

South East Plan: Flood Risk & PUSH Housing Figures

Study undertaken jointly by the PUSH authorities to answer queries raised by the Environment Agency during consultation on district level housing figure in October 2005

Joint report - May 2006

1. Introduction: The Issue

Advice to SEERA from PUSH proposes a total of 80,000 new homes by 2026 for inclusion in the South East Plan. The breakdown by district and indicative phasing is shown in the table below. The Environment Agency is concerned about these housing figures and the likelihood of a substantial number of these dwellings being built in the tidal and fluvial floodplains of South Hampshire. They have asked PUSH to undertake some further technical work to establish the extent of this issue.

	2006-11	2011-16	2016 – 21	2021 – 2026	Total
New Forest (part)	600	500	219	219	1,538
Test Valley (part)	650	1,375	1,375	510	3,910
Southampton	5,100	4,000	3,600	3,600	16,300
Eastleigh	3,000	2,300	891	892	7,083
North-east/ North of Hedge End SDA	0	0	2,600	3,400	6,000
Winchester (part)	1,400	3,800	1,044	495	6,739
Fareham	1,700	1,100	469	460	3,729
North of Fareham SDA	0	0	5,000	5,000	10,000
Gosport	1,200	500	400	400	2,500
Portsmouth	4,650	2,950	3,550	3,550	14,700
East Hampshire (part)	350	500	175	175	1,200
Havant	1,800	2,950	776	775	6,301
Total	20,450	19,975	20,099	19,476	80,000

The following questions need to be answered:

1. How many homes already exist within the floodplain of South Hampshire? How many people are currently at risk?
2. How many new homes might be built in the coastal floodplain as a result of the PUSH strategy? How many additional people might live there and thus be at risk?

Authorities would then need to consider the following question:

3. What would be the cost of upgrading existing defences to protect homes that will be at increased risk of flooding as a result of sea level rise?

Finally, answers to question 3 may lead to further questions:

4. Who should pay for improved defences?
5. If the cost of improving defences is beyond likely available resources, what are the alternatives?

2. Steering Group

As Portsmouth is the authority in the PUSH area at greatest risk from tidal flooding, it was felt appropriate for officers from this authority to lead on the work. A group comprising the Environment Agency and all the PUSH coastal authorities (Portsmouth and Southampton City Councils, and Havant, Eastleigh and Gosport Borough Councils) was set up to devise a methodology and discuss the findings. The inland authorities, as well as Fareham Borough Council and New Forest District Council, where tidal flooding was not considered a significant

issue were kept informed of the process through regular emails and were asked to contribute to the work through that medium.

3. Methodology and Headline Results

Questions 1 and 2 were answered by planning officers, using GIS mapping, monitoring information and population forecasting. Hampshire County Council undertook this work on behalf of all the districts. The following section outlines the methodology and the headline results. More detailed step-by-step results are set out in a table in the appendix.

3.1 How many homes already exist within the floodplain of South Hampshire? How many people are currently at risk?

To answer question 1, tidal and fluvial flood risk areas (Zone 2 and 3) were defined in terms of output areas using GIS and applied to the Small Area Population Forecasts (SAPF) 2006 base to establish number of dwellings and people within floodzone as at 2006.

**Total number of dwellings in combined flood zones 2 & 3 in 2006:
44,197 (of which 23,736 in zone 3)**

**Total Population in flood zones 2 & 3 in 2006:
94,901 (of which 51,530 in zone 3)**

3.2 How many new homes might be built in the coastal floodplain as a result of the PUSH strategy? How many additional people might live there and thus be at risk?

Question 2 required a multi-step approach. Likely dwellings in the floodplain for the periods 2006-2011 and 2011-2026 were modeled separately, as more detailed monitoring information for policy H4 of the County Structure Plan was available to inform the period up to 2011.

To ascertain the likely number of dwellings in the floodplain after 2011, the 2006-2011 figure, was deducted from the total number to be provided by each district by 2026. From the remaining figure, all dwellings definitely to be built outside of the floodplain (mainly development proposed on Greenfield sites which are assumed to be PPS25 compliant), and all dwellings definitely to be built inside the floodplain were deducted. This left a figure of dwellings to be built after 2011, for which no definite information indicated their location in relation to the floodplain. It was therefore assumed that the same percentage of each district as for the period up to 2011 would be in the floodplain. Applying this percentage and adding the resulting figure to the number of dwellings definitely in the floodplain and the number of dwellings in the floodplain up to 2011 gave the total number of dwellings expected in the floodplain by 2026.

Figures for number of dwellings were translated into number of people using Small Area Population Forecasts up to 2011 and HCC April 2006 Long Term Projections for 2011-2026.

**Expected total number of dwellings in flood zones 2&3 in 2026:
54,821 (of which 30,095 in zone 3)**

**Expected total population in flood zones 2&3 in 2026:
106,987 (of which 59,465 in zone 3)**

4. Cost of Coastal Defences

The Environment Agency also raised the issue of cost associated with defending the additional housing. It was not possible to calculate this cost in isolation from the cost of defending existing development into the future. Therefore the table below sets out the cost of coastal defences to defend existing and planned development. The costings have been based on Coastal Defence Strategies where they exist and estimates from Shore Line Management Plans and the working knowledge of authorities' engineers where they do not.

While the group agreed a way of estimating the cost of defences, variations were inevitable, due to varying levels of available information and different levels of vulnerability to flooding in the PUSH coastal authorities. A brief explanation of the basis for the calculation in each authority is therefore set out below. Further, more detailed information can be made available if necessary.

HAVANT:

The figure is inclusive of defending presently undefended frontage and is based on costing within Coastal Defence Strategies where they exist and a typical value of £0.5million/km for harbour frontages (based on estimates within the East Solent Shoreline Management Plan and an allowance of 30% for inflation).

PORTSMOUTH:

Most of this cost is made up of the recommended costs included in the recently completed Portsea Island Coastal Strategy Study Report (£160 million) for protecting Portsea Island. The remaining cost of £6.0 million is that required to protect Portsmouth's mainland coastline, and this sum has been based on costings within Coastal Defence Strategies where they exist, and a typical value of £0.5million/km for harbour frontages (based on estimates within the East Solent Shoreline Management Plan and an allowance of 30% for inflation).

GOSPORT:

Substantial amounts of Gosport's waterfront are in MoD ownership, and it is therefore impossible to estimate the costs associated with these lengths of costs. Other bays and beaches are considered to be stable and not in danger of erosion or overtopping at present. In the section from St Vincent's College to Priddy's Hard, extensive development had been undertaken recently and the sea defences are considered high enough to prevent flooding. In the Priory Road area it is considered that the land rises sufficiently to protect against the risk of flooding. The same is probably true for the area from Priory Road to the Fareham boundary, although no studies have been undertaken of this length of coast. Without undertaking an investigation it is not possible to estimate the cost of any future sea defences necessary in this area.

The area between Jackie Spencer's Bridge and St.Vincent College has been the subject of a major review of the Town Centre's sea defences. Although there is very little land available for new development, approx. £1 -£2m. is required to reconstruct some sections of the sea defences necessary for the protection of existing property.

FAREHAM:

Fareham's coastline can be split into 3 sections. The estimates are based on existing information as follows:

1. The Hamble River: Western Solent and Southampton Water Shoreline Management Plan of 1998. (no quantitative figures available in the SMP, but figures based on recent strategy have been used)
2. The Open Coast: East Solent Shoreline Management Plan of 1997 (uplift of 30%)
3. Portsmouth Harbour Frontage: Portchester Castle to Hoeford Lake Shoreline Defence Strategy of 2006

It should be noted that these estimates do not include any costs for purchasing land for mitigation or for dealing with contamination of land if sea defences have to move.

SOUTHAMPTON:

The total shoreline of Southampton is approximately 34 km. Of this around 24 km is defended mainly by working docks and quays. The majority of which is in ABP ownership. Much of the flood defence of the city is reliant on the continued maintenance in terms of height and condition of these working areas. The remaining frontage consists of approximately 10 km of relatively undefended shingle bank, reclaimed land and recreational areas.

In order to defend areas shown at risk of flooding it would be necessary to improve defences along approximately 8 km of the shoreline consisting of improvements to existing hard defences such as quays and walls (5.5 km) and improvements to the shingle shore at Weston (2.5 km). Based on indicative costing (East Solent Shoreline Management Plan) with allowance for inflation, costings are estimated as follows:

- Refurbishment of seawalls/revetments - - sheltered frontage £0.5M/km
- Beach recharge £1.5M/km

EASTLEIGH:

Eastleigh Borough Council is a Coastal Protection Authority rather than a Coastal Defence Authority and would rely on the Environment Agency to fulfil this function.

The land around the coast is relatively high and there are only a few places that are susceptible to flooding, other than marine associated development, which needs to be immediately adjacent to the water. The structures involved in these developments can in some cases be termed a defence as they may offer some protection against flooding, but their maintenance lies with the various owners.

The only areas that are directly related to defence would be the low lying Hamble Quay, Ferrymans Quay and the beach between Weston Sailing Club and Netley Castle. These have hold the line policies identified in the Shoreline Management Plan. Whilst flooding occurs at extreme high tides, they are not currently considered under threat and the results of the current strategy study will provide further details of their estimated life.

The main problem with coastal erosion is the undermining of soft cliffs. This is a coastal protection function, which is estimated at around £4.5 million for beach replenishment cliff protection and repairs or removal of existing defences.

NEW FOREST DISTRICT COUNCIL:

As a Coastal Protection Authority, NFDC has no coastal defences within the PUSH area. Along much of the western shore of Southampton Water are flood defences that are owned or maintained by either the Environment Agency or privately landowners/individuals. NFDC would rely on the Environment Agency to fulfil its flood defence function for this frontage.

PUSH Coastal Authority	Cost in million £
Havant Borough Council	59.0
Portsmouth City Council	166.0
Gosport Borough Council	1.0
Fareham Borough Council	13.0
Southampton City Council	6.5
Eastleigh Borough Council	4.5
New Forest District Council	Not known
Total All Coastal PUSH Authorities	250 +

5. Conclusions

The results of this work then show an increase of 10,624 properties between 2006 and 2026 at risk from tidal flooding, and a requirement for £250million+ to defend these new properties together with existing properties.

The Environment Agency have posed the questions 'who should pay for improved defences?', and 'If the cost of improving defences is beyond likely available resources, what are the alternatives?' To answer these questions is beyond the scope of this work. What this work has highlighted is that delivery of the extensive growth in the PUSH area envisaged by the South East Plan is unrealistic without further development in the floodplain. Massive investment in coastal defence infrastructure will be needed not only in order to make this scale of development possible, but also to protect existing properties. If the required defences cannot be provided, alternative locations will need to be found not only to accommodate the new development, but also to replace the existing properties within these areas.

APPENDIX : Detailed Results: Dwellings & Population in Flood zones in PUSH area 2006-2026:

Results have been shown firstly for the combined flood zones 2&3, and secondly for zone 3 only. Both tables set out the same information, as explained below:

Column A – name of district. (p) denotes only part of district is within urban South Hampshire.

Column B – estimate of dwellings built 2006 – 2011 for the whole of each district (or part district) within urban South Hampshire, using Policy H4 2006 monitoring information by districts in Autumn of 2005.

Column C – the remaining number of dwellings to be built in each district 2011 –2026 required to deliver their total figure set out in the South East Plan.

Column D – estimate of dwellings to be built on new greenfield sites 2011-26. The key assumption is that none of these dwellings will be built on the floodplain.

Column E – this column shows the number of dwellings that districts expect to be built on brownfield sites 2011-26 which are not on the floodplain.

Column F - this column shows the number of dwellings that districts expect to be built on brownfield sites 2011-26 which are within the floodplain.

Column G – this column shows the number of dwellings which could be built in the floodplain 2011-2026 (column C less columns D,E and F)

Column H – this details the percentage of dwellings within urban South Hampshire for each district that are within the floodplain as of 2011. Small Area Population Forecasts are produced by Hampshire County Council for each year based on anticipated completions within each Census Output area using phasing information from planning approvals, local plan allocations and windfalls sites and estimates. Maps were then overlain over the Output Areas to determine, using GIS, the share and number of dwellings within and outside of floodplain as at 2011.

Column I – The percentage figure for each district (column H) has been applied to the number of dwellings that could be built in the floodplain (column G).

Column J – this shows the number of dwellings expected to be built in the floodplain for each district using Small Area Population Forecasts (see column H above).

Column K – this adds columns J (dwellings expected to be built in floodplain 2006 –2011 to column I (dwellings that could be built in floodplain 2011-2026) to provide a 20 year total.

Column L – this shows the total number of dwellings in the floodplain as at 2006 (produced by laying floodplain maps over Small Area Projection Forecast Output Areas).

Column M – this shows the total number of dwellings in the floodplain in 2026 by adding the expected figure for 2006-2026 to the 2006 figure (column K + column L).

Column N – this shows the forecast number of occupants in each dwelling in 2026 within the floodplain (note that different rates apply to each zone). The way in which the 2026 occupancy rates in each zone within the flood plain were calculated was to calculate the occupancy rates in each zone at 2011 from Small Area Population Forecasts, and then to assume that they declined between 2011 and 2026 at the same rate as the projected average household size in the appropriate LA district in the HCC April 2006 Long Term Projections.

Column O – this shows the number of people living within the floodplain in 2026 (column M x column N).

Population and dwellings in combined zone 2&3 floodplains

District	Total dwellings 2006-11	Total dwellings 2011-26	Deduct greenfield allocations 2011-26 (assume PPS25 compliant)	Deduct brownfield sites 2011-26 outwith floodplain	Brownfield sites 2011-2026 definitely inside floodplain	Remainder which could be in floodplain 2011-26 (C - D, E & F)	% of dwellings in PUSH part of district within floodplain (Zone 2)	Number of dwellings in floodplain (Zone 2) 2011-26 (G x H + F)	Dwellings in floodplain 2006-11	Total dwellings in floodplain 2006-26 (I + J)	Dwellings in Zone 2 as at 2006	Dwellings in Zone 2 2026 (K + L)	Occup rate 2026	Population Zone 2 2026 (M x N)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
New Forest (p)	562	976	258			718	6.3	45	108	153	1742	1895	1.99	3772
Test Valley (p)	601	3309	2500			809	9	73	38	111	1496	1607	1.89	3037
Southampton	6237	10063	0		1300	8763	6.3	1852	1847	3699	4725	8424	1.74	14658
Eastleigh	3672	3411	1000			2411	2.2	53	125	178	1058	1236	1.95	2410
Hedge End SDA	0	6000	6000			0	0	0	0	0	0	0		0
Winchester (p)	1195	5544	4525			1019	5	51	33	84	744	828	2.22	1838
Fareham	1589	2140	655			1485	3	45	39	84	1366	1450	1.99	2885
Fareham SDA	0	10000	10000			0	0	0	0	0	0	0		0
Gosport	1397	1103	0	200		903	8.6	78	187	265	2935	3200	1.82	5823
Portsmouth	4446	10254	0		1500	8754	29.5	4082	1474	5556	24894	30450	2.03	61814
East Hants (p)	162	1038	600			438	1.7	7	3	10	139	149	2.08	311
Havant	1719	4582	1600			2982	10	298	186	484	5098	5582	1.87	10439
Total	21580	58420	27138	200	2800	28282		6584	4040	10624	44197	54821		106987

Dwellings in Floodplain (Zone 2&3) in 2006 = 44197

Dwellings in floodplain (Zone 2&3) in 2026 = 54821

Net change 10624

% South Hampshire dwellings in floodplain in 2006 = 10.1

% South Hampshire dwellings in floodplain in 2026 = 10.6

Population in floodplain (Zone 2&3) in 2006 = 94901

Population in floodplain (Zone 2&3) in 2026 = 106987

Net change 12086

% of South Hampshire residents in floodplain (2006) = 9.5

% of South Hampshire residents in floodplain (2026) = 9.9

Population and dwellings in Zone 3 floodplain only

District	Total dwellings 2006-11	Total dwellings 2011-26	Deduct greenfield allocations 2011-26 (assume PPS25 compliant)	Deduct brownfield sites 2011-26 outwith floodplain	Brownfield sites 2011-2026 definitely inside floodplain	Remainder which could be in floodplain 2011-26 (C - D, E & F)	% of dwellings in PUSH part of district floodplain (Zone 3)	Number of dwellings in floodplain (Zone 3) 2011-26 (G x H + F)	Dwellings in floodplain 2006-11	Total dwellings in floodplain 2006-26 (I + J)	Dwellings in Zone 3 as at 2006	Dwellings in Zone 3 2026 (K + L)	Occup rate 2026	Population in Zone 3 2026 (M x N)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
New Forest (p)	562	976	258			718	2.9	21	49	70	808	878	1.82	1598
Test Valley (p)	601	3309	2500			809	6.1	49	22	71	1026	1097	1.92	2107
Southampton	6237	10063	0		1300	8763	2.6	1528	439	1967	2235	4202	1.77	7437
Eastleigh	3672	3411	1000			2411	1.5	36	93	129	731	860	1.88	1617
Hedge End SDA	0	6000	6000			0	0	0	0	0	0	0	0	0
Winchester (p)	1195	5544	4525			1019	4.4	45	3	48	677	725	2.21	1602
Fareham	1589	2140	655			1485	1.8	27	28	55	835	890	1.93	1717
Fareham SDA	0	10000	10000			0	0	0	0	0	0	0	0	0
Gosport	1397	1103	0	200		903	2	18	19	37	716	753	1.95	1468
Portsmouth	4446	10254	0		1500	8754	16.7	2962	742	3704	14133	17837	2.03	36209
East Hants (p)	162	1038	600			438	1.1	5	1	6	86	92	2.04	187
Havant	1719	4582	1600			2982	4.9	146	126	272	2489	2761	2	5522
Total	21580	58420	27138	200	2800	28282		4837	1522	6359	23736	30095		59465

Dwellings in Floodplain (Zone 3) in 2006 = 23736

Dwellings in floodplain (Zone 3) in 2026 = 30095

Net change 6359

% South Hampshire dwellings in floodplain in 2006 = 5.4

% South Hampshire dwellings in floodplain in 2026 = 5.8

Population in floodplain (Zone 3) in 2006 = 51530

Population in floodplain (Zone 3) in 2026 = 59465

Net change 7935

% of South Hampshire residents in floodplain 2006 = 5.1

% of South Hampshire residents in floodplain 2026 = 5.5