.5	Total volume control (sum of inputs for 5.4)			2700	m^3 [17]

8.0 Site storage volumes (full infiltration only)

8.1	Storage - 1in 30 year + CCA [8]	n/a	m^3	n/a	m^3/m^2 (of developed impermeable area)
8.2	Storage - 1 in 100 year + CCA [11]	n/a	m^3	n/a	m^3/m^2

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Design Inputs

Proposed site use: Residential

Pollution hazard category (see C753 Table 26.2): Very low

High risk area defined as area storing fuels chemicals, refuelling area, washdown area, loading bay.

Design Outputs

List order of SuDS techniques proposed for treatment: 3 Swales and 4 Attenuation Basins

Note that gully pots, pipes and tanks are not accepted by Essex LLFA as a form of treatment (for justification see C753 Section 4.1, Table 26.15 and Box B.2)

Are very high pollution risk areas drained separate from SuDS to foul system: No

Other

Please include any other information that is relevant to your application

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Notes

1. All area with the proposed application site boundary to be included.
2. The site area which is positively drained includes all green areas which drain to the SuDS system and area of surface SuDS features. It excludes large open green spaces which do not drain to the SuDS system.
3. Impermeable area should be measured pre and post development. Impermeable surfaces include, roofs, pavements, driveways and paths where runoff is conveyed to the drainage system.
4. Predevelopment use may impact on the allowable discharge rate. The LLFA will seek for reduction in flow rates to GF (Essex SuDS Design Guide).
5. Runoff may be discharge via one or more methods.
6. Sewers for Adoption 6th Edition recommends a Cv of 100% when designing drainage for impermeable area (assumes no loss of runoff from impermeable surfaces) and 0% for permeable areas. Where lower Cv's are used the applicant should justify the selection of Cv.
7. It is Essex County Council's preference that discharge rates for all events up to the 1 in 100 year event plus climate change are limited to the 1 in 1 greenfield rate. This is also considered to mitigate the increased runoff volumes that occur with the introduction of impermeable surfaces. If discharge rates are limited to a range of matched greenfield flows then it is necessary to provide additional mitigation of increased runoff volumes by the provision of Long-term Storage.
8. Storage for the 1 in 30 year must be fully contained within the SuDS components. Note that standing water within SuDS components such as ponds, basins and swales is not classified as flooding. Storage should be calculated for the critical duration rainfall event.
9. Runoff generated from rainfall events up to the 1 in 100 year will not be allowed to leave the site in an uncontrolled way. Temporary flooding of designated areas to shallow depths and velocities may be acceptable.
10. The following information should only be provided if increased runoff volumes are not mitigated by limiting all discharge rates back to the greenfield 1 in 1 year rate.
11. Climate change is specified as 40% increase to rainfall intensity, unless otherwise agreed with the LLFA / EA.
12. To be determined using the 100 year return period 6 hour duration winter rainfall event.
13. Where Source Control is provided Interception losses will occur. An allowance of 5mm rainfall depth can be subtracted from the net inflow to the storage calculation where interception losses are demonstrated. The Applicant should demonstrate use of subcatchments and source control techniques. Further information is available in the SuDS Design Guide.
14. Please refer to Rain harvesting BS for guidance on available storage.
15. Flows within long term storage areas should be infiltrated to the ground or discharged at low flow rate of maximum 2 l/s/ha.
16. Careful consideration should be used for calculations where flow control / storage is likely to be influenced by surcharged sewer or peak levels within a watercourse. Outlets can be tidally locked where discharge is direct to estuary or sea. Calculations should demonstrate that risk of downed outlet has been taken into consideration. Vortex controls require conditions of free discharge to operate as per specification.
17. In controlling the volume of runoff the total volume from mitigation measures should be greater than or equal to the additional volume generated.