

Appendix E – Summary of flood risk in South Norfolk District

The table below summarises the areas where there are notable flood risks within the South Norfolk District. For this summary the District has been delineated into five Character Areas, taking into account Parish boundaries and the characteristics of the area.

Further information on the South Norfolk Character Areas can be found in Section 4.10 of the main report.

Character Area	Fluvial flood risk	Existing defences	Surface water flood risk	Susceptibility to Groundwater flood risk	Reservoir inundation risks	Historic, recorded flood events
Character Area 1: Wymondham	<p>This area is largely rural and located in the north west of the District. Across the area, Flood Zones 2 and 3a show similar flood extents, with a lot of the fluvial risk shown to remain confined to a relatively narrow floodplain and impacting rural areas, however, there are urban areas which are also shown to be at risk. The River Wensum flows along the northern border of the Character Area, and one of its tributaries, the River Tud, bisects the northern tip of the area. The confluence of the River Tud and River Wensum lies on the eastern border of the Character Area, immediately north of New Costessey. Urban areas to the north of Costessey are shown as being in Flood Zones 2 and 3a. The River Yare bisects the Character Area, flowing west to east from Coston to the cluster of lakes near Bowthorpe. It then follows the eastern border of the Character Area, flowing south east around the outskirts of Norwich. Most of this area is rural but there is some fluvial flood risk to small urban areas, including the east side of Marlingford and the north end of Bawburgh. A tributary of the River Yare, the River Tiffey, flows north to south through the Character Area, joining the River Yare to the north west of Wymondham. The smaller unnamed tributaries of the River Tiffey flow</p>	<p>The EA AIMS dataset shows a natural high ground along both banks of all main watercourses in the Character Area, including the River Wensum, the River Tud, Bays River, the River Tiffey, and the River Yare.</p>	<p>Surface water in the area follows the topography, predominantly flowing downhill towards the north-eastern border of the Character Area and the River Wensum from the higher areas along the southeast, south, and southwest of the area. The flow paths mainly follow the path of the main watercourses and their tributaries, including Bays River, Dyke Beck, the River Tiffey, the River Tud, and the River Yare. Surface water is also channelled by the roads in the area. There are also many small, isolated areas of surface water ponding throughout the residential areas, which may present a localised flood risk to properties.</p> <p>Within Wymondham there are a couple of considerable flow paths which flow in a westerly direction through the centre of the town towards the River Tiffey, with several roads and properties impacted particularly between Norwich Road and Pople Street. There is also a considerable build-up of surface water, particularly in the 0.1% AEP event along the south side of Norwich Road, near its junction with the B1135 in the east side of Wymondham.</p>	<p>The AStGWF dataset shows that the majority of areas with greater than 50% susceptibility to groundwater flooding are located along the path of the watercourses including the River Wensum, the River Tud, Bays River, the River Tiffey, and the River Yare. This is particularly prevalent in the centre of the Character Area north of Wymondham, where a series of tributaries discharge into the River Tiffey. The JBA Groundwater Emergence Map emulates this, with groundwater levels along the immediate floodplain of the watercourses mentioned above sitting at or very near the surface. In addition to this, the north-eastern side of the Character Area is shown to have groundwater emergence levels between 0.5m and 5m from the surface. The RoFSW map shows that if these areas experience groundwater emergence, it is likely to be channelled by the lower topography of watercourses such as Bays River, Dyke Beck, and the River Tiffey in the south of the Character Area, and the River Yare and River Tud in the</p>	<p>The following reservoirs impact the Character Area in the 'Dry Day' and 'Wet Day' scenario.</p> <ul style="list-style-type: none"> • Haveringland Lake – The flood extents follow the north-eastern border of the Character Area in a southerly direction, channelled by the River Wensum. The following reservoirs impact the Character Area in the 'Dry Day' scenario • Heigham Large Deposit Reservoir – This reservoir is located to the east of the Character Area. The flood extents flow west, channelled by the River Tud, to the western border of the Character Area. The flood extent also propagates 	<p>The EA Recorded Flood Outlines dataset details the following historic events:</p> <ul style="list-style-type: none"> • September 1968 – Fluvial flooding due to channel capacity exceedance along the River Tiffey, flowing west to east through the north of the Character Area. • November 1993 – Fluvial flooding due to channel capacity exceedance

Character Area	Fluvial flood risk	Existing defences	Surface water flood risk	Susceptibility to Groundwater flood risk	Reservoir inundation risks	Historic, recorded flood events
	through urban areas such as Spooner Row and Morely St Botolph, areas of which are shown to lie within Flood Zones 2 and 3a. The River Tiffey flows along the southern side of Wymondham, however, the flood risk is shown to remain mostly confined to the channel in both Flood Zones 2 and 3a. It then flows along the south side of Barford before its confluence with the River Yare, where Flood Zone 2 encroaches into the south end of the settlement.		<p>There is a considerable area of surface water ponding to the southeast of Hingham and several flow paths which flow in a south-easterly direction from the south end of the settlement. Several properties in the south end of the settlement are shown to be at flood risk, particularly along Bears Lane, Hopsack Road, and Hall Moor Road.</p> <p>In the north of the area, there are several flow paths which impact areas of New Costessey. Much of this risk is confined to the roads but there are also several areas of properties shown to be at risk, including along East Hills Road, Folwell Road, Jerningham Road, Kabin Road, Olive Road, Valley Road, and Oval Road.</p> <p>Other urban areas with considerable surface water risk include Morley St Botolph, Barnham Broom, Barford, Marlingford, and Easton.</p>	north. All watercourses mentioned above route water north-east to the River Wensum along the north-east border of the Character Area.	around 2.5km upstream along the River Wensum, following the north-eastern border.	ce along the River Wensum along the north-east border of the Character Area.
Character Area 2: Long Stratton	<p>This Character Area is largely rural and located quite centrally within the District.</p> <p>The River Yare flows west to east along the northern border of the Character Area, however, the fluvial flood risk within the area is shown to be predominantly confined to rural areas in the north of the district. Intwood Stream, a small tributary of the River Yare, flows in a northerly direction from Mulbarton to its confluence on the northern border east of Cringleford. Where it flows in a north-westerly direction through</p>	The EA AIMS dataset shows natural high ground along both banks of all the main watercourses, including the River Tas, as well as the south-eastern tributaries that flow through Hemphall, Saxingham, and Shatesham.	Surface water in the area follows the topography, predominantly flowing downhill towards the northern border of the Character Area and the River Yare from the higher areas in the eastern and western sides of the area. The flow paths mainly follow the path of the River Tas and its tributaries. Surface water is also channelled by the roads in the area. There are also many small, isolated areas of surface water ponding throughout the residential areas, which may	The AStGWF dataset shows that the majority of areas with greater than 50% susceptibility to groundwater flooding are located along the River Tas. This is particularly prevalent in the upstream of the catchment north of Tibenham, and along the northern border of the Character Area at Caistor St Edmund. The JBA Groundwater Emergence Map emulates this, with the immediate	There are no reservoir flood extents which impact the area during the 'Dry Day' scenario. The Heigham Large Deposit Reservoir impacts the Character Area in the 'Wet Day' scenario. The flood extent flows from west to east along the northern	<p>The EA Recorded Flood Outlines dataset details one historic event:</p> <ul style="list-style-type: none"> • September 1968 – Fluvial flooding due to channel

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	<p>Mulbarton several properties are shown as lying within Flood Zones 2 and 3a, which show similar extents. Flood Zones 2 and 3a also encroach into the east side of Cringleford, with a number of properties located in Flood Zone 3a along Tungate Crescent and Mark Lemmon Close and further properties located within Flood Zone 2, which extends slightly further west in this area. In addition, the River Tas bisects the entire Character Area, flowing south west to north. The River Tas and its tributaries, including Hempnall Beck, flow through a number of urban centres where there are properties shown to be at fluvial risk:</p> <ul style="list-style-type: none"> • Shelton – Flood Zones 2 and 3a encroach on the eastern side of the village but limited flood risk to properties. • Froncett St Peter – several properties along Low Road shown to be in Flood Zone 2. • Hempnall – a small number of properties along Mill Road lie within Flood Zones 2 and 3a. • Newton Flotman – the flood risk mainly remains confined to the channel where it flows along the southern border of this settlement, with limited flood risk to industrial areas. • Saxingham Nethergate – a couple of properties on the east side are impacted in Flood Zone 2, which extends further than Flood Zone 3a. • Caistor St Edmund – couple of properties located in Flood Zones 2 and 3a in the north end of the settlement. 	<p>Additional natural and engineered high ground lies on both banks of Intwood Stream that flows north from Mulbarton to the northern border of the Character Area east of Cringleford.</p>	<p>present a localised flood risk to properties.</p> <p>Within Long Stratton there are several considerable flow paths which flow through the settlement in an easterly and northeasterly direction with several properties at flood risk across the settlement. There is a considerable area of surface water risk in the east side of the settlement with a large number of properties at risk around the junction of The Street and Swan Lane.</p> <p>Other urban areas with considerable surface water risk include Great Moulton, Hempnall, Wreningham, Swardeston, Stoke Holy Cross, Shelton, and Aslacton.</p>	<p>floodplain of the River Tas having groundwater emergence levels at or near the surface, particularly around its confluence with Hempnall Beck. The wider floodplain is shown to have emergence levels between 0.5m and 5m from the surface. Furthermore, the immediate floodplain of Intwood Stream is also shown as having groundwater emergence levels at or near the surface, with wider floodplain levels between 0.5m and 5m from the surface.</p> <p>The RoFSW map shows that if these areas experience groundwater emergence, it is likely to be channelled by the lower topography the River Tas and its tributaries. These watercourses route water north to the River Yare which flows along the northern border.</p>	<p>border of the Character Area, channelled by the River Wensum and River Yare. The flood extent also propagates up the River Tas flowing south-west along the northern border.</p>	<p>capacity exceedance of the River Tas. The extent flows south-west to north-east through the centre of the Character Area to the northern border, where it discharges into the River Yare.</p>

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Character Area 3: Loddon	<p>The Character Area is largely rural and lies in the north east of the District.</p> <p>The River Yare flows west to east along the north eastern border of the Character Area. The Broads then extend south from the Border by approximately 850m in the north of the Character Area, and 2.3km in the south east. The entirety of the Broads lie within Flood Zone 3a.</p> <p>There are four tributaries flowing south west to north east through the area, discharging into the River Yare: Hellington Beck, Carleton Beck, the River Chet, and Landspring Beck. Several properties in Claxton lie within Flood Zone 2, which extends further south than Flood Zone 3a in this area, due to its proximity to Hellington Beck.</p> <p>Similarly, there are several properties in the southern end of which lie within Flood Zones 2 and 3a from Carlton Beck.</p> <p>The River Chet and its tributaries flows through numerous urban centres including Poringland, Sisland, Hales, and Loddon. Although the flood risk is generally confined to a relatively narrow floodplain, there is considerable flood risk in Hales, with large numbers of properties located within Flood Zones 2 and 3a particularly along Millside and Briar Lane.</p> <p>Finally, Landspring Beck flows through Haddiscoe, where small areas to the east and north of the village are shown to lie within Flood Zones 2 and 3a, which show similar extents in this area.</p>	<p>The EA AIMS dataset shows a series of engineered embankments along the banks of the River Yare. These stretch from Rockland Broad, along the northern border of the Character Area until its confluence with the River Waveney at Burgh Flats. Additional embankments border the River Waveney along its entire length along the eastern border of the Character Area. There are no defences in the upstream catchments, including the River Yare between Postwick and Rockland Broad, Hellington Beck flowing east through Hellington into Rockland Broad, the River Chet between Poringland and Loddon, and Carlton Beck flowing north-east through Thurton</p>	<p>Surface water in the area follows the topography, predominantly flowing downhill from the higher elevations along the southern and eastern borders towards the north-eastern border of the Character Area and the River Yare. In the south of the Character Area, surface water is channelled north by the small tributaries, then east by the lower topography of the River Chet, towards the north-eastern border and the River Yare. In the north of the Character Area, surface water is routed east by the lower topography of The Beck, towards the River Yare on the north-eastern border. Surface water is also channelled by the roads across the area. There are also many small, isolated areas of surface water ponding throughout the residential areas, which may present a localised flood risk to properties.</p> <p>There are two considerable surface water flow paths which flow in a northerly direction through Loddon with several smaller flow paths joining these. Several properties are shown to be at flood risk particularly along Filbert Road, Kittens Lane, Low Bungay Road, Beccles Road, and Kingfisher Walk.</p> <p>There are several surface water flow paths which flow in a southeasterly direction through Poringland. Several properties</p>	<p>The AStGWF dataset shows that the entirety of the Character Area has less than 50% susceptibility to groundwater flooding. Land surrounding Rockland Broad and the River Yare in the north of the Character Area are shown as having between 25% and 50% susceptibility of groundwater flooding. However, the JBA Groundwater Emergence Map shows groundwater emergence levels along the River Yare to be at or near the surface. In addition to this, the groundwater emergence levels on the floodplain of the River Chet are shown as being between 0.5m and 5m below the surface. The tributaries of the River Chet, including Well Beck and the unnamed watercourse that flows through Loddon have groundwater levels at or near the surface in the upstream reaches, and between 0.25m and 0.5m in the downstream reaches.</p> <p>The RoFSW map shows that if these areas experience groundwater emergence, it is likely to be channelled by the lower topography of watercourses such as The Beck and Carlton Beck in the north of the Character Area, Well Beck and the River Chet in the middle, and The Beck and Landspring Beck in the south. All watercourses</p>	<p>The Reeders Reservoir impacts the Character Area in the 'Dry Day' scenario. This reservoir is located in the south-east of the Character Area near Raveningham. The flood extent flows north through Thurlton, channelled by the lower topography, before discharging into a field drainage system north of Lower Thurlton. The Heigham Large Deposit Reservoir impacts the Character Area in the 'Wet Day' scenario. The flood extent flows from west to east along the northern border of the Character Area, channelled by the River Yare.</p>	<p>The EA Recorded Flood Outlines dataset details one historic event:</p> <ul style="list-style-type: none"> • January 1953 – Tidal flooding in Great Yarmouth and Gorleston-on-Sea propagates upstream, channelled by the River Yare and River Waveney into the north-east of the Character Area.

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		and Ashby St Mary to the River Yare.	across the settlement are shown to be at flood risk, with particular risk along Carr Lane, Saxonfields, Springfields, Elizabeth Road and the cul-de-sacs off this, Rosebery Avenue, and Critoph Close. Other urban areas with considerable surface water risk include Alington, Brooke, Sisland, Raveningham, Thurlton, and Claxton.	mentioned above route water east and then north to the River Yare which flows along the north-east border of the Character Area.		
Character Area 4: Ditchingham	<p>This Character Area lies to the west of the District and is largely rural. The River Waveney flows in a north-easterly direction along the south eastern border. There are several urban areas along this watercourse that are at fluvial risk including:</p> <ul style="list-style-type: none"> • Wortwell – there are a small number of properties at risk in the eastern side of the settlement which borders Flood Zones 2 and 3a. • Earsham – Flood Zone 2 extends through the centre of the settlement with several roads and properties at flood risk. • Geldeston – a number of properties in the south end of the settlement lie within Flood Zones 2 and 3a. • Gillingham – a small number of properties in the south end of the settlement lie within Flood Zone 3a with several further properties within Flood Zone 2. <p>The Broads extend into the north eastern tip of the Character Area and are at significant flood risk.</p>	<p>The EA AIMS dataset shows embankments along the south-eastern border, from Geldeston to the edge of the Character Area, bordering the River Waveney which flows west to east.</p> <p>A combination of natural and engineered high ground lies along Broome Beck, which flows south from Woodton to Ditchingham, and along the River Waveney between Harleston and Homers field, and Earsham and the confluence with Broome Beck.</p>	<p>Surface water is channelled by lower topography towards the south-eastern border of the Character Area and the River Waveney.</p> <p>The south-west of the Character Area lies at a much higher elevation than the rest of the area. In the north of the Character Area, surface water flows east from areas of high elevation, such as that along the north-western border, channelled by the lower topography of watercourses such as Broome Beck. Similarly, in the south of the Character Area, surface water is channelled to the southeast via the lower topography of Starston Brook. Surface water is also channelled by the roads across the area. There are also many small, isolated areas of surface water ponding throughout the residential areas, which may present a localised flood risk to properties.</p> <p>There is a significant surface water flow path which flows in a</p>	<p>The AStGWF dataset shows that a small area to the south of the Character Area around Earsham, Ditchingham, and Kirkby Cane have a greater than 50% susceptibility to groundwater flooding. Furthermore, land immediately south of Pulham Market is also shown as having a greater than 50% susceptibility to groundwater flooding.</p> <p>The JBA Groundwater Emergence Map shows the floodplain of the River Waveney as having groundwater levels at or near the surface, particularly around Ditchingham, Kirkby Cane and Geldstone. Further upstream in the south of the Character Area groundwater levels are indicated to be lower, between 0.5m and 5m below the surface. In addition, groundwater levels along Broome Beck are shown as being at or near the surface in the upstream reaches of the watercourse, and between</p>	<p>The Ditchingham Lake reservoir impacts the Character Area in both the 'Dry Day' and 'Wet Day' scenarios. This reservoir is located in the centre of Character Area 4, north of Nelsey Bridge Road. The flood extent flows south-east towards the eastern border, channelled by Broome Beck, until it reaches the River Waveney. In the 'Wet Day' scenario the flood extent is then channelled downstream along the River Waveney along the southern border of the Character Area through Geldeston and Gillingham.</p>	<p>There are no recorded flood events shown in the EA Recorded Flood Outlines dataset for this Character Area.</p>

Character Area	Fluvial flood risk	Existing defences	Surface water flood risk	Susceptibility to Groundwater flood risk	Reservoir inundation risks	Historic, recorded flood events
	<p>There are three tributaries that flow in an easterly direction through the Character Area, discharging into the River Waveney.</p> <p>Broome Beck, in the north of the area, flows through urban areas such as Woodton and Broome Street. Whilst the flood risk is shown to be mostly confined to a relatively narrow floodplain, the flood extents encroach on these settlements with a small number of properties located in Flood Zones 2 and 3a, which show similar extents.</p> <p>Dentonwash flows through the centre of the area and is not shown to flow through any towns or villages.</p> <p>Pulham Beck flows through the south of the area and impacts the urban centres of Pulham St Mary and Harleston. The flood risk is mostly confined to a narrow floodplain but there are a small number of roads and properties at fluvial risk in the south end of Pulham St Mary and the north end of Harleston.</p>		<p>northerly direction through the centre of Harleston, with several smaller flow paths flowing from the east and west to join this. Several properties across the settlement are shown to be at flood risk particularly along The Throughfare and Church Street through the centre and Jay's Green, Lovat Close, Saint Mary's Close, and Bridge Close in the east of the area.</p> <p>Across Ditchingham there are a number of small flow paths and isolated areas of ponding, impacting several roads and properties, particularly in the 0.1% AEP event.</p> <p>Other urban areas with considerable surface water risk include Pulham St Mary, Starston, and Kirby Cane.</p>	<p>0.5m and 5m below the surface in the mid to downstream reaches. The length of the north-eastern border is deemed as having no risk of groundwater emergence due to the nature of the local geological deposits.</p> <p>The RoFSW map shows that if these areas experience groundwater emergence, it is likely to be channelled by the lower topography of watercourses such as Broome Beck in the north of the Character Area, and Starston Brook in the south. These watercourses all route water east towards the River Waveney which flows along the south-eastern border of the Character Area.</p>	<p>The flood extent also follows the River Waveney upstream as far as Bungay.</p>	
Character Area 5: Diss	<p>This Character Area lies in the south of the District and is largely rural. The River Waveney flows along the southern and eastern borders, and impacts several urban areas:</p> <ul style="list-style-type: none"> • Diss – a small number of industrial buildings in the south end of the settlement are impacted by Flood Zone 3a. Flood Zone 2 encroaches further north with several properties shown to lie within this flood extent, particularly towards the southeast side of the settlement. • Scole – there is limited risk from Flood Zone 3a in the south of the settlement. The Flood Zone 2 	<p>The EA AIMS dataset shows a combination of engineered and natural high ground following the southern and eastern borders of the Character Area along the River Waveney. This is mainly where the river flows alongside urban centres such as Diss,</p>	<p>Surface water is channelled by lower topography towards the southern border of the Character Area and the River Waveney. Surface water in this Character Area is channelled by areas of lower topography into Frenze Beck in the west, and Dickleburgh Stream in the east. Surface water is also channelled by the roads across the area. There are also many small, isolated areas of surface water ponding throughout the residential areas, which may present a localised flood risk to properties.</p>	<p>The AStGWF dataset suggests that all land immediately surrounding the River Waveney along the southern border is at greater than 50% susceptibility to groundwater flooding. Furthermore, the immediate floodplains of Frenze Beck and Dickleburgh Stream are shown as having a greater than 75% susceptibility to groundwater flooding immediately adjacent to the watercourses, and then greater than 50% susceptibility across the wider floodplain.</p>	<p>There are no reservoir flood extents which impact the area during the 'Dry Day' or 'Wet Day' scenarios.</p>	<p>The Historic Flood Map and EA Recorded Flood Outlines detail the following historic event: December 2020 – Fluvial flooding of the River Waveney</p>

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	<p>extent encroaches further north with several properties shown to be at flood risk, particularly along Waterloo Lane and Karen Close.</p> <ul style="list-style-type: none"> • Brockdish – limited risk from Flood Zone 3a, but Flood Zone 2 encroaches further into the settlement with several properties at risk along the southeast edge of the settlement. • Needham – limited risk from the River Waveney within the settlement, with Flood Zones 2 and 3a bordering the southeast edge of the settlement. A small unnamed tributary of the River Waveney flows through the northern end of the settlement with a small number of properties located within Flood Zones 2 and 3a. <p>A tributary of the River Waveney, Frenze Beck, flows in a southerly direction through the Character Area. The flood risk is mainly confined to rural areas by the back flows through the centre of Shelfanger, where several properties lie within Flood Zones 2 and 3a, particularly along Common Road and Rectory Road. which partially lies within Flood Zones 2 and 3a.</p> <p>Dickleburgh Stream and its tributaries flow from the east and north to join Frenze Beck upstream of Diss. The flood extent along the stream extends across a wide floodplain in places but predominantly only impacts rural areas. However, there are a small number of properties in Gissing shown to lie in Flood Zones 2 and 3a. There are also a small number of</p>	<p>Scole, Brockdish, and Needham.</p>	<p>Throughout Diss there are several considerable flow paths which flow in a southerly direction through the settlement. Properties across the settlement are shown to be at flood risk, with particularly considerable areas of risk in the southeast around Skelton Road and Wordsworth Road and through the centre along Mount Street, Frenze Road and around the A1066. There is also a considerable flow path channelled along the A1066 in the southwest of the settlement with considerable risk to properties particularly to the south of this road.</p> <p>Other urban areas with considerable surface water risk include Shelfanger, Burston, Dickleburgh, Scole, Brockdish, and Needham.</p>	<p>This is supported by the JBA Groundwater Emergence Map, which shows the southern border of the Character Area as having groundwater levels at or near the surface. Groundwater levels between Lower Street and Thorpe Abbot are shown as being between 0.5m and 5m below the surface. The south-eastern border is deemed as having no risk of groundwater emergence due to the nature of the local geological deposits.</p> <p>The RoFSW map shows that if these areas experience groundwater emergence, it is likely to be channelled by the lower topography of watercourses such as Frenze Beck and Dickleburgh Stream. These watercourses route water south into the River Waveney which flows along the southern and eastern borders of the Character Area.</p>		<p>due to channel capacity exceedance. The extent flows west to east along the southern border of the Character Area until the urban centre of Diss.</p>

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	<p>properties in the east side of Shimpling which lie within Flood Zones 2 and 3a.</p> <p>At the confluence of the River Waveney and Frenze Beck, Flood Zone 2 shows a wider extent than Flood Zone 3a, with a small number of properties and industrial buildings in the southeast corner of Diss shown to lie within Flood Zone 2.</p>					