Site Assessment Summary – Rowhedge Business Park , Rectory Road

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Rowhedge	RSE08	5.73	Residential (40 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences
The Birch Brook flows from west to east approximately 200m north of the site. The Birch Brook adjoins the River Colne approximately 1km to the east of the site. The site is defined as Flood Zone 1 low probability of flooding from rivers.

Climate Change
Flood modelling of the ordinary watercourse section of the Birch Brook that passes through the site is derived from high level JFLOW modelling, and therefore outputs including an allowance for the impact of climate change are not available for this watercourse.

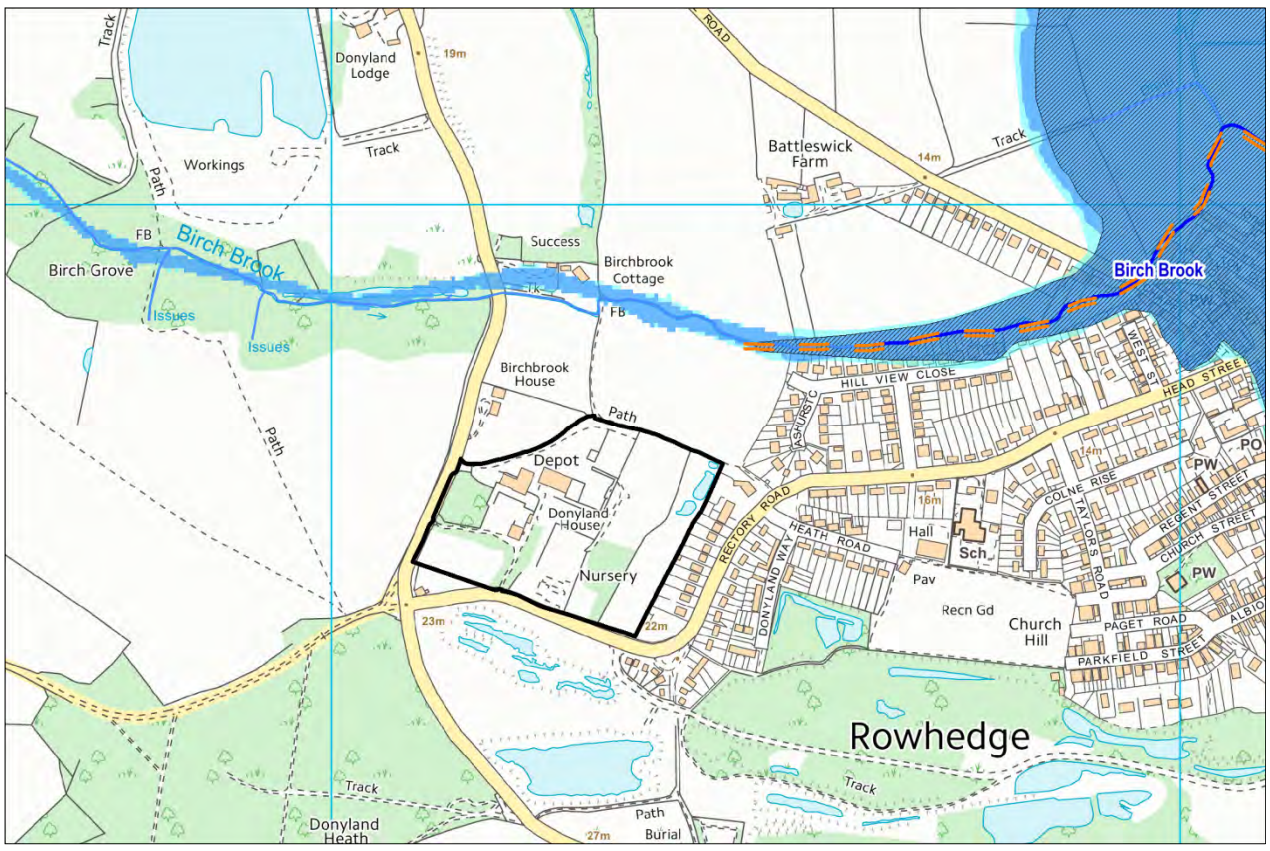

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Figure A Modelled Flood Extents

Residual Risk – Failure of the Colne Barrier at Wivenhoe
The area to the east of the site is protected by the presence of the Colne Barrier at Wivenhoe, which closes during extreme tidal events. A model simulation has been completed to determine the residual risk to the site in the event there is a failure of the Barrier to close. Results for the 0.5% AEP event including an allowance for climate change show that the site is not at risk of flooding from this source, however, flood water may inundate the channel of the Birch Brook, and impact the area to the east of the site including Rowhedge Road and access routes to the area. Flood depths in this area are shown to be as great as 2-3m, corresponding to a hazard rating of Extreme (danger to all).

It should be noted that modelled levels for the Birch Brook are for the section just upstream of the confluence with the River Colne. If the whole length of the Brook were to be modelled, this is likely to alter flood extents and depth levels close to the site. Surface water mapping also appears to show a flow path heading North towards the Birch Brook, which could contribute to further change in flood extents and depths. Design of the site should take this into consideration, and may potentially require modelling of the Birch Brook to more accurately assess this risk.

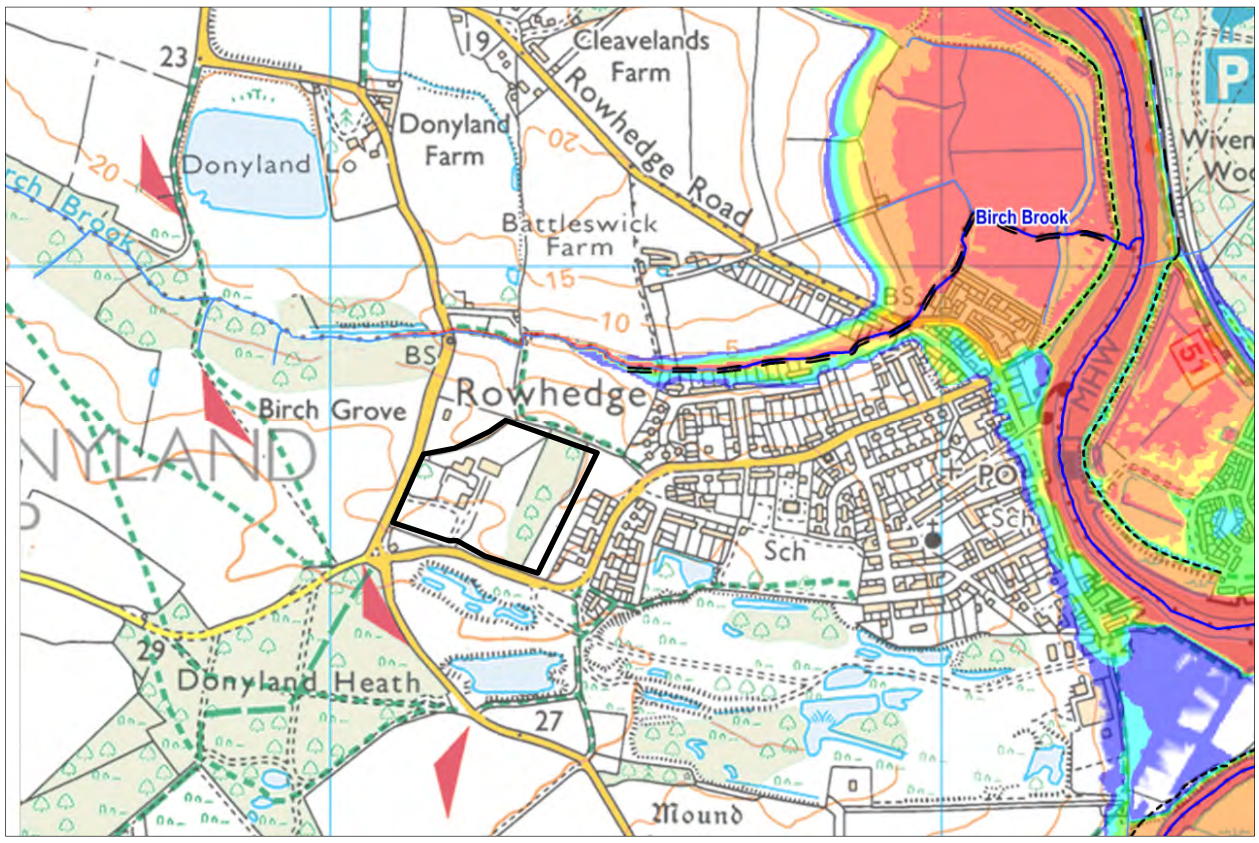

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Figure B Extreme Tidal Event; 0.5% AEP including Climate Change: Maximum Flood Depth

Site Assessment Summary – Rowhedge Business Park , Rectory Road

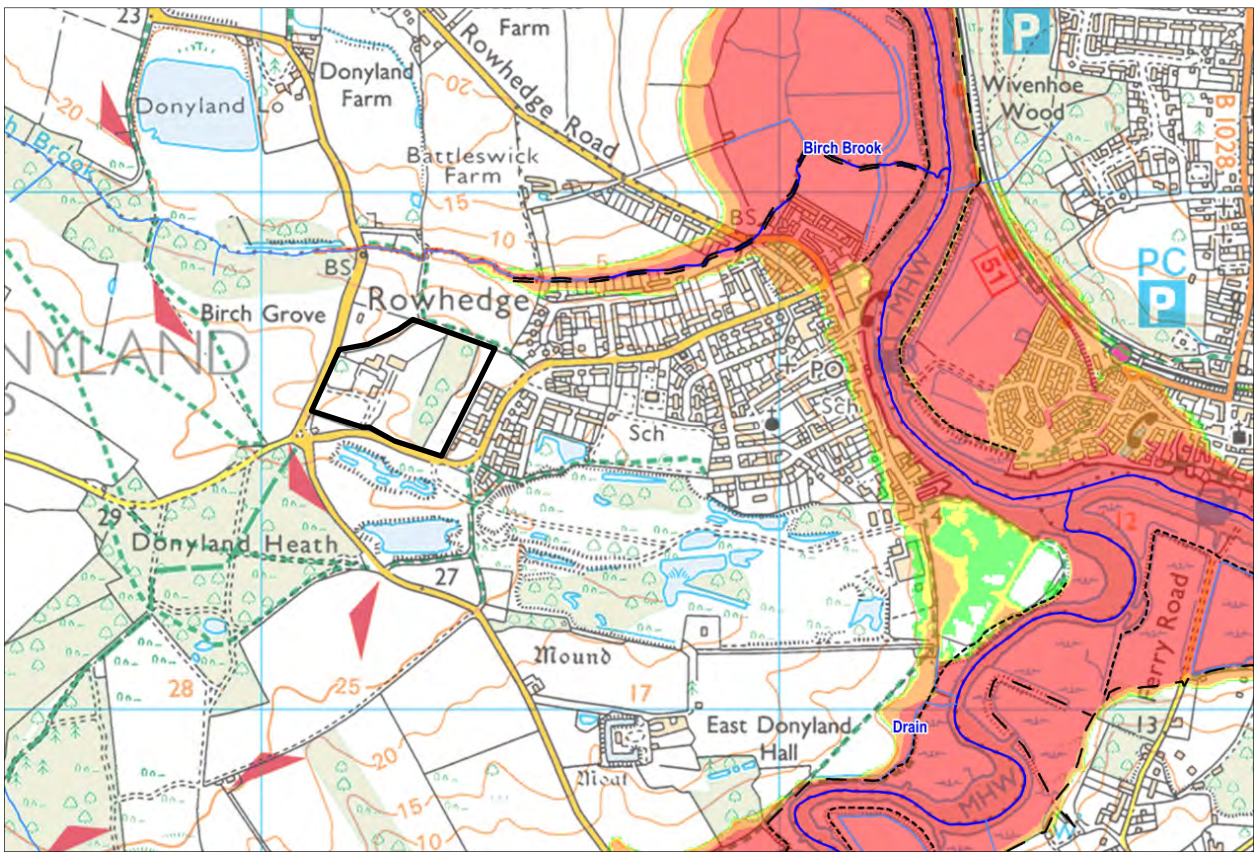

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Figure C Colne Barrier Breach Assessment; 0.5% AEP including Climate Change: Hazard Ratings

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping and SWMP modelling indicate that the majority of the site is at very low risk of surface water flooding (<0.1% AEP).

In accordance to the National Planning Policy Framework, proposed development should not have unacceptable adverse impacts on the flow and quantity of surface water. Therefore the site layout should be carefully planned to ensure that residential dwellings are not at risk from surface water flooding and the position of new development does not divert flow paths to the vicinity of the site.

Geology

The bedrock geology in this area is Thames Group, comprising clay and silt. Adjacent to the Birch Brook, this is overlain by alluvial clays and silts associated with the river environment. Further to south of the Birch Brook, there are bands of Kesgrave catchment subgroup, comprising sand and gravel. Clayey ground is typically not very permeable and provides the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within the study area for the town of Colchester SWMP and is not within a Critical Drainage Area (CDA). There are no historic records of flooding in the area local to the site.

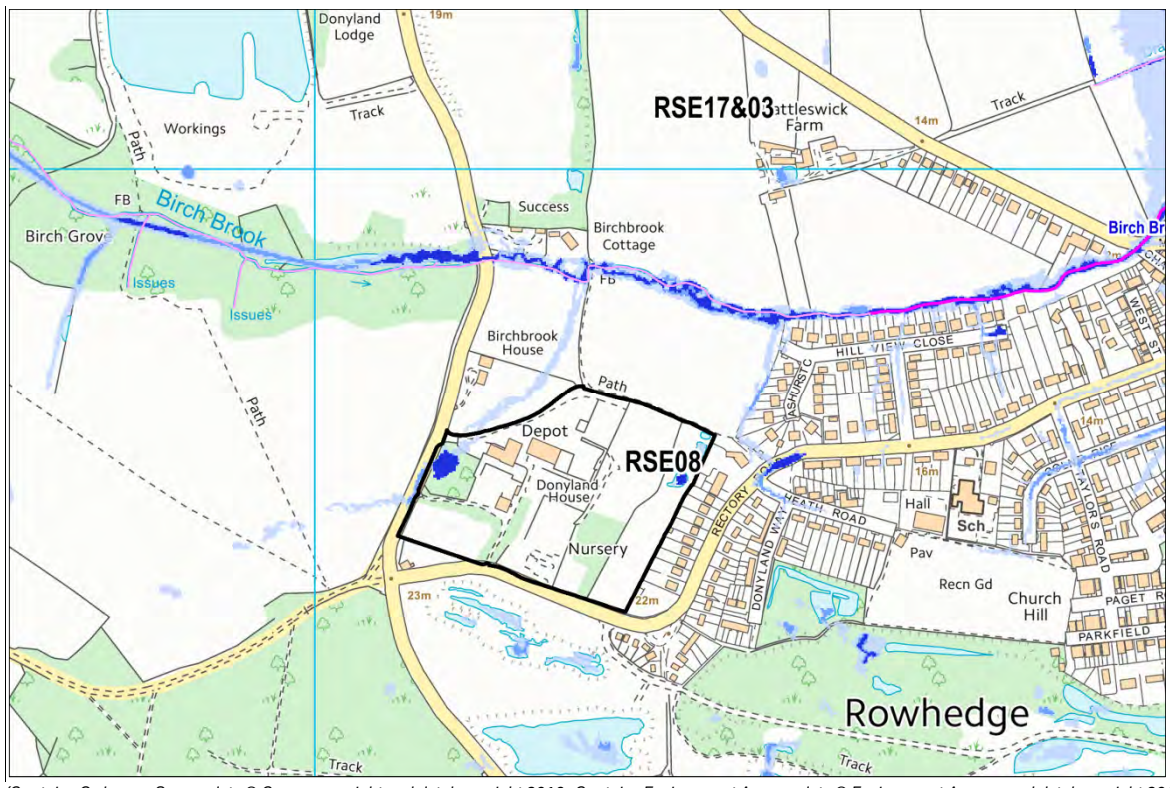

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Figure D Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Rowhedge Business Park , Rectory Road

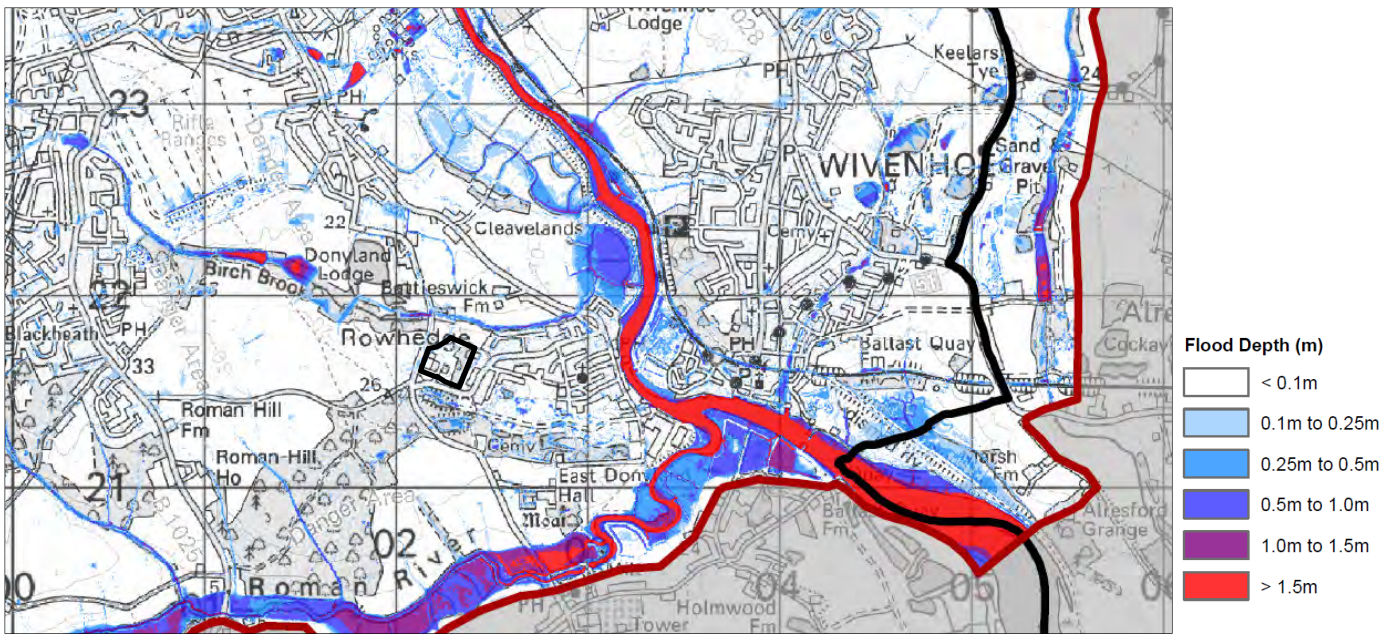

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Figure E Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	7.9 l/s	
	1 in 1 year:	11.5 l/s	
	1 in 30 year:	18.1 l/s	
	1 in 100 year:	25.1 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge may be possible to the Birch Brook, subject to consultation with Essex CC and landowners. Potential constraint of crossing private land to reach watercourse. Discharge via Anglian Water Network may be necessary.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which <25% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore generally considered to be low. This will need to be confirmed during site investigation survey.

Other Sources

The Environment Agency 'Risk of Flooding from Reservoirs' mapping shows that the floodplain of the Birch Brook, located to the north of the site, is at risk of inundation in the event of a failure of the following reservoirs: Abberton Central and Western Arm (NGR 598901, 219790); and Abberton (NGR 598780, 219734). The site itself is not shown to be at risk of inundation. As noted in the Level 1 SFRA report, given the regular inspection of these reservoirs in accordance with the Reservoirs Act 1975, flooding from reservoirs is considered to be a managed risk.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the Essex CC's SuDS Design Guide[16] (i.e. considering infiltration measures first wherever possible).

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[17].

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable via Rectory Road and Fringringhoe Road to the south and west of the site. Access to the site from the east along Head Street and Rowhedge Road is shown to be at residual risk of flooding from the River Colne, in event of a breach of the Colne Barrier.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the River Colne, into which the nearby Birch Brook feeds, so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[16] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[17] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – West of Lakelands

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Stanway	STN06	8.3	Residential (150 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The Roman River flows from north to south in open channel approximately 800m west of the site. The site is located entirely within Flood Zone 1, and is therefore currently considered to be at low risk of flooding from the Roman River.

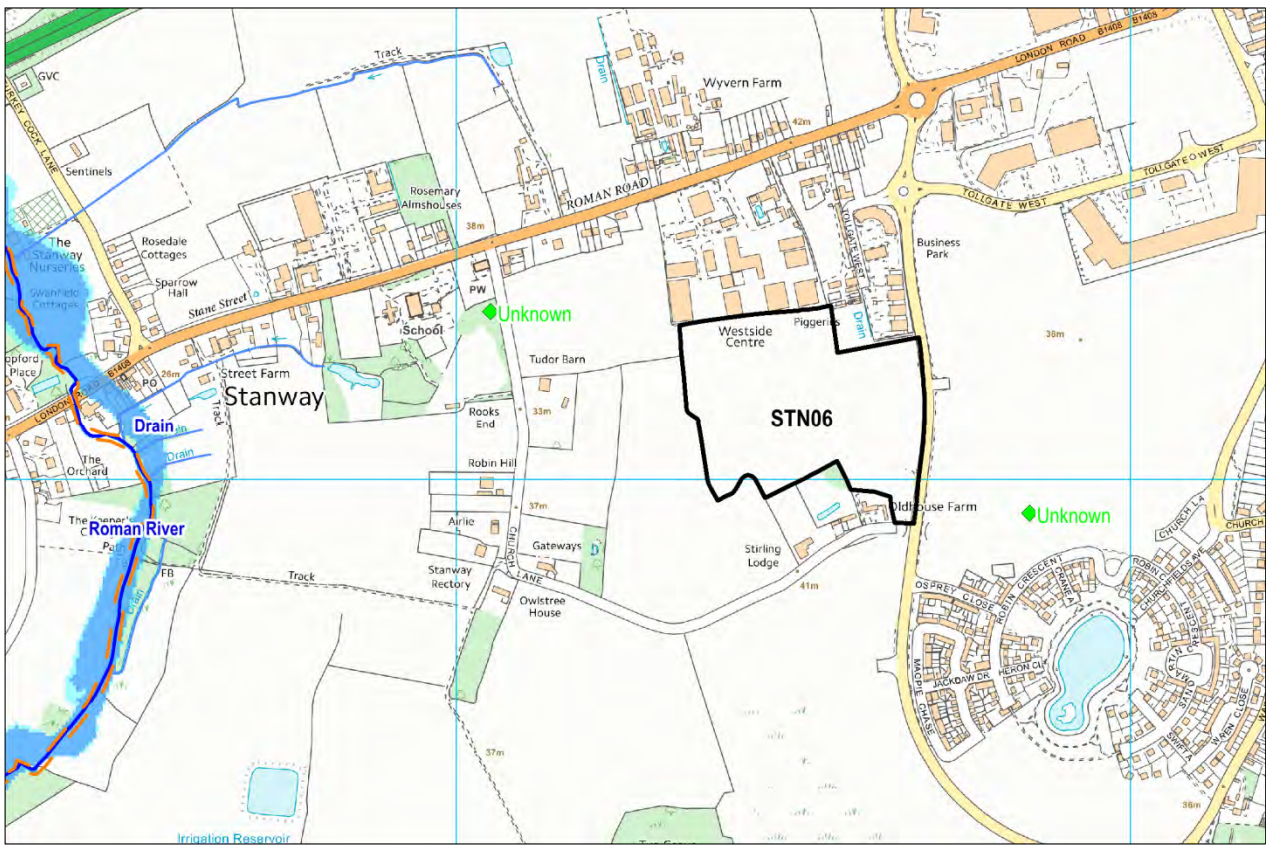

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping indicates that whilst the majority of the site is at low risk of surface water flooding (<0.1% AEP), the mapping indicates there may be areas at medium to high risk of surface water flooding.

In accordance with the National Planning Policy Framework, proposed development should not have unacceptable adverse impacts on the flow and quantity of surface water. Therefore the site layout should be carefully planned to ensure that residential dwellings are not at risk from surface water flooding and the position of new development does not divert flow paths to the vicinity of the site.

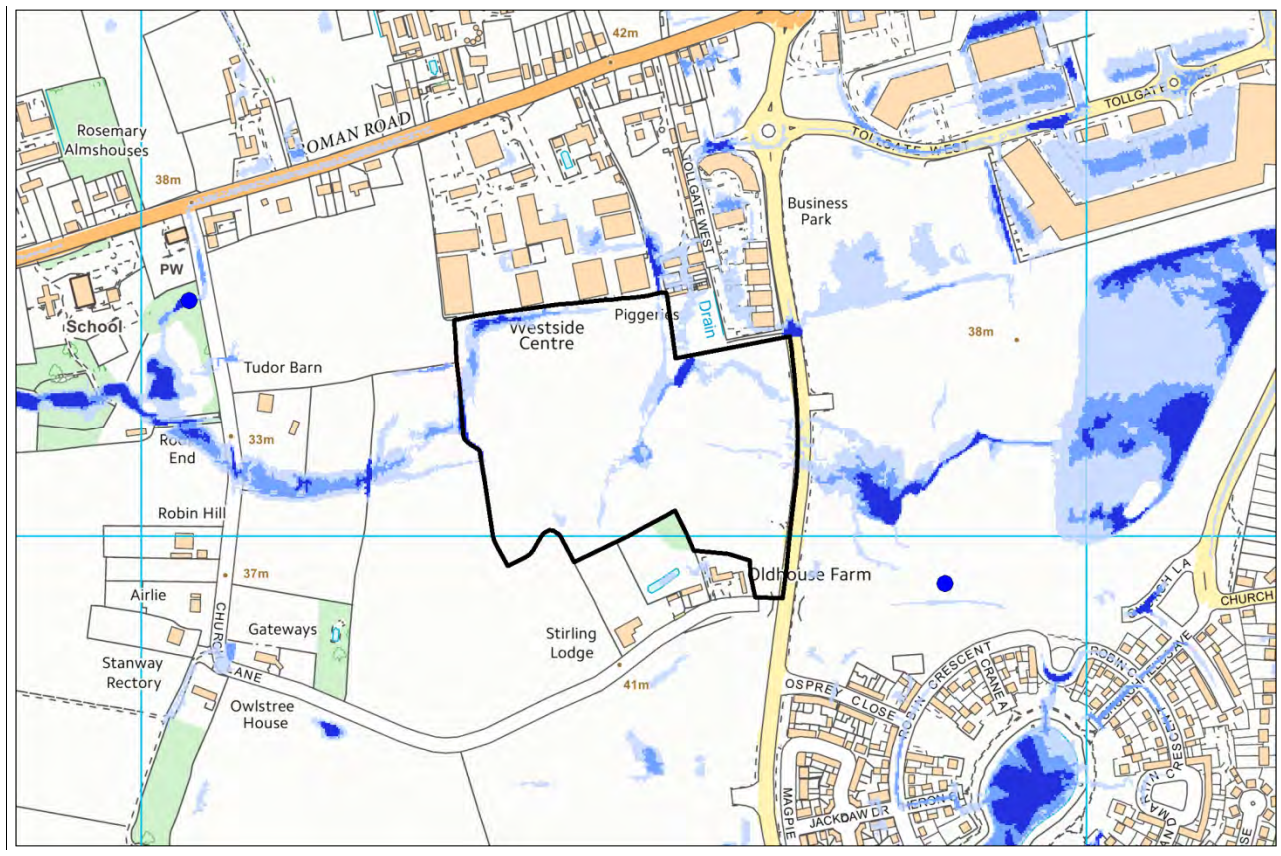

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Figure B Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – West of Lakelands

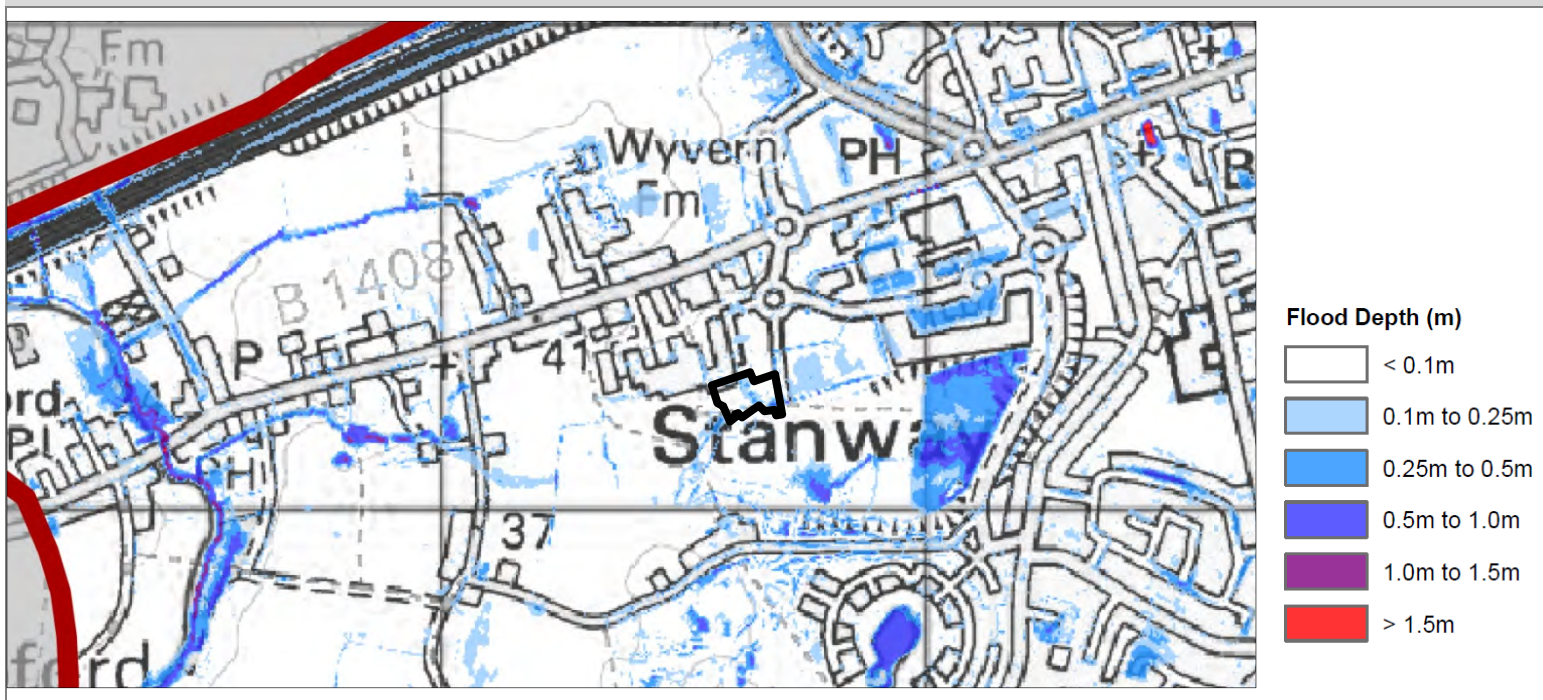

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Figure C Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth

Geology

The bedrock geology in this area is London Clay Formation, comprising clay, silt and sand, which are overlain by clay, silty and sandy Cover Sand. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within the study area for the town of Colchester SWMP and is not within a Critical Drainage Area (CDA). There are no historic records of flooding in the area local to the site.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	11.6 l/s	
	1 in 1 year:	16.6 l/s	
	1 in 30 year:	26.7 l/s	
	1 in 100 year:	37.1 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Unlikely to be possible due to distance from watercourse.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which 25-50% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore generally considered to be low. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. Further assessment should be made of the surface water flowpaths across the site. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the Essex CC's SuDS Design Guide[18]. (I.e. considering infiltration measures first wherever possible).

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[19].

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable along the road network to the east of the site and onto London Road.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[18] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[19] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – DSG Site, Flagstaff Road

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Colchester	COL98	4.31	Residential (100 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for this site as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences
The site is located entirely within Flood Zone 1, which is defined as low probability of flooding from rivers. There are no ordinary watercourses within close proximity to the site, and the closest Main River is the River Colne, 1.2km away.

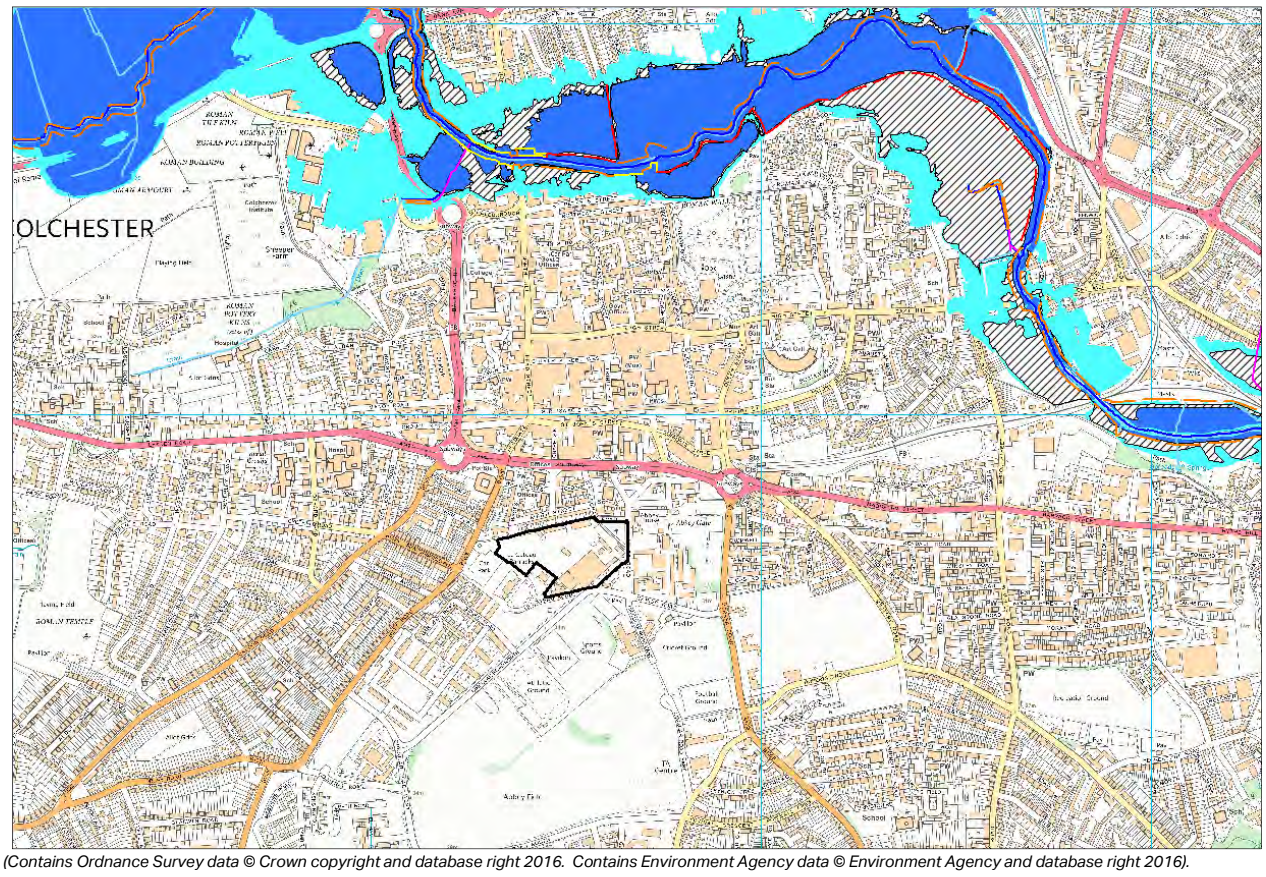

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Figure A Modelled Flood Extents

Residual Risk – Failure of the Colne Barrier at Wivenhoe
The area to the east of the site is protected by the presence of the Colne Barrier at Wivenhoe, which closes during extreme tidal events. A model simulation has been completed to determine the residual risk to the site in the event there is a failure of the Barrier to close. Results for the 0.5% AEP event including an allowance for climate change show that flood water would not inundate the site or affect safe access / egress routes.

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Figure B Colne Barrier Breach Assessment; 0.5% AEP including Climate Change: Maximum Flood Depth

Site Assessment Summary – DSG Site, Flagstaff Road

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Figure C Colne Barrier Breach Assessment; 0.5% AEP including Climate Change: Hazard Rating

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW and SWMP modelling indicate that sections of the site are at risk of surface water ponding. In some small areas in the north of the site, this is a high risk. This may be due to a flow path which appears to run down Walsingham Road from the north.

In accordance with the National Planning Policy Framework, proposed development should not have unacceptable adverse impacts on the flow and quantity of surface water. Therefore the site layout should be carefully planned to ensure that residential dwellings are not at risk from surface water flooding and the position of new development does not divert flow paths to the vicinity of the site.

Geology

The bedrock geology in this area is Thames Group, comprising of clay and silt. The superficial deposits consist of Kesgrave catchment subgroup, made up of sand and gravel. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site lies within a Critical Drainage Area (CDA) (Colchester Town Area) identified during the preparation of the town of Colchester SWMP. There are no historic records of flooding nearby to the site.

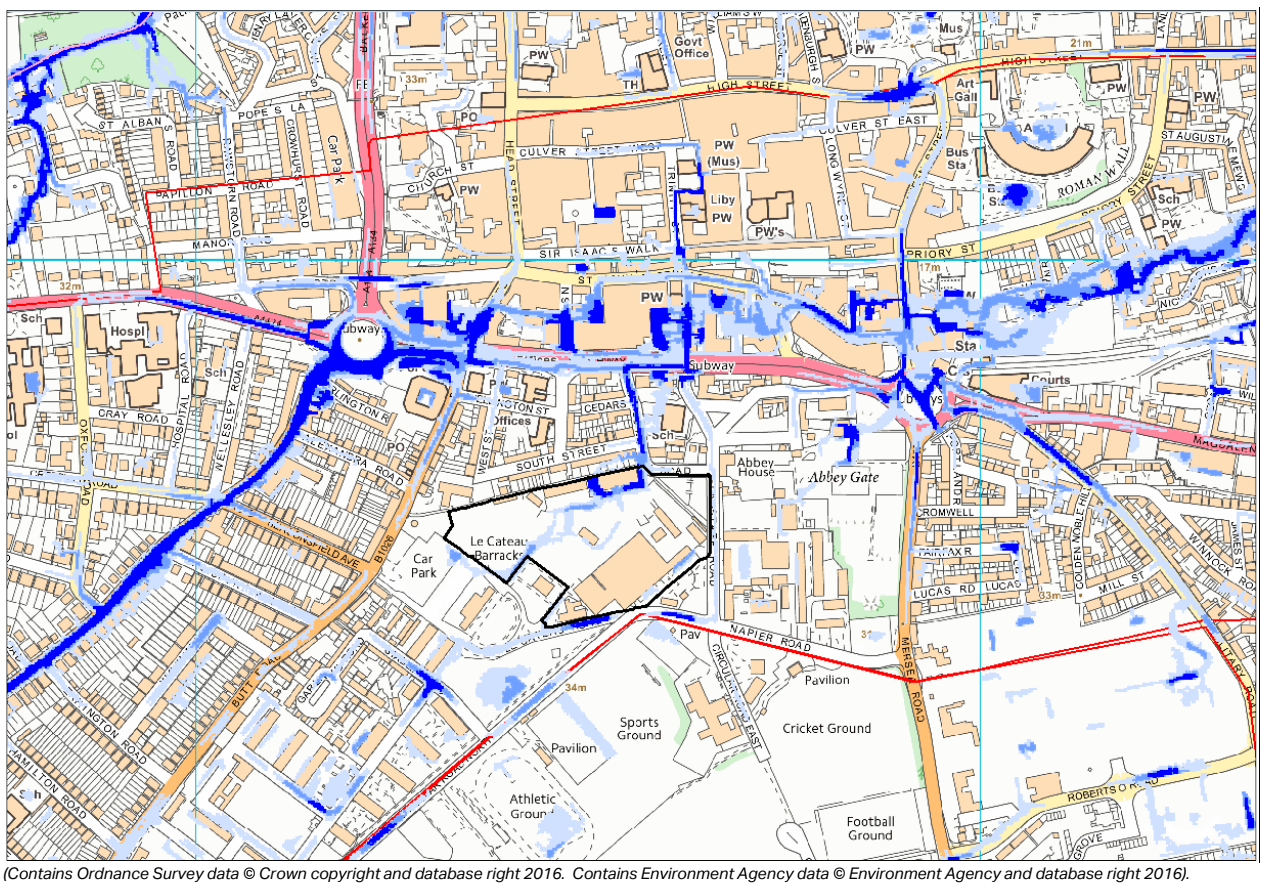

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Figure D Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – DSG Site, Flagstaff Road

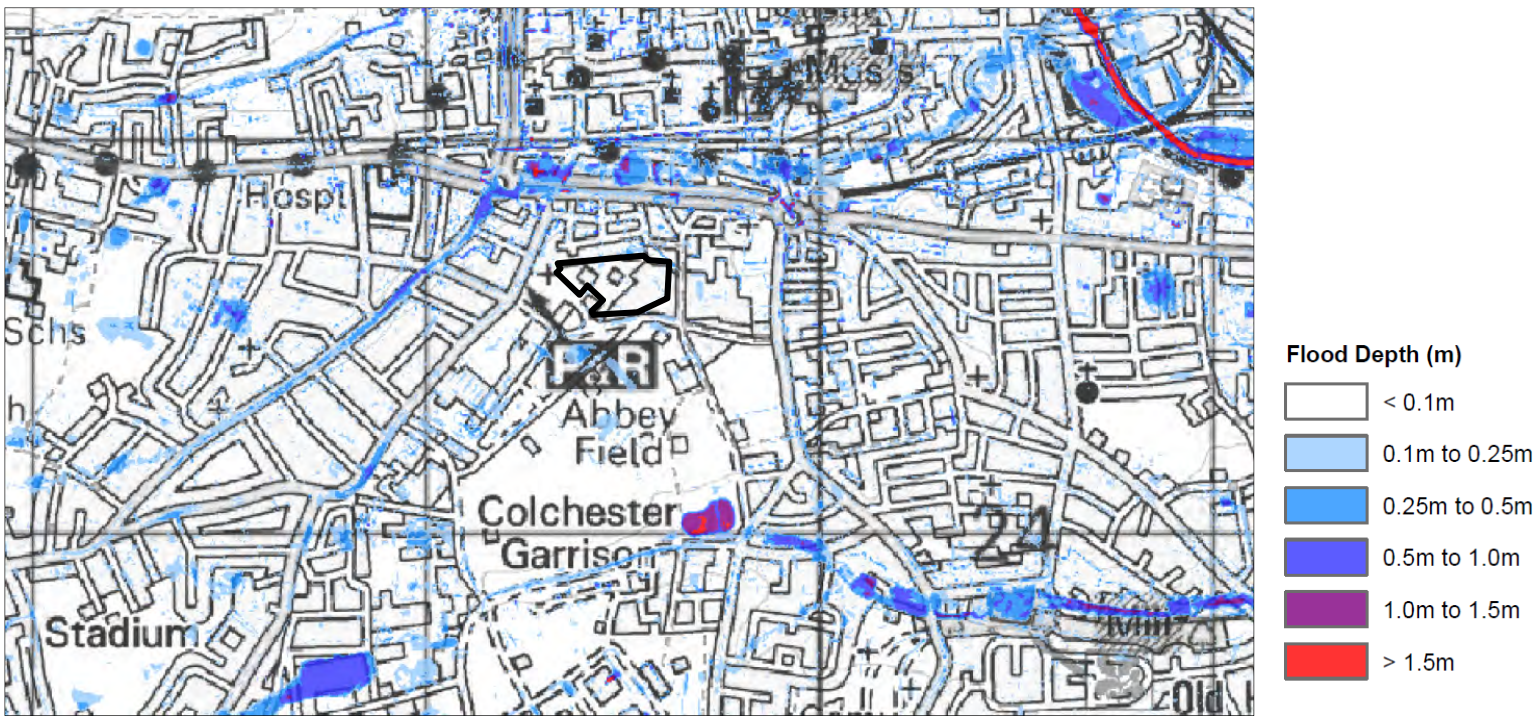

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Figure E Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	7.9 l/s	
	1 in 1 year:	6.7 l/s	
	1 in 30 year:	17.9 l/s	
	1 in 100 year:	25.2 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		This may be difficult as there are no nearby watercourses.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which 25-50% is susceptible to groundwater emergence. The risk of groundwater flooding is therefore considered to be medium. The potential for groundwater flooding in this area will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with Essex CC's SuDS Design Guide[20] (i.e. considering infiltration measures first wherever possible).

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[21].

Access / Egress

Access to the site is provided via Flagstaff Road, which is shown to be susceptible to surface water ponding in a 1 in 1000 year storm event from the updated Flood Map for Surface Water. Further assessment of this potential flooding should be made during the preparation of proposals for the site, and opportunities taken to improve the capacity of surface water drainage infrastructure along this route where possible.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the River Colne, into which the nearby Birch Brook feeds, so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[20] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[21] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Berechurch Hall Road

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Colchester	COL99	30.11	Residential (500 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences
The Environment Agency Detailed River Network (DRN) shows that there are two ordinary watercourses near the site boundary, one to the east and the other to the west. They both flow south to join the Roman River, approximately 900m to the south. The Roman River adjoins the River Colne to the east. Birch Brook is located 1.2km north east to the site. The site is defined as Flood Zone 1, with low probability of flooding from rivers.

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Figure A Modelled Flood Extents

Residual Risk – Failure of the Colne Barrier at Wivenhoe
The area to the east of the site is protected by the presence of the Colne Barrier at Wivenhoe, which closes during extreme tidal events. There is the potential risk that in the event of breaching; flood water may back up into the Roman River. A model simulation has been completed to determine the residual risk to the site in the event there is a failure of the Barrier to close. Results for the 0.5% AEP event including an allowance for climate change show that flood water does not approach the site, however there is potential for flows to back up the ordinary watercourses nearby. Further investigation and modelling would be required to establish whether this might occur.

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Figure B Colne Barrier Breach Assessment; 0.5% AEP including Climate Change: Maximum Flood Depth

Site Assessment Summary – Berechurch Hall Road

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Figure C Colne Barrier Breach Assessment; 0.5% AEP including Climate Change: Hazard Rating

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping and SWMP modelling indicate that the majority of the site is at very low risk of surface water flooding (<0.1% AEP). There are a few spots with higher risk, but this could likely be resolved by topographic reprofiling or suitable drainage.

In accordance with the National Planning Policy Framework, proposed development should not have unacceptable adverse impacts on the flow and quantity of surface water. Therefore the site layout should be carefully planned to ensure that residential dwellings are not at risk from surface water flooding and the position of new development does not divert flow paths to the vicinity of the site.

Geology

The bedrock geology in this area is Thames Group, comprising clay and silt. The superficial sediments overlain consist of Cover Sand, made up of clays, silt and sand. Clayey ground is typically not very permeable and provides the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within the study area for the town of Colchester SWMP and is not within a Critical Drainage Area (CDA). There are no historic records of flooding in the area local to the site.

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Figure D Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Berechurch Hall Road

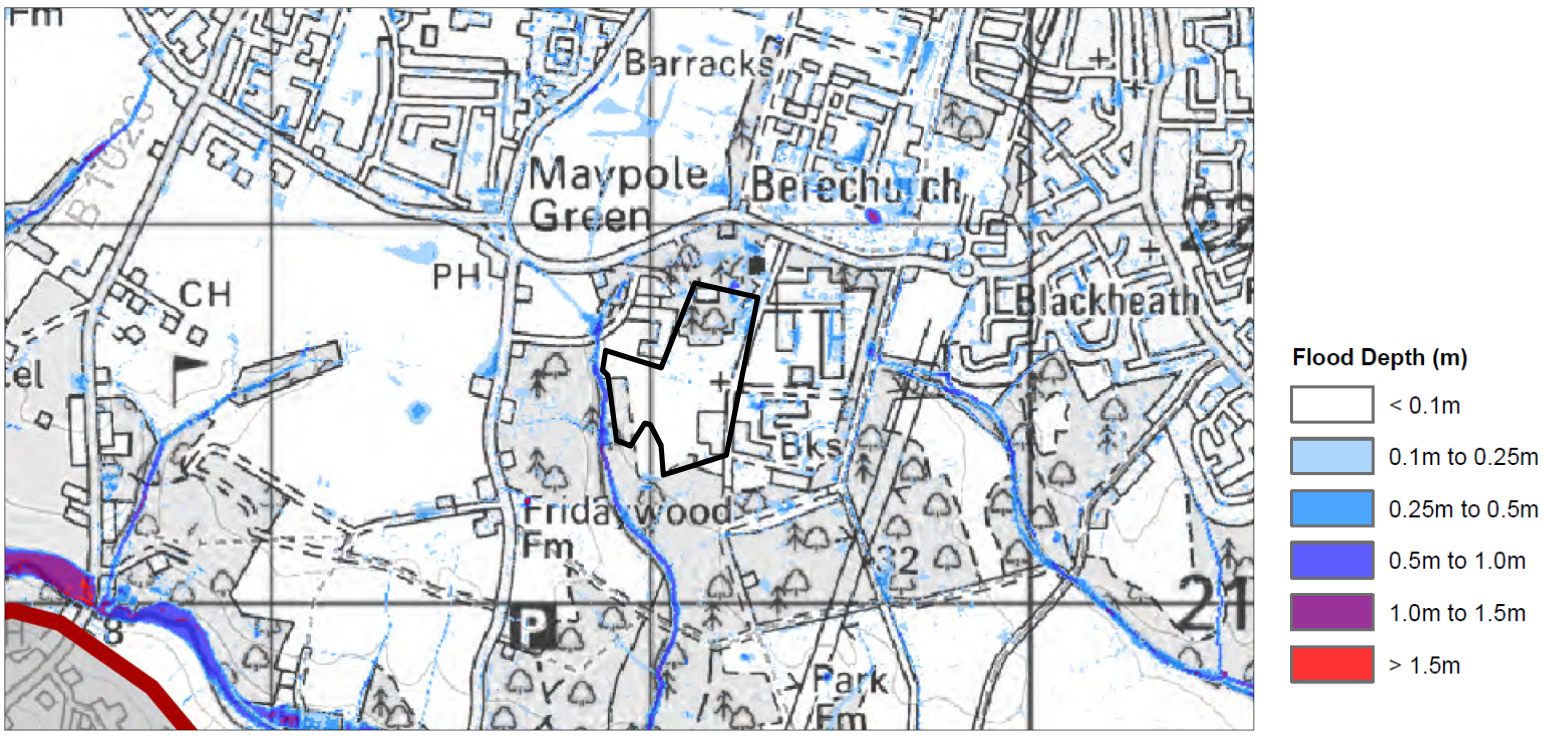

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Figure E Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	44.7 l/s	
	1 in 1 year:	38.0 l/s	
	1 in 30 year:	101.3 l/s	
	1 in 100 year:	142.6 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to surrounding ordinary watercourses, subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which 75% or more is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore generally considered to be high. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with Essex CC's SuDS Design Guide[22] (i.e. considering infiltration measures first wherever possible).

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back on one side of the ordinary watercourse to the east of the site, to provide access for maintenance. Essex CC will need to be consulted and consent obtained for any proposed works that may impact flow within the channel of the watercourse.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[23].

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable via side roads from Berechurch Hall Road to the north of the site. The roads immediately surrounding the site do not appear to be at risk from extensive surface water flooding that would prevent safe access / egress.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the River Colne, into which the nearby Roman River feeds, so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[22] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[23] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Middlewick Ranges

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Colchester	COL71	84.35	Residential (1000 dwellings)	More Vulnerable

Sequential Test Status:

The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
99.82%	0.09%	0.09%	0%

Flood Zones and Flood Defences

The River Colne flows to the east of the site, approximately 1.3km away. A very small area in the south of the site is subject to medium and high probability of flooding and is classed as Flood Zone 2 and 3, as the Birch Brook runs through the site from west to east. The majority of the large site (99.82%) is located within Flood Zone 1, and is therefore considered to be at low risk from flooding from the River Colne.

The Birch Brook is not modelled along it's entire length, which may impact current flood extents, depths and flows running through the site. It is likely that modelling of the brook may be required to ensure safe design of the site.

Functional Floodplain

Flood modelling of the ordinary watercourse section of the Birch Brook that passes through the site is derived from high level JFLOW modelling, and therefore outputs for Flood Zone 3b functional floodplain are not available for this watercourse. Further modelling is required to determine the extent of Flood Zones across the site, described further below in the 'site specific recommendations' section.

Climate Change

Flood modelling of the ordinary watercourse section of the Birch Brook that passes through the site is derived from high level JFLOW modelling, and therefore outputs including an allowance for the impact of climate change are not available for this watercourse.

Figure A Modelled Flood Extents

Residual Risk – Failure of the Colne Barrier at Wivenhoe

The area to the south east of the site is protected by the presence of the Colne Barrier at Wivenhoe, which closes during extreme tidal events. A model simulation has been completed to determine the residual risk to the site in the event there is a failure of the Barrier to close. Results for the 0.5% AEP event including an allowance for climate change shows that the site is not at risk of flooding from this source.

Figure B Colne Barrier Breach Assessment; 0.5% AEP including Climate Change: Maximum Flood Depth

Site Assessment Summary – Middlewick Ranges

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Figure C Colne Barrier Breach Assessment; 0.5% AEP including Climate Change: Hazard Ratings

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping indicates that whilst the majority of the site is at low risk of surface water flooding (<0.1% AEP), the mapping indicates there may be areas at medium to high risk of surface water flooding, particularly in the south of the site where the Birch Brook runs through the site. There are also some potential flow routes to the north and west of the site boundary.

In accordance with the National Planning Policy Framework, proposed development should not have unacceptable adverse impacts on the flow and quantity of surface water. Therefore the site layout should be carefully planned to ensure that residential dwellings are not at risk from surface water flooding and the position of new development does not divert flow paths to the vicinity of the site.

Geology

The bedrock geology in this area is Thames Group, comprising of clay and silt. This is overlain by sand and gravel of the Kesgrave Catchment subgroup. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The northern section of the site is within the study area for the town of Colchester SWMP and is within the 'Old Heath' Critical Drainage Area (CDA). There are four historic records of flooding a considerable distance away to the north of the site, but the causes of these incidents are unknown.

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Figure D Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Middlewick Ranges

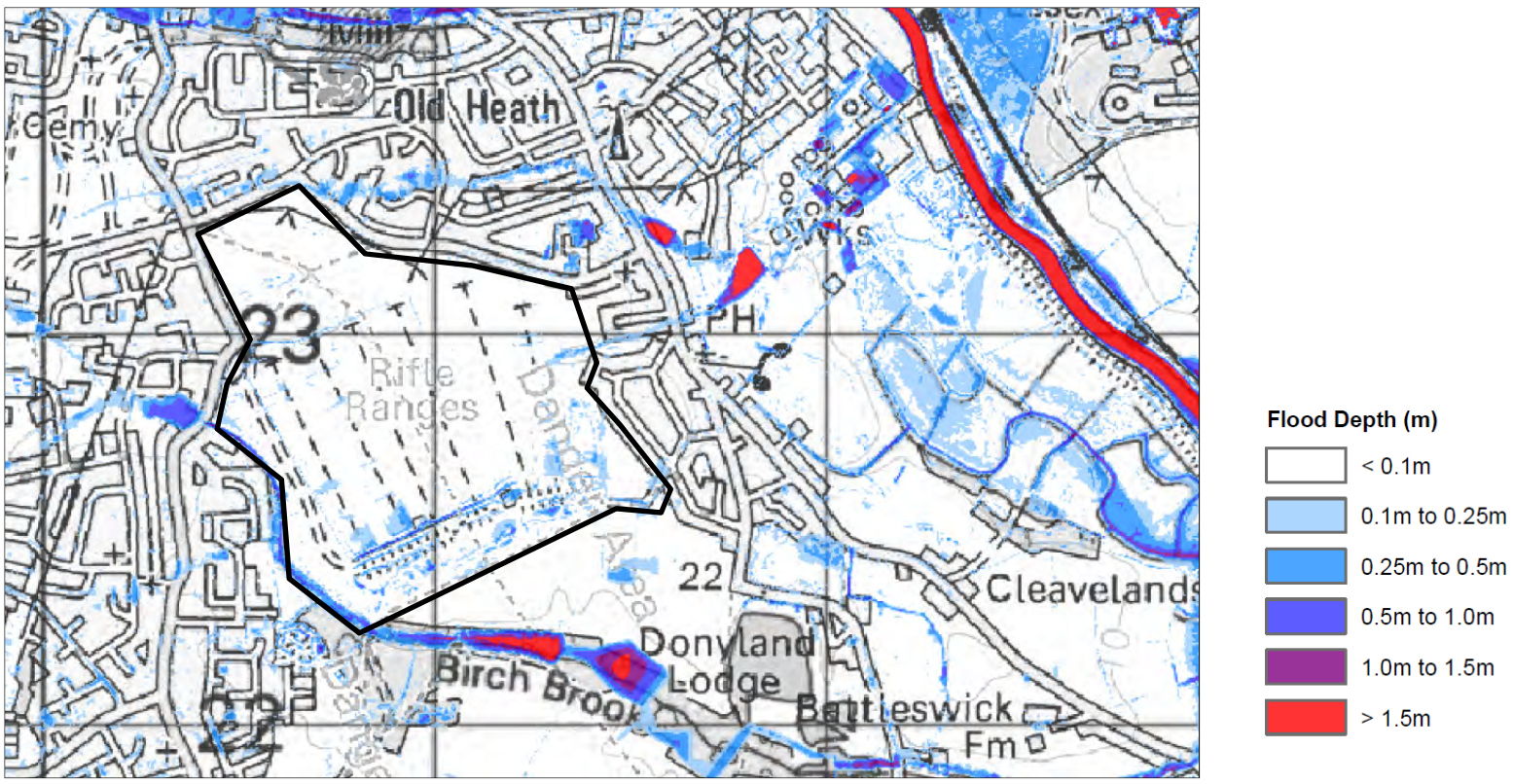

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Figure E Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	111.8 l/s	
	1 in 1 year:	95.0 l/s	
	1 in 30 year:	253.3 l/s	
	1 in 100 year:	356.6 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to the Birch Brook, subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is mostly located within a 1km square of which at least 75% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore generally considered to be high. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Fluvial Modelling

As part of a site specific FRA for this site, a simple hydraulic model may need to be developed to more accurately determine the probability of flooding across the site from the Birch Brook. As part of this assessment, a range of probability events should be compared to determine impact of climate change on the risk of flooding at this location.

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. Further assessment should be made of the surface water flowpaths across the site. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS.

Development has been identified as being within a CDA. Policies to manage surface water are already in place and should be adhered to. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with Essex CC's SuDS Design Guide[24] (i.e. considering infiltration measures first wherever possible).. Potential to modify the kerb and flow patterns along Abbots Road to divert flows into SuDS measures within the remaining open space south of the road. Would pend investigation.

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back on one side of the ordinary watercourse to the east of the site, to provide access for maintenance. Essex CC will need to be consulted and consent obtained for any proposed works that may impact flow within the channel of the watercourse.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[25].

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable along the road network to the north west of the site and onto Mersea Road.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the River Colne, into which the nearby Birch Brook feeds, so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[24] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[25] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Heathfields

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Eight Ash Green	RNW71	6.7	Residential (170 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for this site as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The site is located entirely within Flood Zone 1, which is defined as low probability of flooding from rivers. The Environment Agency Detailed River Network (DRN) shows a Main River forming the southern boundary of the site, which flows from west to east to join the River Colne, which is 900m away. The EA data identifies the site as 'defended' from the Main River by high ground, however further investigation would be advised to acknowledge the potential flood risk to the site. As there is no detailed flood data for this section of the river, it is likely that modelling would be required as part of this investigation. This would then contribute to planning applications which must demonstrate that flood risk can be managed appropriately, without increasing downstream flood risk.

Functional Floodplain

Flood modelling of the Main River that passes along the southern boundary needs to include outputs for Flood Zone 3b functional floodplain as they are not available for this watercourse. Further modelling is required to determine the extent of Flood Zones across the site, described further below in the 'site specific recommendations' section.

Climate Change

Flood modelling of the Main River that passes along the southern boundary of the site is derived from high level JFLOW modelling, and therefore outputs including an allowance for the impact of climate change are not available for this watercourse.

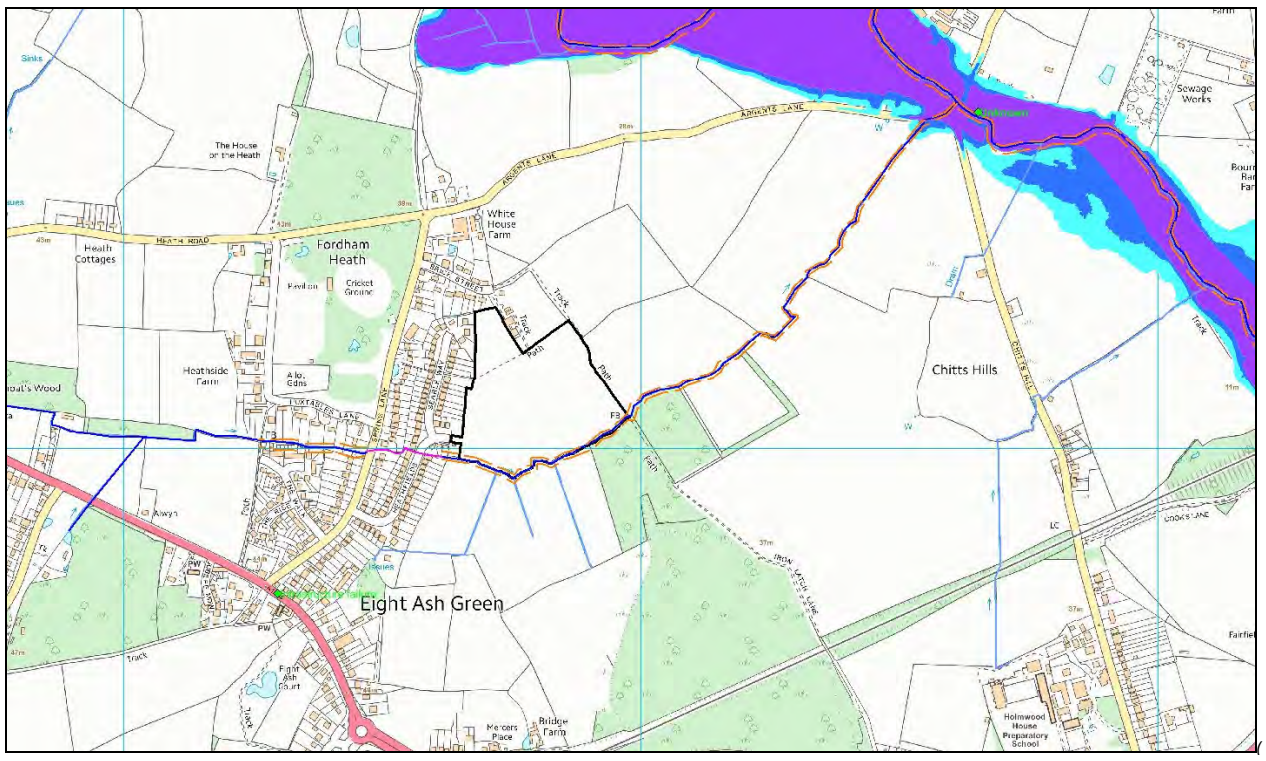

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW indicates that sections in the south of the site, along the Main River are at low to medium risk of surface water ponding. This could be due to the high ground preventing surface water run-off from entering the watercourse.

In accordance with the National Planning Policy Framework, proposed development should not have unacceptable adverse impacts on the flow and quantity of surface water. Therefore the site layout should be carefully planned to ensure that residential dwellings are not at risk from surface water flooding and the position of new development does not divert flow paths to the vicinity of the site.

Geology

The bedrock geology in this area is Thames Group, comprising of clay and silt. This is overlain by Head deposits consisting of clay, silt, sand and gravel. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not shown to lie within a Critical Drainage Area (CDA), which were identified during the preparation of the town of Colchester SWMP. There are no historic records of flooding nearby to the site.

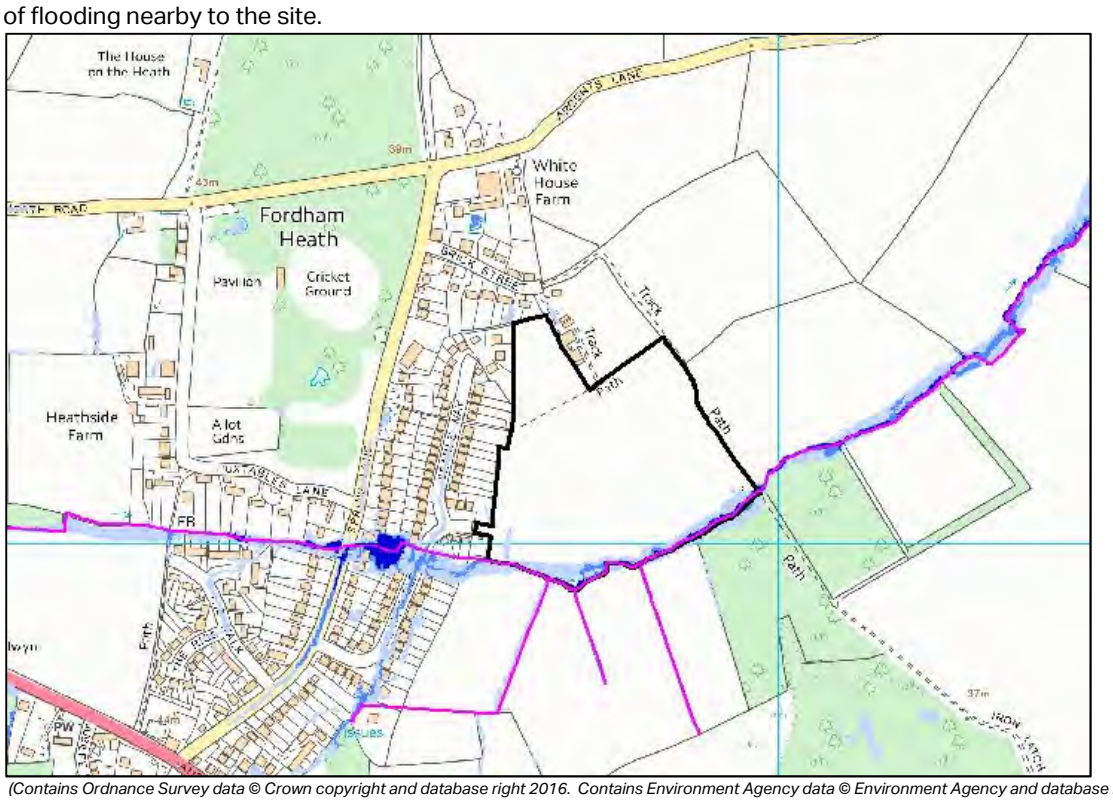

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Figure B Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Heathfields

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	11.7 l/s	
	1 in 1 year:	10.0 l/s	
	1 in 30 year:	26.6 l/s	
	1 in 100 year:	37.4 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to the Main River to the south . Subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which <25% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be low. The potential for groundwater flooding in this area will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Fluvial Modelling

As part of a site specific FRA for this site, a simple hydraulic model may need to be developed to more accurately determine the probability of flooding across the site from the Main River. As part of this assessment, a range of probability events should be compared to determine impact of climate change on the risk of flooding at this location.

Site Layout and Design

The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with with Essex CC's SuDS Design Guide[26] (i.e. considering infiltration measures first wherever possible)

Set-back Distance

Essex CC, as the LLFA, requires at least a 8 m set back on one side of the Main River to the east of the site, to provide access for maintenance. Essex CC will need to be consulted and consent obtained for any proposed works that may impact flow within the channel of the watercourse.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[27]..

Access / Egress

Access to the site is provided via Brick Street to the north east of the site. There is no evidence of surface water flooding along this route and surrounding road networks, so safe dry access / egress should be possible from the site.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the nearby River Colne, so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[26] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[27] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Grove Road, Tiptree

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Tiptree	TIP39	2.17	Residential (55 dwellings)	More Vulnerable

Sequential Test Status:

The Sequential Test has been undertaken by Colchester BC for this site as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The site is located entirely within Flood Zone 1, which is defined as low probability of flooding from rivers. There are three ordinary watercourses nearby to the site, with one flowing parallel to the northern site boundary. They connect to the east of the site, where they continue eastwards to join with the nearest main watercourse, the Layer Brook, approximately 2.15km away.

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW indicates that there is surface water flooding to the northern edge of the site, adjacent to the ordinary watercourse. There is also a collection of surface water in the middle of the site, which is deemed at low risk. This could be an area of low ground and an associated flow path. The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert flows to a neighbouring area.

Geology

The bedrock geology in this area is Thames Group, comprising of clay and silt. This is overlain by Glaciofluvial deposits – consisting of sand and gravel. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not shown to lie within a Critical Drainage Area (CDA), which were identified during the preparation of the town of Colchester SWMP. There are no historic records of flooding nearby to the site.

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Figure B Risk of Flooding from Surface Water (RoFSW)

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	4.3 l/s
	1 in 1 year:	3.7 l/s
	1 in 30 year:	9.7 l/s
	1 in 100 year:	13.7 l/s

Site Assessment Summary – Grove Road, Tiptree

Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to the ordinary watercourse. Subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that over half of the site (1.3ha) is located within a 1km square of which <25% is susceptible to groundwater emergence. However the rest of the site is located within a 1km square of which 50-75% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be low - medium. The potential for groundwater flooding in this area will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[28] (i.e. considering infiltration measures first wherever possible).

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back on one side of the ordinary watercourse to the east of the site, to provide access for maintenance. Essex CC will need to be consulted and consent obtained for any proposed works that may impact flow within the channel of the watercourse.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[29]..

Access / Egress

Access to the site is provided via Grove Road to the south of the site, which is shown to be susceptible to surface water ponding in the SWMP modelling. Further assessment of this potential flooding should be made during the preparation of proposals for the site, and opportunities taken to improve the capacity of surface water drainage infrastructure along this route should be investigated.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[28] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[29] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Cooks Hall Lane

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
West Bergholt	WBG16	0.22	Residential (6 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for this site as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences
The site is located entirely within Flood Zone 1, which is defined as low probability of flooding from rivers. There are 2 ordinary watercourses to the south of the site, which are 50 and 150m away, flowing in a southerly direction away from the site. The closest Main River is the River Colne, which is 360m to the south west. The Colne is protected by high ground. However there is no hydraulic modelling available for nearby ordinary watercourses. Therefore the potential fluvial risks from these watercourses should be further clarified as part of the site specific FRA.

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling
The RoFSW indicates that there is potential for surface water flooding around the site boundary. This is generally low probability; however the road to the south of the site has high to medium surface water flooding. This could be due to a flow path from the north, poor drainage or perhaps a depression in the topography.
In accordance with the National Planning Policy Framework, proposed development should not have unacceptable adverse impacts on the flow and quantity of surface water. Therefore the site layout should be carefully planned to ensure that residential dwellings are not at risk from surface water flooding and the position of new development does not divert flow paths to the vicinity of the site.

Geology
The bedrock geology in this area is Thames Group, comprising of clay and silt. This is overlain by Head deposits consisting of clay, silt, sand and gravel. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records
The site is not shown to lie within a Critical Drainage Area (CDA), which were identified during the preparation of the town of Colchester SWMP. There are no historic records of flooding nearby to the site.

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Figure B Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Cooks Hall Lane

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	0.6 l/s	
	1 in 1 year:	0.5 l/s	
	1 in 30 year:	1.3 l/s	
	1 in 100 year:	1.8 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to nearby ordinary watercourses. Subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which <25% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be low. The potential for groundwater flooding in this area will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[30] (i.e. considering infiltration measures first wherever possible).

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back on one side of the ordinary watercourse to the east of the site, to provide access for maintenance. Essex CC will need to be consulted and consent obtained for any proposed works that may impact flow within the channel of the watercourse.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[31]..

Access / Egress

Access to the site is provided via Cook's Hall Road to the east of the site, which is shown to be susceptible to surface water ponding in the SWMP modelling. Further assessment of this potential flooding should be made during the preparation of proposals for the site, and opportunities taken to improve the capacity of surface water drainage infrastructure along this route where possible.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the nearby River Colne, so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[30] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[31] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Godbolt's Farm

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Marks Tey	WST21	0.86	Residential (22 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for this site as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences
The site is located entirely within Flood Zone 1, which is defined as low probability of flooding from rivers. There is an ordinary watercourse 80m south of the site, which joins the Roman River 2.11km to the east.

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling
The RoFSW indicates that there is surface water flooding surrounding the site, with a strip of low-high flooding in the north of the site. The surrounding fields seem to have patches of low – medium surface water flooding, and this seems to spread onto nearby roads. Poor drainage and uneven terrain is likely to be the cause of this. The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert flows to a neighbouring area.

Geology
The bedrock geology in this area is Thames Group, comprising of clay and silt. This is overlain by Lowestoft formation deposits. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records
The site is not shown to lie within a Critical Drainage Area (CDA), which were identified during the preparation of the town of Colchester SWMP. There are 4 historic records of flooding nearby, all of which are due to 'other watercourses'.

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Figure B Risk of Flooding from Surface Water (RoFSW)

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	1.9 l/s
	1 in 1 year:	1.6 l/s
	1 in 30 year:	4.3 l/s
	1 in 100 year:	6.0 l/s

Site Assessment Summary – Godbolt's Farm

Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to the ordinary watercourse. Subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

There is no record of groundwater flood risk for this site, and so further investigation into the potential of groundwater flooding in this will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[32] (i.e. considering infiltration measures first wherever possible).

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back on one side of the ordinary watercourse to the east of the site, to provide access for maintenance. Essex CC will need to be consulted and consent obtained for any proposed works that may impact flow within the channel of the watercourse.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[33]..

Access / Egress

Access to the site is provided via Coggeshall Road to the south of the site, which is shown to have sections susceptible to low probability surface water flooding in the SWMP modelling. Further assessment of this potential flooding should be made during the preparation of proposals for the site, and opportunities taken to improve the capacity of surface water drainage infrastructure along this route where possible.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[32] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[33] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Nayland Road

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
West Bergholt	WBG17	0.59	Residential (10 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for this site as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences
The site is located entirely within Flood Zone 1, which is defined as low probability of flooding from rivers. There is an ordinary watercourse 10 metres north of the site. The closest Main River is St. Botolph's Brook, which is 1.6km away. St. Botolph's Brook is defended by high ground (as defined by the Environment Agency), and has relatively small fluvial flood extents.

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling
The RoFSW indicates that whilst only a small section in the north of the site has a low probability of surface water flooding, there are substantial 'hotspots' to the north and east which have extensive high probability of surface water flooding. This could potentially be due to poor drainage on the plant site to the north, or constrictions within the ordinary watercourse channel which prevent flows moving downstream. These 'hotspots' needs to be assessed as the flooding could potentially impact the site and surrounding safe access and egress routes. The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert flows to a neighbouring area.

Geology
The bedrock geology in this area is Thames Group, comprising of clay and silt. This is overlain by Lowestoft Formation deposits and Cover sand, consisting of clay, silt and sand. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records
The site is not shown to lie within a Critical Drainage Area (CDA), which were identified during the preparation of the town of Colchester SWMP. There is a historic record of flooding to the south, which was related to a 'small watercourse'.

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Figure B Risk of Flooding from Surface Water (RoFSW)

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	1.4 l/s
	1 in 1 year:	1.1 l/s
	1 in 30 year:	3.1 l/s
	1 in 100 year:	4.3 l/s

Site Assessment Summary – Nayland Road

Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to nearby ordinary watercourses. Risk that discharging to watercourse may increase the risk of surface water hot spots. Subject to consultation with Essex CC and further investigation.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the majority of the site (0.43ha) is located within a 1km square of which <25% is susceptible to groundwater emergence. However the rest of the site is deemed as being 25-50% susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be low - medium. The potential for groundwater flooding in this area will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with Essex CC's SuDS Design Guide[34] (i.e. considering infiltration measures first wherever possible).

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back on one side of the ordinary watercourse to the east of the site, to provide access for maintenance. Essex CC will need to be consulted and consent obtained for any proposed works that may impact flow within the channel of the watercourse.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[35]..

Access / Egress

Access to the site is provided via Nayland Road to the west of the site. The site access itself is only shown to be at low risk from surface water flooding, and there is safe access / egress to the south. However the substantial surface water flooding further north may cause issues if flow paths were to move south. Further assessment of this potential flooding should be made during the preparation of proposals for the site, and opportunities taken to improve the capacity of surface water drainage infrastructure along this route where possible.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[34] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[35] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Bakers Lane, Colchester

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Bakers Lane, Colchester	COL102	8.832	Residential (100 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The site is located entirely within Flood Zone 1 and is therefore currently considered to be at low risk of flooding. The River Colne flows approximately 700m south of the site, travelling west to east. The map illustrates that there are no areas benefiting from defences local to the site. South of the site, within Flood Zone 3a and 3b, high ground is the current defence from the River Colne. A drainage river network is also evident south of the site alongside Lexden Dyke travelling in a southerly direction, adjoining the River Colne.

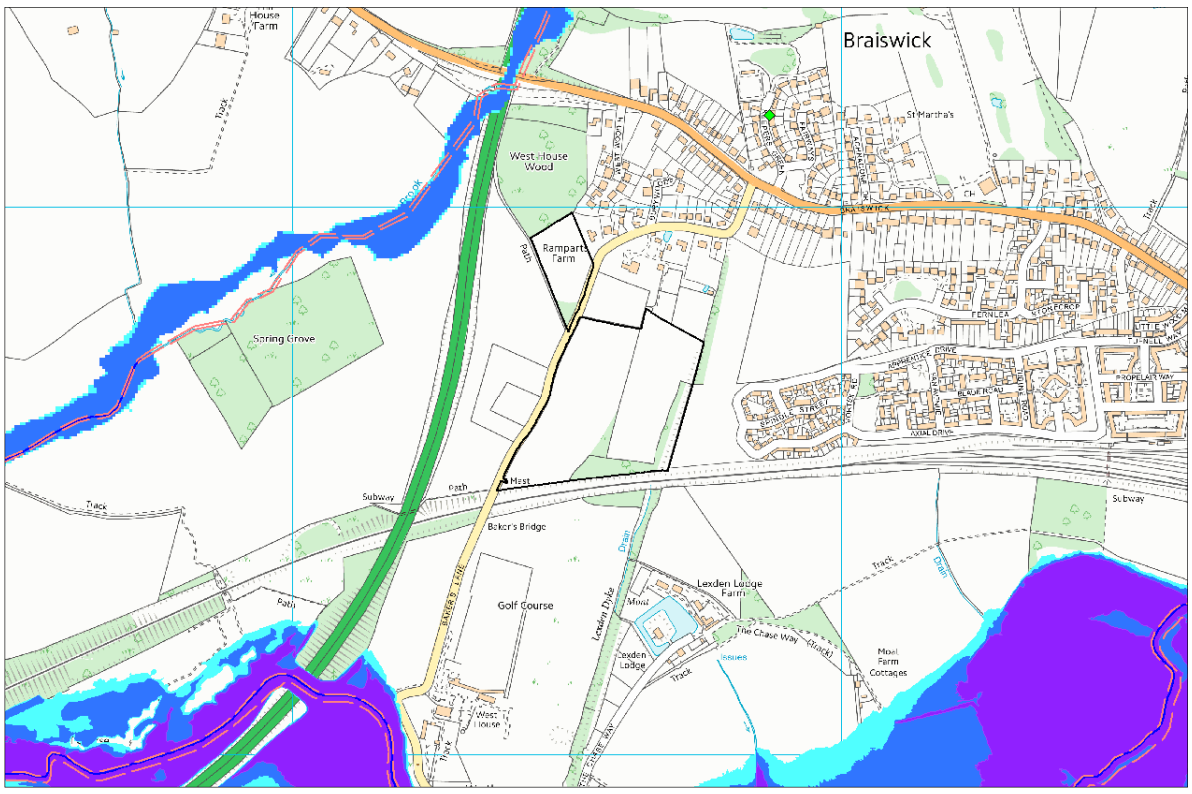

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW and SWMP Modelling mapping indicates that most of the site is at very low risk of surface water flooding (<0.1% AEP). However east of the site, the probability of surface water flooding increases to low (0.1% - 1% AEP). In addition the access road, Bakers Lane obtains a very low probability of pluvial flooding. However where Bakers Lane adjoins the A12, south of the site, the probability from surface water flooding increases to medium – high risk (1% - >3.3%).

The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert the flow path to a neighbouring area.

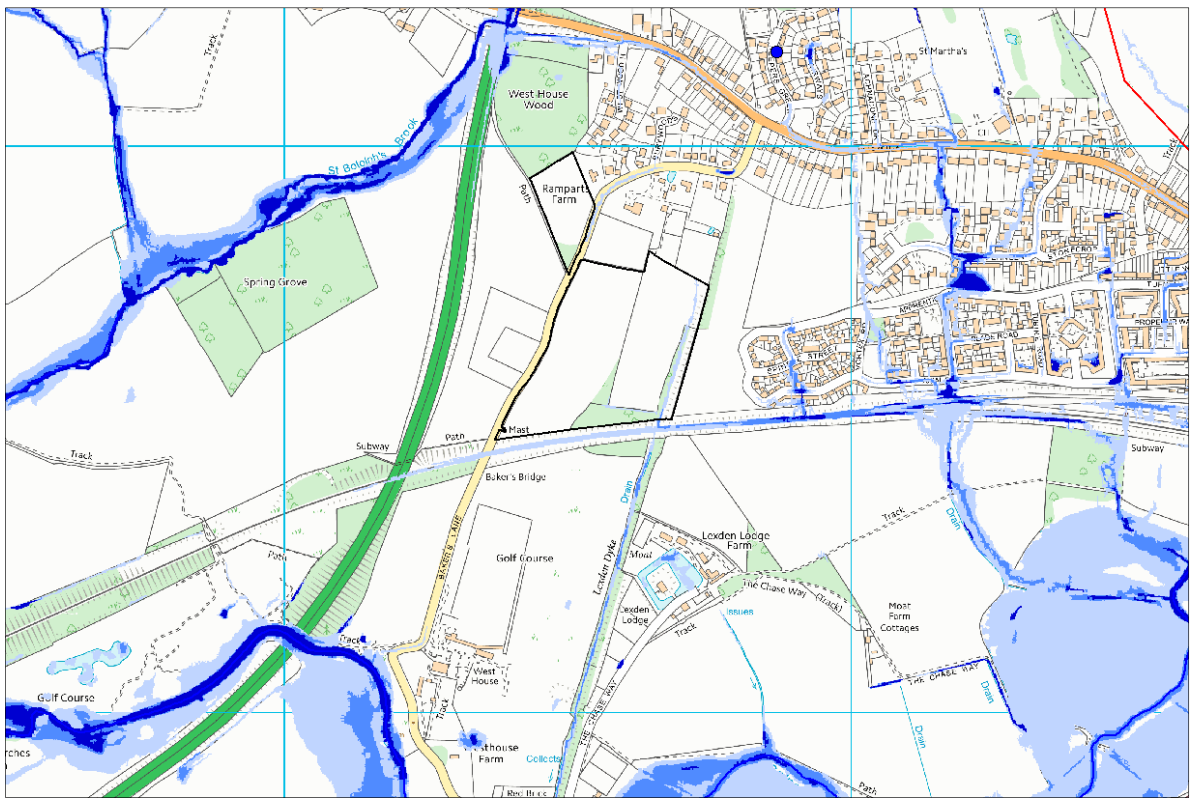

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Figure B Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Bakers Lane, Colchester

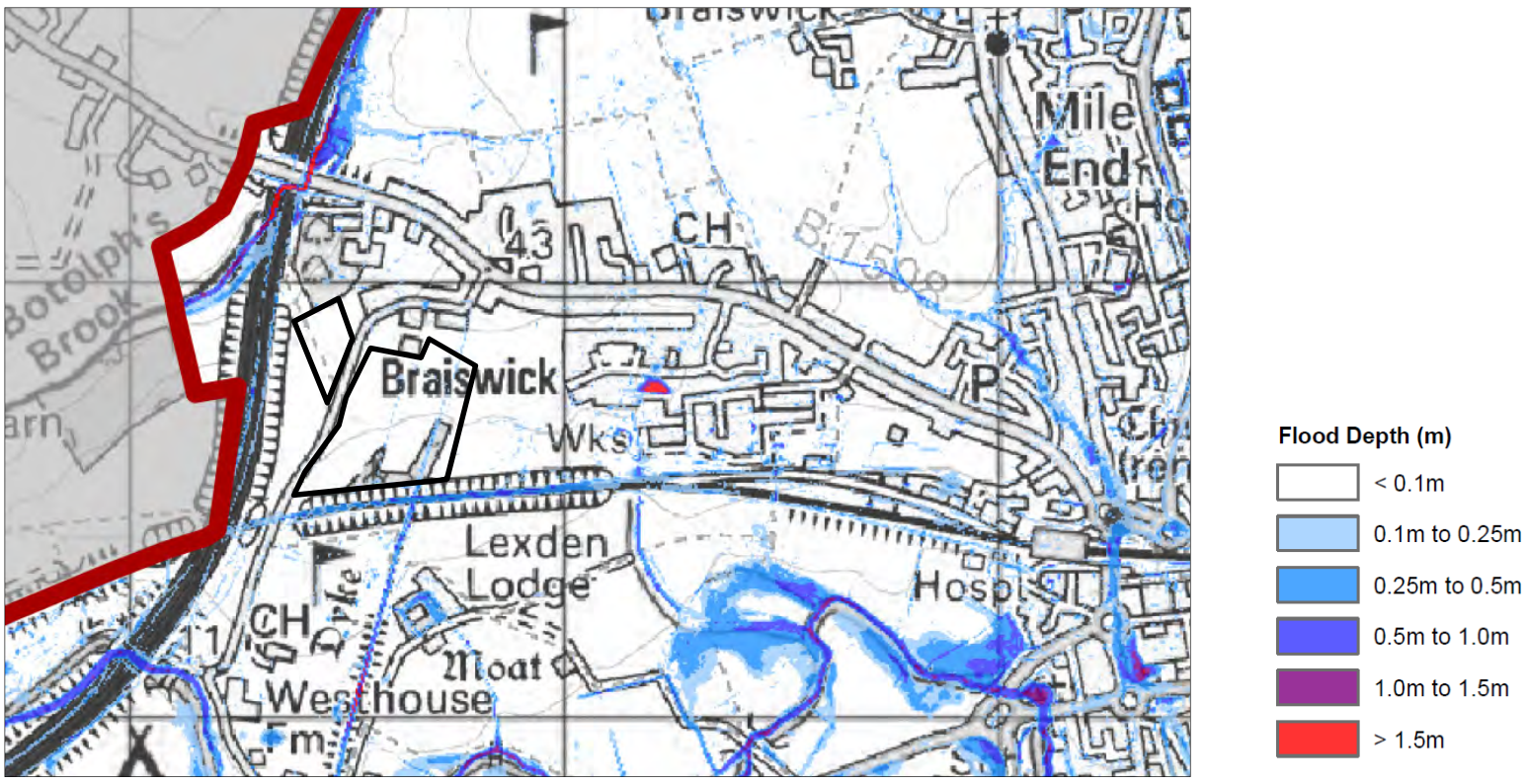

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Figure C Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth.

Geology

The bedrock geology in this area is London Clay Formation, comprising clay, silt and sandy cover sand. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within a Critical Drainage Area (CDA), although a CDA is highlighted on the map, 950m east of the site. The map demonstrates two historical records of flooding of which the source of flooding are both unknown. One record is located 420m to the north of the site and the other is located 860m south of the site.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	15.0 l/s	
	1 in 1 year:	12.7 l/s	
	1 in 30 year:	33.9 l/s	
	1 in 100 year:	47.8 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible along drainage network to Lexden Dyke, subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the entirety of the site is located within a 1km square of which 25% - 50% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be generally low. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. Further assessment should be made of the surface water flow paths across the site. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[36] (i.e. considering infiltration measures first wherever possible).

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[37]..

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable along the road network at Baker's Lane.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the risk from the River Colne and tidal breaching so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[36] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[37] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Former Sainsbury's Site, Tollgate, Stanway

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Former Sainsbury's site, Tollgate, Stanway	COL103	8.58	Residential (200 dwellings)	More Vulnerable

Sequential Test Status:

The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The site is located entirely within Flood Zone 1 and is therefore currently considered to be at low risk of flooding. The Roman River flows approximately 1.5km west of the site, travelling in a south-easterly direction, adjoining the River Colne near Wivenhoe. In addition the River Colne is located approximately 1.8km north of the site, travelling west to east. The map illustrates that there are no areas benefiting from defences local from the site. West of the site, within Flood Zone 3a, high ground is located by the River Roman. No drainage river networks have been identified local to the site.

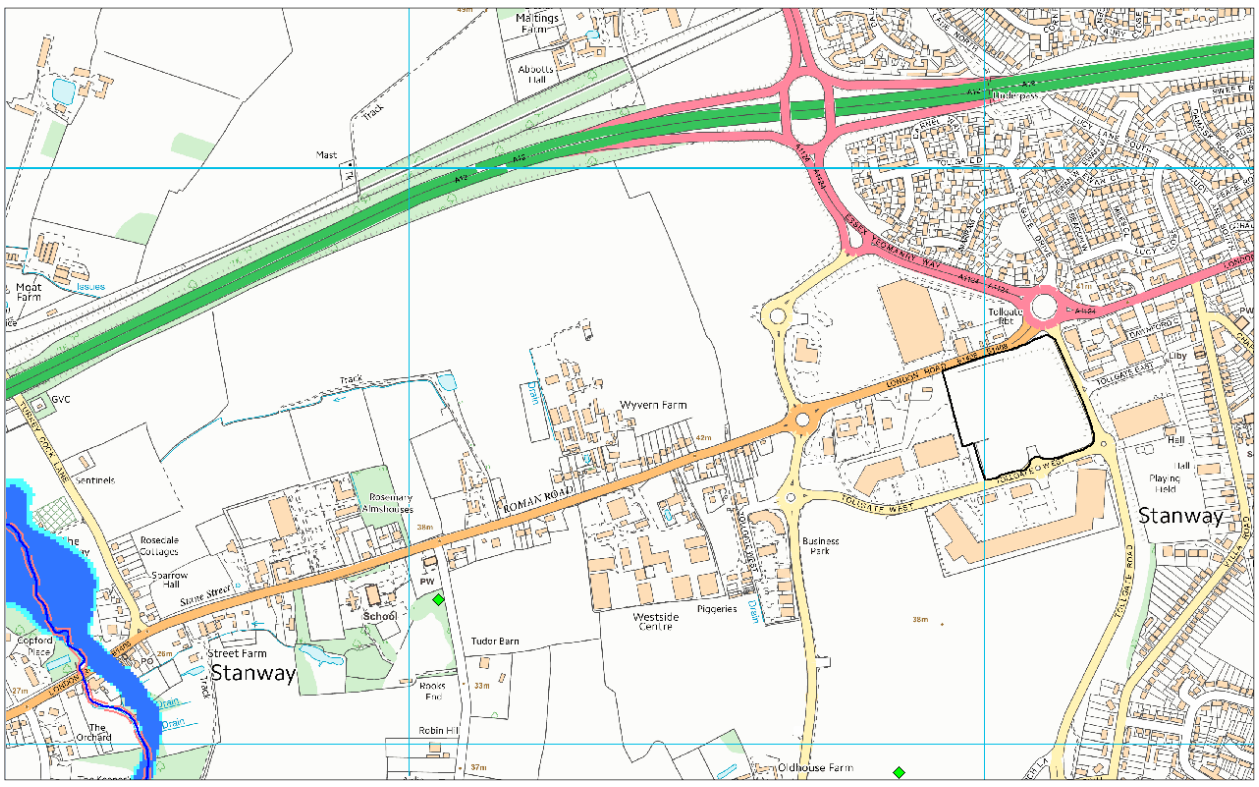

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping and SWMP Modelling indicates that most of the site is at very low risk of surface water flooding (<0.1% AEP). However south of the site, the probability of surface water flooding increases to low-medium (0.1% - 3.3%). Within the site, 2% of the area may be at risk from a 1% - 3.3% AEP. Only 0.01% of the site obtains a high risk of surface water flooding within the site.

Whilst not within the site boundary, it should be noted there is a high risk of surface water flooding (>3.3%) at close proximity to the west boundary. The access road, London Road obtains a very low to low probability of surface water ponding. However Tollgate West located south of the site, has a low to medium risk. A high probability of flooding from surface water can additionally be identified on a small area of Tollgate Road. The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert the flow path to a neighbouring area.

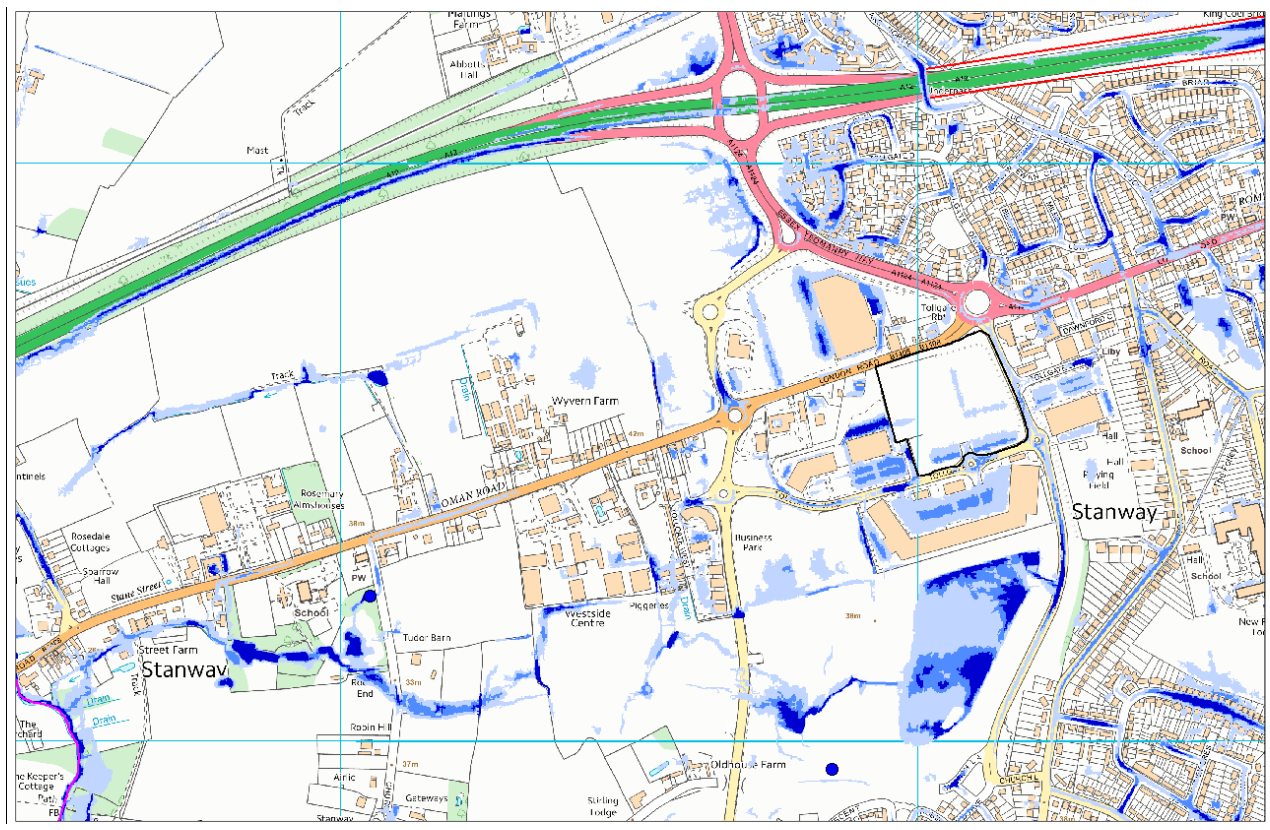

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Figure B Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Former Sainsbury's Site, Tollgate, Stanway

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Figure C Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth.

Geology

The bedrock geology in this area is London Clay Formation, comprising of clay, silt and sandy cover sand. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within a Critical Drainage Area (CDA), although a CDA is highlighted on the map, 420m north of the site on the A12. The map demonstrates two historical records of flooding located south-west of the site, approximately 550m. The source of the flooding is unknown for both records.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	27.4 l/s	
	1 in 1 year:	23.2 l/s	
	1 in 30 year:	62.0 l/s	
	1 in 100 year:	87.3 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Unlikely to be possible due to distance from watercourse.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that most of the site is located within a 1km square of which <25% is susceptible to groundwater emergence. However 1.62 ha of the west side of the site is located within a 1km square of which 25% - 50% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be generally low. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. Further assessment should be made of the surface water flow paths across the site. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[38] (i.e. considering infiltration measures first wherever possible).

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[39].

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable along the road network London Road.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[38] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[39] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Rugby Club, Mill Road, Colchester

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Rugby Club, Mill Road, Colchester	COL97	6.48	Residential (300 dwellings)	More Vulnerable

Sequential Test Status:

The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The site is located entirely within Flood Zone 1 and is therefore currently considered to be at low risk of flooding. The Environment Agency Detailed River Network identifies two ordinary watercourses, one north east and one north west, both connecting to the Salary Brook. Salary Brook is located approximately 643metres north of the site which adjoins the Ardleigh Reservoir approximately 2.5km to the east. The ordinary watercourse located north west, is approximately 200m from the site boundary. The ordinary watercourse located north east, is approximately 450m from the site boundary. No defences are currently located near the proposed site.

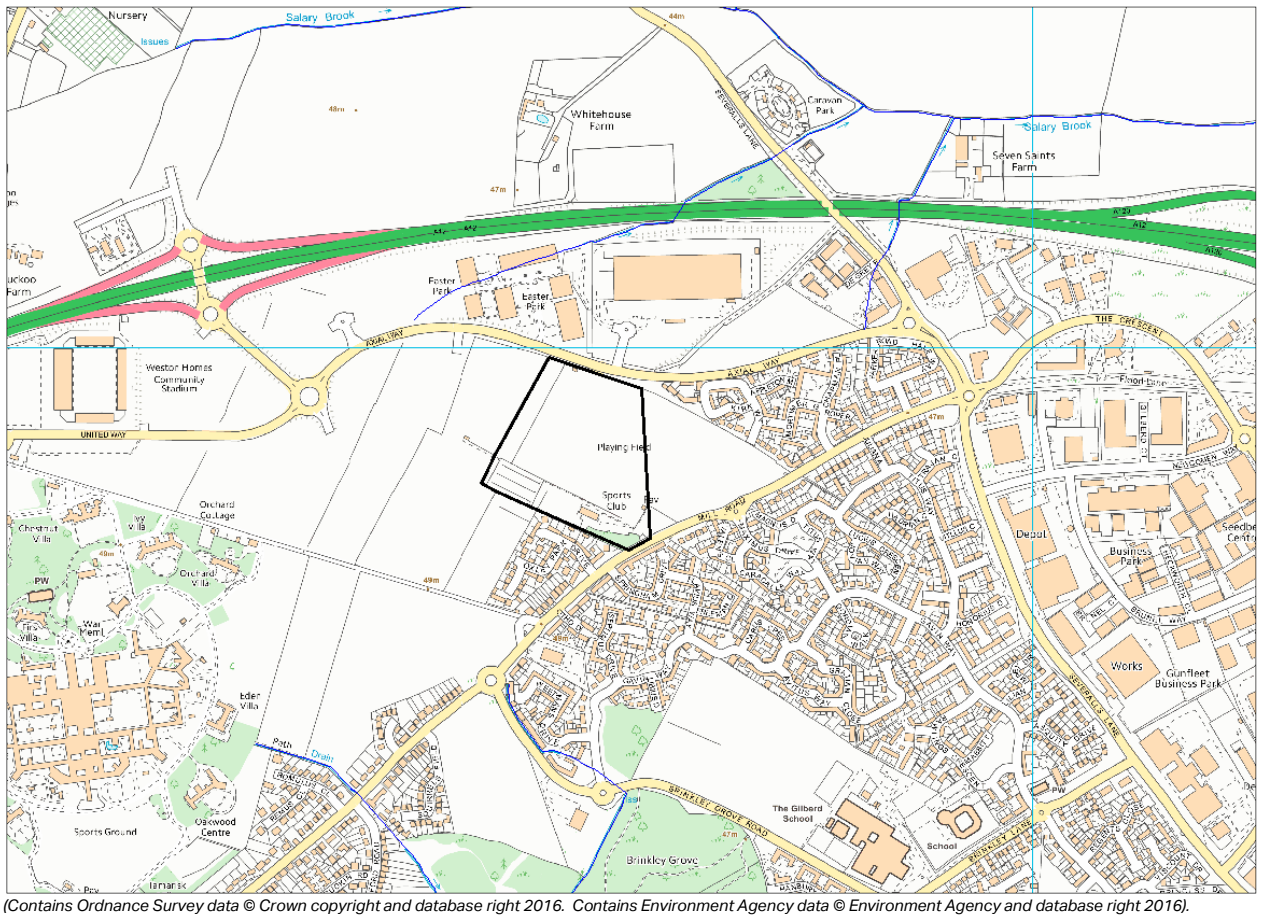

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping and SWMP Modelling indicates that most of the site is at very low risk of surface water flooding (<0.1% AEP). South of the site, a small area has been identified with a low probability of risk, including a small area south-west of the site that has a medium probability of surface water flooding (1% - 3.3%). However most of the access road to the site (Mill Road) demonstrates a very low risk. The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert the flow path to a neighbouring area.

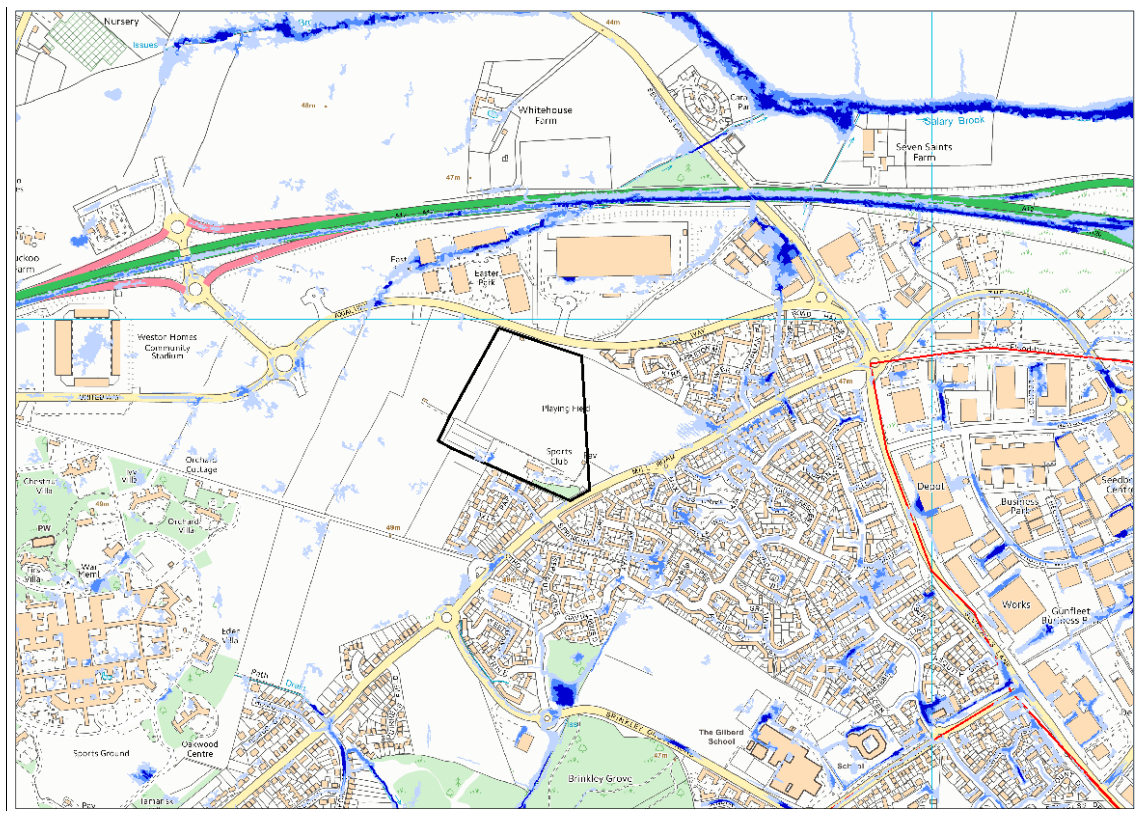

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Figure B Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Rugby Club, Mill Road, Colchester

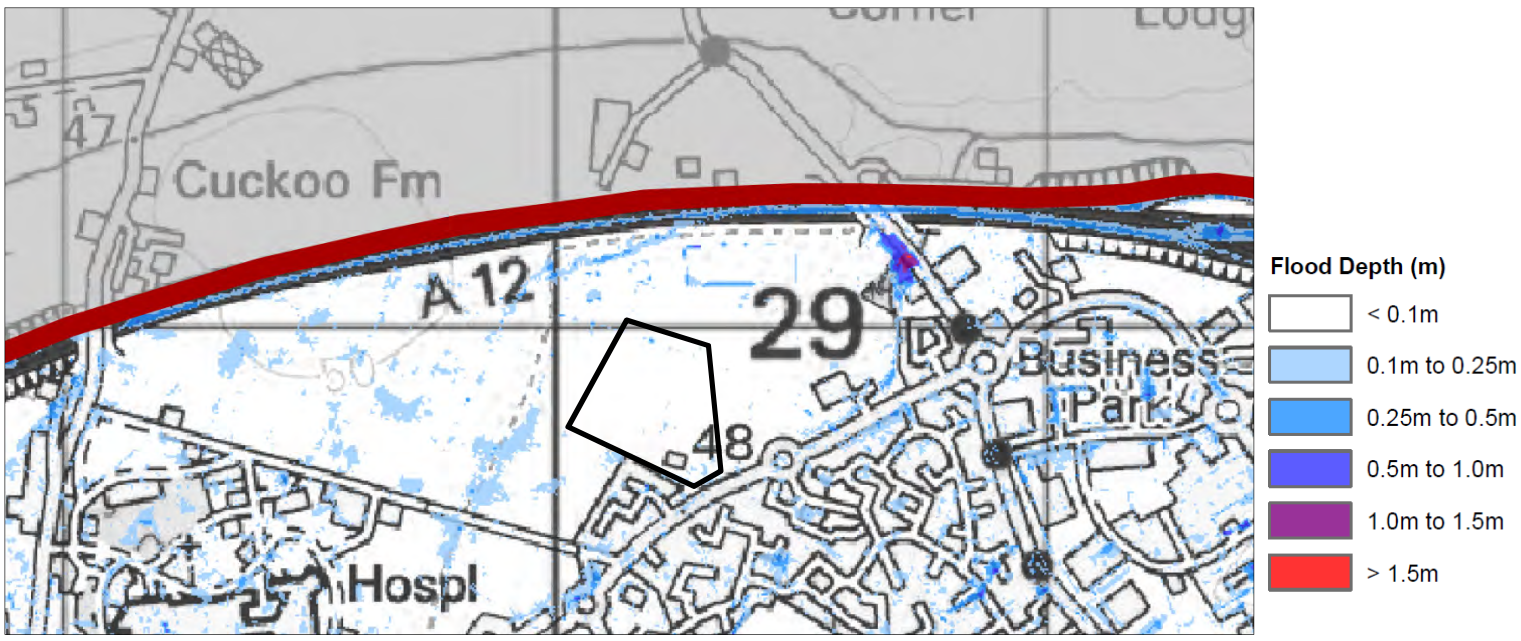

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Figure C Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth.

Geology

The bedrock geology in this area is Thames Group, comprising of clay and silt. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within a Critical Drainage Area (CDA). However a CDA can be identified approximately 582m east of the site. The map demonstrates that there are no historical flood records located near this site.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	11.2 l/s	
	1 in 1 year:	9.5 l/s	
	1 in 30 year:	25.3 l/s	
	1 in 100 year:	35.6 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge may be possible to Salary Brook along the drainage network, subject to consultation with Essex CC. The distance between the site and the drainage network may act as a constraint. The Highway centered between the site and drainage network may add to its complexity.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which <25% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be low. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. Further assessment should be made of the surface water flow paths across the site. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within the Essex CC's SuDS Design Guide[40] (i.e. considering infiltration measures first wherever possible). The drainage strategy should also consider the small drainage network from the north of the site that adjoins to Salary Brook.

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back from an ordinary watercourse. In accordance to the Environment Agency Detailed River Network, an ordinary watercourse has been identified north-west of the site. Essex CC will need to be consulted and consent obtained for any proposed works that may impact flow within the channel of the watercourse

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[41].

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable along the road network to the east of the site and onto Mill Road.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the River Colne, into which the nearby Salary Brook feeds, so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[40] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[41] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Welshwood Park, Colchester

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Welshwood Park, Colchester	EST07	10.75	Residential (100 dwellings; proposed allocation for 100 with reserve for 730)	More Vulnerable

Sequential Test Status:

The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The site is located entirely within Flood Zone 1, which is defined as low probability of flooding from rivers. The Environment Agency Detailed River Network identifies an ordinary watercourse (Salary Brook) that flows from north to south approximately 50m east of the site. Salary Brook adjoins the River Colne approximately 2.17km to the south of the site. A drainage river network is also apparent through the centre of the site, adjoining Salary Brook to the east.

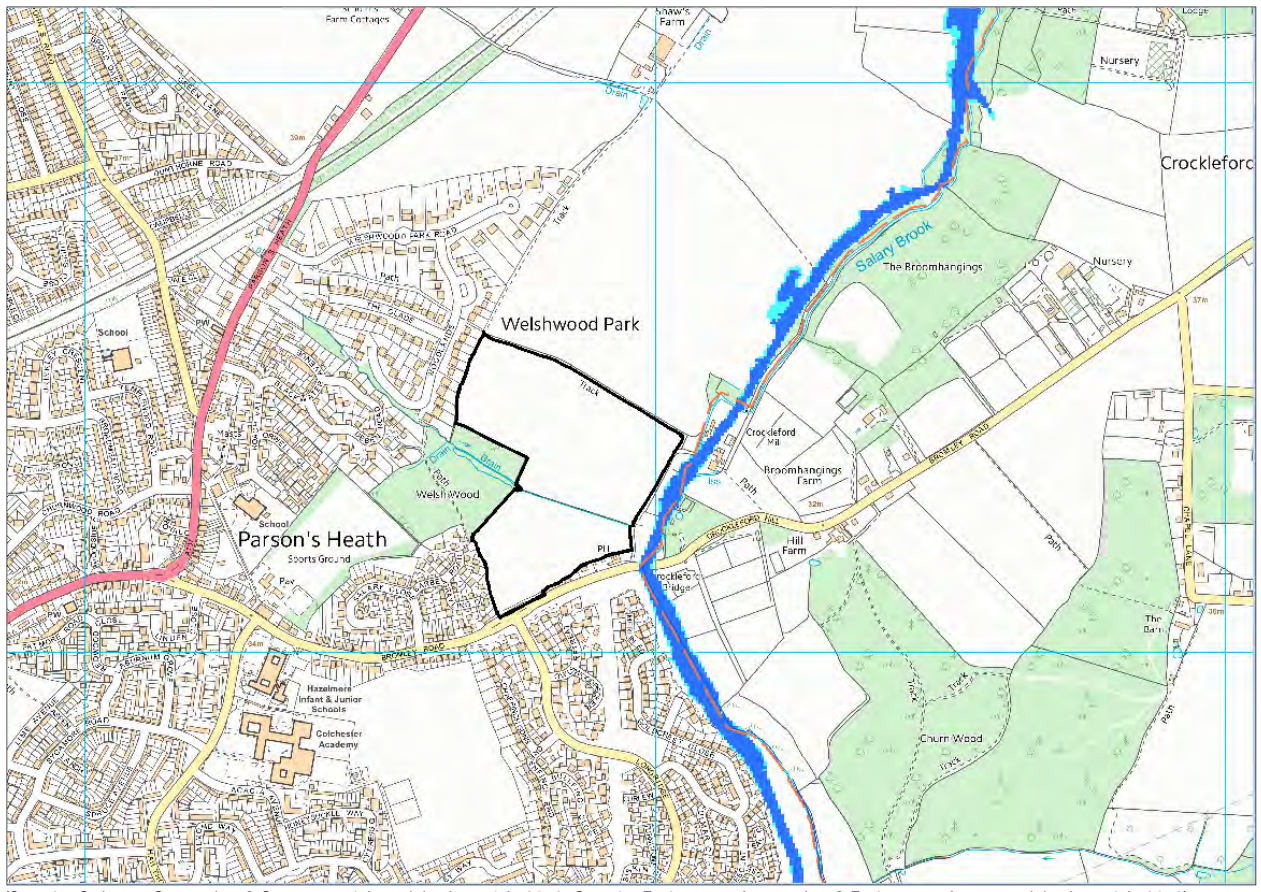

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Figure A Modelled Flood Extents

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping and SWMP Modelling indicates that most of the site is at very low risk of surface water flooding (<0.1% AEP). However within the centre of the site, an area of high risk surface water flooding (>3.3%) can be identified. This is a potential consequence of surface water run-off from Welshwood Park discharging towards Salary Brook, through the identified drainage network. Subsequently a high risk of surface water flooding has been identified to the east of the site also. In addition there may be a risk to Bromley Road, approximately 20m south of the site, as a high risk of surface water flooding can also been identified. The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert the flow path to a neighbouring area.

Geology

The bedrock geology in this area is Thames Group, comprising of clay and silt. Adjacent to Salary Brook there are superficial deposits comprising of mud, sand and gravel associated with the river environment. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within a Critical Drainage Area (CDA). There are no historic records of flooding in the area local to the site.

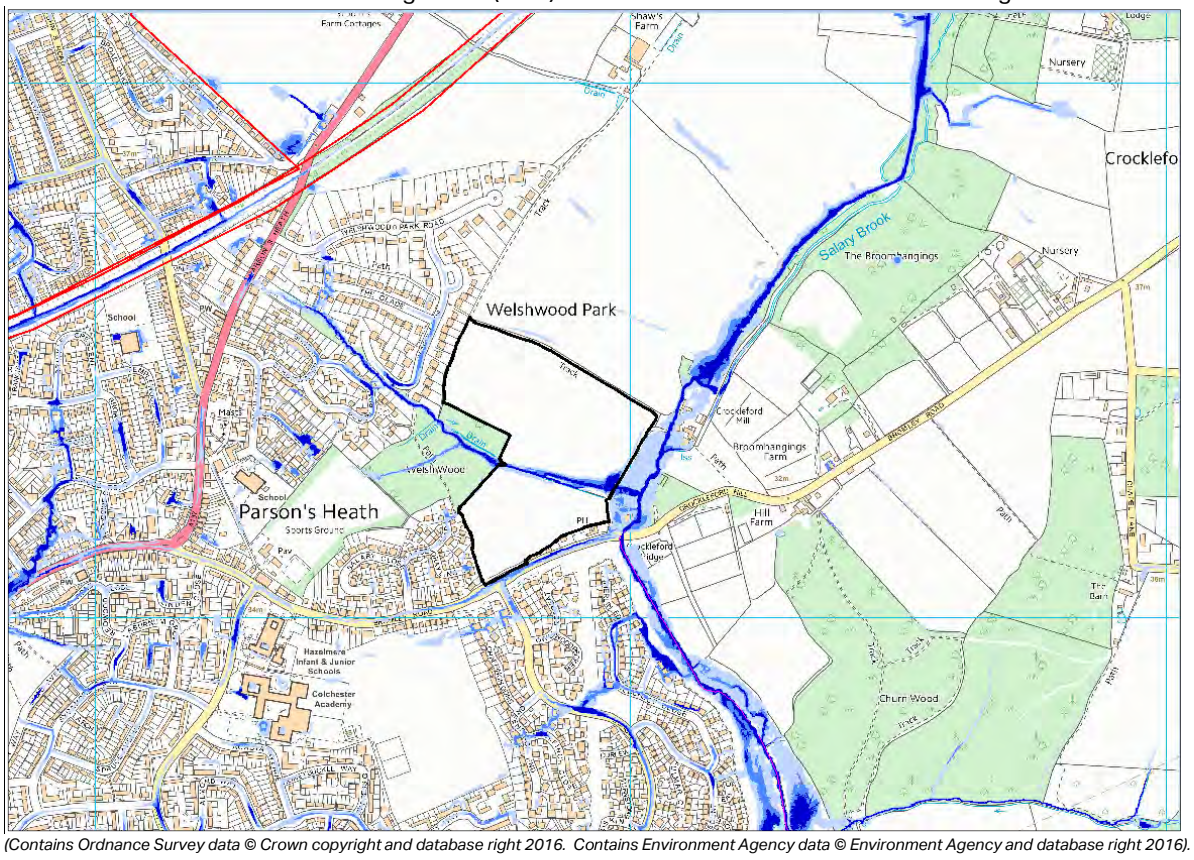

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Figure B Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – Welshwood Park, Colchester

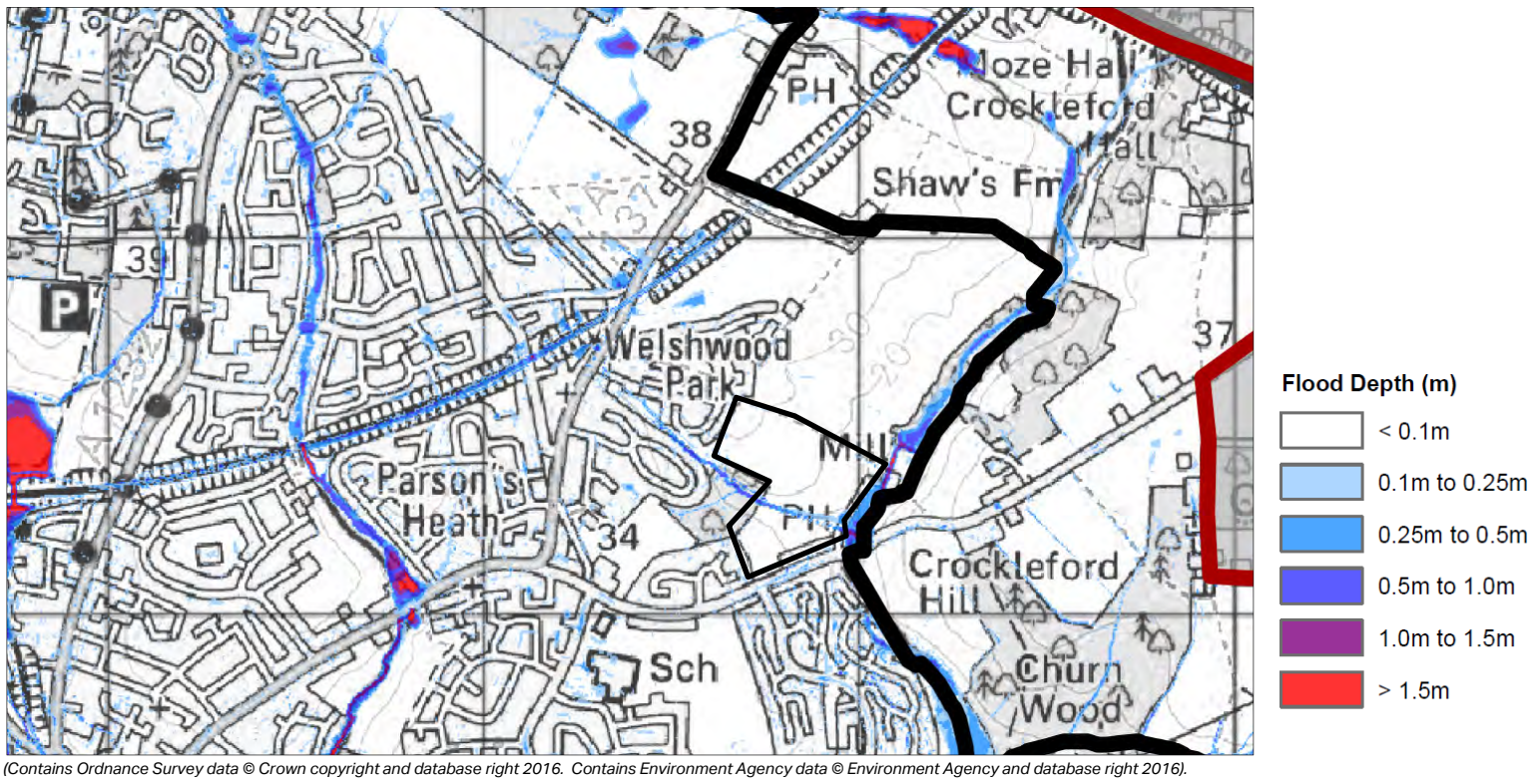

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Figure C Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth.

Surface Water Flood Risk			
Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	17.6 l/s	
	1 in 1 year:	15.0 l/s	
	1 in 30 year:	39.9 l/s	
	1 in 100 year:	56.2 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to Salary Brook along drainage network, subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) demonstrates that the site is located within a 1km square of which <25% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore generally considered to be low. This will need to be confirmed during site investigation survey.

Other Sources

The Environment Agency 'Risk of Flooding from Reservoirs' mapping highlights that the floodplain of Salary Brook, located to the east of the site, is at risk of inundation in the event of a failure of the following reservoirs: Abberton Central and Ardleigh; (NGR 98672 18620) and (NGR 03316, 28249) respectively. Most of the site is not shown to be at risk of inundation, however the extent of flooding does infringe upon the eastern edge of the site. As noted in the Level 1 SFRA report, given the regular inspection of these reservoirs in accordance with the Reservoirs Act 1975, flooding from reservoirs is considered to be a managed risk.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[42] (i.e. considering infiltration measures first wherever possible).

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back from an ordinary watercourse. In accordance to Environment Drainage River Network, a drainage river network has been identified through the centre of the site. An investigation would be required to ascertain the characteristics of the network and determine whether this is likely to act as a constraint to development. Essex CC will need to be consulted and consent obtained for any proposed works that may impact the drainage river network.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[43]..

Access / Egress

Safe dry access to and from the site should be provided. Access to the site is provided by Bromley Road which is shown to be susceptible to high risk of surface water ponding directly outside the site boundary. Further assessment of this potential flooding should be made during the preparation of proposals for the site, and opportunities taken to improve the capacity of surface water drainage infrastructure along this route where possible.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the River Colne, into which the nearby Salary Brook feeds, so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[42] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[43] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – London Road, Stanway

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Stanway	STN09	49.17	Residential (500 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences
The site is located entirely within Flood Zone 1 and is therefore currently considered to be at low risk of flooding from the Roman River. The Roman River flows in a south-easterly direction approximately 150m west of the site. The watercourse adjoins the River Colne near the River Colne Estuary. In addition a drainage network flows through the centre of the site. The current defence implemented upon the River Roman near the site is high ground.

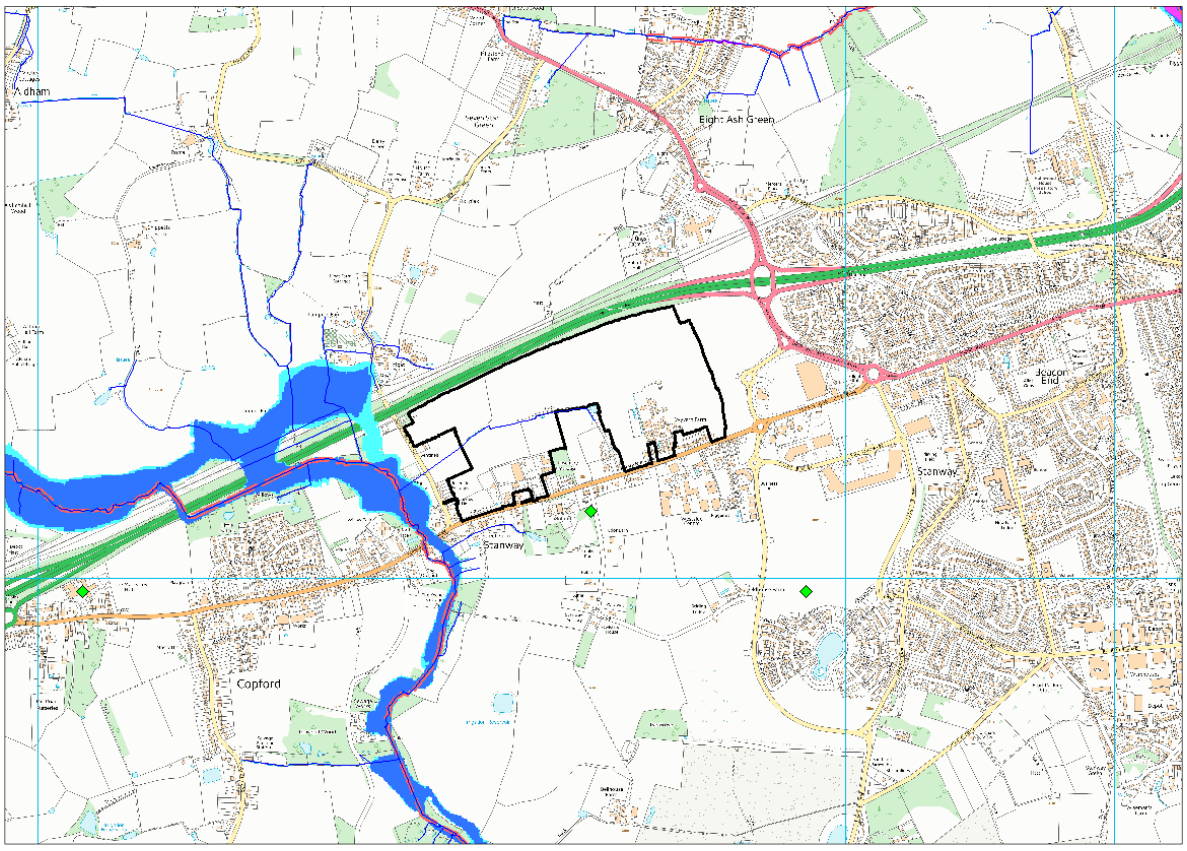

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Figure A Modelled Flood Extents

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling
The RoFSW mapping and SWMP Modelling indicates that whilst most of the site is at very low risk of surface water flooding (<0.1% AEP), a low to medium risk is apparent, specifically alongside the drainage network that crosses the site. Additionally the access road (London Road, B1408) obtains a very low probability of flooding from surface water. Nonetheless the site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert the flow path to a neighbouring area.

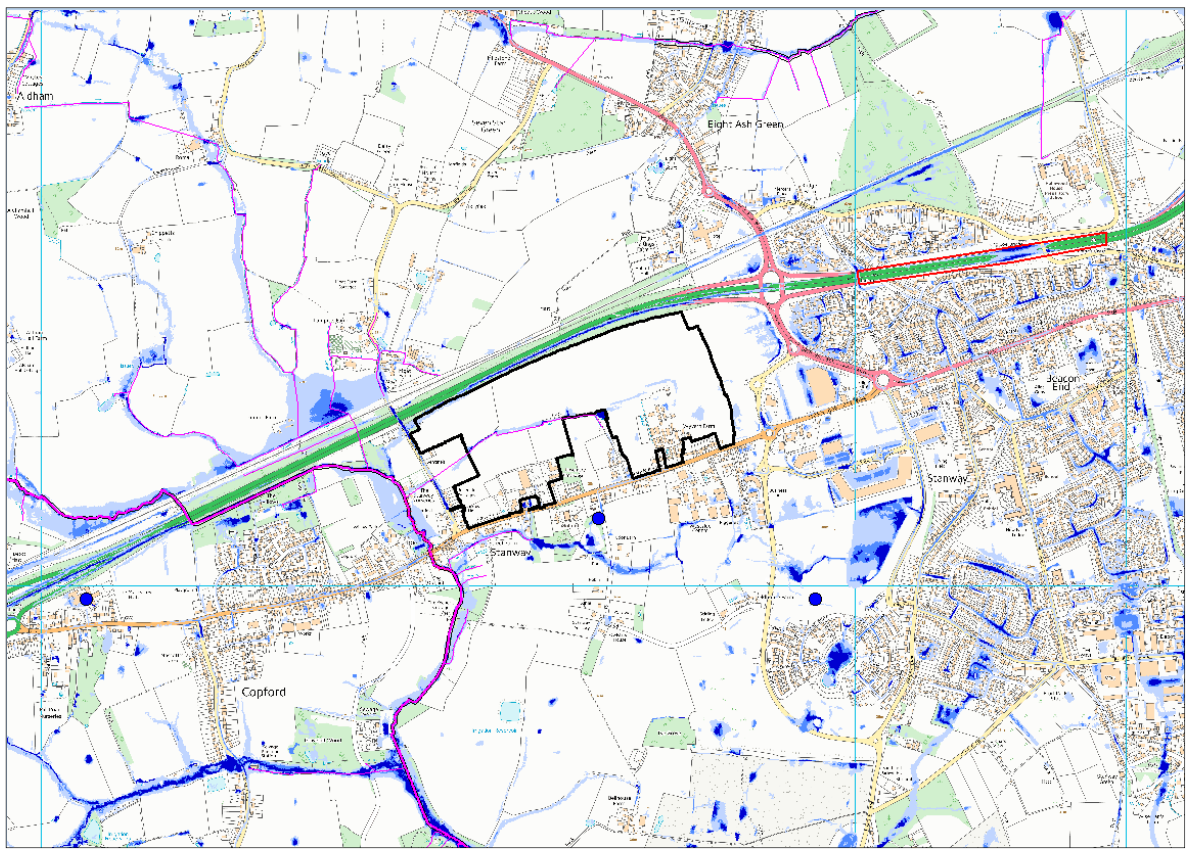

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Figure B Risk of Flooding from Surface Water (RoFSW)

Site Assessment Summary – London Road, Stanway

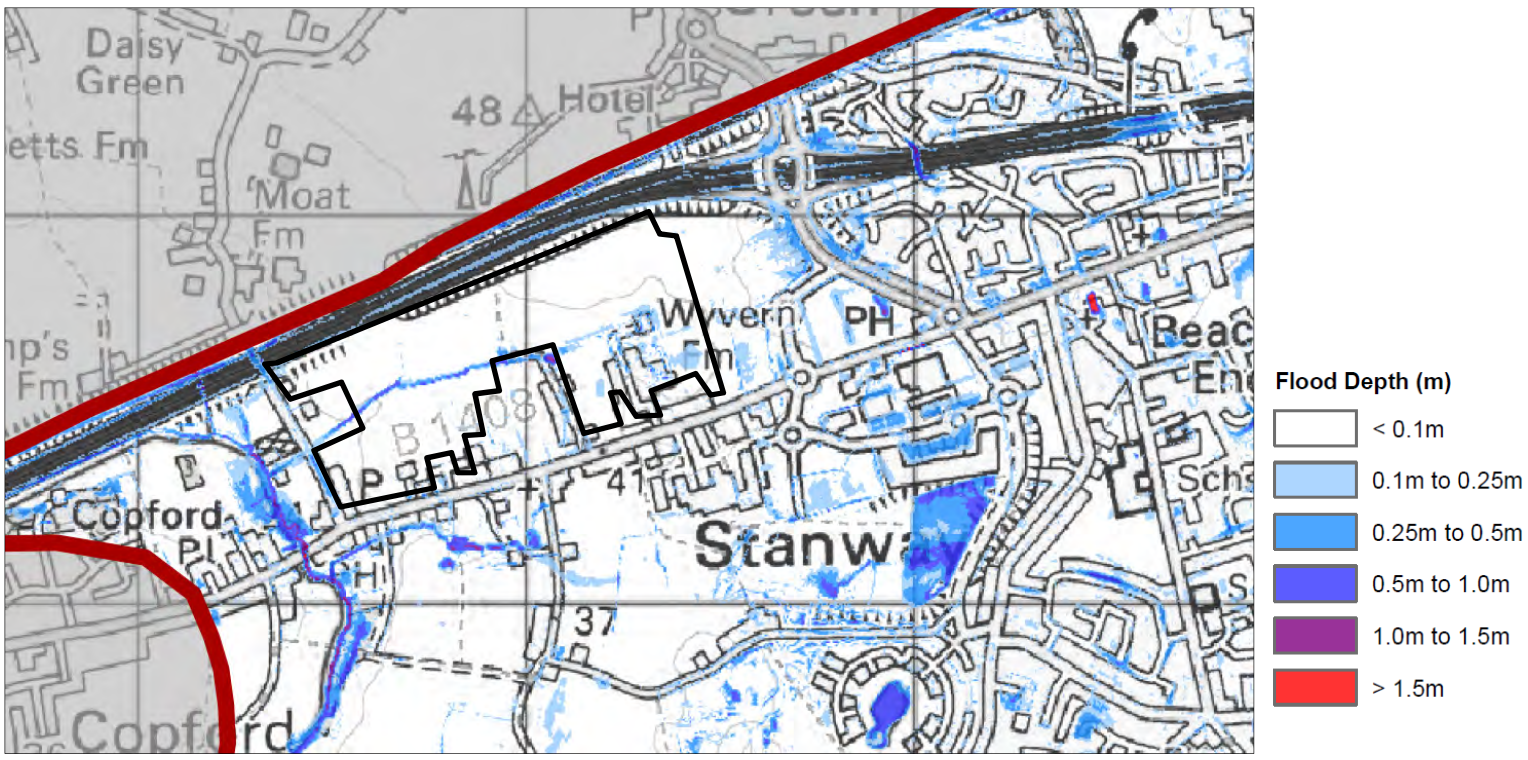

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Figure C Town of Colchester SWMP (Capita Symonds, 2013) Surface Water Modelling, 1% AEP Maximum Flood Depth.

Geology

The bedrock geology in this area is London Clay Formation, comprising clay, silt and sand, which are overlain by clay, silty and sandy Cover Sand. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within a Critical Drainage Area (CDA). However a CDA can be identified approximately 662m north east of the site along the A12. The map demonstrates two historic records south of the site, both of which the source is unknown.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	64.5 l/s	
	1 in 1 year:	54.8 l/s	
	1 in 30 year:	146.2 l/s	
	1 in 100 year:	205.7 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge possible to watercourse (Roman River), subject to consultation with Essex CC.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which 25-50% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore generally considered to be low. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. Further assessment should be made of the surface water flow paths across the site. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[44] (i.e. considering infiltration measures first wherever possible). The drainage strategy should also consider the small drainage network that crosses through the site.

Set-back Distance

Essex CC, as the LLFA, requires at least a 3m set back from an ordinary watercourse. In accordance to the Environment Agency Drainage River Network, a drainage river network has been identified through the centre of the site. An investigation would be required to ascertain the characteristics of the network and determine whether this is likely to act as a constraint to development. Essex CC will need to be consulted and consent obtained for any proposed works that may impact the drainage river network.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[45].

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable along the road network to the east of the site and onto London Road.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service associated with the River Roman so that they are aware of the flood risk to the area local to where they are located, including key transport routes.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[44] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[45] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Dawes Lane, West Mersea

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Dawes Lane, West Mersea	MER02	4.53	Residential (100 dwellings)	More Vulnerable

Sequential Test Status:
The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The site is located entirely within Flood Zone 1 and is therefore currently considered to be at low risk of flooding. The surrounding area, bordering the River Blackwater estuary is however within Flood Zone 3b. The map illustrates that 1.2km south of the site boundary, the area is 'defended' by high ground.

2.5km east of this area, a flood wall protects the coastal area. An embankment located 1.09 km north-west of the proposed site is also illustrated on the map. The site is at a reasonable distance from flooding at this source.

The Strood Channel flows in a southerly direction towards the River Blackwater Estuary, located towards the west of Mersea Island. The site is approximately 1.62km east of the Strood Channel. A detailed river network has also been identified to the east of the proposed site, located by Mortimer's farm travelling in a southerly direction towards the Mersea Flats.

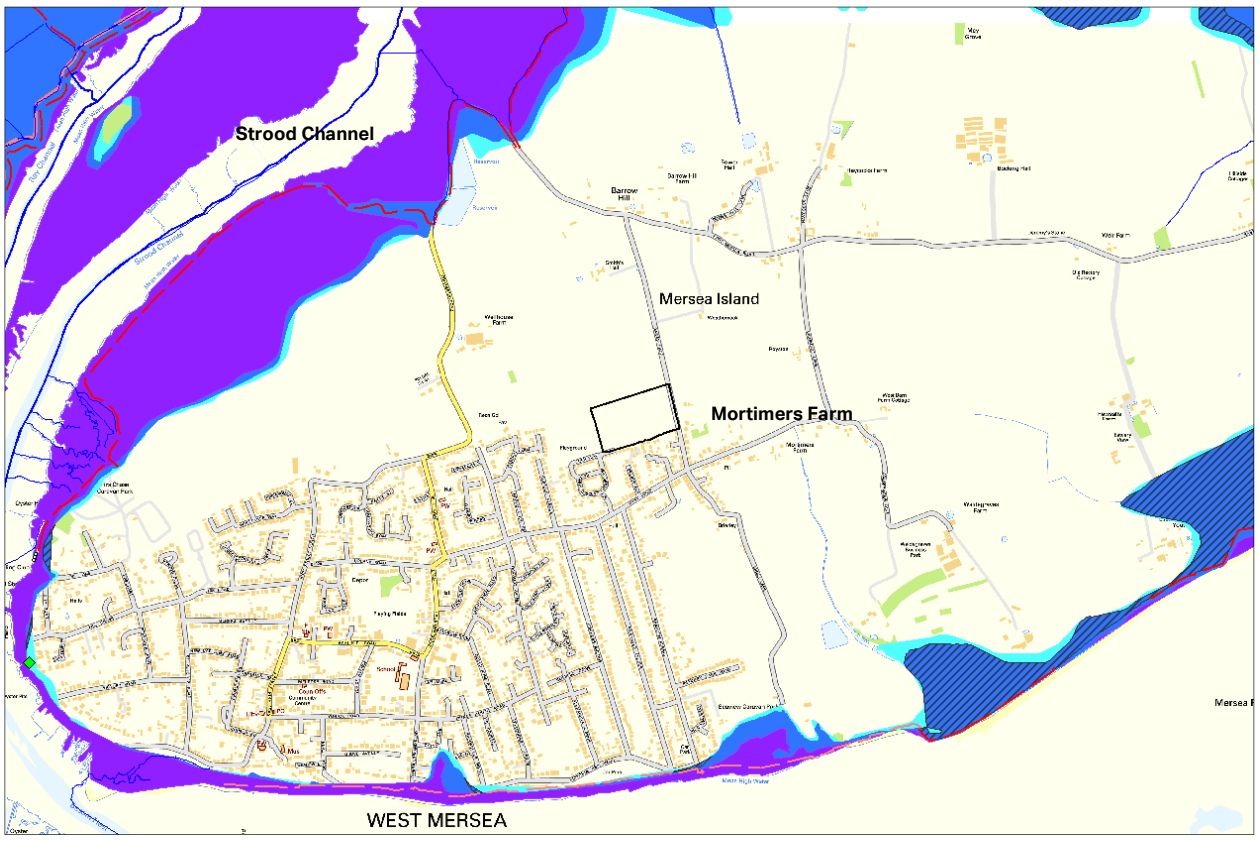

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Figure A Modelled Flood Extents

Residual Risk: Extreme Tidal Event at West Mersea

The site is located on Mersea Island which is protected by the current defences along the coastline. However during extreme tidal events, areas of the island become at risk. A model simulation has been completed to determine the residual risk to the site in the event of a 0.5% AEP event + Climate Change. Results for the 0.5% AEP event including an allowance for climate change demonstrate that flood water may inundate the outskirts of Mersea Island to depths greater than 3.0m. This includes the only access road to the Island via The Strood. This corresponds to a hazard rating of Extreme (danger to all). Nonetheless the proposed site does not present to be at risk from an extreme tidal event.

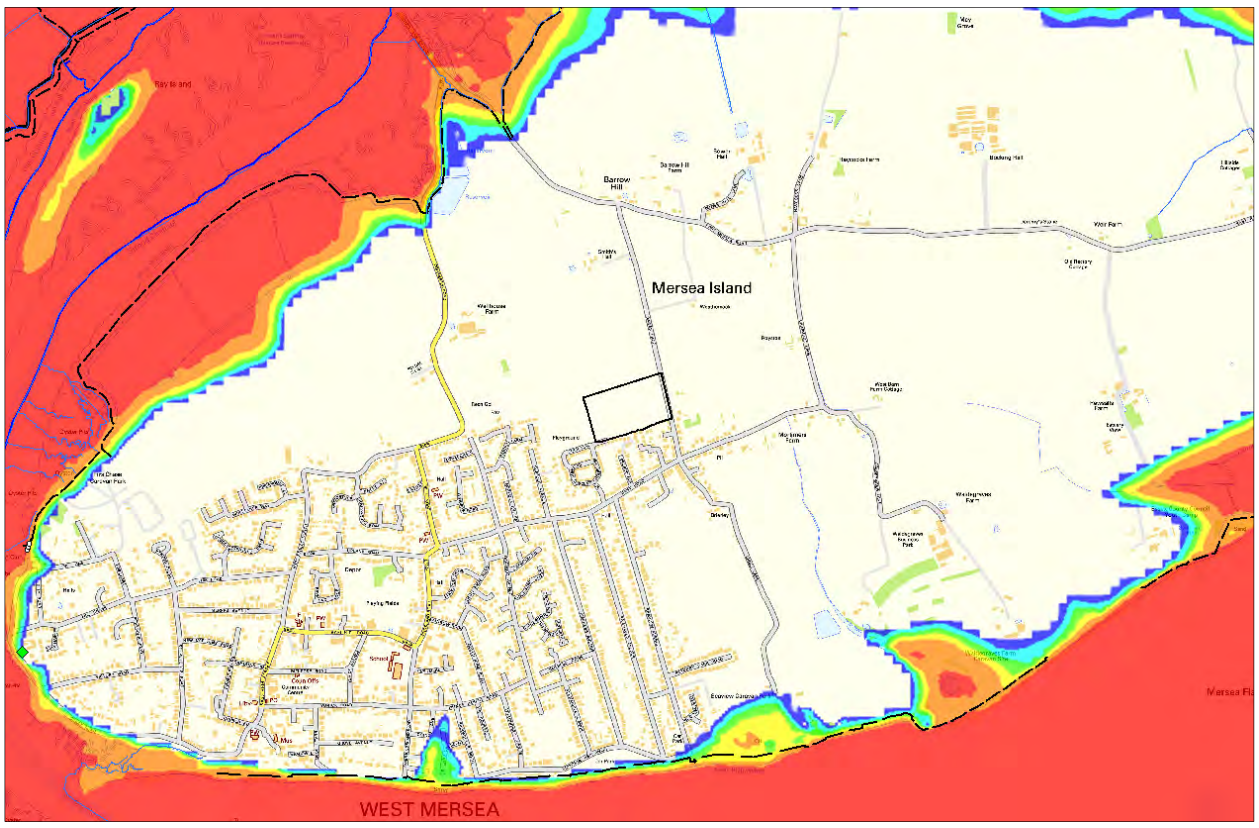

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Figure B Extreme Tidal Event; 0.5% AEP including Climate Change: Maximum Flood Depth

Site Assessment Summary – Dawes Lane, West Mersea

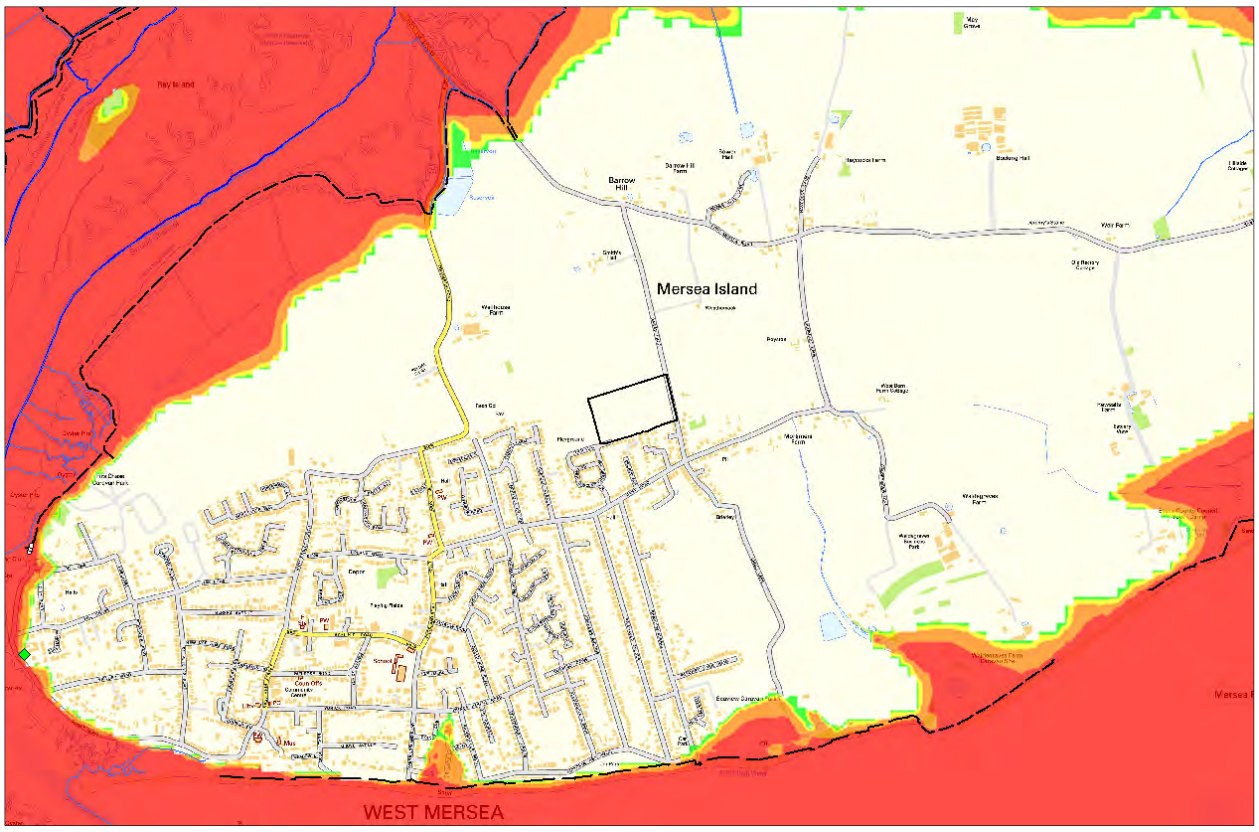

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Figure C Extreme Tidal Event; 0.5% AEP including Climate Change: Hazard Ratings

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping indicates that most of the site is at very low risk of surface water flooding (<0.1% AEP). However south of the site, an area with a high risk of surface water flooding is illustrated (>3.3%). In addition the access road to the site, Dawes Lane, has a very low risk of surface water flooding. The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert the flow path to a neighbouring area.

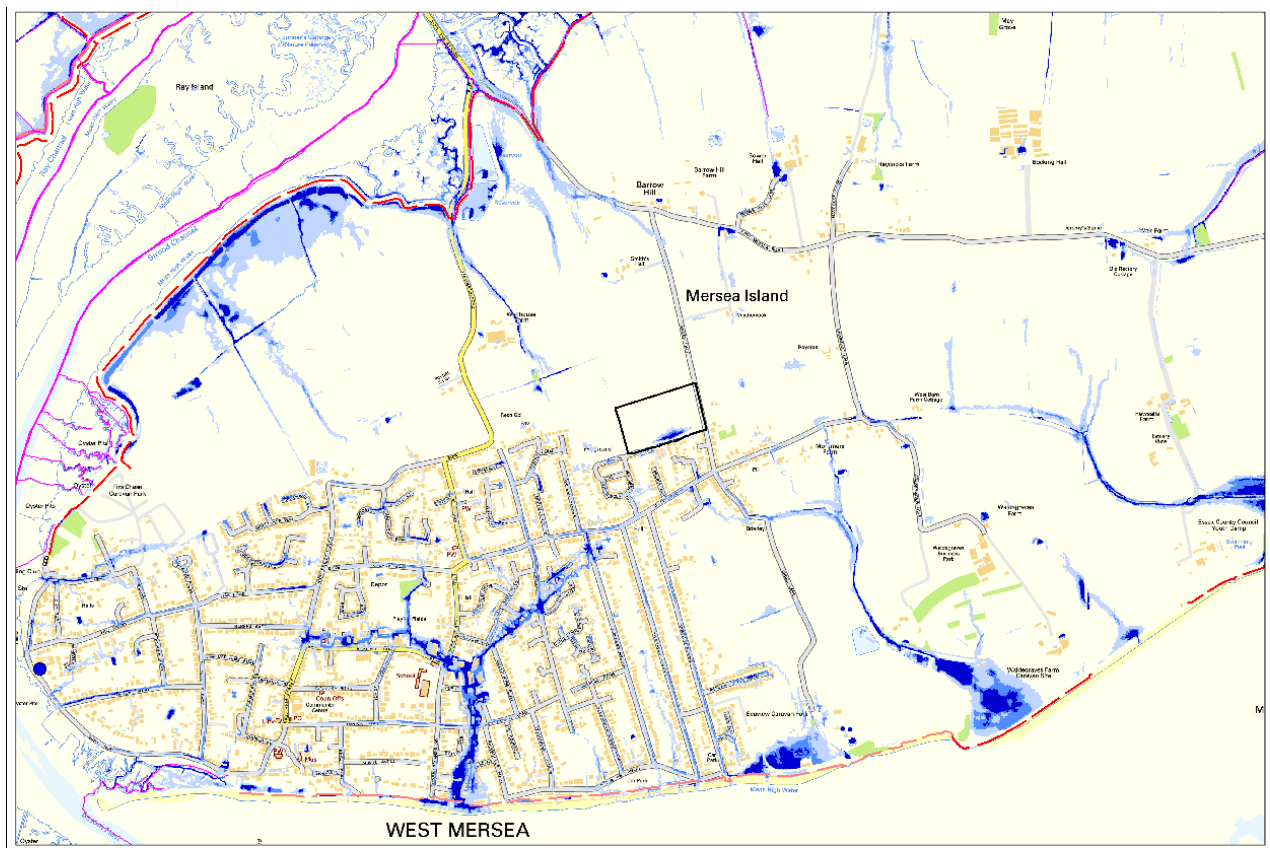

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Figure D Risk of Flooding from Surface Water (RoFSW)

Geology

The bedrock geology in this area is Thames Group, comprising of clay and silt. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within the study area for the town of Colchester SWMP and is therefore not within a Critical Drainage Area (CDA). The map highlights a previous historical flood event located approximately 2km to the west of the site. The flood source is unknown.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	19.5 l/s	
	1 in 1 year:	16.6 l/s	
	1 in 30 year:	44.3 l/s	
	1 in 100 year:	62.4 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge may be possible along drainage network towards Mersea Flats, subject to consultation with Essex CC. As the drainage network is not directly adjacent to the site, it may be difficult to connect.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

Site Assessment Summary – Dawes Lane, West Mersea

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that the site is located within a 1km square of which <25% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be low. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. Further assessment should be made of the surface water flow paths across the site. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[46] (i.e. considering infiltration measures first wherever possible). The drainage strategy should also consider the small drainage network east of the site, travelling towards the Mersea Flats.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[47].

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable along the road network Dawes Lane. However as the site is located on an island, the only access road onto the Island can become cut off during high tides, proving access to be difficult during these conditions.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service so that they are aware of the flood risk to the area local to where they are located, including key transport routes. It is fundamental that residents are aware that the island can become cut off from the mainland when the access road onto the island is inundated by high tides. Increasing community resilience and safe refuge sites should be considered on Mersea Island.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[46] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[47] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

Site Assessment Summary – Brierley Paddock, East Road, West Mersea

Location:	SHLAA Ref /Ref:	Area (ha):	Proposed use:	Vulnerability Classification:
Brierley Paddock, East Road, West Mersea	MER18	8.96	Residential (100 dwellings)	More Vulnerable

Sequential Test Status:

The Sequential Test has been undertaken by Colchester BC for these sites as part of the preparation of the Local Plan Site Allocations.

Tidal and Fluvial Flood Risk

Flood Zone 1:	Flood Zone 2:	Flood Zone 3a:	Flood Zone 3b:
100%	0%	0%	0%

Flood Zones and Flood Defences

The site is located entirely within Flood Zone 1 and is therefore currently considered to be at low risk of flooding. The surrounding area, bordering the River Blackwater estuary is however within Flood Zone 3b. It is fundamental to note that the site is located on an island and is therefore surrounded by water. The map illustrates that 0.5km south of the site, the area is benefiting from high ground. The site is approximately 2.2km from the Strood Channel. Additionally a drainage river network is located 240m east of the site boundary by Mortimers Farm. This travels in a southerly direction 650m towards the Mersea Flats.

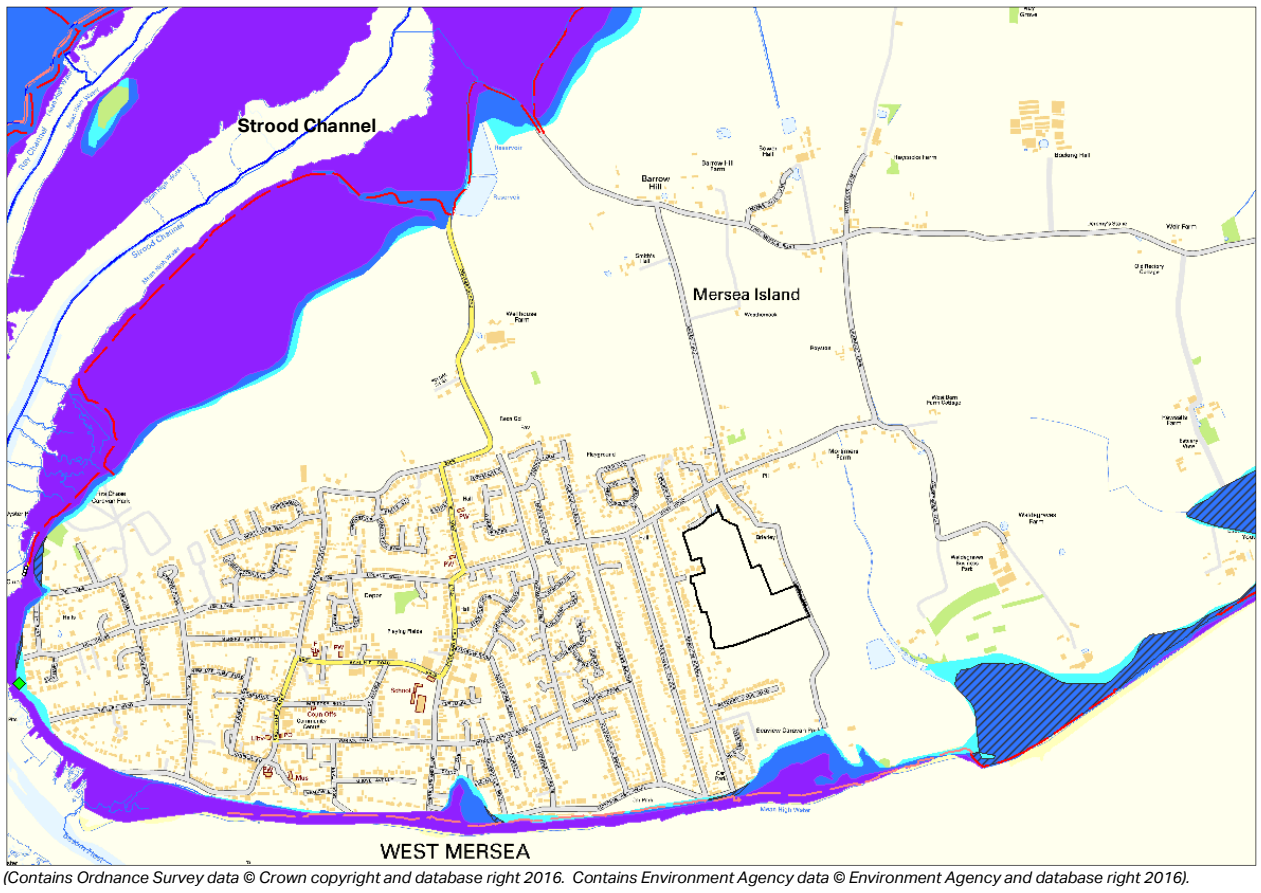

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Figure A Modelled Flood Extents

Residual Risk: Extreme Tidal Event at West Mersea

The site is located on Mersea Island which is protected by the current defences along the coastline. However during extreme tidal events, areas of the island become at risk. A model simulation has been completed to determine the residual risk to the site in the event of a 0.5% AEP event + Climate Change. Results for the 0.5% AEP event including an allowance for climate change demonstrate that flood water may inundate the outskirts of Mersea Island to depths greater than 3.0m. This includes the only access road to the Island via The Strood. This corresponds to a hazard rating of Extreme (danger to all). Nonetheless the proposed site does not present to be at risk from an extreme tidal event. Although adjacent to the site is Cross Lane which obtains a maximum flood depth of 0.1 – 0.5m at the end of the road, corresponding to a low hazard rating. This is approximately 352m from the site.

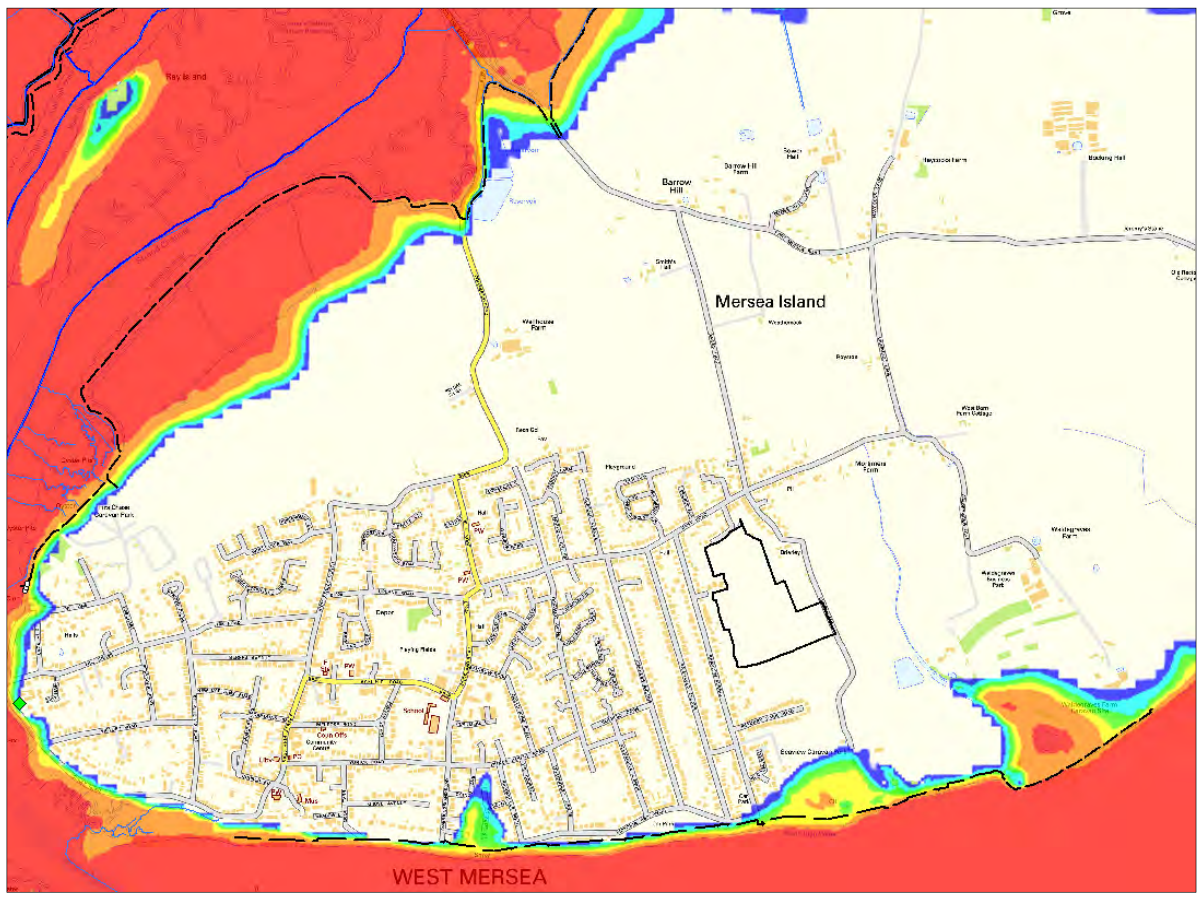

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Figure B Extreme Tidal Event; 0.5% AEP including Climate Change: Maximum Flood Depth

Site Assessment Summary – Brierley Paddock, East Road, West Mersea

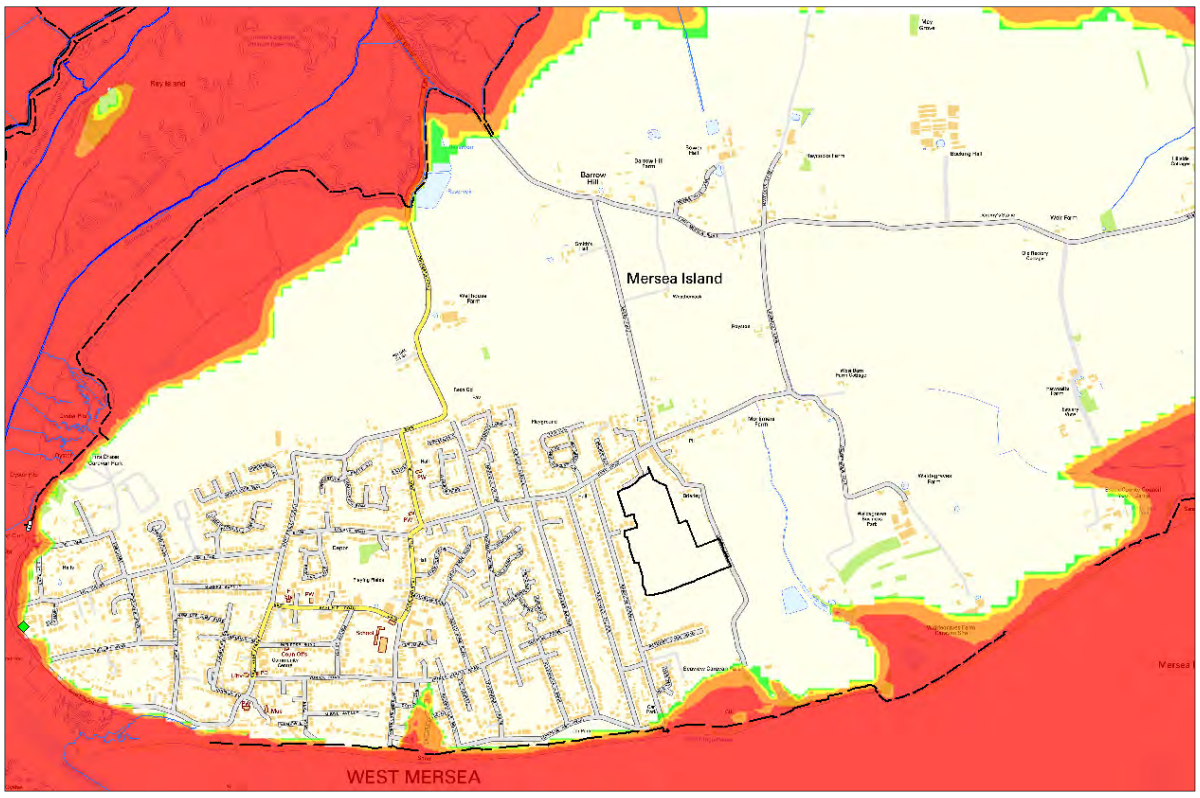

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Figure C Extreme Tidal Event; 0.5% AEP including Climate Change: Hazard Ratings

Surface Water Flood Risk

Risk of Flooding from Surface Water and SWMP Modelling

The RoFSW mapping indicates that most of the site is at very low risk of surface water flooding (<0.1% AEP). South-east of the site, an area has a low probability of flooding from surface water (0.1% - 1%). In addition, whilst not within the site boundary, a small area north of the site, demonstrates a high probability of flooding from surface water. Most of the access road, Cross Lane, has a very low probability of surface water flooding although north of the road; the risk does increase to medium (1% - 3.3%). The site layout should be carefully planned to ensure that residential dwellings are not placed at surface water flood risk, and that the position of any new development does not divert the flow path to a neighbouring area.

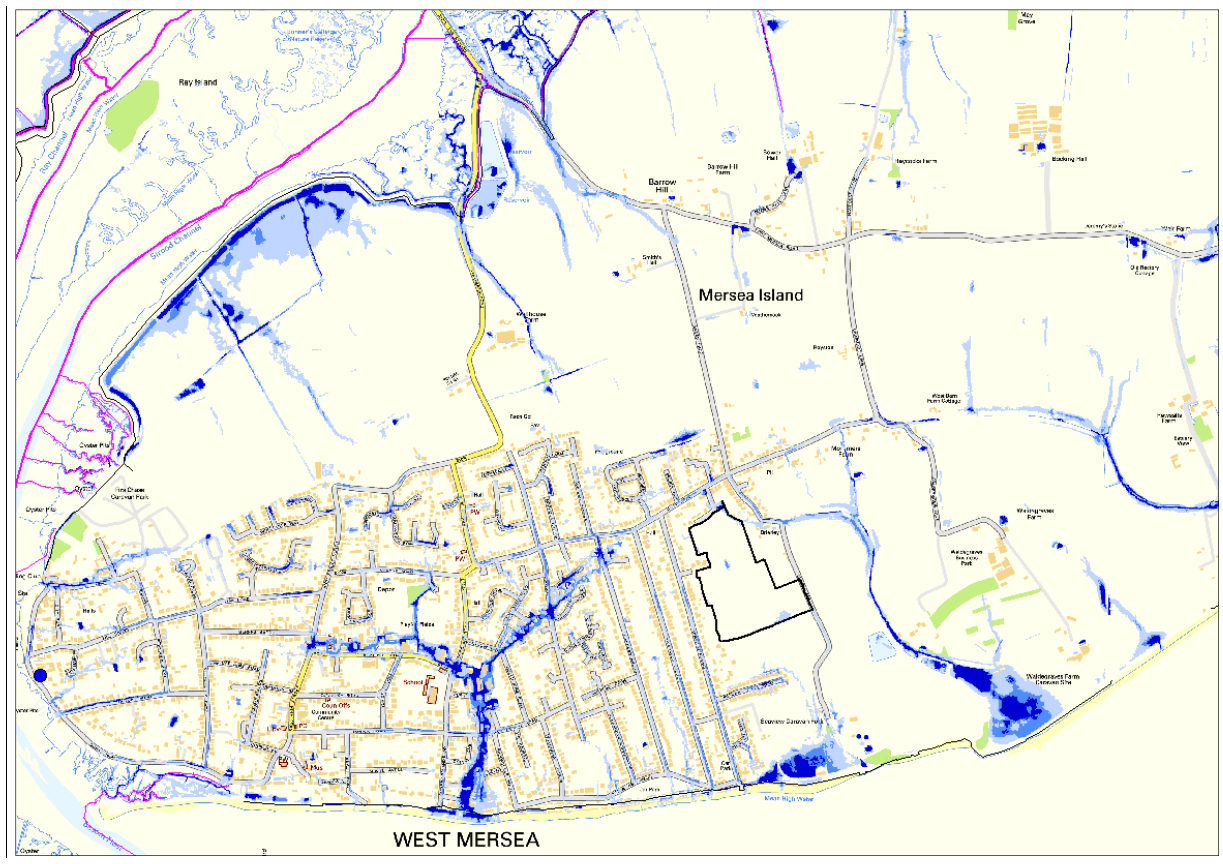

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Figure D Risk of Flooding from Surface Water (RoFSW)

Geology

The bedrock geology in this area is Thames Group, comprising of clay and silt. Underlying clay conditions are typically not very permeable and provide the potential for ponding of surface water on the ground surface during heavy rainfall.

Historic Records

The site is not within the study area for the town of Colchester SWMP and is therefore not within a Critical Drainage Area (CDA). The map demonstrates a historical record of flooding 2.2km west of the site. The source of flooding is unknown.

Estimated Greenfield Runoff Rates (IH124 Results).	QBAR:	36.3 l/s	
	1 in 1 year:	30.8 l/s	
	1 in 30 year:	82.2 l/s	
	1 in 100 year:	115.7 l/s	
Drainage Hierarchy	Infiltration to ground		Uncertain due to geology; subject to on site infiltration testing.
	Discharge to watercourse		Discharge may be possible along drainage river network from Mortimer's Farm, subject to consultation with Essex CC. Constraint that the drainage network is not adjacent to the site and may be difficult to connect. Land ownership and the distance between the site and the drainage network may conflict with this option.
	Discharge to surface water sewer		Possible, subject to consultation with Anglian Water.

Groundwater Flood Risk

Site Assessment Summary – Brierley Paddock, East Road, West Mersea

The AStGWF mapping (Level 1 SFRA Appendix A Figure 5) shows that most of the site is located within a 1km square of which <25% is susceptible to groundwater emergence. However 1.46ha south of the site is located within a 1km square of which 25% - 50% is susceptible to groundwater emergence. The risk of groundwater flooding in this area is therefore considered to be generally low. This will need to be confirmed during site investigation survey.

Other Sources

The site is not shown to be at risk of inundation in the event of a failure of a reservoir on the Environment Agency 'Risk of Flooding from Reservoirs' mapping.

Site Specific Recommendations

Site Layout and Design

The site is located within Flood Zone 1, low probability of flooding from rivers in which More Vulnerable residential development is considered appropriate. Further assessment should be made of the surface water flow paths across the site. The drainage strategy for the site must be considered early in the site planning process to ensure adequate inclusion of SuDS. They should be considered in accordance with the hierarchy of SuDS as stated within Essex CC's SuDS Design Guide[48] (i.e. considering infiltration measures first wherever possible). The drainage strategy should also consider the small drainage network east of the site towards the Mersea Flats.

Finished Floor Levels

Finished floor levels should be set 300mm above ground level, to provide protection from surface water flooding in accordance with Environment Agency guidance on FRA's[49]..

Access / Egress

Safe dry access to and from the site should be provided, and this should be achievable along Cross Lane. However as the site is located on an island, the only access road onto the Island can become cut off during high tides, proving access to be difficult during these conditions.

Emergency Planning

The site is not shown to be within an Environment Agency Flood Warning Area; however residents may wish to register to receive the warning service so that they are aware of the flood risk to the area local to where they are located, including key transport routes. It is fundamental that residents are aware that the island can become cut off from the mainland when the access road onto the island is inundated by high tides. Increasing community resilience and safe refuge sites should be considered on Mersea Island.

Summary

The proposed development entails More Vulnerable residential development located in Flood Zone 1, which is considered compatible development in accordance with the NPPF. The proposals are therefore not subject to the Exception Test. However, Colchester BC have included this site for assessment as part of the Level 2 SFRA due to the risk of surface water flooding, and based on the strategic assessment of flood risk and the recommendations for mitigation measures set out above, it is considered that proposed development on this site could be suitably designed to satisfy part 2) of the Exception Test.

[48] https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf
[49] https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

4 SWMP Preferred Options for Colchester Town and The Hythe

As part of the Town of Colchester SWMP, preferred options for the management of surface water have been set out for each of the CDAs in the study area. A number of the development sites identified by Colchester BC are located within or adjacent to CDA 2 – The Hythe Area, and CDA 3 - Colchester Town Area. The preferred options for these CDAs have been included within the Level 2 SFRA for ease of reference.

Those considering development within any of the CDAs identified in the SWMP should consult Essex CC as early as possible to obtain the most up to date details of proposed schemes and the implications for future development with respect to contributions to the implementation of the schemes and the effective management of local flood risk in these areas.

CDA 02 – The Hythe Area

Preferred Option:

- Introduce a swale within the upper catchment to divert flows into an attenuation feature within Scrub End Sports Ground. Determine if preferential flow paths can be created within Layer Road to discharge into this device;
- Promote preferential flow paths (remove kerbs and include swales) to divert flows into the attenuation feature within Abbey Field;
- Investigate if expanding the attenuation feature within Abbey Field will benefit the CDA;
- Promote preferential flow paths which divert (out)flows from Abbey Field attenuation area into Bourne Pond via local roads (raised kerbs and local resistance and resilience measures may be required once other measures have been assessed);
- Review maintenance within channels linking permanent water bodies to ensure no objects/features reduce flood storage volumes within the area and if this can be enhanced;
- Investigate utilising a culvert from Distillery Pond into the River Colne (including pumping regime) during times of peak flooding to reduce downstream ponding; and
- Review if resistance/resilience measures should be incorporated within the electrical sub-station and industrial park – review drainage and investigate pumping scheme (update existing if suitable) to reduce risk of ponding within this location.

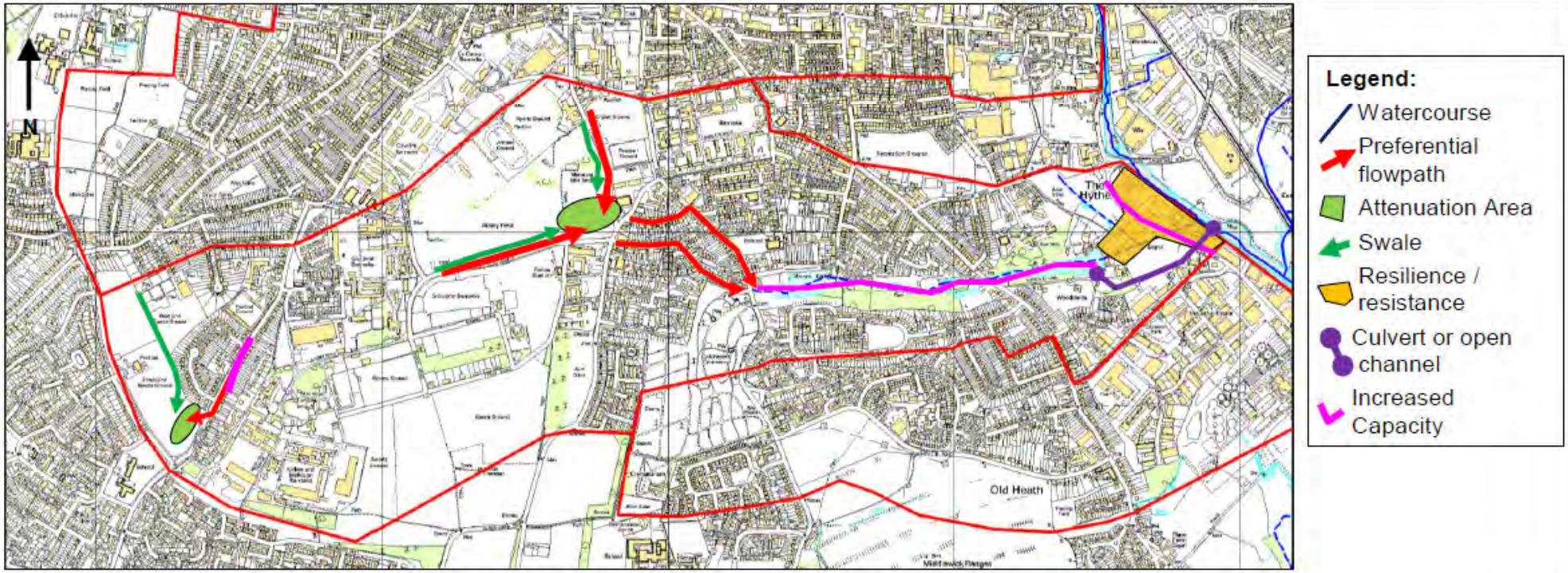

Figure 5-6 Preferred Options CDA 02 – The Hythe Area

CDA 03 – Colchester Town Area

Preferred Option:

- Enhance the hydraulic model (in consultation with AW) to include the drainage network in the CDA (and upper catchment);
- Investigate attenuating (via vegetated bio-retention /soakaways) upstream flows within attenuation areas north and west of Irvine Road (this may impact the existing allotment) with cut off swales directing flows into these attenuation areas;
- Investigate the benefit of including a swale (directing flows to a proposed attenuation soakaway area) within the sports fields of Colchester County High School for Girls to assist with reducing ponding near Cambridge Road area;
- Investigate the benefit of extending the separating the drainage system up Maldon Road and review redesigning the roundabout(s) to attenuate runoff;
- Determine if pipe capacity can be increased and if necessary a pumping regime in place to divert ponding from flooding of commercial/residential areas;
- Determine benefit of retrofitting storage under the car park north of the Colchester Town station which also includes permeable surfacing;
- Determine risk to Network Rail line (including their management procedures) and determine if during extreme events the rail line can be used as a preferential flow path to convey flows into a potential attenuation area within the allotment area north of the line; and
- Review pipe network within Victor Road can determine if a capacity increase is feasible and its benefits and confirm if resistance/resilience measures should be included in the area at risk.

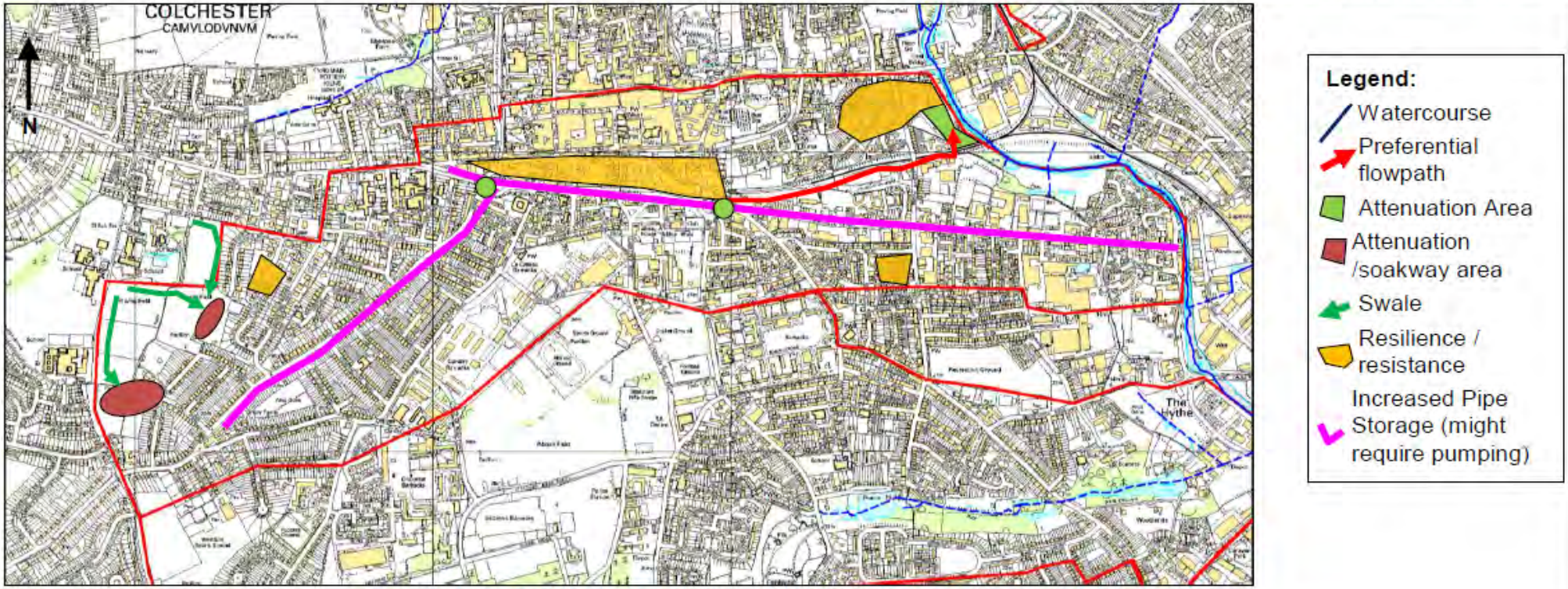

Figure 5-7 Preferred Options CDA 03 – Colchester Town Area

5 Summary

A Level 2 SFRA has been carried out for the 27 potential development sites, the Essex University Employment Zone and two larger proposals for Garden Settlements at Marks Tey and East Colchester, identified by Colchester BC.

For the majority of the sites, it is considered that proposed type of development could be suitably designed to satisfy part 2) of the Exception Test.

For the following sites located adjacent, or near to, Haven Road and Distillery Lane it is considered that the suitability of allocating these sites in the Colchester BC Site Allocations rests on the ability of the risk management authorities to work together to deliver a solution for the surface water flooding issues currently experienced in this area.

- COL44 Commercial land between Haven Road and River Colne; and,
- COL54 Scrapyard and allotments off Haven Road and Distillery Lane.

The Level 2 SFRA has also identified that for a number of sites, additional modelling information for fluvial watercourses will be required as part of site specific FRAs in order to more accurately determine the flood risk to the site and inform specific development design details such as finished floor levels.

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