CAMERON DARROCH ASSOCIATES

APPENDIX V

CAMERON DARROCH ASSOCIATES
KESTREL BUSINESS CENTRE, PRIVATE ROAD No. 2, COLWICK,
NOTTINGHAM, NG4 2JR

DO NOT SCALE FROM THIS DRAWING

INDICATES DIRECTION OF FLOOD WATER DURING EXCEEDANCE EVENTS

INDICATES DIRECTION OF FLOOD WATER DURING EXCEEDANCE EVENTS

INDICATES AREAS OF PERMEABLE BLOCK PAVING CONSTRUCTION

SURFACE WATER DRAINAGE IS SUBJECT TO RECEIPT OF ALL RWP SETTING OUT FROM THE ARCHITECT

EXISTING GROUND TO BE BATTERED BACK, IF NECESSARY, TO FACILITATE CONSTRUCTION OF NEW RETAINING STRUCTURE & REINSTATED. ALL TO BE IN ACCORDANCE WITH THE LICENCE AGREEMENT BETWEEN BARCHESTER & THE ADJACENT LAND OWNER.

ELEVATED WALKWAY (61.225) TO ENABLE GROUND TO BE PROFILED UNDER TO SUIT EXISTING LEVELS & OMIT REQUIREMENT FOR RETAINING STRUCTURE AROUND TREE & ON BOUNDARY. FOOTPATH ROUTE TO BE AMENDED SUBJECT TO AGREEMENT WITH ARCHITECT

STEEL STAIR CASE DETAILS TO BE AGREED TO ENABLE OMISSION OF RETAINING WALL TO INSIDE LINE OF STAIR

FLOW CONTROL 21mm DIA. ORIFICE PLATE TO RESTRICT FLOW TO 1.2 l/sec. DESIGN HEAD 1.0m

FLOW CONTROL 24mm DIA. ORIFICE PLATE TO RESTRICT FLOW TO 1.2 l/sec. DESIGN HEAD 1.0m

4No. 200mm DIA. DEEP BORE SOAKAWAYS TO 15m DEPTH BELOW EXISTING GROUND LEVEL. 1350mm DIA. PCC CHAMBERS **DISCHARGE USED IN THIS LOCATION BASED ON RESULTS FROM SITE INVESTIGATION BOREHOLE BH1. REFER TO TABLE.**

4No. 200mm DIA. DEEP BORE SOAKAWAYS TO 15m DEPTH BELOW EXISTING GROUND LEVEL. 1350mm DIA. PCC CHAMBERS **DISCHARGE USED IN THIS LOCATION BASED ON RESULTS FROM SITE INVESTIGATION BOREHOLE BH2. REFER TO TABLE.**

1No. 200mm DIA. DEEP BORE SOAKAWAY TO 15m DEPTH BELOW EXISTING GROUND LEVEL.

VEHICLE BARRIER & PEDESTRIAN GUARDING ALONG TOP OF WALL. GUARDING TO BE DESIGNED & INSTALLED INTEGRAL WITH RET WALL & FOUNDATION - SEE SEPARATE DETAILS

PARTY WALL NOTICE/AGREEMENT MAY BE REQUIRED WITH NEIGHBOURING LAND OWNER PRIOR TO WORKS COMMENCING - TO BE LED BY PROJECT MANAGER/ARCHITECT

ALL WORKS WITHIN EXISTING PUBLIC HIGHWAY TO BE APPROVED BY THE LOCAL HIGHWAYS AUTHORITY VIA S278 AGREEMENT TO BE SUBMITTED/OBTAINED BY THE MAIN CONTRACTOR.

EXISTING SITE ACCESS TO MODIFIED, CONSTRUCTED TO ADOPTABLE STANDARDS & INSTALLED FULLY IN ACCORDANCE WITH LOCAL HIGHWAYS AUTHORITY REQUIREMENTS & SECURED VIA S278 AGREEMENT OBTAINED BY THE MAIN CONTRACTOR. CONTRACTOR TO ALLOW FOR ANY DIVERSION, LOWERING OR PROTECTION OF EXISTING BURIED SERVICES AS NECESSARY.

Top Dartford Road (B258)

Herbert Road

Top Dartford Road

PRELIMINARY

REV	INITIALS	DATE	DETAIL
P2	MJC	05.03.24	AMENDED TO SUIT CONTRACTORS PREFERRED ATTENUATION CRATE MANUFACTURER.
P1	MJC	28.06.23	PRELIMINARY

STATUS

CAMERON DARROCH ASSOCIATES
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
KESTREL BUSINESS CENTRE, PRIVATE ROAD No. 2, COLWICK, NOTTINGHAM, NG4 2JR
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CLIENT: BARCHESTER	JOB NO: CDA-2601
PROJECT: PROPOSED CARE HOME, TOP DARTFORD ROAD, HEXTABLE.	DRG NO: DD150
TITLE: SURFACE WATER EXCEEDANCE ROUTES	REVISION: P2
	SCALE: 1:125 @ A3
	DATE: APR 2023
	DRAWN BY: MJC
	CHKD: SEL

CAMERON DARROCH ASSOCIATES

APPENDIX VI

CAMERON DARROCH ASSOCIATES
KESTREL BUSINESS CENTRE, PRIVATE ROAD No. 2, COLWICK,
NOTTINGHAM, NG4 2JR

REF: 8/2607

24 January 2023

Seven Oaks District Council
Argyle Road
Sevenoaks
Kent
TN13 1HG

For the attention of Mrs Anna Horn

Your reference: 22/00459/FUL

Location: 57 Top Dartford Road, Hextable, Swanley, Kent. BR8 7SG

Proposal: Demolition of the existing house and erection of a 67-bedroom care home including associated access and landscaping works.

Please find enclosed updated drainage plans and catchment assessment plans for the above scheme.
Drawings enclosed:
4400 -P5 – Drainage GA
4402-P3 – Catchment Areas Plan

These drawings have been updated to reflect the minor revisions to the current proposed landscape and architectural scheme.

Landscape - DJOGS Drawing 711 rev 1 dated 24/10/22.
Architects - Harris Irwin Site Plan – 0102 Rev P5 dated 20/10/22.

We can confirm that the catchment area draining to the below ground soakaway network is slightly reduced from the earlier scheme. This means that the current calculations and designs provided in the SUDS report remain current.

Comments were received from the LLFA (SEDC/2022/089508 19/4/22)

The LLFA were seeking clarification concerning the location of the deep bore soakaways in relation to the proposed foundations for the building structure. It is usual for deep bore soakaways to be sited at least 10m from building foundations. Due to the constraints of the existing trees it is not possible to achieve this distance and the nearest soakaway is approximately 8m to the centre of the BH.

The design of the foundations will take into consideration all the site constraints such as geology, groundwater, geotechnical, trees and drainage. In this instance, the drainage design and location of the borehole soakaways may affect the choice of foundation type and deep foundations or piled foundations may be required where the building is close to the soakaways.

It is standard practice for structural engineers to consider the drainage systems as part of their structural design. However, a note has been provided on the drainage strategy drawing for the designers of the foundations to take into account the location of the soakaways. As a structural engineering practice, we can confirm that a safe foundation solution can be achieved with the soakaways in this location.

Kind regards

Greg Scott CEng MIstructE
Director
Clancy Consulting Ltd

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Energy
Environment
Infrastructure

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clancy consulting

FLOOD RISK AND DRAINAGE STRATEGY REPORT 57 TOP DARTFORD ROAD, HEXTABLE, KENT, BR8 7SG

Report prepared on behalf of HARRIS IRWIN ASSOCIATES for BARCHESTER HEALTHCARE LTD

17 January 2021

Rev. 02

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FLOOD RISK ASSESSMENT & SUDS STRATEGY

Revision List

REVISION	REASON FOR ISSUE	DATE OF ISSUE
01	First Issue - Draft	16 December 2021
02	Second issue	14 January 2022

Prepared by: **Richard Hendry Eng. Tech MIHE, Senior Civil Engineer**
for and on behalf of CLANCY CONSULTING LTD

Checked by: **Greg Scott B.Eng. (Hons), C.Eng., M.I.Struct.E Director**
for and on behalf of CLANCY CONSULTING LTD

CAVEAT

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Appendix A – Development Proposals

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Appendix C – Topo and Utilities

Appendix D – Thames Water utility information

Appendix E – Surface Water Flood Flows

Appendix F – Drainage Layout and Calculations

Appendix G – Kent County Council; LLFA proforma

1.0 Introduction

1.1 General

1.1.1 This report relates to a planning application for the development of a brownfield site, north of the B258 Top Dartford Road, Hextable, for a proposed care home.

1.1.2 This report sets out the results of a flood risk assessment required in support of a planning application for this development. The assessment has been carried out in accordance with the general principles set out in National Planning Policy Framework, Technical Guidance to the National Planning Policy Framework and Flood Risk and Coastal Change Planning Practice Guidance.

1.1.3 This report is prepared solely for the benefit of Harris Irwin Associates for Barchester Healthcare Ltd. This report may not be assigned without prior written permission from Clancy Consulting Ltd.

1.2 Background Information

1.2.1 In 2001 the Department for Transport, Local Government and the Regions (DTLR) published Planning Policy Guidance Note 25 (PPG25), which explains how flood risk should be taken into consideration during the planning and development process.

1.2.2 PPG25 was replaced by Planning Policy Statement 25: Development and Flood Risk published in March 2010. This Policy Statement was introduced to place more emphasis on the increased flood risk from climate change.

1.2.3 In March 2012, the Government released the National Planning Policy Framework (NPPF) aiming to make the planning system less complex and more accessible, to protect the environment and promote sustainable growth.

1.2.4 NPPF accompanied with the Technical Guidance superseded PPS25 although the principles set out in the new publication remain similar in terms of the flood risk aspect.

1.2.5 The flood risk Practice Guide was published online in March 2014 with the latest update in August 2021.

1.2.6 In July 2018 the NPPF was updated. This update has highlighted the need for further awareness of flood risk issues for new developments. This has since been revised in February 2021 to include minor clarifications.

2.0 Structure of the Report

2.1 The report has been structured to follow the general principles set out in the Technical Guidance published in March 2014 along with subsequent revisions.

2.2 The methodology for this FRA has comprised a desktop study making reference to the Environment Agency (EA) Mapping, Kent Council – Flood risk to communities - Sevenoaks and Kent Council SFRA with relevant plans including plans showing the location of local sewers.

2.3 Sources of information

- Flood maps from the Environment Agency published online
- Kent Council SFRA
- Thames Water utility asset data
- British Geological Survey / Magic Map
- Existing site records
- Dartford Borough Council Level 1 & 2 SFRA
- Water. People. Places. A guide for master planning sustainable drainage into developments Prepared by the Lead Local Flood Authorities of the South East of England _ AECOM

3.0 Site Description

3.1 Location

3.1.1 The site is located detailed as below.

OS X (Eastings)	-552520
OS Y (Northings)	170870
Nearest Post Code	BR8 7SD

Table 1 – Site Details

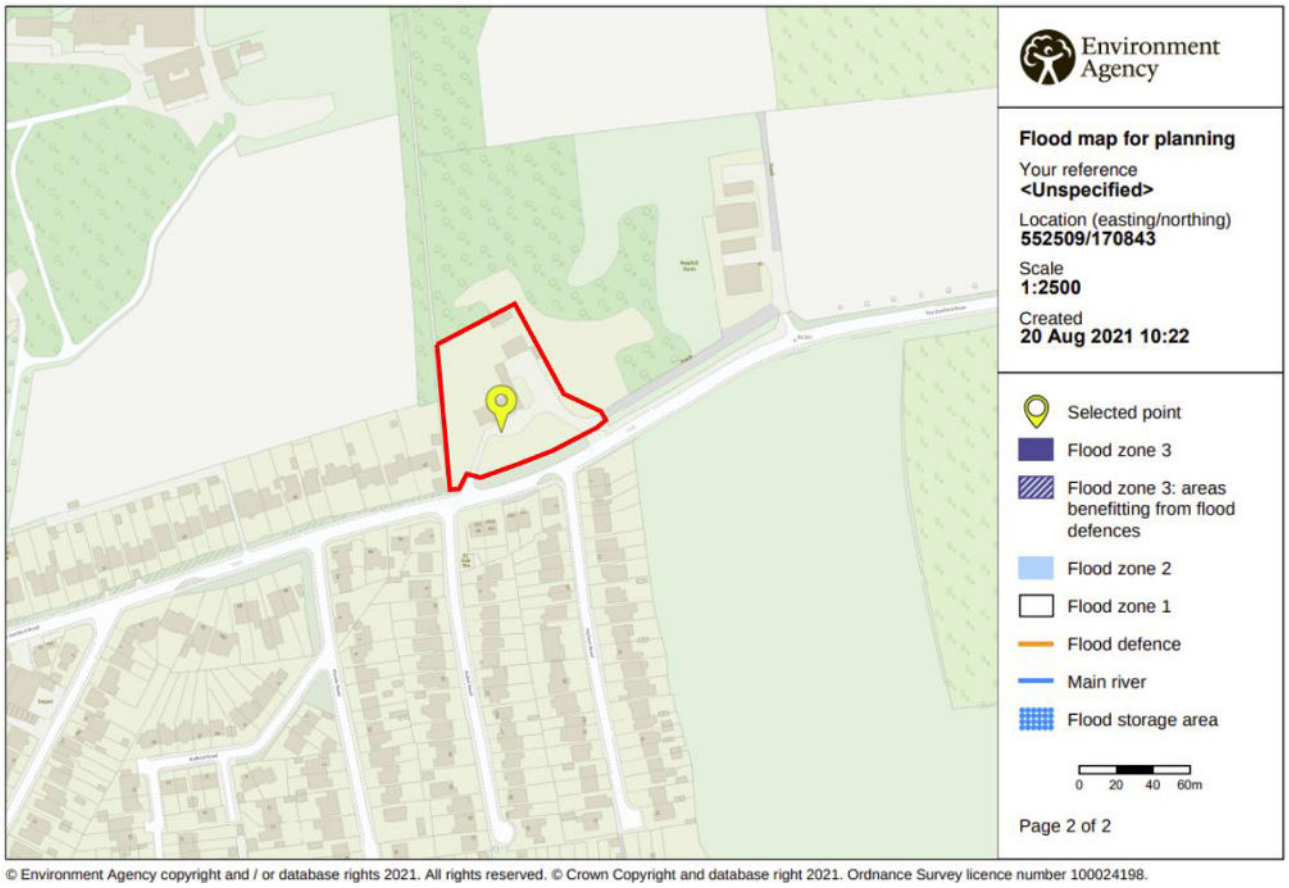


Figure 1- Existing Aerial Plan identifying the proposed site in relation to the wider area of Hextable (Extract taken from EA mapping)

Figure 2 - Site Location

(OS Maps: https://osmaps.ordnancesurvey.co.uk/51.41599,0.19221,18)

3.2 Existing Site Layout and Topography

3.2.1 The Existing site comprises a brownfield site of approximately 0.508 hectares which was formerly used as a single residential dwelling with outbuildings.

3.2.2 The site is accessible from the south off the (B258) Top Dartford Road.

3.2.3 A topographic survey has been undertaken and is included in Appendix C. The ground levels slope down from the Northern Boundary at approximately 60.5m AOD to 54.2m AO in the Southwest Corner.

3.3 Geology

3.3.1 The British Geological Survey's (BGS) online geological maps indicates the site has:
1:50 000 scale bedrock geology description: *Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) - Chalk. Sedimentary Bedrock formed approximately 72 to 94 million years ago in the Cretaceous Period. Local environment previously dominated by warm chalk seas.*

3.3.2 A ground investigation has been carried out by Clancy Consulting Geotechnical team in October 2021. Extensive infiltration testing was carried out. The investigations confirmed the presence of soft sand clay with occasional gravel over structureless chalk (Lewes Nodular Chalk Formation) to a depth of 1.45m. These included slightly sandy SILT, clay and subangular flint deposits as well as some areas of made ground. Refer to the report in Appendix B. Further discussion on infiltration results is included in Section 6.

3.4 Hydrology

3.4.1 There are no watercourse or surface drainage features within or in close proximity to the site.

3.5 Hydrogeolology

3.5.1 The ground water table was not located during the ground investigation works (noted in 3.3.2 above). Following further deep bore investigations, again, no ground water was encountered to a depth of 30m below nominal ground level.

3.5.2 The site is not within an inner or outer ground water source protection zone but is within the total catchment area. Refer to the extract from Magic Map below.

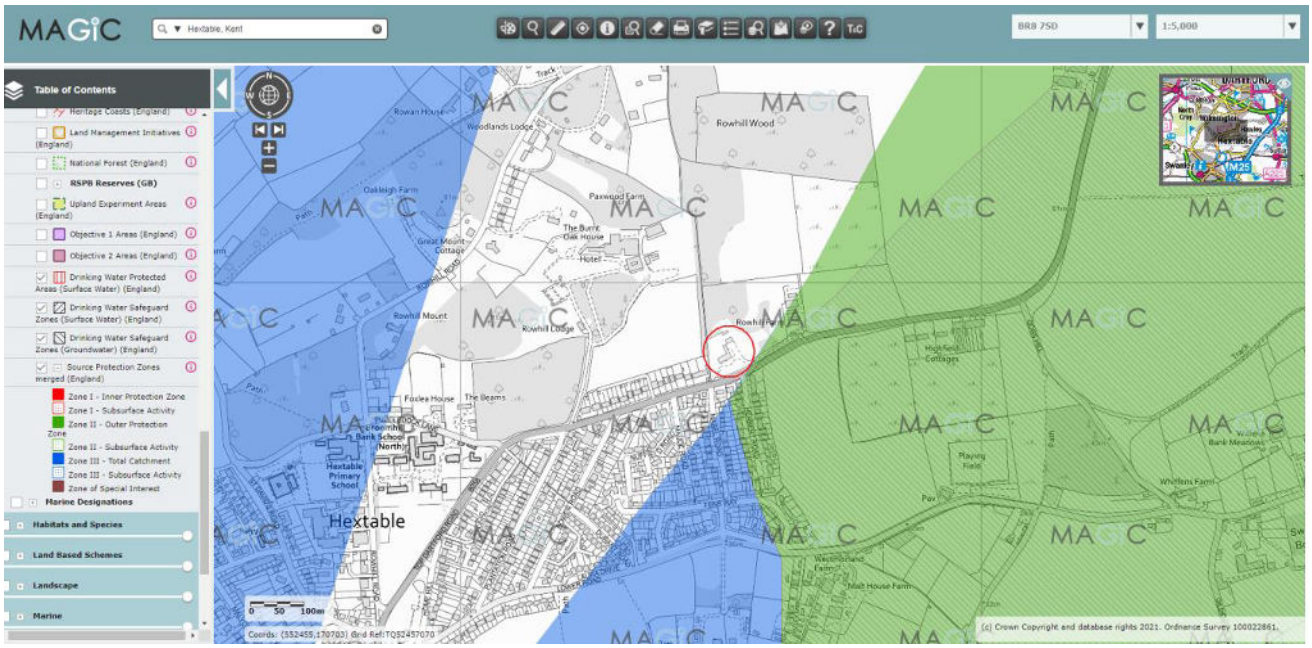


Figure 4 – Ground Water Source Protection.

(Magic Maps: https://magic.defra.gov.uk/MagicMap.aspx)

4.0 Proposed Development

4.1 Description

4.1.1 The proposed development comprises of a 67 bedroom care home across a new purpose built 3 storey building, located to the north-east of Hextable. The new building has a footprint of approximately 1480m². The Proposed development is serviced by an access road off Top Dartford Road.
A proposed plan of the development can be found in Appendix A.

4.1.2 The development will see a net increase in impermeable surfaces on the site by approximately 15.2%. These impermeable areas can be found on Drawing 01 in Appendix F.

4.2 Vulnerability and Classification

4.2.1 The gov.uk website provides information on the flood risk vulnerability for new development.

4.2.2 Table 2 of the NPPF indicates the intended Care Home use to be "**More Vulnerable"**.

5.0 Flood Potential

5.1 Rivers and Sea.

5.1.1 The following zones define the levels of flood risk from Rivers and the Sea:

Zone 1: Low Probability
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)

Zone 2: Medium Probability
This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

Zone 3a: High Probability
This zone comprises land assessed as having between 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of
flooding from the sea (>0.5%) in any year.

Zone 3b: Functional Flood Plain
This zone comprises land where water must flow or be stored in times of flood. SFRA should identify this zone.

5.1.2 As part of its general obligations under the Water Resources Act 1991, The Environment Agency has carried out surveys of its existing defences against flooding and has published a series of nationwide 'Indicative Floodplain Maps' based upon information from historic flood events and basic hydraulic modelling. In general terms, these maps give a good indication of the areas likely to be affected by flooding. More recently, the Environment Agency have published the 'Flood Map' on their website which is based on improved hydraulic modelling and detailed local data.

5.1.3

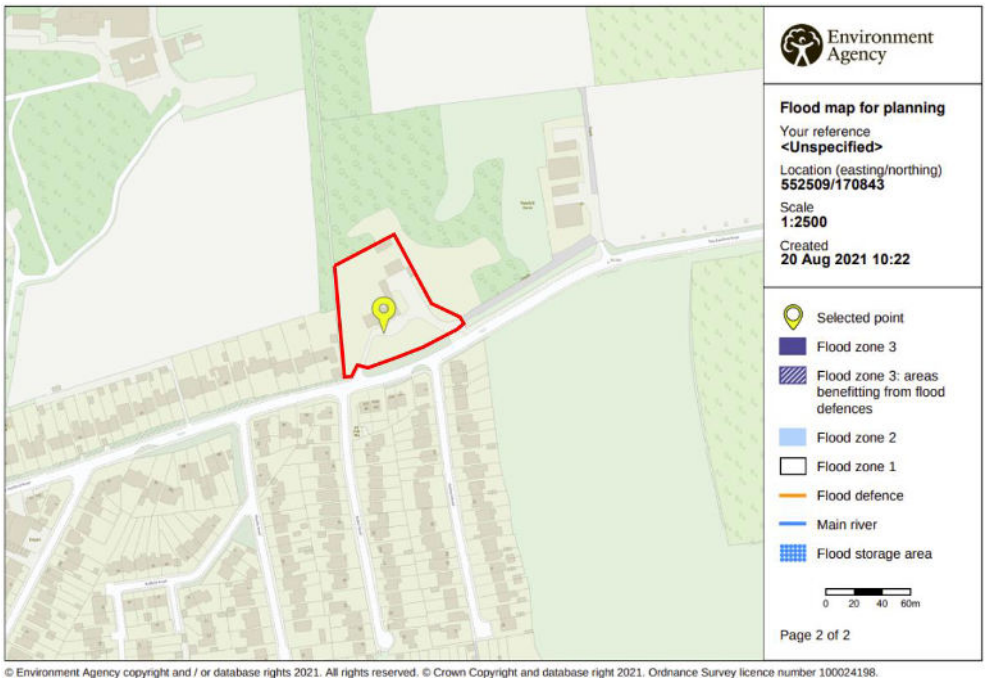


Figure 5 – EA Flood Map for Planning (Gov.uk)

5.1.4 The site is located within **Flood Zone 1** in terms of flooding from any nearby water course or the sea.

5.1.5 Flood Risk Vulnerability Classification.

	Flood Risk Vulnerability Classification				
Flood Zones	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 2 - Flood Risk Vulnerability and Flood Zone 'Compatibility' (Gov.uk)

Key:
✓ Development is appropriate
✗ Development should not be permitted

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

*" * " In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:*

- *remain operational and safe for users in times of flood;*
- *result in no net loss of floodplain storage;*
- *not impede water flows and not increase flood risk elsewhere.*

5.1.6 The NPPF (Technical Guidance) Table 3, Flood Risk Vulnerability and Flood Zone Compatibility matrix, indicates that "**More Vulnerable**" development proposals in **Flood Zone 1** are acceptable.

5.2 Surface Water

5.2.1 During extreme rainfall events, or due to poor gully drainage maintenance, there will be times when gully capacity is exceeded which will lead to surface flow within surrounding roads. However, as can be seen from the map below, the proposed site is not affected by these flows Mapping for this form of flooding is shown on the Environment Agency website as below.

Risk Category	Definition
High	Each year, there is a chance of flooding of greater than 1 in 30 (3.3%)
Medium	Each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%)
Low	Each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 1000 (0.1%)
Very Low	Each year, there is a chance of flooding of less than 1 in 1000 (0.1%)

Figure 6 - Flood Risk from Surface Water (Gov.uk)

5.2.2 It can be seen from the flood mapping (Fig 6) that the site is considered to be at “Very low” risk of surface water flooding.

5.3 Ground Water

5.3.1 Reference has been made to the Dartford borough Council level 1 & 2 for flood risk areas. Mapping has been provided for a "cumulative impact assessment" of flood risk. As can be seen below, Hextable sits in an area classified as – Low. scenarios which include areas susceptible to ground water flooding. The development site shown to be at low flood risk.

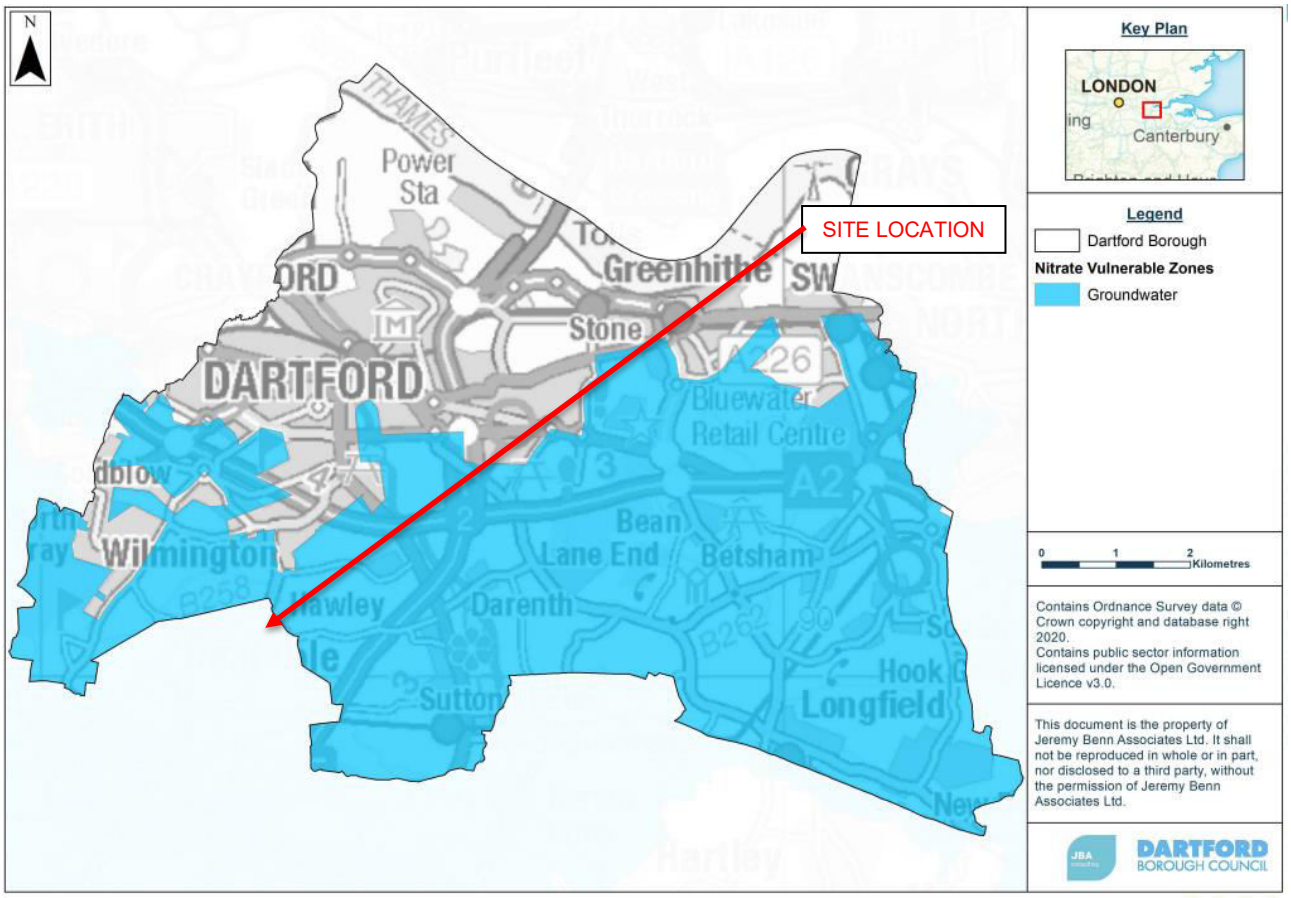


Figure 9 – SFRA mapping for potential ground water flooding.

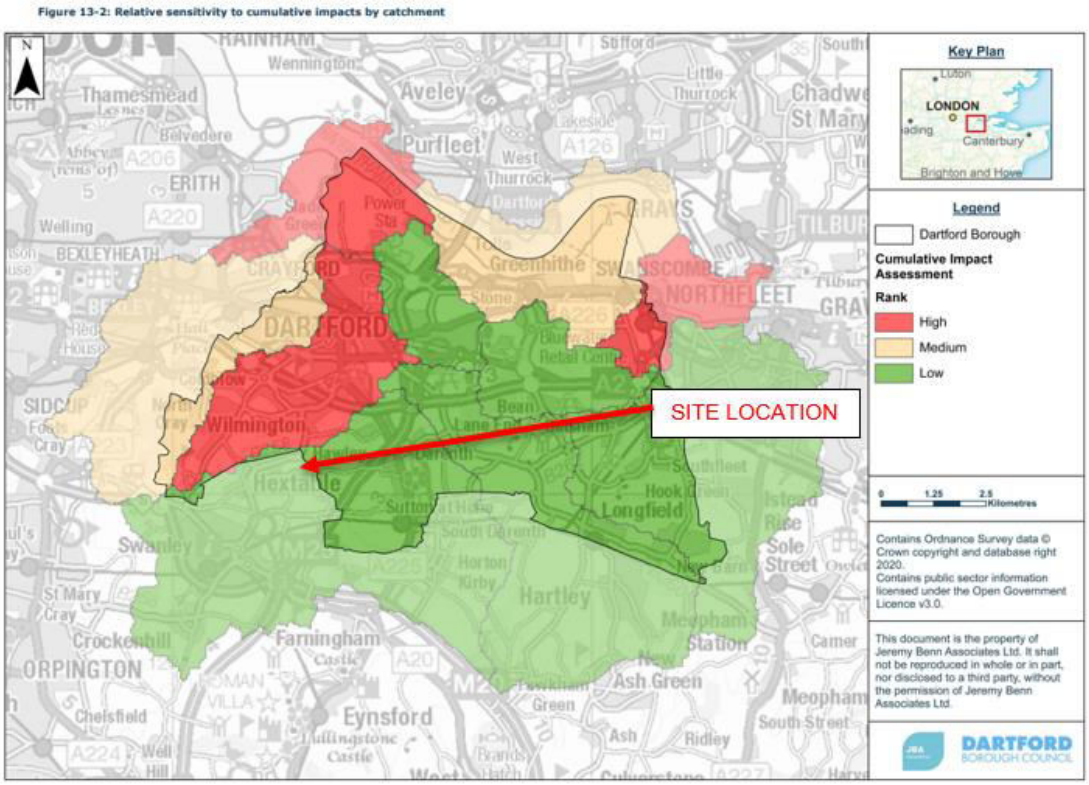


Figure 9 – SFRA mapping for Cumulative impact Assessment.

5.3.2 A ground investigation was carried out in July 2021. This found that the permeability of the ground across the site were not conducive for shallow infiltration features due to the size of attenuation needed to capture and infiltrate via soakaways. There was insufficient available space, given the dimensions of the proposed building.

5.3.3 Further ground investigation was undertaken during October 2021 that included 4 No. trial pits and infiltration tests. Again these determined that shallow infiltration was not a viable option to drain the site.

5.3.4 Given the above results, deep bore investigations where carried out early December 2021. The results confirmed that to a depth of 20m; no ground water was encountered to a depth of 30.0m and infiltration rates are acceptable to drain within the development site boundaries. All results of ground investigations can be found in Appendix B.

Permeability rates recorded from the falling head tests are presented in the table below:

Location	Depth (m)	Run	Permeability k (m/s)
BH01	10	1	$1.74X10^{-4}$
	15	1	$5.73X10^{-4}$
		2	$2.61X10^{-4}$
	20	1	$4.31X10^{-4}$
		2	$3.76X10^{-4}$
BH02	10	1	$2.46X10^{-4}$
		2	$4.12X10^{-4}$
	15	1	$1.37X10^{-4}$
		2	$4.03X10^{-4}$
	20	1	$2.29X10^{-4}$
		2	$4.98X10^{-4}$

Figure 10 – extract of tabled permeability results

5.4 Artificial Sources

5.4.1 Artificial sources of flooding are potentially from man-made structures and infrastructure. The Environment Agency have modelled the potential effect of flooding from failures in retaining structures containing reservoirs. As can be seen below in figure 11, there is no risk of flooding from reservoirs.

5.4.2 The risk of flooding from reservoirs at this site is **low**.

Figure 11 – Extent of Flooding from Reservoirs

(https://check-long-term-flood-risk.service.gov.uk/map?easting=552561&northing=170817&map=SurfaceWater)

5.5 Existing Drainage

5.5.1 Flooding could occur if the on-site drainage system becomes blocked or a rainfall event exceeds the design capacity. See Section 6 for details of the drainage system for the new development.

5.5.2 There are no other sewers known to be present within the site boundaries, therefore, no existing areas of the site are currently drained. It is assumed that rainfall is either discharged into the ground or runs-off site when the ground is saturated.

5.6 Existing Historical Flood Information

5.6.1 Reference has been made to the Dartford Borough Council – Level 1 & 2 SFRA and also Water. People. Places. A guide for master planning sustainable drainage into developments Prepared by the Lead Local Flood Authorities of the South East of England _ AECOM.

5.6.2 There are no specific recorded events of flooding at the development site.

5.6.3 For surface water flooding, this site is on a relatively steep slope, however, there are no records identifying any flooding at this location and no flow paths are evident that cross the site.

5.7 Sequential Testing

5.7.1 The site layout has been sequentially tested and the buildings have been located within an area of low flood risk.

6.0 Drainage

6.1 Existing Drainage

6.1.1 Greenfield Run-off rates.

6.1.1.1 The existing site area is brownfield in terms of run-off, however, the following rates were calculated using the HR Walligford UKsuds greenfield run-off tool.
Refer to Appendix F for details.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.81	0.81
1 in 1 year (l/s):	0.69	0.69
1 in 30 years (l/s):	1.85	1.85
1 in 100 year (l/s):	2.57	2.57
1 in 200 years (l/s):	3.02	3.02

6.1.2 Thames Water Sewers.

6.1.2.1 No public sewers run through the developmentsite.

6.1.2.2 There is an existing Thames Water foul sewer south of Top Dartford Road within the junction of Maple Road. See Fig 12 Below.

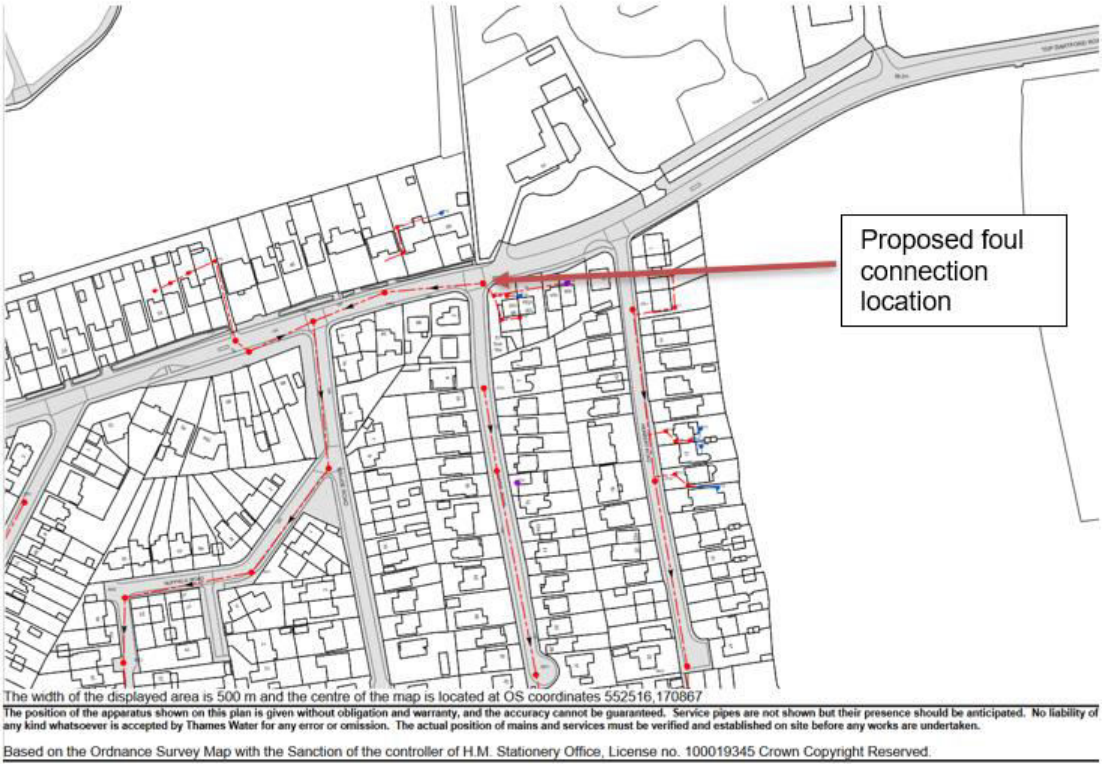


Fig 12 – Thames Water Asset Plan.

6.1.2.3 The foul water drainage connection point level taken from existing Thames Water data as being 52.43m AOD.

6.2 Proposed Drainage

6.2.1 Surface Water Disposal Hierarchy

6.2.1.1 The disposal of surface water should be considered in the following order of priority:

1. Infiltration into the subsoil via soakaways or permeable paving.
2. Discharge to a water course or the sea.
3. Discharge to a surface water sewer.
4. Discharge to a combined sewer.

6.2.1.2 If it is not possible to discharge to a soakaway, surface water should be controlled with the use of Sustainable Drainage Systems (SuDS) and considered using the SuDS Hierarchy.

6.2.1.3 In this instance, it is proposed to use direct infiltration through deep bore soakaways.

6.2.2 Disposal of Surface Water

6.2.2.1 Infiltration

Extensive testing has been carried out to determine the suitability of soakaways for the site. Refer to Appendix B for the full ground investigation report and summary mapping. As can be seen in these reports, while traditional shallow infiltration is not a viable solution for this development, a solution of attenuation, restriction and treatment prior to outfalling to a series of deep bores, has been recommended as a viable solution.

6.2.2.2 Connection to a Watercourse

There are no watercourses close to the proposed site therefore this has not been considered.

6.2.2.3 Connection to a surface water sewer.

There are no surface water sewers with in close proximity of the site.

6.2.3 SuDS Strategy – Control at Source

6.2.3.1 Permeable paving is proposed for all parking bays. Runoff from roof areas are considered to be of a low source of pollution under the indices as set out under the Simple index Guide - Section 26 of the CIRIA SuDS Manual 2015 (C753). This is discussed further in section 6.2.8. That said, it is intended to treat flows from that and other sources by the use of proprietary features like vortex separators prior to water entering attenuation tanks. Other measures include the use of orifice flow controls top slow water velocity to help control flows and reduce, run-off volumes and flow rates.

6.2.3.2 The above systems will provide adequate water quality improvements and help reduce surface water flows and volumes.

6.2.4 Proposed Surface Water Drainage

6.2.4.1 The proposed surface water strategy will split the site into two separate catchments, east & west.

6.2.4.2 **Catchment – West**

6.2.4.2.1 For this catchment all surface water runoff shall drain to a range of features including permeable parking bays, draining to a piped system through vortex separators before eventual outfall to 4No. deep bore soakaways. Sub-base materials used under the permeable parking bays shall provide necessary filtration and control should a contamination occurrence occur. To aid this, further filtration will be provided by the vortex separator units, thus providing adequate and necessary water quality improvements.

6.2.4.2.2 2 No. attenuation tanks with flows restricted by orifice plates to control flow will be used for the final control. This has been designed to cater for the storage of extreme rainfall events up to the 100 year plus 40% climate change events.

6.2.4.2.3 At the lowest part of the site is at the entrance off Top Dartford Road. Gullies are located to capture runoff before this can enter the public highway.

6.2.4.3 **Catchment – East**

6.2.4.3.1 Unlike the western catchment area there is no vehicular access. However, 2 attenuation tanks (upper & lower) are again proposed.

6.2.4.3.2 The tanks shall receive water via a piped system collecting runoff from all roof and hard paved areas, while passing through a vortex separator to remove any heavy or contaminated particles. This will ensure longevity of the attenuation tanks while reducing maintenance liability to the orifice plates and wider system.

6.2.4.3.3 Refer to Appendix F for all drawings and calculations for the proposed drainage.

6.2.5 Proposed Foul Water Drainage

6.2.5.1 It is proposed for the foul water to be routed around the building as necessary, with the final section of pipe leaving the site in the south-western corner. From there it is intended to cross Top Dartford Road, to the junction with Mable Road, where an existing Thames Water foul chamber (4801) is located. This is currently being negotiated with Thames Water and will be the subject of a Section 106 agreement.

6.2.6 Exceedance

6.2.6.1 During extreme rainfall events over and above those designed for or if blockages occur within the drainage systems, there will be times when there are additional overland flows. The site has been designed with this in mind and overland flows routes have been indicated on the drainage plan. (Appendix F Drg. 4400)

6.2.7 Drainage and SuDS Maintenance

6.2.7.1 All of the measures described in this document will form part of the building O&M manual. 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 and foul water drainage systems. Health and Safety risks have been communicated on design drawings. All responsibility for the on-site surface, foul water drainage and maintenance will lie with the site owner or adopting body.

6.2.7.2 The below ground drainage network is to be designed in accordance with Building Regulations Part H 2015, BSEN 752-2008, LASOO Non-Statutory Technical Standards for Sustainable Drainage 2015 and Chapter 32 of CIRIA C753 – The SUDS Manual.

6.2.7.3 General Maintenance

Inspection chambers and access points are to be provided at regular intervals 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, rodding eyes, gullies, channels etc.

6.2.7.4 Drainage Gullies

To be maintained in accordance with the manufacturer's recommendations and the "General" Section above.

6.2.7.5 Foul Systems

To be maintained in accordance with the "General" Section above.

SUDS Maintenance Plan

Permeable paving

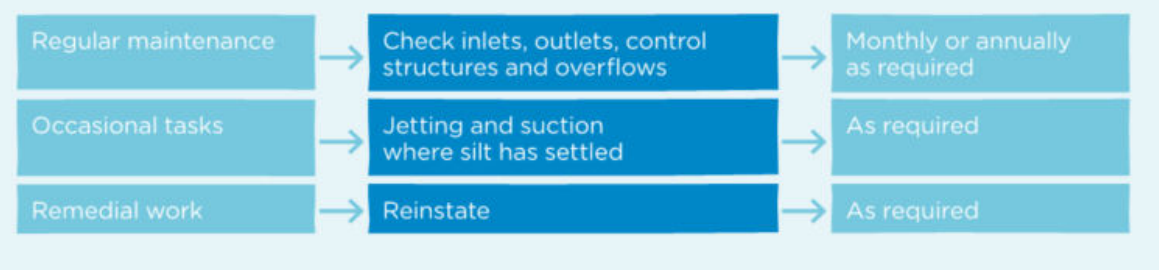
To be in accordance with the suppliers requirements otherwise as noted below;

Regular maintenance	Surface brushing for appearance and to reduce silt accumulation	Monthly
	Brushing and suction sweep or jet wash and suction sweep particularly for block pavement in autumn after leaf fall	Annually
	Mow grass edges to paving at 35-50mm and remove weeds and leaves	As required
	Check outlets and control structures	Monthly depending on detail
Occasional tasks	Jetting and suction where silt has accumulated in joints or voids. Replace grit and vibrate surface to lock for permeable block paving	As required
Remedial work	Where sinkage or surface damage occurs uplift blocks, remove grit bedding layer, geotextile if present and reinstate to design profile	As required

Filter Strips – (where feasible)

Maintenance	Action	Frequency
Regular maintenance	Litter and debris removal from site	Monthly
	Grass cut at 75-100mm not to exceed 150mm leaving cuttings in situ	Monthly or as required
Occasional tasks	Remove leaves in autumn to prevent damage to grass	As required
	Cut back overhanging branches to allow dense grass growth	
Remedial work	Repair erosion, level uneven surfaces or damage by re-turfing or seeding	As required
	Remove an oblique divot along the hard edge where silt has accumulated to reinstate flow over the edge	
	Remove silt and spread locally outside design profile and reinstate surface	

Attenuation (Geocellular) Tanks



Key Responsibilities for SUDS Features.

Deep Bore soakaways, Filter Strips, Vortex control separators, Flow Controls, GeoCellular Storage - Care Home operator/landowner
Permeable Paving - Care Home Operator.

6.2.8 Water Quality

6.2.9 All well designed SuDS should manage the quality of runoff so that receiving waters and / or groundwater are protected from pollution hazards. The methods to achieve the required water quality requirements specific to this site have been designed in accordance with The SuDS Manual (CIRIA 2015) using the simple Indices method.

6.2.10 The below table defines the pollution hazard indices for varying use classifications.

	Pollution hazard indices for different land use classifcations			
Land use	**Pollution hazard level**	**Total suspended solids (TSS)**	**Metals**	**Hydro-carbons**
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (eg schools, offces) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to	High	0.8[2]	0.8[2]	0.9[2]

industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways				

Table 3 - Pollution hazard indices for different land use classifications (The SuDS Manual 2015)

Notes

1. *Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).*
2. *These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should frst be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.*

Where a site land use falls outside the defned categories, the indices should be adapted (and agreed with the drainage approving body) or else the more detailed risk assessment method should be adopted.

Where nutrient or bacteria and pathogen removal is important for a particular receiving water, equivalent indices should be developed for these pollutants (if acceptable to the drainage approving body) or the risk assessment method adopted.

6.2.11 The use classifications for this site have been highlighted green in table 4. The site presents a low risk from runoff generated by roof areas, the access road and parking. However, pollution will be an important factor due to the deep bore soakaway requirements for the site. The ground investigation report confirmed that there was no ground water present within 10.0m of the base of the borehole. This solution is considered acceptable to the Environment Agency as confirmed by them. See Appendix D.

The following table indicates that permeable paving and the proposed vortex separator combinations will provide sufficient mitigation to protect receiving groundwaters.

Mitigation = 0.0

Mitigation index	**TSS**	**Metals**	**Hydrocarbons**
(Constructed permeable pavements)	*0.7*	*0.6*	*0.7*
(Proprietary features – Vortex separator (Downstream Defender))	*0.5*	*0.4*	*0.8*
Deep Bore soakaway	*0.8*	*0.8*	*0.8*

Table 4 - Proposed pollution mitigation

7.0 Flood Mitigation Measures

7.1 The site is at a low risk of flooding. While every effort has been made to prevent flooding on site during the design process, this is largely dependent upon the future maintenance activities of the site owner/ operator.

8.0 Conclusions and Recommendations

8.1 This report gives details of the flood risk assessment and drainage design, which has been carried out in relation to the proposed care home development on land at 57 Top Dartford Road, Hextable.

8.2 The site can be considered at low risk from all forms of flooding. The site ground levels, landscaping and floor levels of the building have all been designed to accommodate potential overland flow routes during extreme rainfall events.

8.3 The site drainage has been designed in accordance with LLFA guidance and recommendations. SuDS features have been introduced to reduce run-off velocity, flood water volume and to improve water quality before it is discharged to the deep bore sewers.

8.4 Allowances have been made for climate increases in rainfall events and systems have been designed for extreme rainfall events.

8.5 The Proposed development meets NPPF and Local Policy requirements.

Appendix A – Development Proposals