Report to: Essex Flood Partnership Board	**Report Number:** AGENDA ITEM 8 (EFPB/04/18)
Date of report: 25/01/2018	**County Divisions affected by the decision:** All
Title of report: Essex Surface Water Management Plan Update	
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1. Background

1.1 Essex County Council has recently undertaken a review of the numbers of properties at risk of pluvial flooding across the county. The review has been carried out to capture the most up to date standards, modelling methods and data availability and comprises of two stages as follows:

1) Review the number of properties at risk of pluvial flooding across the whole of Essex to reflect changes in national datasets and the subsequent impact this will have on existing flood risk area rankings (Tier Review) within the Local Flood Risk Management Strategy (LFRMS) (2013).

2) Update existing Surface Water Management Plan (SWMP) hydraulic modelling and review the impact this has on the number of properties identified as being at risk of pluvial flooding within each study area.

1.2 Some key changes in the way national flood mapping data is produced and the method/ criteria used to identify properties at risk of pluvial flooding has led to some significant changes in the flood risk area rankings to be reported in the Local Flood Risk Management Strategy.

1.3 Improvements in hydraulic modelling and data availability have produced a much better understanding of the numbers of properties at risk of pluvial flooding within existing SWMP study areas and the move toward a catchment based approach to defining Critical Drainage Area's (CDA's) will help improve flood alleviation scheme viability by opening up opportunities for more cost effective, catchment wide solutions such as Natural Flood Management (NFM) measures.

2. Purpose of report

2.1. The purpose of this report is to highlight observations made during the review of properties at risk of pluvial flooding across Essex, along with the Surface Water Management Plan hydraulic modelling update.

3. Observations

Stage One Flood Risk Area Ranking/ Tier Review

3.1 The numbers of properties identified at risk of pluvial flooding within the Essex LFRMS (2013) are based on the Flood Map for Surface Water (FMfSW) (2010), a national dataset produced by the Environment Agency (EA).

3.2 In 2013 the EA produced the updated Flood Map for Surface Water (uFMfSW) which introduced changes in the way properties at risk of pluvial flooding were identified based on an improved methodology, modelling techniques and data availability to better represent the risk of flooding. Table 1 below provides a summary of the key differences between the FMfSW (2010) and the uFMfSW (2013) datasets:

	Nationally produced surface water flood mapping (2013)	FMfSW (2010)
Hydraulic modelling	2D overland flow modelling	2D overland flow modelling
Model software and equations	JFlow+ (Shallow Water Equation-based)	JFlow-DW (diffusion wave-based) - does not solve full shallow water equations
Hydrological modelling	Direct Rainfall approach with allowances for the sewer network and infiltration (see below).	Direct Rainfall approach with allowances for the sewer network and infiltration (see below).
Design rainfall	FEH depth-duration-frequency parameters defined on a regular 5km grid (with no areal reduction factor applied) for rainfall with a probability of occurring in any year: • 1 in 30 • 1 in 100 • 1 in 1,000	FEH depth-duration-frequency parameters defined on a regular 5km grid (with no areal reduction factor applied) for rainfall with a probability of occurring in any year: • 1 in 30 • 1 in 200
Storm duration(s)	1, 3 and 6hrs used for all scenarios (unless specified locally by LLFA) 50% summer storm profile	1.1hrs used for all scenarios 50% summer storm profile

Table 1 – Summary of Differences between FMfSW (2010) and uFMfSW (2013)

3.3 Table 2 below provides a summary of the new parameters used to identify a property 'at risk' of internal flooding from surface water based on the uFMfSW Property Point dataset:

Buffer	MasterMap building footprints buffered by **2m** to represent the size of a grid square and to reduce the gridded effect of the way that the raised property footprint is represented.
Proportion of property perimeter wetted by a minimum depth of water	**50%** of the **external** portion of the buffered property perimeter to be wet to the given minimum depth - balances the desire to include all affected properties with the need to recognise that many borderline properties will not be affected.
Minimum depth of water	Minimum modelled depth of **200mm** - a depth that is broadly between the average airbrick height and average door threshold height.

Table 2 – National Property Count Method Parameters (2014)

3.4 Whilst these parameters identify property 'at risk' of internal flooding it should also be noted that properties reaching the 200mm depth threshold with 0% wetted perimeter are said to be in 'areas at risk' of surface water flooding.

3.5 Given these changes it was necessary for Essex County Council to carry out a review of the number of properties at risk of pluvial flooding across the county to align with this. The results of this exercise are summarised in Table 3 below:

Residential	Wetted Perimeter	Depth Threshold					
		0mm	150mm	200mm	300mm	600mm	900mm
30 Year	>0%	33781	25995	18119	9126	1497	493
	>25%	21010	13206	8441	3701	619	220
	>50%	9722	5776	**3677**	1728	382	135
	>75%	5006	3179	2118	1086	278	98
100 Year	>0%	61583	48856	36165	19502	3470	1213
	>25%	40120	27105	18310	9092	1771	636
	>50%	20341	12815	**8692**	4670	1139	446
	>75%	11033	7400	5311	3044	857	360
1000 Year	>0%	173309	151578	125075	76889	19192	6293
	>25%	127443	94781	69653	39656	10943	3710
	>50%	71064	48700	**35924**	21668	7008	2556
	>75%	39913	28391	21478	13905	4965	1912

Table 3 – Summary of updated Essex County Residential Property Counts

3.6 In reviewing the total number of properties at risk across the county it was also necessary to look at the impact updates to the national mapping and property point dataset would have on the ranking of Local Flood Risk Areas identified within the Essex LFRMS (2013). Table 4 below provides a summary of the outcome of the Local Flood Risk Area Ranking review:

Area Name	New Tier Classification	Old Tier Classification	Tier Movement
South Essex - Rochford & Hocl	T1	T1	T1 Remain
Chelmsford	T1	T1	T1 Remain
Heybridge	-	T1	Unclassified Remain
South Essex - Castle Point	T1	T1	T1 Remain
South Essex - Billericay	T1	T1	T1 Remain
Maldon	-	T1	T1 to unclassified
Brentwood	T1	T1	T1 Remain
Harlow	T1	T1	T1 Remain
Colchester	T1	T1	T1 Remain
Loughton	T1	T1	T1 Remain
South Essex - Basildon	T1	T1	T1 Remain
Baintree	T2	T1	T1 to T2
Witham	T2	T1	T1 to T2
South Woodham Ferrers	-	T2	T2 to unclassified
Waltham Abbey	-	T2	T2 to unclassified
Saffron Walden	-	T2	T2 to unclassified
Halstead	-	T2	T2 to unclassified
Steeple Bumpstead	-	T2	T2 to unclassified
Hedingham	-	T2	T2 to unclassified
Clacton on Sea	T1	-	Unclassified to T1
Mayland	-	-	Unclassified remain
Sawbridgeworth	T2	-	Unclassified to T2
Lower Nazeing	-	-	Unclassified remain
Manningtree	-	-	Unclassified remain
Great Dunmow	-	-	Unclassified remain
Thaxted	-	-	Unclassified remain
Bicknacre	-	-	Unclassified remain
North Weald	-	-	Unclassified remain

Table 4 - Summary of Flood Risk Area Ranking Review

Ranking	Criteria
Tier 1	More than 1000 people predicted to be at risk
Tier 2	Between 1000 and 500 people predicted to be at risk
Tier 3	Less than 500 people predicted to be at risk

Table 5 – Ranking Criteria for Flood Risk Areas

3.7 Some key observations of this exercise were the emergence of Clacton on Sea as a Tier 1 Flood Risk Area, Sawbridgeworth as a Tier 2 Flood Risk Area and movement of a number of former Tier 1 and 2 areas to un-classified. With this in mind we are looking at procurement of the Clacton-on-sea SWMP for delivery in the 2018/19 financial year.

Stage Two Existing SWMP Hydraulic Modelling Update

3.8 SWMPs have been completed within Essex for the urban areas of South Essex, Brentwood, Chelmsford, Colchester, Epping (Inc. Loughton), Braintree and Witham, Harlow and Maldon (Inc. Heybridge). Hydraulic modelling was used to inform the SWMPs, identifying areas at risk of pluvial flooding and assessing the effectiveness of potential mitigation schemes.

3.9 Essex County Council commissioned an update of the existing models for South Essex, Brentwood, Chelmsford, Colchester, Harlow and Maldon to include new datasets and current best practice methodologies, such as climate change, integrated urban drainage, infiltration etc. to improve the estimation of surface water flood risk within these SWMP study areas.

3.10 The results of this exercise are broad, including updated hydraulic modelling outputs and associated property at risk of flooding counts for each of the Critical Drainage Areas (CDAs) identified within the SWMP Study areas.

3.11 There is no clear trend as to whether or not the number of properties at risk within each CDA increases or decreases but in some cases the difference is quite significant, for example BAS10 Existing 826 Properties, Updated 403 Properties and CHE9 Existing 119 Properties, Updated 199 Properties.

3.12 A key change that came about as result of this exercise was the move toward defining CDAs using a 'Catchment Based Approach'. Previously CDAs were defined by forming a boundary around clusters of properties identified at risk of flooding which meant they were often located within urbanised areas and may not have truly reflected influences from the wider catchment area.

3.13 The revised approach will extend the CDA boundary to the full extent of the catchment area which will incorporate both urban and rural areas that have an influence on flood risk. This will enable a wider range of flood alleviation measures to be considered, such as Natural Flood Management measures which may prove more cost effective than more heavily engineered options.

4. Recommendations

4.1. We would recommend that the Essex Flood Partnership board note the changes in this report to the numbers of properties identified as being at risk of surface water flooding across Essex and reclassification of flood risk areas for inclusion

in the Local Flood Risk Management Strategy. This will be the subject of approval via the ECC governance process.

4.2. We would recommend that the update to the existing SWMP hydraulic modelling, revised CDA boundaries and revised properties at risk counts are adopted as a technical addendum to the existing Surface Water Management Plans for Essex which will be subject to approval via the ECC governance process.

5. Looking ahead

5.1. The revised property counts will be used for any future reporting of properties at risk of flooding within Essex (inc. Local Flood Risk Management Strategy) and hydraulic models along with associated outputs will be made available as part of our paid services provision.

5.2. The changes outlined in this report are likely to have an impact on Local Development Plans and moving forward we will look at working with local planning authority teams and Spatial Planning at ECC to decide how best to incorporate the impact of these changes.

5.3. The changes will also impact on the Flood Capital programme, in particular economic appraisal and assessing viability of flood alleviation schemes so we will continue to work with the programme lead on incorporating these as appropriate.