Appendix B – Risk Assessment

Appendix B - Risk Assessment

B.1.1 Introduction

The principal purpose of the Risk Assessment for County Durham is to strategically identify broad locations which are considered to be vulnerable to surface water flooding. Given the geographical scale of the strategic assessment, it is likely that it will be used to inform the locations requiring further assessment and to help prioritise phased SWMP studies. As the strategic assessment operates at a large geographical scale the SWMP guidance recommends the analysis should be based on existing information or the use of simple analysis methods to improve existing information and make maximum use of existing data and information.

B.1.2 Defining Surface Water Risk Areas

Surface Water Risk Areas (SWRAs) have been defined in GIS using cluster analysis. Cluster analysis looks at the distribution of 'priority' datasets to look for correlations and patterns in the data so as to form a cluster, in this case a SWRA.

The following priority datasets have been used to define the SWRAs:

1. Known Surface Water Incidents
2. SFRA Surface Water modelling
3. Environment Agency Areas Susceptible to Surface Water Flooding
4. Potential Development Sites (SHLAA and ELR data)
5. Critical Infrastructure - (Schools, railway lines and major roads)
6. Environmental Designations

These datasets are deemed a priority as they inform us of areas where surface water flooding has or could cause a significant risk to people and property, or pose a threat to the degradation of one or more environmental designations. Clusters of known incidents of surface water flooding indicate hotspots where surface water currently poses a flood risk.

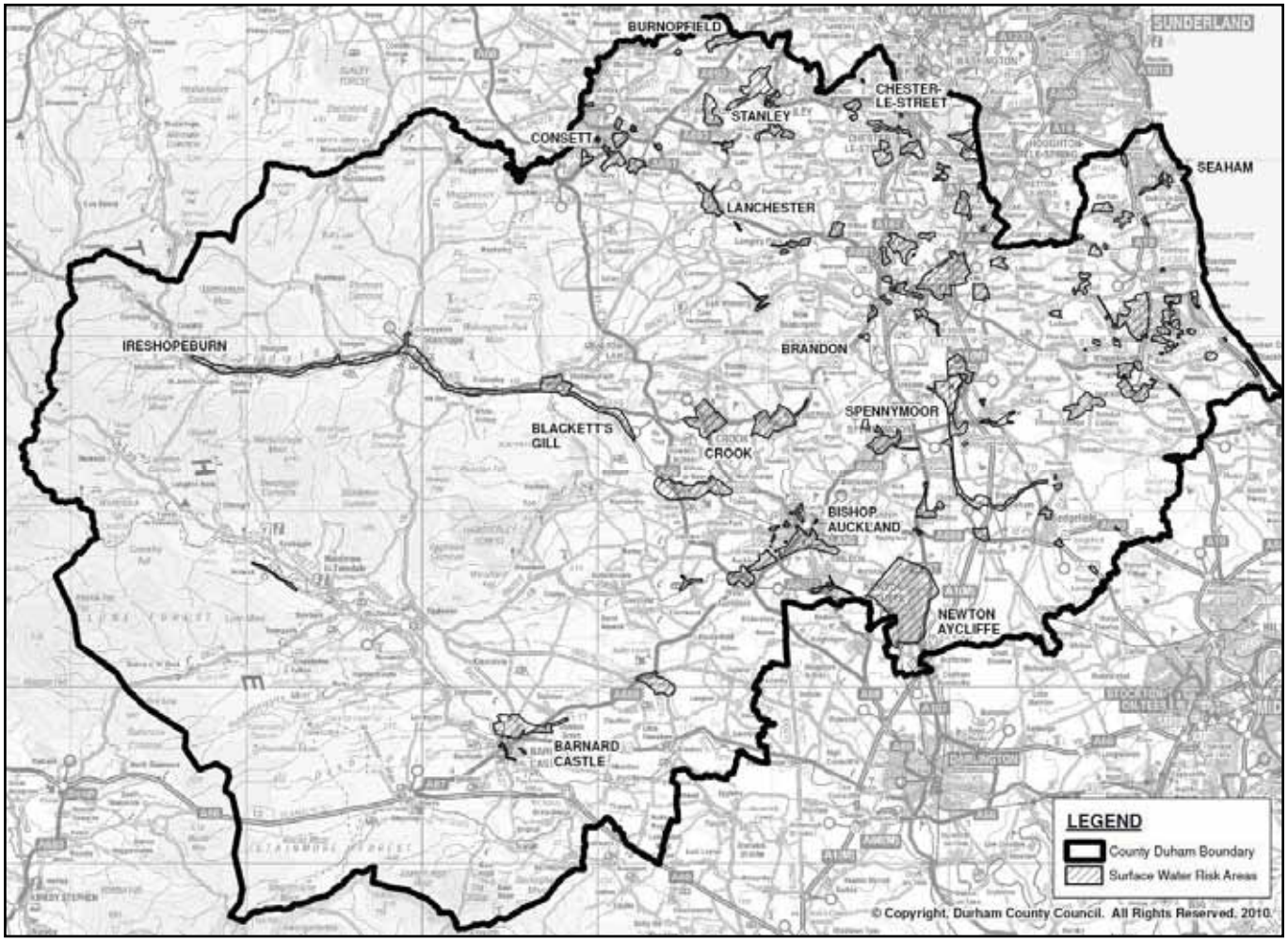
The SFRA surface water modelling and Environment Agency Areas Susceptible to Surface Water Flooding present the results of computational models that provide an overview of the potential risk posed by surface water flooding throughout the County. The SFRA modelling has been categorised into minor, moderate and significant surface water risk, whilst the Environment Agency data are similarly classified into less, intermediate and more susceptible to surface water flooding. Where the SFRA and Environment Agency data highlighted large urban areas at moderate/intermediate or significant/more risk a SWRA was delineated.

(Note: The Environment Agency Flood Map for Surface Water became available after the Draft Scoping Report had been submitted and work commenced on the Options phase. As such a high level review has been undertaken to compare the differences between the two data-sets. In general it has been found that the Flood Map for Surface Water is considerably less extensive than the Areas Susceptible to Surface Water Flooding. Whilst there are some differences in the flood locations it has been concluded that it would not significantly affect the delineation of SWRAs. The Options phase of the SWMP has been based on the Flood Map for Surface Water given that it has now superseded the Areas Susceptible to Surface Water Flooding).

Where SHLAA and ELR development sites intersected, or were in close proximity to a SWRA, the SWRA boundary was expanded to incorporate these sites for analysis. The remaining areas of County Durham not covered by a SWRA were assessed to see if any pockets of critical infrastructure (roads, railways and schools) or environmental designations that were at risk of surface water flooding should form SWRAs.

In total, 139 SWRAs were created across County Durham, as shown in Figure B.1.1.

Figure B.1.1: SWRA Locations

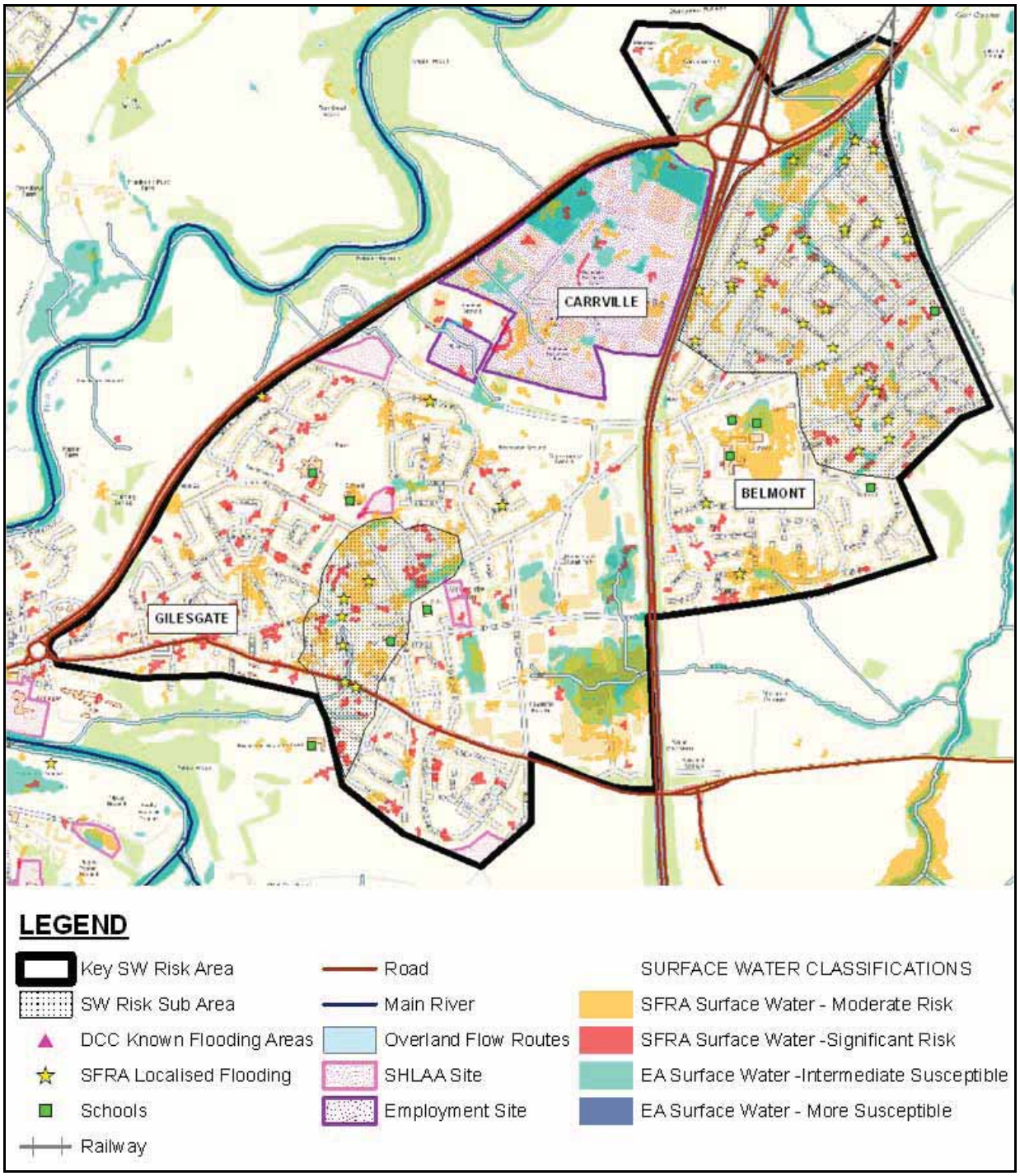


(Source: Environment Agency, 2010)

Figure B1.1 illustrates that the majority of SWRAs are located in the eastern area of County Durham, located in or around urban conurbations. The main SWRAs to the west include Barnard Castle and a long stretch of railway that runs from Ireshopeburn to Blackett's Gill. An individual SWRA example containing the priority datasets is shown in Figure B.1.2.

Capabilities on project:
Water

Figure B.1.2: SWRA Example – Gilesgate, Belmonst and Carrville (Durham City)



(Source: Environment Agency and Durham County Council, 2010)

B.1.3 Prioritising SWRAs

Having identified SWRAs across County Durham it was appropriate to rank them in terms of their importance. The prioritisation process sought to address known surface water problems and the largest numbers of people at risk of surface water flooding so that resources can be targeted in these areas. Each of the key data sets used to define the SWRAs; known surface water incidents, SFRA modelling, Environment Agency Areas Susceptible to Surface Water Flooding, critical infrastructure, development sites, and degree of urbanisation, were given different weightings as shown in Table B.1.1.

Table B.1.1: Priority Weightings

Priority	Scenario	Weighting
Known Surface Water Incidents	Current & Future	15
SFRA Surface Water modelling and Environment Agency Areas Susceptible to Surface Water Flooding	Current & Future	15
Development Sites (SHLAA and ELR)	Future	10
Degree of Urbanisation	Current & Future	10
Critical Infrastructure	Current & Future	5

The analysis was undertaken in GIS with the ranked results stored in a Surface Water Risk Matrix shown in Annex B1 at the end of this report. The Surface Water Risk Matrix shows for each SWRA the assigned weighting for each priority. The priority weightings have been combined together to rank the SWRAs for current and future scenarios. The current scenario sums the weightings of the number of known flood incidents, the number of address points that fall within the SFRA or Environment Agency surface water maps, the urban area, and the number of critical infrastructure sites within each SWRA. The future scenario assesses an additional priority, looking at the number of potential development sites within the SWRA.

Of the 139 SWRAs identified across County Durham, 13 sites have been assessed in more detail as part of the Risk Assessment. This includes 11 sites that were ranked in the top ten (accounting for equal rankings) for the current scenario along with their related future ranking, plus two additional sites in Chester-le-Street that whilst they fell lower down the priority ranking table are known surface water problem areas according to the Environment Agency's environment priority documents. The two Chester-le-Street sites were ranked 12th and 17th.

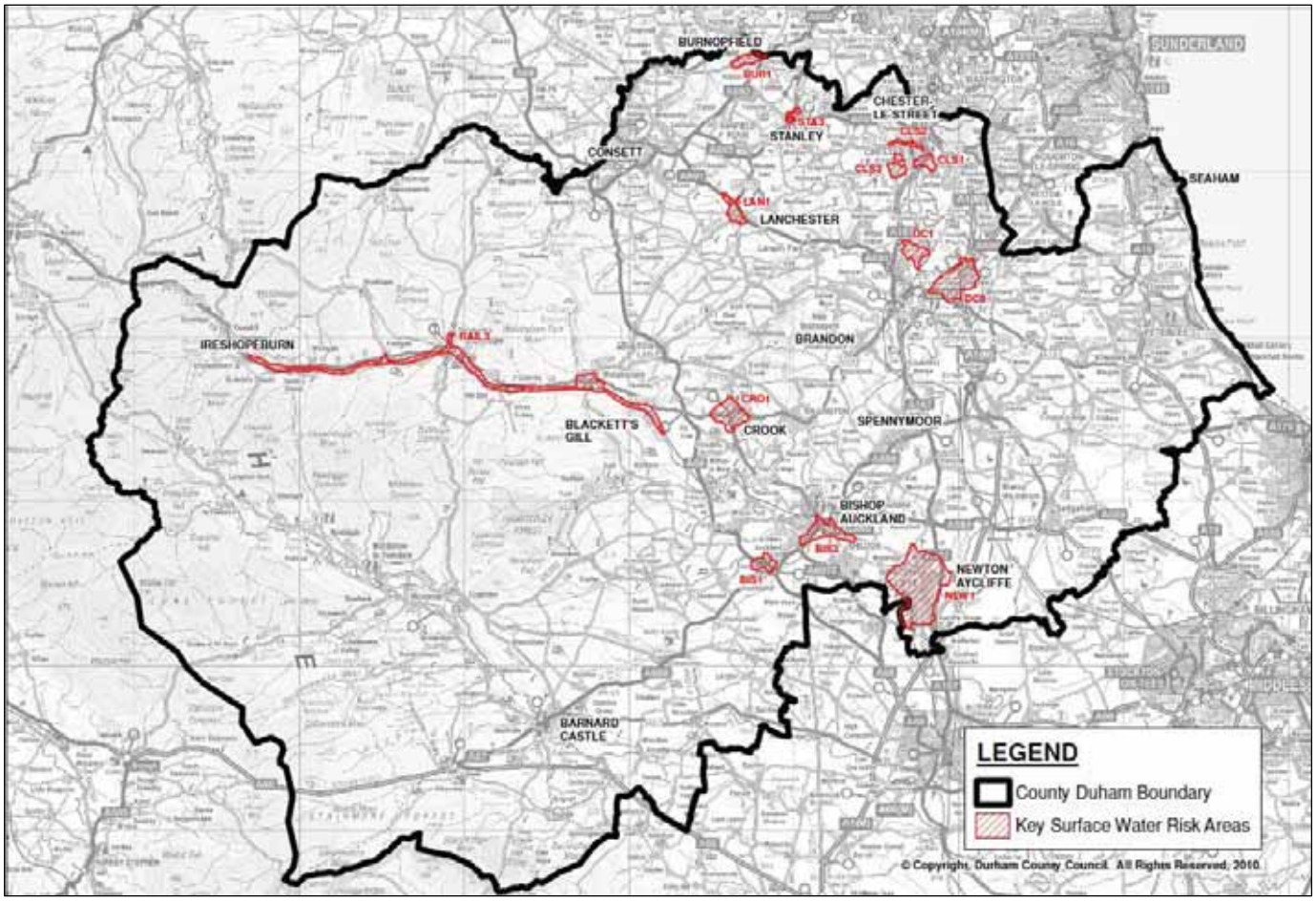
Of the 13 SWRAs, three are in Chester-le-Street, two in Durham City and one in Lanchester. These three areas tie in well with the Wear CFMP and the Environment Agency's environmental priorities. The 13 prioritised SWRAs are listed in Table B.1.2 and illustrated in Figure B.1.3.

Table B.1.2: Prioritised SWRAs

Reference	SWRA	Current Rank	Future Rank
DC8	Durham City - Gilesgate, Belmont and Carrville	1	1
NEW1	Newton Aycliffe	2	2
STA3	East Stanley	3	6
RAIL3	Railway Line - Ireshopeburn to Blackett's Gill	4	3
BIS3	Bishop Auckland	4	4
LAN1	Lanchester	4	8
DC1	Durham City - Pity Me	7	7
CRO1	Crook	8	5
CLS3	Chester-le-Street	9	10
BIS1	Bishop Auckland - West Auckland	10	9
BUR1	Burnopfield	10	13
CLS1	Chester-le-Street	12	19
CLS2	Chester-le-Street	17	19

Capabilities on project:
Water

Figure B.1.3: Prioritised SWRAs



A summary sheet has been prepared for each of the 13 SWRAs in Table B1.2, highlighting the known and future hotspots for each SWRA and the causes for the incidents. These sheets were circulated to the Partners to communicate the findings of the Risk Assessment, to obtain feedback and further information concerning the SWRAs and to ascertain whether the SWRA should be considered further by the SWMP and carried forward to the Options stage. A Workshop attended by Durham County Council and the Environment Agency subsequently discussed each of the SWRAs to decide how they should be addressed by the SWMP. The key message coming out of the Workshop was that many of the known surface water flood incidents are being addressed by either Durham County Council or Northumbrian Water and the SWMP therefore ought to focus on the residual risks posed by exceedance events i.e. areas identified by the SFRA modelling or the Environment Agency Areas Susceptible to Surface Water Flooding.

A summary sheet for each SWRA is presented in Annex B2 at the end of this report.

B.1.4 SWRAs: Optioneering

Following a Workshop which discussed each of the 13 SWRAs, nine have been identified as potentially being able to go to the Options phase in their current state and four will not be considered further by the SWMP (Table B.1.3).

Table B.1.3: Current standing of SWRAs carried forward to the Options Phase

SWRA	Comment
DC8 – Durham	Options appraisal
NEW1 – Newton Aycliffe	Options appraisal
STA3 – East Stanley	Options appraisal
RAIL3 – Railway: Ireshopeburn to Blackett's Gill	Options appraisal
BIS3 – Bishop Auckland	Options appraisal
LAN1 – Lanchester	No further work
DC1 – Durham	Options appraisal
CRO1 – Crook	Options appraisal
CLS3 – Chester-le-Street	Options appraisal
BIS1 – Bishop Auckland	No further work
BUR1 - Burnopfield	No further work
CLS1 – Chester-le-Street	No further work
CLS2 – Chester-le-Street	Options appraisal

B.1.5 Future Development and the Risk of Surface Water Flooding

One of the objectives for the SWMP is to "Ensure the level of future development does not exacerbate existing problems and identify opportunities for new development to provide benefits in terms of flood risk management". Durham County Council provided information concerning potential future development in the form of SHLAA and ELR data-sets. As part of the Risk Assessment SWRAs have been identified based on the presence of SHLAA and ELR sites in close proximity to areas at risk of surface water flooding. Many of the potential development sites fall within or in close proximity to areas at risk of flooding. In light of this it will be essential that site specific FRAs are undertaken if the development comes forward to ensure that each development takes due account of the potential flood risk and does not place people at risk of flooding. Another important aspect for the Council to be aware of is where development sites present opportunities to manage and mitigate flood risk beyond the site boundary.

As part of the Options report a series of maps/tables will be incorporated to provide Durham County Council with an indication of the surface water risks facing development sites and any opportunities that they present.

B.1.6 Emergency Planning

The third objective of the SWMP is to "Inform emergency planning and feed into Durham County Council's Flood Plan". The findings of this Risk Assessment should be disseminated within each of the Partner organisations to inform and update (multi-agency) flood plans / severe weather plans and Local Resilience Forum community risk registers. This might include information on high flood risk areas, roads and access routes likely to be impassable, impacts on critical infrastructure or vulnerable people.

Should the Options phase of the SWMP identify schemes which are likely to use roads as conveyance routes or recreational areas for temporary flood storage then it will be done so with the assistance and support of emergency planners and the relevant highways engineers. If Durham County Council make information available concerning their Flood Plan it will be possible to feed into it as part of the Options reporting.

Capabilities on project:
Water

ANNEX B1 - SURFACE WATER RISK MATRIX

RED = Prioritised SWRAs BLACK = Not taken forward

FID	SWRA	Known Flooding Area	Localised Flooding	Current Flood Total		Future SW Flooding (SFRA/EA SW Risk - address point)		SHLAA	ELR	SHLAA ELR Total Count		Degree of Urbanisation		Schools	Rail	Road	Critical Infrastructure Total		Current Total Score	Current Rank	Future Total Score	Future Rank
				GIS Count	Weighting : 15	GIS Count	Weighting : 15			GIS Count	Weighting : 10	GIS %	Weighting : 10				GIS Count	Weighting : 5		Highest Risk First		Highest Risk First
7	DC8	0	57	57	15	611	14	5	1	6	4	75.3	8	9	1	3	13	5	42	1	46	1
84	NEW1	1	4	5	4	1949	15	10	15	25	10	63.8	7	12	2	3	17	5	31	2	41	2
62	STA3	3	12	15	7	108	10	2	0	2	2	92.7	10	1	1	3	5	3	30	3	32	6
133	RAIL3	13	13	26	11	382	12	3	11	14	6	14.6	2	3	3	3	9	4	29	4	35	3
73	BIS3	0	8	8	5	1084	15	9	2	11	5	43.2	5	3	2	3	8	4	29	4	34	4
67	LAN1	2	12	14	7	221	11	0	0	0	0	64.0	7	3	1	4	8	4	29	4	29	8
0	DC1	0	2	2	2	451	13	1	2	3	3	99.1	10	3	3	0	6	3	28	7	31	7
128	CRO1	4	4	8	5	130	10	11	2	13	6	73.1	8	3	1	3	7	4	27	8	33	5
12	CLS3	1	5	6	4	136	10	1	0	1	1	94.6	10	1	0	0	1	1	25	9	26	10
71	BIS1	0	4	4	3	221	11	4	2	6	4	62.1	7	2	1	2	5	3	24	10	28	9
137	BUR1	4	3	7	4	112	10	1	0	1	1	69.2	7	1	0	3	4	3	24	10	25	13
85	SPE1	0	0	0	0	143	10	4	2	6	4	70.8	8	2	4	2	8	4	22	12	26	10
129	WIL1	2	8	10	5	86	8	5	3	8	4	46.0	5	5	2	2	9	4	22	12	26	10
18	CON3	0	0	0	0	109	10	2	0	2	2	70.6	8	4	1	2	7	4	22	12	24	14
125	SHE1	0	3	3	3	87	8	0	1	1	1	80.1	9	1	1	1	3	2	22	12	23	16
10	CLS1	1	9	10	5	82	8	0	0	0	0	50.1	6	2	0	2	4	3	22	12	22	19
130	STA1	3	6	9	5	126	10	0	5	5	3	23.2	3	2	2	1	5	3	21	17	24	14
112	BOU1	0	3	3	3	99	9	3	0	3	2	50.1	6	1	2	2	5	3	21	17	23	16
1	DC2	0	1	1	1	208	11	1	0	1	1	81.8	9	0	0	0	0	0	21	17	22	19
11	CLS2	2	6	8	5	112	10	1	0	1	1	36.8	4	0	1	2	3	2	21	17	22	19
33	PET6	0	0	0	0	206	11	0	0	0	0	87.0	9	0	0	1	1	1	21	17	21	24
87	SPE3	0	0	0	0	104	10	0	0	0	0	97.9	10	1	0	0	1	1	21	17	21	24
108	STAIN 1	5	1	6	4	259	11	0	0	0	0	20.1	3	1	0	3	4	3	21	17	21	24
72	BIS2	0	0	0	0	100	10	2	2	4	3	77.4	8	1	0	1	2	2	20	24	23	16
13	CLS4	0	1	1	1	323	12	2	0	2	2	45.4	5	0	1	1	2	2	20	24	22	19

Capabilities on project:
Water

FID	SWRA	Known Flooding Area	Localised Flooding	Current Flood Total		Future SW Flooding (SFRA/EA SW Risk - address point)		SHLAA	ELR	SHLAA ELR Total Count		Degree of Urbanisation		Schools	Rail	Road	Critical Infrastructure Total		Current Total Score	Current Rank	Future Total Score	Future Rank
				GIS Count	Weighting : 15	GIS Count	Weighting : 15			GIS Count	Weighting : 10	GIS %	Weighting : 10				GIS Count	Weighting : 5		Highest Risk First		Highest Risk First
94	WOO1	1	1	2	**2**	128	**10**	1	1	2	**2**	46.6	**5**	1	2	2	5	**3**	20	**24**	22	**19**
69	LAN3	1	2	3	**3**	73	**7**	0	0	0	**0**	99.9	**10**	0	0	0	0	**0**	20	**24**	20	**30**
86	SPE2	0	0	0	**0**	107	**10**	0	0	0	**0**	93.0	**10**	0	0	0	0	**0**	20	**24**	20	**30**
92	GRE1	0	0	0	**0**	130	**10**	0	0	0	**0**	76.9	**8**	2	0	0	2	**2**	20	**24**	20	**30**
4	DC5	0	2	2	**2**	69	**6**	1	0	1	**1**	99.5	**10**	0	1	0	1	**1**	19	**30**	20	**30**
80	BIS9	0	1	1	**1**	75	**7**	0	0	0	**0**	95.0	**10**	0	0	1	1	**1**	19	**30**	19	**36**
45	PET18	0	0	0	**0**	221	**11**	4	1	5	**3**	25.5	**3**	3	4	1	8	**4**	18	**32**	21	**24**
58	SEA3	1	1	2	**2**	53	**5**	4	0	4	**3**	99.3	**10**	0	0	1	1	**1**	18	**32**	21	**24**
105	BOW1	1	8	9	**5**	55	**5**	2	3	5	**3**	48.2	**5**	1	0	3	4	**3**	18	**32**	21	**24**
134	CHI1	3	2	5	**4**	81	**8**	3	0	3	**2**	36.8	**4**	0	1	1	2	**2**	18	**32**	20	**30**
36	PET10	2	0	2	**2**	62	**6**	0	0	0	**0**	82.3	**9**	1	0	0	1	**1**	18	**32**	18	**38**
136	ANN1	3	0	3	**3**	66	**6**	3	2	5	**3**	53.0	**6**	1	0	1	2	**2**	17	**37**	20	**30**
53	HAS3	1	0	1	**1**	71	**7**	1	0	1	**1**	64.0	**7**	0	1	1	2	**2**	17	**37**	18	**38**
3	DC4	0	5	5	**4**	24	**2**	0	0	0	**0**	97.3	**10**	0	1	0	1	**1**	17	**37**	17	**43**
25	CON2	0	6	6	**4**	52	**5**	0	0	0	**0**	75.9	**8**	0	0	0	0	**0**	17	**37**	17	**43**
78	BIS10	0	1	1	**1**	54	**5**	0	0	0	**0**	100.0	**10**	0	1	0	1	**1**	17	**37**	17	**43**
127	WIT1	1	8	9	**5**	15	**1**	0	0	0	**0**	87.6	**9**	1	0	1	2	**2**	17	**37**	17	**43**
89	BAR1	0	1	1	**1**	175	**10**	0	3	3	**2**	16.1	**2**	0	4	2	6	**3**	16	**43**	18	**38**
5	DC6	0	0	0	**0**	66	**6**	1	0	1	**1**	80.1	**9**	1	0	0	1	**1**	16	**43**	17	**43**
6	DC7	0	0	0	**0**	40	**4**	0	0	0	**0**	100.0	**10**	1	0	1	2	**2**	16	**43**	16	**51**
46	PET19	0	1	1	**1**	45	**4**	0	0	0	**0**	86.6	**9**	0	1	2	3	**2**	16	**43**	16	**51**
56	SEA1	1	2	3	**3**	56	**5**	0	0	0	**0**	68.5	**7**	0	1	0	1	**1**	16	**43**	16	**51**
91	BAR3	0	3	3	**3**	55	**5**	0	0	0	**0**	72.7	**6**	0	0	2	2	**2**	16	**43**	16	**51**
97	SOU2	1	0	1	**1**	80	**8**	0	0	0	**0**	68.7	**7**	0	0	0	0	**0**	16	**43**	16	**51**
99	EAS1	0	1	1	**1**	50	**5**	0	0	0	**0**	91.1	**10**	0	0	0	0	**0**	16	**43**	16	**51**
32	PET1	0	1	1	**1**	53	**5**	3	4	7	**4**	63.5	**7**	0	0	2	2	**2**	15	**51**	19	**36**
83	STA3	0	1	1	**1**	37	**3**	1	3	4	**3**	82.9	**9**	0	1	1	2	**2**	15	**51**	18	**38**
8	DC9	0	0	0	**0**	42	**4**	0	2	2	**2**	97.4	**10**	0	1	0	1	**1**	15	**51**	17	**43**
123	ESH1	1	1	2	**2**	61	**6**	2	1	3	**2**	36.5	**4**	1	2	1	4	**3**	15	**51**	17	**43**

Capabilities on project:
Water

FID	SWRA	Known Flooding Area	Localised Flooding	Current Flood Total		Future SW Flooding (SFRA/EA SW Risk - address point)		SHLAA	ELR	SHLAA ELR Total Count		Degree of Urbanisation		Schools	Rail	Road	Critical Infrastructure Total		Current Total Score	Current Rank	Future Total Score	Future Rank
				GIS Count	Weighting : 15	GIS Count	Weighting : 15			GIS Count	Weighting : 10	GIS %	Weighting : 10				GIS Count	Weighting : 5		Highest Risk First		Highest Risk First
101	SED1	0	0	0	**0**	90	**9**	0	1	1	**1**	39.3	**4**	0	0	2	2	**2**	15	**51**	16	**51**
126	DC13	0	7	7	**4**	27	**2**	1	0	1	**1**	66.2	**7**	1	0	2	3	**2**	15	**51**	16	**51**
48	PET21	0	3	3	**3**	37	**3**	6	0	6	**4**	42.9	**5**	2	1	1	4	**3**	14	**57**	18	**38**
138	GRO1	1	0	1	**1**	45	**4**	1	1	2	**2**	59.6	**6**	2	1	1	4	**3**	14	**57**	16	**51**
2	DC3	0	0	0	**0**	25	**2**	0	0	0	**0**	100.0	**10**	0	2	0	2	**2**	14	**57**	14	**60**
16	CLS7	0	0	0	**0**	20	**2**	0	0	0	**0**	99.7	**10**	0	0	2	2	**2**	14	**57**	14	**60**
95	HIG1	0	9	9	**5**	24	**2**	0	0	0	**0**	54.6	**6**	1	0	0	1	**1**	14	**57**	14	**60**
17	CON1	0	0	0	**0**	164	**10**	4	3	7	**4**	7.8	**1**	0	2	1	3	**2**	13	**62**	17	**43**
20	CON5	3	1	4	**3**	20	**2**	0	0	0	**0**	56.6	**6**	1	0	1	2	**2**	13	**62**	13	**63**
38	PET12	0	0	0	**0**	23	**2**	0	0	0	**0**	87.9	**9**	2	0	0	2	**2**	13	**62**	13	**63**
39	PET8	0	0	0	**0**	44	**4**	0	0	0	**0**	81.3	**9**	0	0	0	0	**0**	13	**62**	13	**63**
65	STA5	0	1	1	**1**	37	**3**	1	0	1	**1**	60.6	**7**	0	0	1	1	**1**	12	**66**	13	**63**
70	LAN2	1	1	2	**2**	70	**7**	0	1	1	**1**	18.7	**2**	0	1	0	1	**1**	12	**66**	13	**63**
76	BIS7	0	1	1	**1**	0	**0**	0	0	0	**0**	100.0	**10**	1	0	0	1	**1**	12	**66**	12	**69**
77	BIS8	0	0	0	**0**	1	**1**	0	0	0	**0**	100.0	**10**	1	0	0	1	**1**	12	**66**	12	**69**
98	SOU3	0	1	1	**1**	47	**4**	0	0	0	**0**	69.3	**7**	0	0	0	0	**0**	12	**66**	12	**69**
19	CON4	0	0	0	**0**	46	**4**	2	1	3	**2**	65.1	**7**	0	0	0	0	**0**	11	**71**	13	**63**
21	CON6	0	0	0	**0**	1	**1**	0	1	1	**1**	99.6	**10**	0	0	0	0	**0**	11	**71**	12	**69**
42	PET15	0	0	0	**0**	1	**1**	1	0	1	**1**	100.0	**10**	0	0	0	0	**0**	11	**71**	12	**69**
51	PET24	0	0	0	**0**	2	**1**	0	1	1	**1**	100.0	**10**	0	0	0	0	**0**	11	**71**	12	**69**
75	BIS5	0	0	0	**0**	0	**0**	1	0	1	**1**	100.0	**10**	1	0	0	1	**1**	11	**71**	12	**69**
79	BIS6	0	1	1	**1**	0	**0**	1	0	1	**1**	100.0	**10**	0	0	0	0	**0**	11	**71**	12	**69**
135	WIT1	4	11	15	**7**	4	**1**	1	0	1	**1**	7.2	**1**	1	1	1	3	**2**	11	**71**	12	**69**
26	CON10	0	0	0	**0**	5	**1**	0	0	0	**0**	93.9	**10**	0	0	0	0	**0**	11	**71**	11	**79**
34	PET7	0	0	0	**0**	39	**3**	0	0	0	**0**	71.9	**8**	0	0	0	0	**0**	11	**71**	11	**79**
52	PET25	0	0	0	**0**	29	**2**	0	0	0	**0**	69.1	**7**	0	1	2	3	**2**	11	**71**	11	**79**
61	STA2	0	0	0	**0**	0	**0**	0	0	0	**0**	100.0	**10**	1	0	0	1	**1**	11	**71**	11	**79**
64	STA4	3	5	8	**5**	21	**2**	2	0	2	**2**	13.5	**2**	1	0	0	1	**1**	10	**82**	12	**69**
28	PET2	0	0	0	**0**	1	**1**	0	1	1	**1**	85.5	**9**	0	0	0	0	**0**	10	**82**	11	**79**

Capabilities on project:
Water

FID	SWRA	Known Flooding Area	Localised Flooding	Current Flood Total		Future SW Flooding (SFRA/EA SW Risk - address point)		SHLAA	ELR	SHLAA ELR Total Count		Degree of Urbanisation		Schools	Rail	Road	Critical Infrastructure Total		Current Total Score	Current Rank	Future Total Score	Future Rank
				GIS Count	Weighting : 15	GIS Count	Weighting : 15			GIS Count	Weighting : 10	GIS %	Weighting : 10				GIS Count	Weighting : 5		Highest Risk First		Highest Risk First
43	PET16	0	0	0	**0**	0	**0**	0	1	1	**1**	97.0	**10**	0	0	0	0	**0**	10	**82**	11	**79**
74	BIS4	0	0	0	**0**	0	**0**	1	0	1	**1**	100.0	**10**	0	0	0	0	**0**	10	**82**	11	**79**
96	SOU1	1	0	1	**1**	53	**5**	1	0	1	**1**	16.3	**2**	0	2	1	3	**2**	10	**82**	11	**79**
40	PET13	0	0	0	**0**	1	**1**	0	0	0	**0**	82.2	**9**	0	0	0	0	**0**	10	**82**	10	**89**
23	CON11	0	0	0	**0**	0	**0**	0	2	2	**2**	85.3	**9**	0	0	0	0	**0**	9	**88**	11	**79**
104	COR1	0	0	0	**0**	1	**1**	1	1	2	**2**	72.7	**8**	0	0	0	0	**0**	9	**88**	11	**79**
41	PET14	0	0	0	**0**	7	**1**	0	0	0	**0**	79.7	**8**	0	0	0	0	**0**	9	**88**	9	**90**
57	SEA2	0	2	2	**2**	60	**6**	0	0	0	**0**	0.2	**1**	0	0	0	0	**0**	9	**88**	9	**90**
81	BIS12	0	0	0	**0**	44	**4**	1	0	1	**1**	31.2	**4**	0	0	0	0	**0**	8	**92**	9	**90**
103	RAIL2	0	0	0	**0**	29	**2**	1	0	1	**1**	1.2	**1**	0	9	3	12	**5**	8	**92**	9	**90**
54	HAS1	0	0	0	**0**	43	**4**	0	0	0	**0**	10.1	**2**	0	1	1	2	**2**	8	**92**	8	**96**
90	BAR2	0	0	0	**0**	10	**1**	0	0	0	**0**	69.5	**7**	0	0	0	0	**0**	8	**92**	8	**96**
119	WES2	1	4	5	**4**	11	**1**	0	0	0	**0**	1.6	**1**	0	1	1	2	**2**	8	**92**	8	**96**
106	COX1	0	1	1	**1**	14	**1**	1	1	2	**2**	35.0	**4**	0	0	1	1	**1**	7	**97**	9	**90**
109	FIS1	0	0	0	**0**	4	**1**	0	3	3	**2**	48.7	**5**	0	1	0	1	**1**	7	**97**	9	**90**
22	CON8	0	0	0	**0**	6	**1**	1	0	1	**1**	52.7	**6**	0	0	0	0	**0**	7	**97**	8	**96**
35	PET9	0	0	0	**0**	3	**1**	0	0	0	**0**	59.3	**6**	0	0	0	0	**0**	7	**97**	7	**101**
59	SEA4	0	0	0	**0**	40	**4**	1	1	2	**2**	2.2	**1**	0	0	1	1	**1**	6	**101**	8	**96**
37	PET11	0	0	0	**0**	6	**1**	0	0	0	**0**	41.1	**5**	0	0	0	0	**0**	6	**101**	6	**103**
115	RAM1	0	3	3	**3**	18	**1**	0	0	0	**0**	0.5	**1**	0	1	0	1	**1**	6	**101**	6	**103**
139	NEWB 1	4	1	5	**4**	2	**1**	0	0	0	**0**		**0**	0	1	0	0	**1**	6	**101**	**6**	**103**
66	STA6	0	1	1	**1**	4	**1**	0	3	3	**2**	3.5	**1**	0	0	3	3	**2**	5	**105**	7	**101**
107	COX2	0	0	0	**0**	2	**1**	1	0	1	**1**	3.3	**1**	0	3	1	4	**3**	5	**105**	6	**103**
9	DC10	0	4	4	**3**	4	**1**	0	0	0	**0**	0.0	**0**	0	0	1	1	**1**	5	**105**	5	**109**
47	PET20	0	0	0	**0**	0	**0**	0	0	0	**0**	28.5	**3**	0	1	2	3	**2**	5	**105**	5	**109**
120	DC11	0	1	1	**1**	17	**1**	0	0	0	**0**	3.4	**1**	0	0	2	2	**2**	5	**105**	5	**109**
29	PET3	0	0	0	**0**	0	**0**	1	1	2	**2**	35.3	**4**	0	0	0	0	**0**	4	**110**	6	**103**
132	BOW2	0	0	0	**0**	2	**1**	0	2	2	**2**	0.3	**1**	0	2	0	2	**2**	4	**110**	6	**103**
44	PET17	0	0	0	**0**	13	**1**	1	0	1	**1**	5.2	**1**	0	1	1	2	**2**	4	**110**	5	**109**

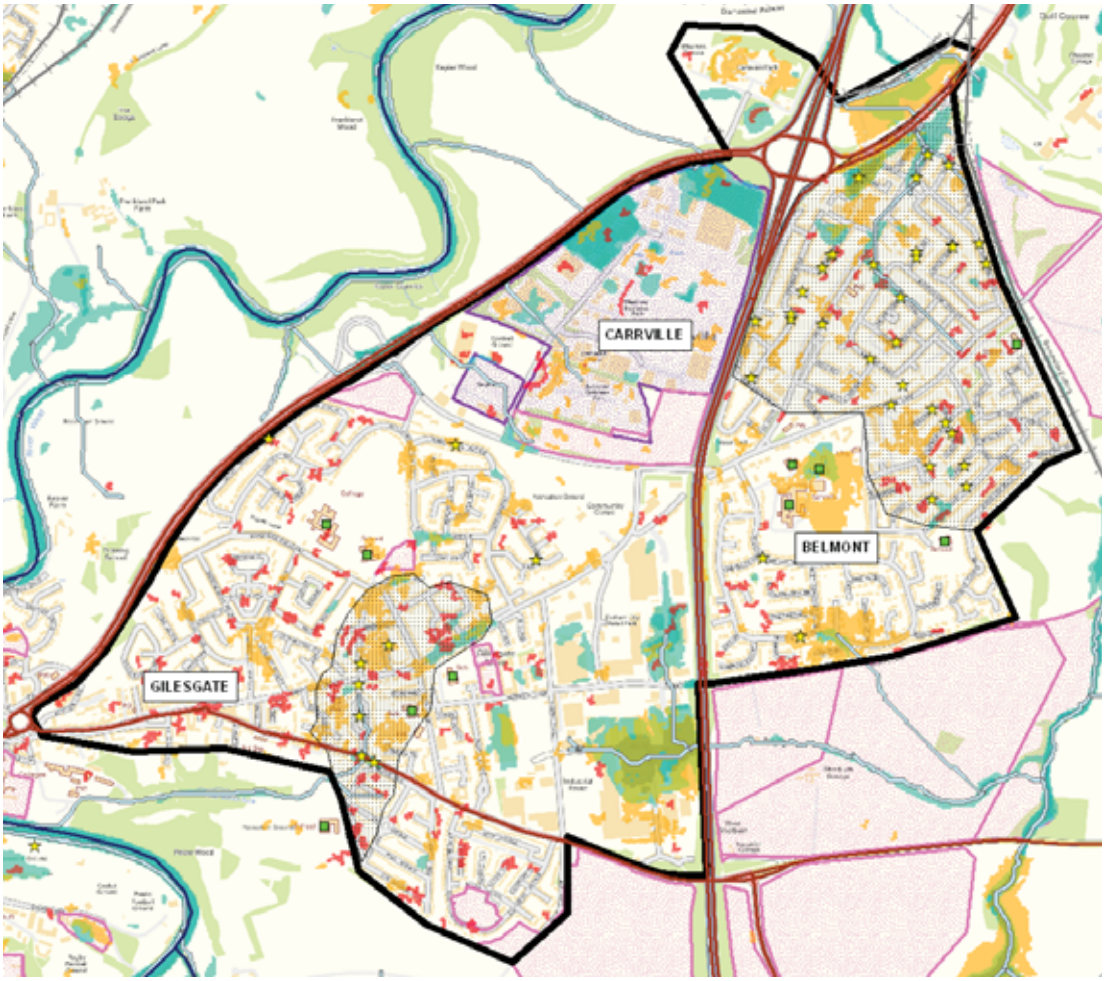
Capabilities on project:
Water

FID	SWRA	Known Flooding Area	Localised Flooding	Current Flood Total		Future SW Flooding (SFRA/EA SW Risk - address point)		SHLAA	ELR	SHLAA ELR Total Count		Degree of Urbanisation		Schools	Rail	Road	Critical Infrastructure Total		Current Total Score	Current Rank	Future Total Score	Future Rank
				GIS Count	Weighting : 15	GIS Count	Weighting : 15			GIS Count	Weighting : 10	GIS %	Weighting : 10				GIS Count	Weighting : 5		Highest Risk First		Highest Risk First
93	WES1	0	0	0	**0**	1	**1**	0	0	0	**0**	16.9	**2**	0	0	1	1	**1**	4	**110**	4	**113**
110	HOL1	0	5	5	**4**	0	**0**	0	0	0	**0**	0.0	**0**	0	0	0	0	**0**	4	**110**	4	**113**
113	BRA1	0	1	1	**1**	1	**1**	0	0	0	**0**	0.0	**0**	0	1	2	3	**2**	4	**110**	4	**113**
122	DC12	0	0	0	**0**	3	**1**	0	0	0	**0**	0.5	**1**	0	0	2	2	**2**	4	**110**	4	**113**
60	SEA5	0	0	0	**0**	3	**1**	0	0	0	**0**	0.0	**0**	0	0	3	3	**2**	3	**117**	3	**117**
100	CAS1	0	0	0	**0**	23	**2**	0	0	0	**0**	0.0	**0**	0	0	1	1	**1**	3	**117**	3	**117**
102	SED2	0	0	0	**0**	3	**1**	0	0	0	**0**	0.0	**0**	0	0	2	2	**2**	3	**117**	3	**117**
121	RUS1	0	0	0	**0**	6	**1**	0	0	0	**0**	0.0	**0**	0	0	2	2	**2**	3	**117**	3	**117**
124	LOF1	0	0	0	**0**	1	**1**	0	0	0	**0**	0.0	**0**	0	1	1	2	**2**	3	**117**	3	**117**
14	CLS5	0	0	0	**0**	15	**1**	0	1	1	**1**	0.0	**0**	0	1	0	1	**1**	2	**122**	3	**117**
30	PET4	0	0	0	**0**	8	**1**	0	1	1	**1**	0.0	**0**	0	0	1	1	**1**	2	**122**	3	**117**
68	LAN4	0	0	0	**0**	2	**1**	0	1	1	**1**	0.0	**0**	0	1	0	1	**1**	2	**122**	3	**117**
82	BIS11	0	1	1	**1**	0	**0**	1	0	1	**1**	6.5	**1**	0	0	0	0	**0**	2	**122**	3	**117**
88	SPE4	0	0	0	**0**	10	**1**	0	1	1	**1**	0.0	**0**	0	1	0	1	**1**	2	**122**	3	**117**
111	OUS1	0	0	0	**0**	0	**0**	1	0	1	**1**	11.0	**2**	0	0	0	0	**0**	2	**122**	3	**117**
31	PET5	0	0	0	**0**	1	**1**	0	0	0	**0**	0.0	**0**	0	0	1	1	**1**	2	**122**	2	**130**
49	PET22	0	0	0	**0**	22	**2**	0	0	0	**0**	0.0	**0**	0	0	0	0	**0**	2	**122**	2	**130**
50	PET23	0	0	0	**0**	15	**1**	0	0	0	**0**	0.0	**0**	1	0	0	1	**1**	2	**122**	2	**130**
114	FIS2	0	0	0	**0**	1	**1**	0	0	0	**0**	0.0	**0**	0	0	1	1	**1**	2	**122**	2	**130**
116	SEA1	0	0	0	**0**	0	**0**	0	0	0	**0**	0.0	**0**	0	0	3	3	**2**	2	**122**	2	**130**
118	SED4	0	0	0	**0**	1	**1**	0	0	0	**0**	0.0	**0**	0	0	1	1	**1**	2	**122**	2	**130**
131	RAIL1	0	0	0	**0**	0	**0**	0	0	0	**0**	0.0	**0**	0	3	0	3	**2**	2	**122**	2	**130**
24	CON12	0	0	0	**0**	0	**0**	0	3	3	**2**	8.4	**1**	0	0	0	0	**0**	1	**135**	3	**117**
27	CON13	0	0	0	**0**	6	**1**	0	3	3	**2**	0.0	**0**	0	0	0	0	**0**	1	**135**	3	**117**
55	HAS2	0	0	0	**0**	3	**1**	0	0	0	**0**	0.0	**0**	0	0	0	0	**0**	1	**135**	1	**137**
117	SED3	0	0	0	**0**	0	**0**	0	0	0	**0**	0.0	**0**	0	0	1	1	**1**	1	**135**	1	**137**
15	CLS6	0	0	0	**0**	0	**0**	1	0	1	**1**	0.0	**0**	0	0	0	0	**0**	0	**139**	1	**137**

Capabilities on project:
Water

ANNEX B2 - SUMMARY SHEETS

SITE DC8 – DURHAM: GILESGATE, BELMONT & CARRVILLE



LEGEND

- Key SW Risk Area
- SW Risk Sub Area
- DCC Known Flooding Areas
- SFRA Localised Flooding
- Schools
- Railway
- Road
- Main River
- Overland Flow Routes
- SHLAA Site
- Employment Site

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **57**

Current Ranking = **1**

Location	No. of Incidents	Comments
Gilesgate	16	3 incidents of surface water flooding have been detailed along Sherburn Road. 1 incident was possibly caused by a blockage between Sherburn Road and the outfall. The location is still vulnerable to flooding and may be solved by improvements to

			highway drainage. The remaining two incidents show the A181 and Maple Road affected. The carriageway floods affecting gardens and properties. Work has been undertaken by DCC for cleaning, repairing and providing additional gullies. Jetting and a camera survey of the outfall have been undertaken which showed blockages. Landowner required to clear drain. 1 incident of surface water flooding along Sunderland Road could be due to a culvert issue; however culvert size and dimensions are unknown. 4 incidents of surface water flooding are known along Musgrave Gardens. 1 incident reported the road flood with sewage, 1 incident as a drainage issue, and the other 2 incidents as a capacity problem with the sewer system. 1 incident of surface water flooding along Deans Walk has been attributed as a drainage issue. No more details are provided. Properties along Rowan Tree Avenue have been affected by 2 surface water flood incidents. The cause of the flooding is due to a capacity problem with the sewer system. Surface water flows from carriageway between both houses. Sewage has been noted as coming out of two houses. Properties along Ashdown Avenue have been affected by 2 surface water flood incidents. The cause is due to a capacity problem with the sewer system, with sewage located between both properties. 3 incidents have been detailed at The Moorlands. The carriageway floods with surface water flooding gardens and properties. Work has been undertaken by DCC including cleaning, repairing and providing additional gullies. The incidents are believed to be a capacity problem on the sewer. A meeting with DCC occurred and the EA are investigating measures but cost may limit investigation and mitigation options? Area of frequent surface water flooding. Northumbrian Water is currently completing a flood alleviation scheme involving oversized pipes to provided storage in the Gilesgate and Belmont systems.
	Belmont	11	A cluster of roads and properties at Belmont & Carville housing estate suffering from repeated incidents of surface water flooding, suggesting an interlinked cause. The areas at risk include Ferndale, Rosedale, Lingdale, Brackendale, Heatherdale and Thorndale Roads. 7 separate incidents have been recorded. The cause is a combination of sewer and surface drainage. Surface and foul water drains overflowing have been documented. Improvements to highway drainage and sewer checks showed multiple blockages and collapse. NWL investing £2m to improve drainage in this area. 2 incidents along Devonshire Road and 2 incidents along Buckinghamshire Road look to be interlinked. Both sites are close to each other and seem to have capacity problems with the sewer system. Works have been carried out by DCC in 2004/05 at both sites; however flooding occurred on the

		19/06/2005. NWL arranging flood risk assessments and workshops. The Nottinghamshire Road which links both roads could also be affected by surface water. Northumbrian Water have re-modelled the Belmont area and instigated works.
Carrville	30	Carrville has an even spread of surface water incidents covering the whole area. Carrville neighbours Belmont and mentions the issues at Belmont and Carrville housing estate and the £2m investment that is required to improve drainage. 14 incidents in Carrville are a combination of sewers, surface water and highway drainage, related to gully and drain blockages. Repeated surface water incidents occuring at least once a year. Carrville suffers from frequent surface water flooding including incidents in August 2002, June 2005 and June 2007. Over 100 properties are known to be affected over this time, which includes Gilesgate, Belmont and Carrville (Belmont Parish). Additional gullies have been put in and frequent drain clearing has occurred in Carrvilee but has only been partially effective. NWL is aware of the drainage capacity issue. The main roads affected are Broom Lane, Broomside Lane, Fallsway, Filby Drive, Grange Road, Grinstead Way, Hawthorne Road, High Street, Kinley Road, Kirkstone Drive, Oakham Drive, Ramside View, Swinside Drive and Wantage Road. Carrville Residents Association has been involved with these incidents, however further details are not known. 4 incidents at Carrville, at Kinley Road, Kirkston, Oakham and Grinstead. Combination of sewer and surface water drainage. Improvements to highway drainage are needed. Checking of sewers highlighted blockages and collapsed drains. 2 incidents have occurred along numerous roads in Carrville, namely Kinley Road, Wantage Road, Kirkstone Drive and Grange Road. The carriageway floods affecting gardens and properties. Work has been undertaken by DCC at Kinley and Grange Road to improve the sewer capacity issue through, cleaning, repairing and creating additional gullies. Properties on Kirkstone Drive are at or below road level and most at risk. Gullies require amending at Wantage Road. An additional comment was works are required by DCC on the High Street. 1 incident of surface and foul water drains overflowing has been recorded in both Newlands Road and Langdale Crescent. 1 incident of surface water flooding extending from Pittington Lane to Broomside. Casue unknown. Pittington Parish Council is aware of this incident.

The majority of incidents at Gilesgate look to be associated with an inadequate sewer network and associated drainage issues. Blockages seem to be the main cause for the surface water issues. There is a cluster of surface water incidents around Musgrave Gardens and Sherburn Road.

At Belmont the main issues seem to be a combination of sewer and surface water drainage and focussed on two issue areas: Belmont & Carville housing estate and Buckinghamshire

and Devonshire Roads.

Carrville has recorded repeated incidents of surface water flooding along numerous roads, properties and gardens. The issues include a combination of the sewers, surface water and highways drainage. Works have been carried out, however it has only been partially effective and more works and regular maintenance are needed to radically reduce the surface water risks at Carrville.

Durham County Council engineers reported that Northumbrian Water have, and continue to undertake a considerable amount of work in the Gilesgate, Belmont and Carrville areas of Durham. They have re-modelling the Belmont area and are completing a flood alleviation scheme involving oversized pipes to provided storage in the Belmont and Gilesgate systems.

In addition to the work undertaken by Northumbrian Water, Durham County Council has undertaken works to improve highways drainage. This has included the localised movement of gullies, the provision of additional gullies and de-silting blocked highways drains. These works have been very reactive, responding to problems and basically puts the water back into Northumbrian Water's sewer system.

As a result of the works undertaken, Durham County Council has not had any incidents of flooding reported this year. As a result the opinion of the Council Engineers was that the known flood problems within this part of Durham were being resolved, at least up to the 1 in 30yr event. However the residual risk in exceedance events remains and requires consideration by the SWMP.

FUTURE SURFACE WATER FLOODING

Properties at risk = **611**

Future Ranking = **1**

The risk is equally dispersed over Gilesgate, Belmont and Carrville, and only looks to increase in the future with more residential roads and properties affected.

POTENTIAL STAKEHOLDERS

Carrville Residents Association

Pittington Parish Council

Belmont Parish

All of the above have been identified as providing information concerning the known flood incidents.

POTENTIAL DEVELOPMENT SITES

7 SHLAA sites at surface water risk

1 ELR site at surface water risk

An Environment Agency environmental priority for Durham City is *"Careful planning of future development in relation to managing and reducing Flood Risk".* The 8 potential development sites in DC8 will need further consideration prior to development, notably ELR3 in Carrville which is at future surface water risk.

Whilst the flood risk is obviously an issue for the development sites they would also present an opportunity by which to manage the surface water flood risk to the surrounding urban environment.

CONCLUSIONS

As a result of the works undertaken, Durham County Council has not had any incidents of flooding reported in 2010. The opinion of the Council Engineers was that the known flood problems within this SWRA were being resolved, at least up to the 1 in 30yr event. However the residual risk in exceedance events remains and therefore this SWRA will be taken forward to the Options phase of the SWMP.

SITE NEW1 – NEWTON AYCLIFFE

LEGEND

- Key SW Risk Area
- SW Risk Sub-Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Surface Water Issue
- Unknown

DCC KNOWN FLOODING

- Runoff from field

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **5**

Current Ranking = **2**

Location	No. of Incidents	Comments
Woodham Village	4	3 surface water incidents have occurred at Stag Lane, Cheltenham Way, and Mulgrave Court, along with 1 culvert issue at Woodham Bridge. These incidents are clustered together and are in close proximity to Woodham Burn. Durham County Council engineers and the Environment Agency agreed that the known flood incidents in Woodham Village are a result of fluvial flooding. Although Stag Lane and Cheltenham Way are very low lying so it is possible that the surface water sewers are unable to discharge when river levels are high. This will be investigated as part of the Options phase. Fluvial flooding occurs up and downstream of the culvert under the A167 and the Environment Agency has undertaken some works including hydraulic modelling of the Woodham Burn. Gabions were put in the watercourse although this was to provide scour protection rather than any flood protection. The watercourse downstream of the A167 to the River Skerne has also been cleared out by the landowner following the flooding. The area has not flooded for 6 or 7 years.
Middridge	1	1 surface water incident caused from runoff from the field to the north. The area only floods in exceptional circumstances and there are no properties at risk only the highway (Middridge Road) which is a minor road. The road embankment holds water back until it spills onto the road and then flows down the road. A simple solution would be to put a culvert under the road to allow the water to get into the drain on the other side which is presumably what happened prior to the road being put in place. This area will be taken forward to the Options phase. Development of the SHLAA site located on the field in question could therefore solve the problem. Any development would be required to reduce the rates of runoff although the SWMP could look to put a constraint on development of the site to ensure the issue is addressed. The SWMP cannot provide a specific solution since it is not known what plans there are for the site and a number of solutions may be feasible. To state a specific solution which must be implemented may constrain and deter developers.

FUTURE SURFACE WATER FLOODING

Properties at risk = **1949**

Future Ranking = **2**

Future flood risk is a key issue for this SWRA due to the vast number of properties potentially at risk. A potential sub-area with a significant surface water flood risk based on the SFRA modelling exists to the south of Woodham Burn where there is a good correlation between the SFRA and EA datasets. The cause of this flooding is extreme rainfall ponding on the surface because it is unable to get into the sewer systems. Since no new development is planned for this part of Newton Aycliffe, re-development does not present an option by which to manage this risk and additional works would need to be carried out on the ground.

POTENTIAL ADDITIONAL STAKEHOLDERS

None identified

POTENTIAL DEVELOPMENT SITES

13 SHLAA sites at surface water risk

15 ELR sites at surface water risk

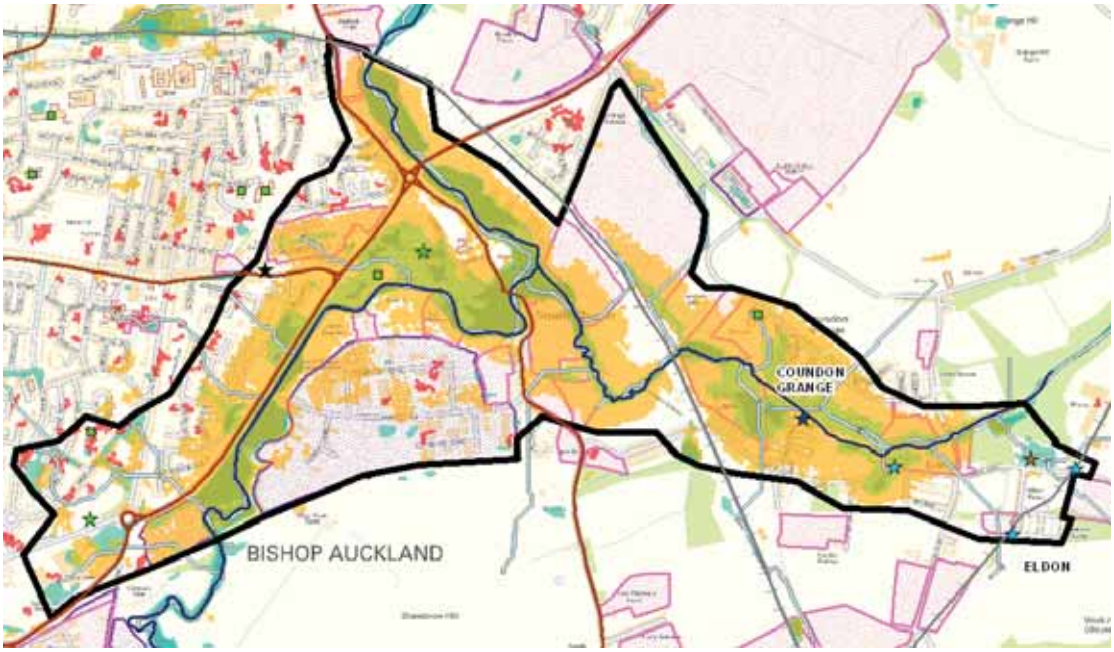
ELR and SHLAA sites to the south of Newton Aycliffe are potentially at risk of surface water flooding with the overland flow route network cutting through these development sites. Whilst there are no major pockets at current or future risk in this area, it remains an area to watch.

CONCLUSIONS

It is proposed that the areas at risk of surface water flooding in Woodham Village and Middridge will be taken forward to the Options phase of the SWMP.

The residual risk of surface water flooding across Newton Aycliffe is considered to be a significant problem area that needs to be addressed by the SWMP.

SITE BIS3 – BISHOP AUCKLAND



LEGEND

- Key SW Risk Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Blocked Drains
- Ground Depression
- Insufficient River Capacity
- River Breach
- Surface Water Issue

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **8**

Current Ranking = **4**

Location	No. of Incidents	Comments
Bishop Auckland	3	There are 2 known incidents caused by a breach of the River Gaunless affecting St Andrews Road and the A6072. The incident at St Andrews Road involved the Dene Valley Community Partnership and details approximately 80 homes affected by the June 2000 flood. The A6072 flooded over 100m in length causing a road closure and has been recorded to flood 3 times in the last 5 years. The Environment Agency has implemented a flood alleviation scheme for Bishop Auckland providing flood storage that now provides a standard of protection of 1 in 200yrs for the River Gaunless. These incidents are cases of fluvial flooding and not surface water and not covered by a SWMP.

		1 incident details a sag along St Andrews Road beneath a historical railway bridge. However this has now been removed.
Eldon	4	3 incidents in Eldon have been noted as highways issues. Surface water runoff affects the memorial cottages, Eldon Brickworks and a footpath and surrounding area. The memorial cottages flood due to overland flow from the fields to the south. Eldon Brickworks suffer overland flooding from land to the north. The footpath and surrounding area is affected from surface water from the fields south of the children's play area. 1 incident at Eldon suggests blocked drains at Office Road are the main cause for the surface water incident.
Coundon Grange	1	The incident was a result of Dean Beck when an inadequately sized culvert in the centre of the village caused flooding in 1980, notably at Randolph Street. The watercourse has been cleared out and flooding not reported since.

FUTURE SURFACE WATER FLOODING

Properties at risk = **1084**

Future Ranking = **4**

Future flood risk is the key issue for this area as it could affect a substantial number of properties. Furthermore, potential development sites and the A688, A689 and B6282 are main roads at major risk from future surface water flooding meaning that emergency planning would play a role.

POTENTIAL ADDITIONAL STAKEHOLDERS

Emergency Planning

Dene Valley Community Partnership

Highways Agency

POTENTIAL DEVELOPMENT SITES

16 SHLAA sites at surface water risk

2 ELR sites at surface water risk

Of the 18 development sites, 14 SHLAA sites and both ELR sites (ELR48 and ELR46) are heavily at risk from future surface water flooding. The SHLAA sites at risk are:

- 3/BA/07
- 3/BA/02
- 3/BA/24
- 3/BA/40
- 3DV/03
- 3/DV/11
- 3/SC/01
- 3/SC/02
- 3/SC/04

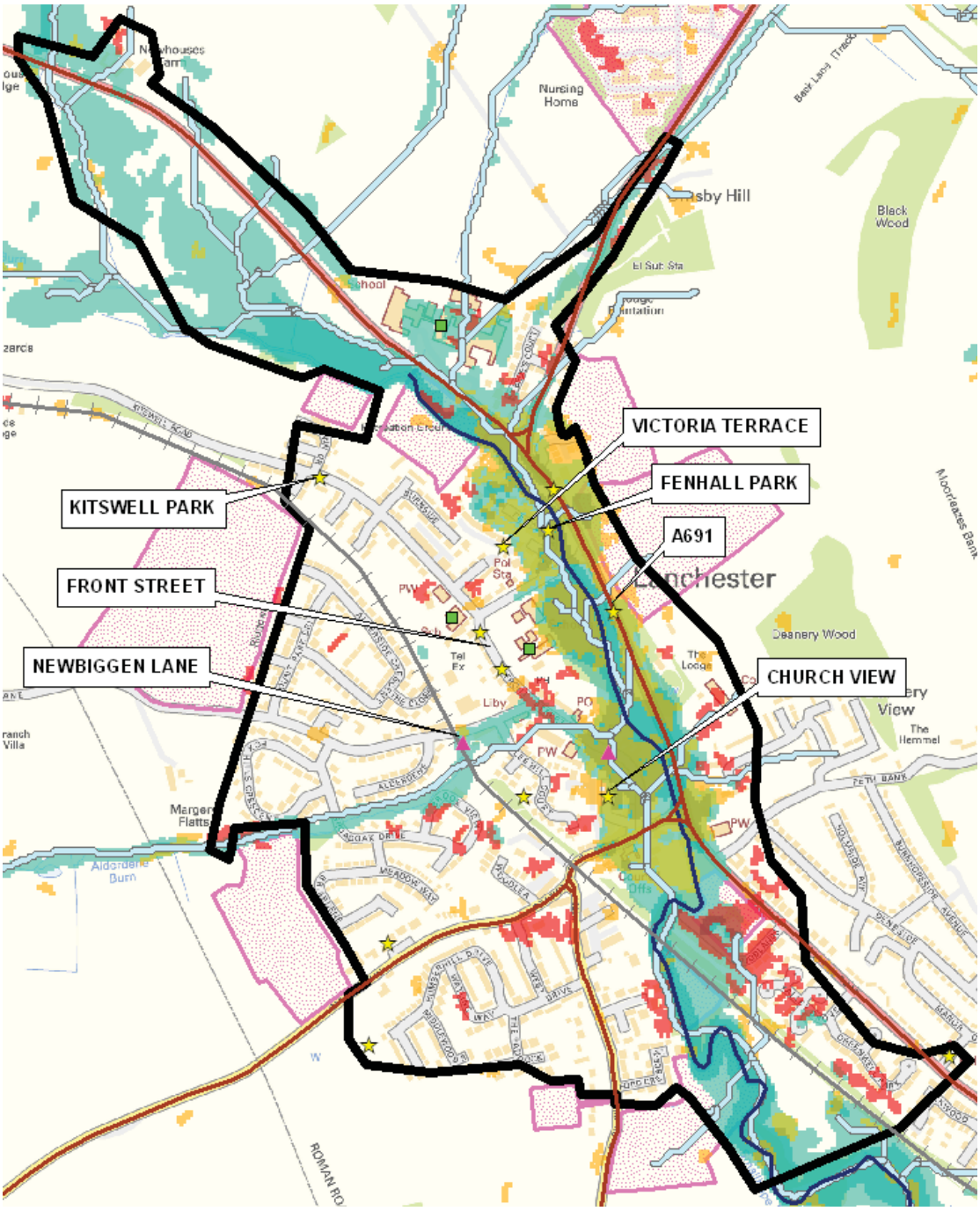
- 3/SC/05
- 3/SC/06
- 3/SC/07
- 7/EL/121
- 3/DV/06

Durham County Council stated that Bishop Auckland is a former growth point site and could experience significant development, with potentially 4 of the 16 SHLAA sites coming forward in the near future. With 14 SHLAA sites at risk from future surface water flooding, any development sites put forward need to address the surface water issues. Whilst the flood risk is obviously an issue for the development sites they would also present an opportunity by which to manage the surface water flood risk to the surrounding urban environment.

CONCLUSIONS

Whilst the current surface water risk seems to be under control, the residual risk in exceedance events remains, affecting approximately 1000 properties and requires consideration by the SWMP. This SWRA will be carried forward to the Options phase.

SITE LAN1 – LANCHESTER



LEGEND

Key SW Risk Area	Road	SURFACE WATER CLASSIFICATIONS
DCC Known Flooding Areas	Main River	SFRA Surface Water - Moderate Risk
SFRA Localised Flooding	Overland Flow Routes	SFRA Surface Water -Significant Risk
Schools	SHLAA Site	EA Surface Water -Intermediate Susceptible
Railway	Employment Site	EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **14**

Current Ranking = **4**

Location	No. of Incidents	Comments
Front Street	3	Inadequate drainage along Smallhope Burn is the main cause for the severe historic surface water flooding which occurred in 1975, 2000, 2001 and 2003 affecting residential and commercial properties, parks and farms. Key areas at risk have been noted as the area between Maiden Law Bank and the entrance of Fenhall Park, Kitswell Road, Victoria Terrace and Front Street. Drainage culverts have been thoroughly inspected and cleaned following the 2001 and 2003 floods. Continual maintenance is required to reduce the risk. Repeated flood records (every 3 - 4 years) after heavy rainfall have been recorded, notably along Front Street, the A691, Victoria Terrace and Church View. Shops and approximately 40 houses were affected during the 2003 floods with some abandoned for large periods of time. The cause for the incidents in 2000, 2001, 2003 and 2004 were inadequate and blocked drains, sewers and a culvert. Major works have recently been carried out between 2008 and 2009, including new gullies, increased drain size, river level monitoring and regular maintenance. No recorded flood incidents have been recorded after the works. A small unnamed road off Cadger Bank and Newbiggin Lane suffer from surface water flooding. The causes are unknown.
Victoria Terrace	2	
A691	3	
Fenhall Park	1	
Kitswell Road	1	
Church View	1	
Newbiggen Lane	1	
Un-named Roads	2	

With large residential and commercial areas of Lanchester repeatedly flooding this is a key SWRA. Furthermore emergency planning is required to tackle the access problems that could occur both now and in the future along the A691 and potentially the A6076 and B6296. Smallhope Burn clearly plays an important role in the existing flood risk and the Environment Agency has set a key environmental priority entirely for Lanchester, based on studies that the Environment Agency have carried out, three separate flooding mechanisms have been identified which result in the inundation of properties in Lanchester. These include:

- the surcharging of manholes and the surface water drainage system within the village (both as a result of high flows and backing up from the Smallhope Burn);
- the blockage of culverts on the Smallhope Burn and Alderdene Burn and;
- overtopping of the channel banks due to insufficient channel capacity.

The Environment Agency has undertaken a number of studies concerning flooding in Lanchester and is currently considering what flood alleviation options may be viable. The Environment Agency advised that the issues in Lanchester were primarily fluvial, were being addressed by the Environment Agency and the SWMP did not need to consider the area further.

FUTURE SURFACE WATER FLOODING

Properties at risk = **221**

Future Ranking = **8**

POTENTIAL ADDITIONAL STAKEHOLDERS

Lanchester Partnership

Lanchester Parish Council

Emergency Services

Highways Agency

Network Rail

POTENTIAL DEVELOPMENT SITES

5 SHLAA sites at surface water risk

0 ELR sites at surface water risk

5 SHLAA sites are heavily at risk from future surface water flooding: 1/LA/10, 1/LA/11, 1/LA/13, 1/LA/02 and 1/LA/16. Whilst the flood risk is obviously an issue for the development sites they would also present an opportunity by which to manage the surface water flood risk to the surrounding urban environment.

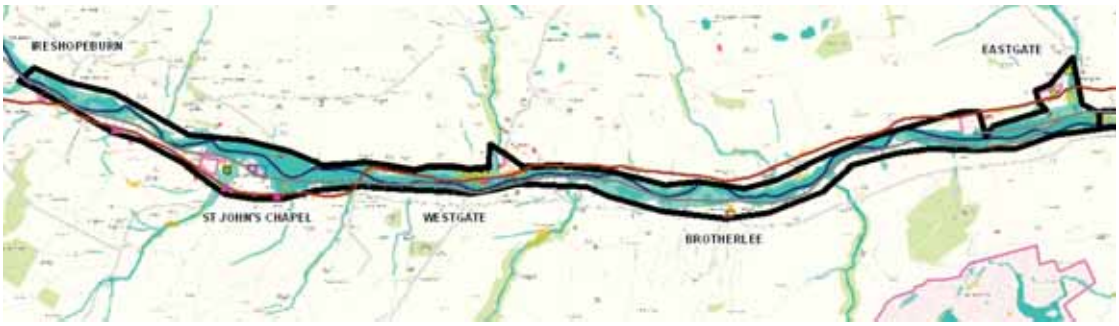
The Wear CFMP states that the floodplain area should remain free of development so they can absorb the increasing amounts of flood waters.

CONCLUSIONS

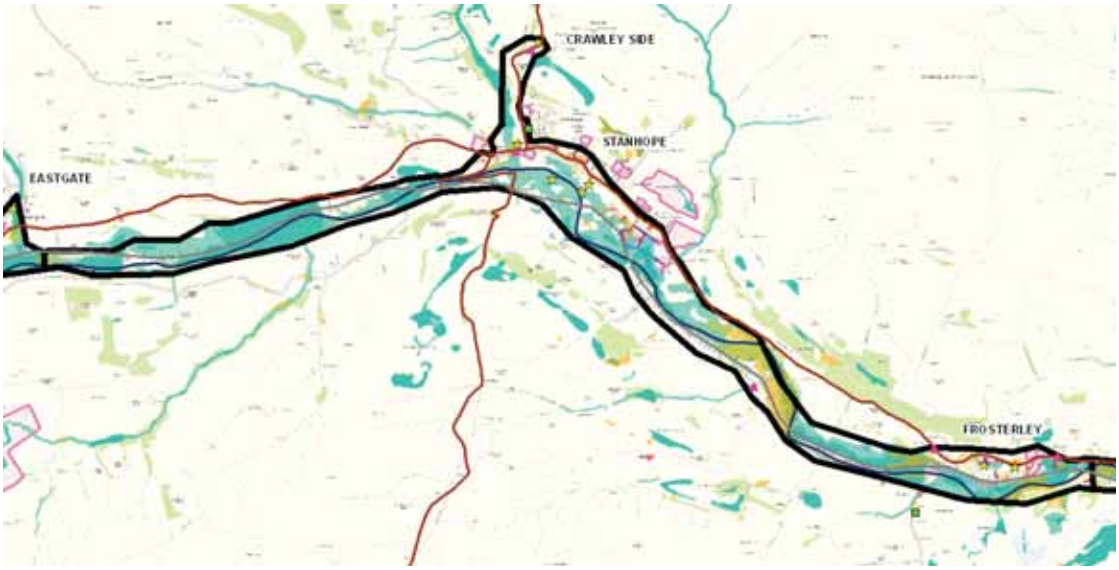
The Environment Agency advised that the issues in Lanchester were primarily fluvial, were being addressed by the Environment Agency and the SWMP did not need to consider the area further.

SITE RAIL3 – RAILWAY LINE BETWEEN IRESHOPEBURN AND BLACKETT'S GILL

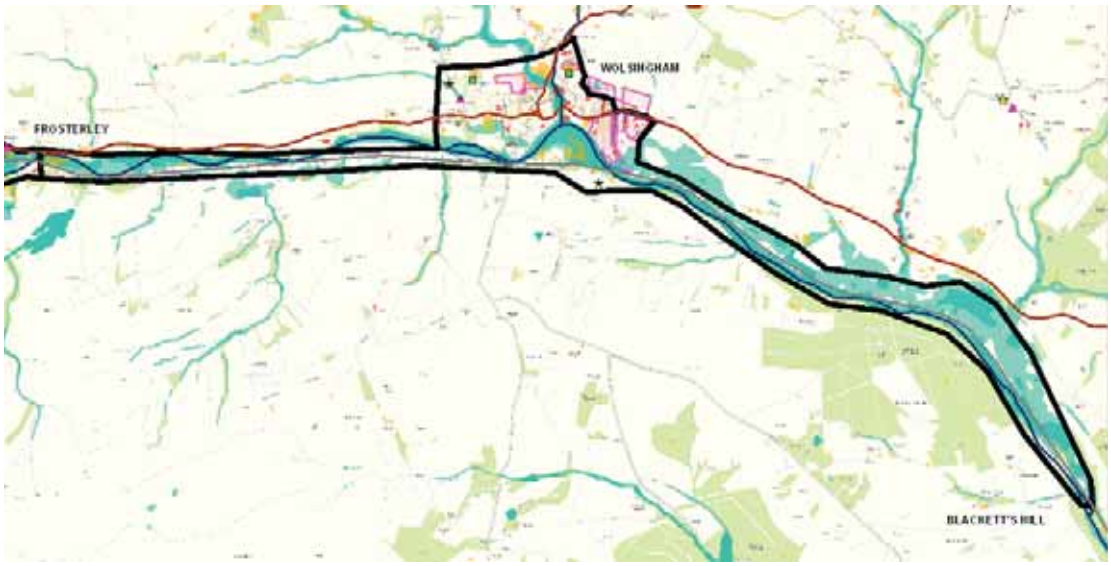
WESTERN SECTION – IRESHOPE BURN TO EASTGATE



CENTRAL SECTION – EASTGATE TO FROSTERLEY



EASTERN SECTION – FROSTERLEY TO BLACKETT'S GILL



LEGEND

Key SW Risk Area	Road	SURFACE WATER CLASSIFICATIONS
# DCC Known Flooding Areas	Main River	SFRA Surface Water - Moderate Risk
SFRA Localised Flooding	Overland Flow Routes	SFRA Surface Water -Significant Risk
Schools	SHLAA Site	EA Surface Water -Intermediate Susceptible
Railway	Employment Site	EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **26**

Current Ranking = **4**

Location	No. of Incidents	Comments
WESTERN SECTION	**9**	
C74, Brotherlee	1	Highways issue. 1 incident caused by overland flooding from land to the south, draining into the River Wear
A689, Westgate	2	Highways issue. Cause unknown
Eastgate	2	1 incident caused by overland flow from the local fields affecting Braeside House 1 incident recorded where Rookhope Burn floods during heavy rainfall, flows overland into the River Wear and causes backing up. No overtopping of the River Wear was recorded.
St John's Chapel	3	Surface Water Issues at Kirks Field, Cattle Market and Dry Gill. Cause unknown
Daddry Shield, Brotherlee	1	Cause unknown.
CENTRAL SECTION	**13**	
Frosterley	6	1 incident in 1995 where flooding from River Wear affecting 38 residential properties 1 drainage incident affecting recreational grounds and cellars of adjacent properties. The cellars are below the area of the recreational drainage system resulting in flooding. 4 incidents where the cause is unknown.
Stanhope	5	3 incidents – Extreme rainfall causing surface water runoff affecting 12 properties between swing bridge and railway bridge. Areas do not flood frequently, however the embankments have been raised and large stone blocks placed in the river to divert water at Unthank Mill, Weat Terrace and The Butts. Weardale Community Partnership has been involved in Stanhope. Their impact is unknown. 1 incident caused by runoff from local fields affecting gardens and cellars at Rose Terrace. 1 unknown incident in Rose Terrace. Possible duplicate record. Cause could be the runoff from the local field.

Crawley Side	2	Highways issue. Runoff from disused railway line into escape lane on B6278.
EASTERN SECTION	**4**	
Wolsingham	4	1 incident where fields to south of River Wear flooded. Potential fluvial issue, as the River Wear is a main river it would be the responsibility of the Environment Agency and not covered by this study. Wolsingham Parish Council is identified as a source of information. 3 Unknown incidents, 2 along Leazes Lane and 1 along Durham Road. Potential highways issue.

Critical infrastructure is largely at risk in this SWRA with three sections of railway line and three main roads (A689, B6278 and B6296) at surface water risk. The known incidents along the 27.3km stretch of rail have not affected any properties.

Durham County Council engineers advised that Northumbrian Water has undertaken upsizing of the sewer system and taken some Combined Sewer Overflows off-line to address some of the problems in the area.

FUTURE SURFACE WATER FLOODING

Properties at risk = **382**

Future Ranking = **3**

POTENTIAL ADDITIONAL STAKEHOLDERS

Network Rail

Highways Agency

Wolsingham Parish Council

Emergency Services

Weardale Community Partnership

POTENTIAL DEVELOPMENT SITES

19 SHLAA sites at surface water risk

11 ELR sites at surface water risk

These sites should be assessed prior to development, due to their close proximity to the River Wear, known incidents and future surface water hotspots. SHLAA and ELR sites most at risk are:

- SHLAA Sites - 3/WO/04 and 3/WO/07, 3/WO/13, 3FR/03, 3/FR04, 3/WE/04 and 3/WE/05
- ELR Sites - 64, 65b, 67, 68, 69 and 70

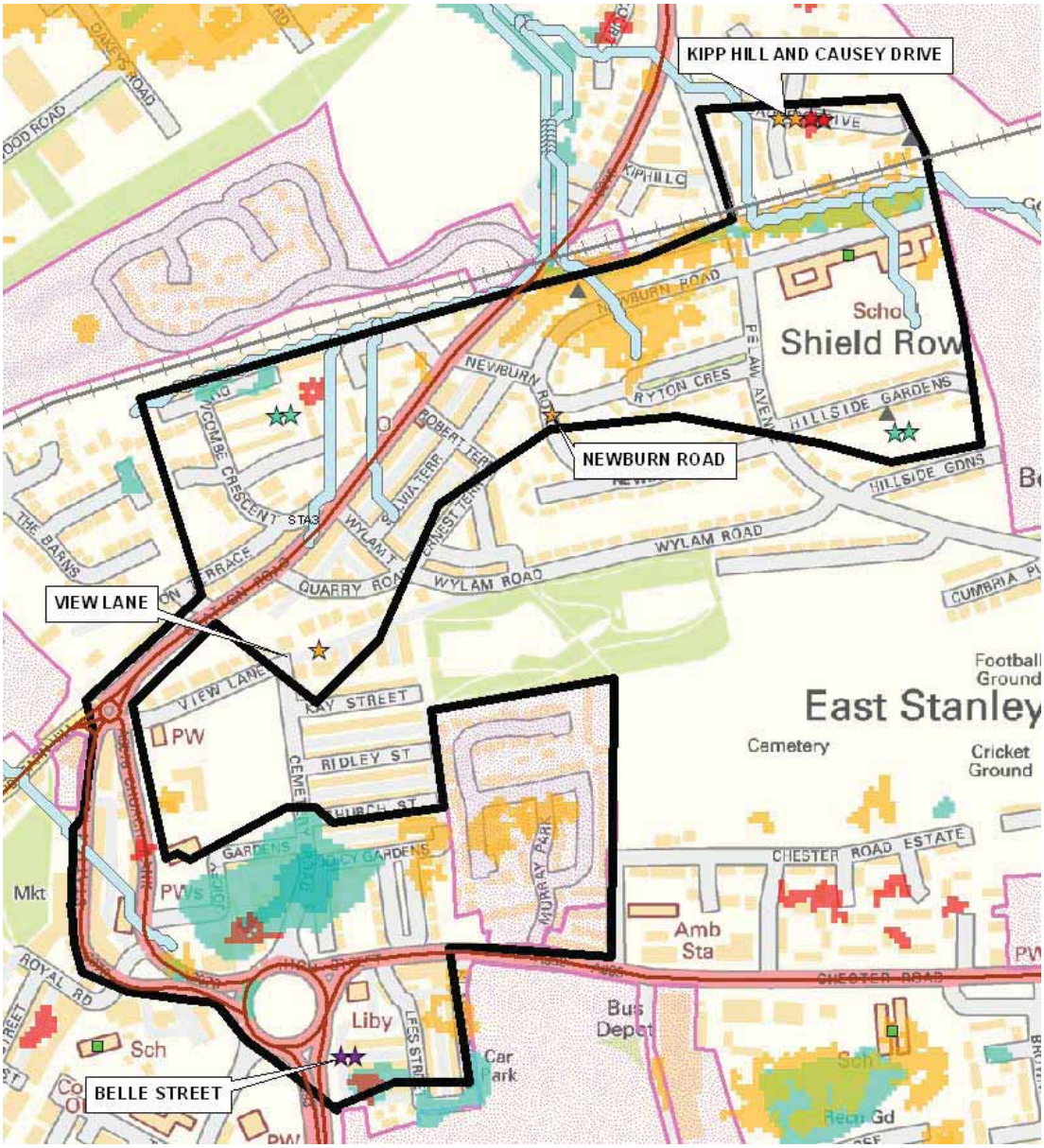
Whilst the flood risk is obviously an issue for the development sites they would also present an opportunity by which to manage the surface water flood risk to the surrounding urban environment.

CONCLUSIONS

Critical infrastructure is largely at risk in this SWRA with three sections of railway line and three main roads (A689, B6278 and B6296) at surface water risk.

It would be possible to address the areas where critical infrastructure is most at risk from surface water flooding as well as the residual risk along discrete sections of the SWRA as part of the Options phase.

SITE STA3 – EAST STANLEY



LEGEND

- Key SW Risk Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Curtilage flooding, gully blockages
- Collapsed surface water drain
- Combination of surface water issues
- Inadequate drainage

DCC KNOWN FLOODING AREAS

- Unknown

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **15**

Current Ranking = **3**

Location	No. of Incidents	Comments
Belle Street	2	2 incidents of curtilage flooding. Potential gully blockages. NWL to uncover buried manholes, allowing access to check the gullies. NWL and DCC to liaise.
Kip Hill	2	2 incidents caused by a collapsed surface water drain under the existing railway near Causey Drive. 1 property affected from surface water flooding. DCC are carrying out the repairs to the collapsed surface water drain.
Shield Row	7	4 incidents reported. Combination of surface water, highway drainage, blocked gullies and combined sewers. Capacity issue. 2 of these incidents occur along Newburn Row, affecting 9 properties, where surface water flooding has occurred once every 2-3 years. NWL and DCC advised to check all gullies, highway drainage and combined sewers in this locality. The remaining 2 surface water incidents occur along Hillside Gardens affecting 19 properties. NWL, DCC are advised to meet to discuss drainage capacity in flood conditions. 1 incident along Causey Drive is due to inadequate drainage in the area. This is in the same locality as the collapsed surface water drain with approximately 9 properties affected. This infers that these incidents could be interlinked as part of identifying a means of managing the risk. The Havannah Partnership is involved with this incident. Their degree of their involvement is unknown. 2 incidents. Cause unknown.
View Lane	1	Inadequate drainage. The Havannah Partnership is involved with this incident.
Newburn Road	1	Inadequate drainage. The Havannah Partnership is involved with this incident.
Causey Drive	1	Inadequate drainage. The Havannah Partnership is involved with this incident.

FUTURE SURFACE WATER FLOODING

Properties at risk = **108**

Future Ranking = **6**

POTENTIAL ADDITIONAL STAKEHOLDERS

Havannah Partnership

POTENTIAL DEVELOPMENT SITES

2 SHLAA sites at surface water risk

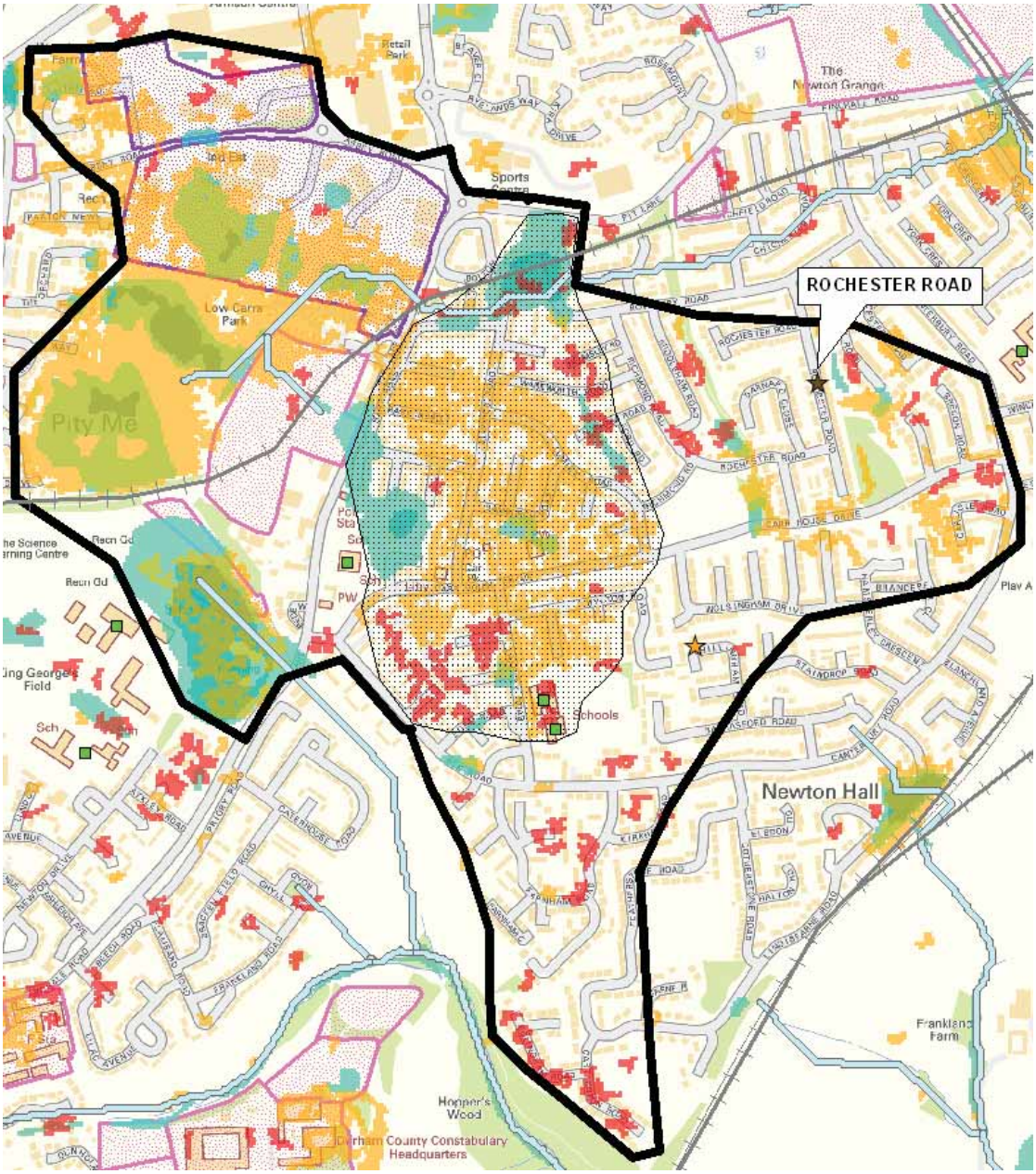
0 ELR sites at surface water risk

Whilst the flood risk is a potential issue for the development sites they would also present an opportunity by which to manage the surface water flood risk to the surrounding urban environment.

CONCLUSIONS

The residual risk in exceedance events remains and therefore this SWRA will be taken forward to the Options phase of the SWMP.

SITE DC1 – DURHAM: PITY ME



LEGEND

- Key SW Risk Area
- SW Risk Sub Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Inadeqaute sewer network
- Inadequate drainage

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **2**

Current Ranking = **7**

Location	No. of Incidents	Comments
Rochester Road	1	Numerous roads flooded due to an inadequate sewer network. Storage and reinstatement works carried out on Cantebury Road, Salisbury and Lindisfarme. NWL have a model of the area and lots of works have been undertaken.
Newton Hall	1	Inadequate drainage. Drainage system has recently been upgraded.

FUTURE SURFACE WATER FLOODING

Properties at risk = **451**

Future Ranking = **7**

With works carried out by NWL to reduce the surface water risk in the area, the main issue is the opportunity to manage future surface water risk. There is the potential for 451 properties to be at risk in the future which far exceeds the current surface water risk to properties. Furthermore, Pity Me is a potential development site which would add undue stresses on the sewer network and could increase the risk of surface water flooding.

POTENTIAL ADDITIONAL STAKEHOLDERS

None identified

POTENTIAL DEVELOPMENT SITES

2 SHLAA site at surface water risk

2 ELR sites at surface water risk

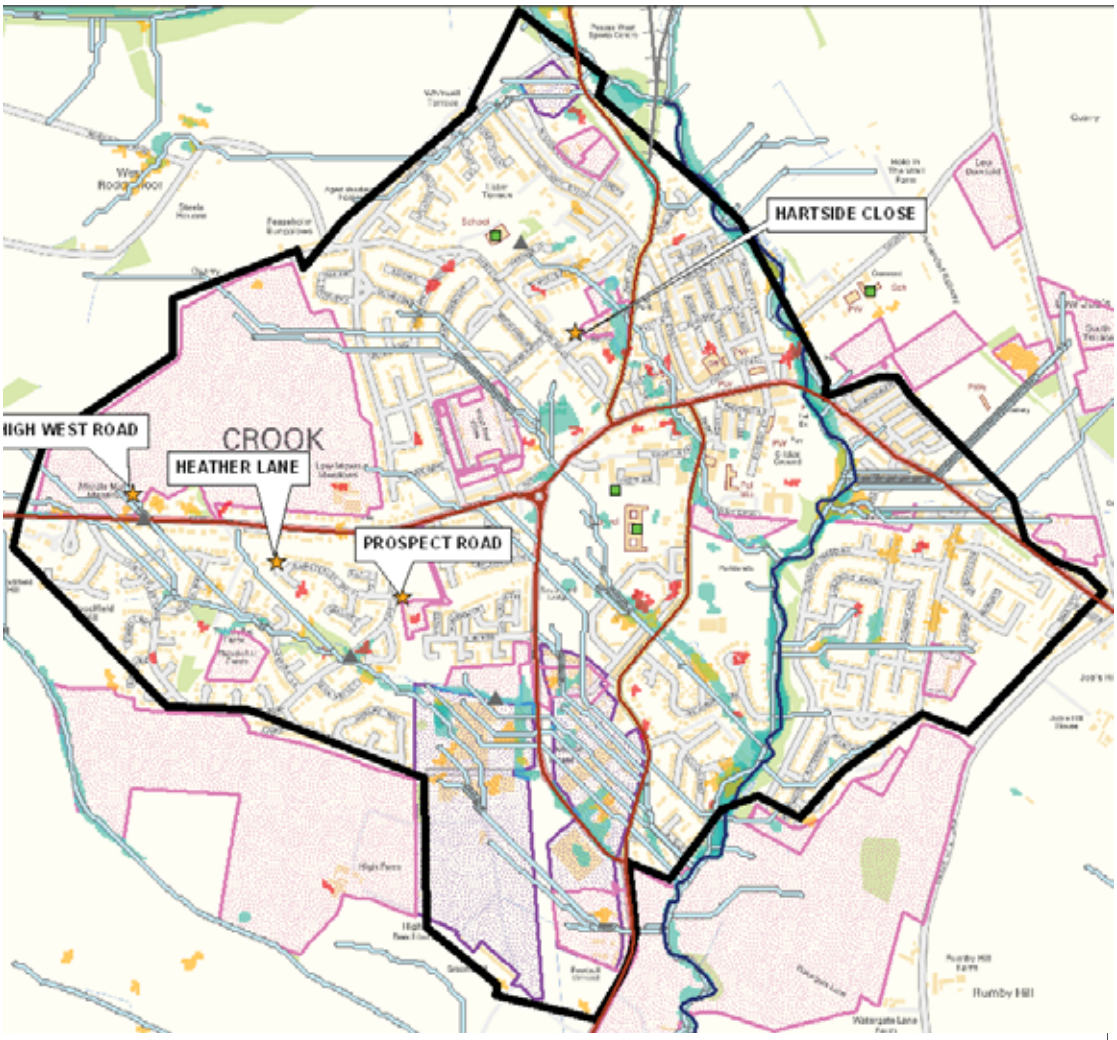
An Environment Agency environmental priority for Durham City is *"Careful planning of future development in relation to managing and reducing Flood Risk".* All 4 sites are heavily affected by future surface water flooding, and should be considered further prior to development.

Whilst the flood risk is obviously an issue for the development sites they would also present an opportunity by which to manage the surface water flood risk to the surrounding urban environment.

CONCLUSIONS

With works carried out by NWL to reduce the surface water risk in the area, the main issue is the opportunity to manage future surface water risk. The residual risk in exceedance events could affect over 450 properties and therefore this SWRA will be taken forward to the Options phase.

SITE CRO1 – CROOK



LEGEND

- Key SW Risk Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCAL FLOODING

- Inadequate drainage

DCC KNOWN FLOODING

- Unknown

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **8**

Current Ranking = **8**

Location	No. of Incidents	Comments
Hartside Close	2	1 incident where the school playing field drains towards homes. The drain has no formal outlet, resulting in flooding of gardens. Inadequate drainage. 1 unknown incident. However the incident is attributed to the same school implying it is either the same incident or an interlinked drainage issue.
High West Road Heather Lane Metalink Factory, Prospect Road	2 2 2	The incidents of overland flooding are all interlinked, caused through inadequate drainage. At High West Road the field runoff overwhelms the road drainage system resulting in surface water flooding. Sandbagging has been used to protect properties in High West Road but aids the overland flooding to the south of High West Road affecting Heather Lane and a factory. Overland flow paths seem to correspond well with the known surface water flood incidents in Crook. This infers that these incidents could be interlinked as part of identifying a means of managing the risk.

Durham County Council engineers have advised that Crook Beck presents no significant problems. The watercourses feeding into Crook Beck drain opencast sites and there are one or two hotspots which are purely gardens and conservatories. The cause is due to land use change and water now runs off the opencast sites much quicker. Durham County Council has taken action in a number of areas to address this.

FUTURE SURFACE WATER FLOODING

Properties at risk = **130**

Future Ranking = **5**

The future risk of surface water flooding across this SWRA is considered to be a significant problem area that needs to be addressed by the SWMP.

POTENTIAL ADDITIONAL STAKEHOLDERS

None identified

POTENTIAL DEVELOPMENT SITES

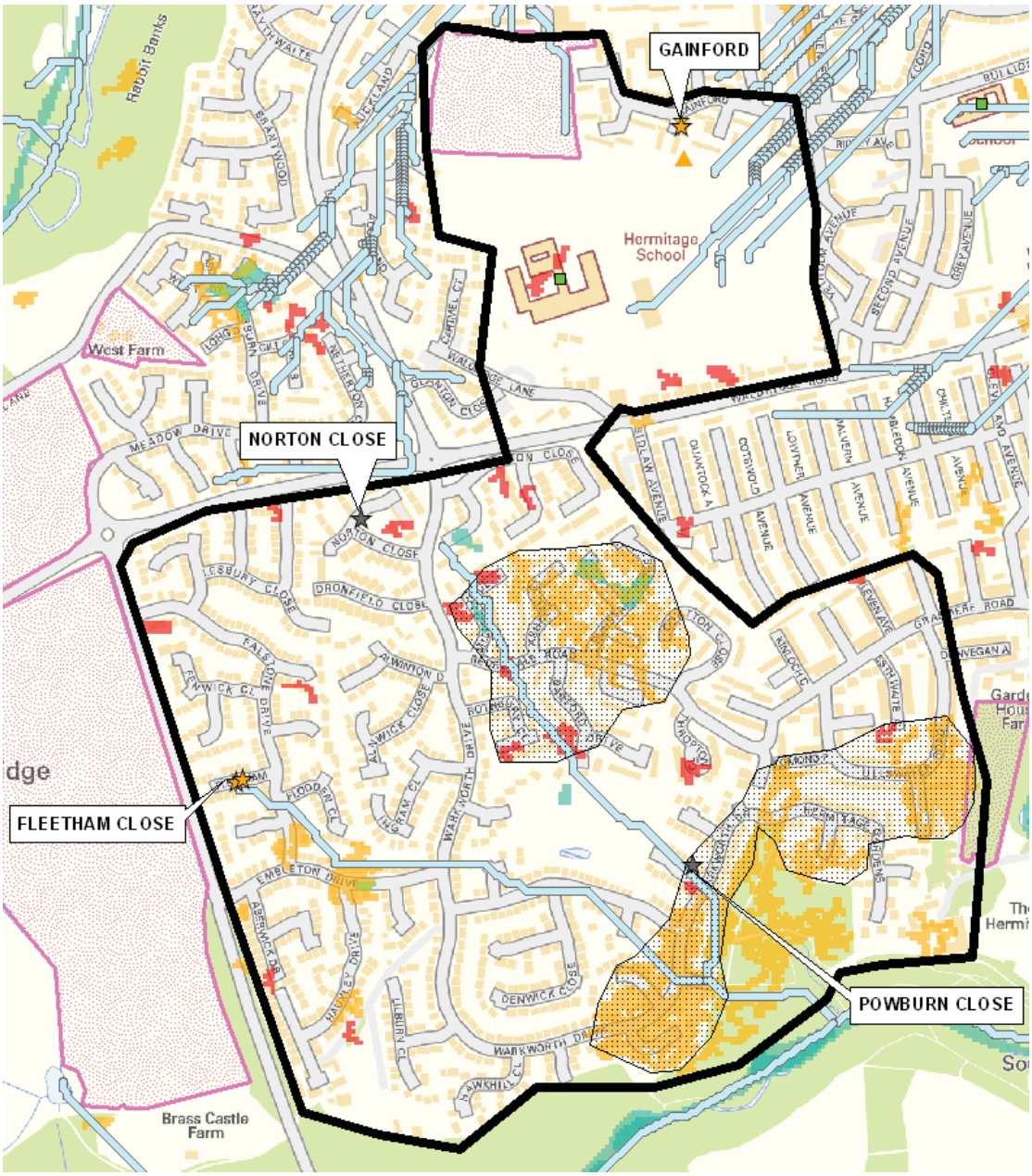
15 SHLAA sites at surface water risk

2 ELR sites at surface water risk

Durham County Council advised that Crook was a former growth point site and will experience increased development pressure. A total of seventeen SHLAA and ELR sites are dispersed around Crook and are potentially at risk of surface water flooding with the overland flow route network cutting through these development sites. Whilst there are no major

pockets at future risk in this area, the development sites are in close proximity to known surface water incidents, and therefore remain an area to watch.
CONCLUSIONS The future risk of surface water flooding across this SWRA is considered to be a significant problem area that needs to be addressed by the SWMP. As a result, this SWRA is a carried forward to the Options phase.

SITE CLS3 – CHESTER-LE-STREET



LEGEND

- Key SW Risk Area
- SW Risk Sub Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Inappropriate drainage
- Unknown

DCC KNOWN FLOODING

- Inappropriate drainage

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **6**

Current Ranking = **9**

Location	No. of Incidents	Comments
Gainford	2	2 incidents of surface water flooding from Hermitage School caused by inadequate drainage. Clearance and maintenance of blocked drains and gullies is required. The land to the south is approximately 5m higher than the land to the north contributing to the surface water risk at Hermitage School. A possible solution would be an attenuation scheme. Area frequently floods on a yearly basis.
Fleetham Close, Waldridge	2	Runoff from fields and inundated highway drainage are the causes for the surface water incidents. The overland flow path that intersects both incidents flows from Fleetham Road and into Southburn Dene.
Powburn Close	1	1 incident, cause unknown. The overland flow path, shown in the above figure, is in close proximity to the two incidents which infers they are interlinked and most likely a surface water issue. Council engineers advised that since Northumbrian Water had put attenuation tanks in the Norton Close area which was subject to regular flooding had not flooded since.
Norton Close	1	

Northumbrian Water is currently implementing a new outfall and one replacement outfall downstream of the SWRA to alleviate the local drainage issues.

FUTURE SURFACE WATER FLOODING

Properties at risk = **136**

Future Ranking = **10**

POTENTIAL ADDITIONAL STAKEHOLDERS

None identified

POTENTIAL DEVELOPMENT SITES

1 SHLAA site at surface water risk

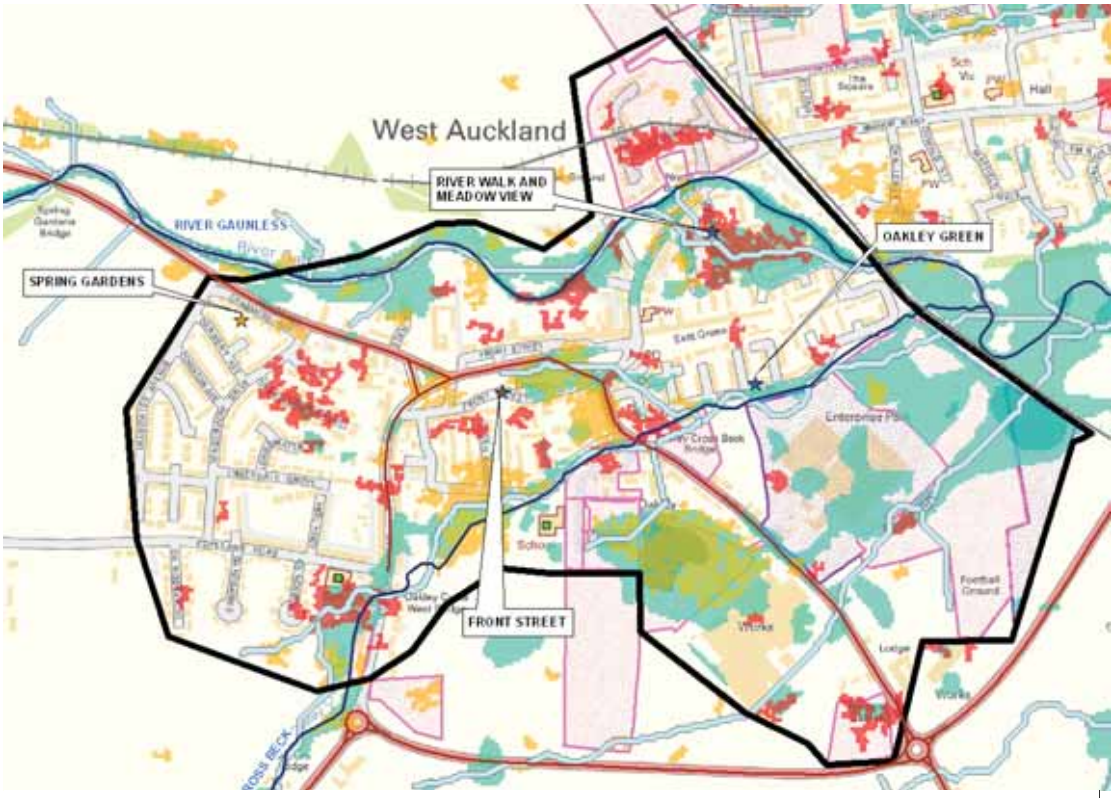
0 ELR sites at surface water risk

Whilst there are no major pockets at future risk in this area, the SHLAA site is in close proximity to the known incidents at Hermitage School and should be monitored closely.

CONCLUSIONS

The current and future risk of surface water flooding across this SWRA is considered to be a problem area that needs to be addressed by the SWMP, especially at Hermitage School. As a result, this SWRA is a carried forward to the Options phase.

SITE BIS1 – BISHOP AUCKLAND (WEST AUCKLAND)



LEGEND

- Key SW Risk Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Inadequate drainage
- Unknown
- Watercourse issue

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **4**

Current Ranking = **10**

Location	No. of Incidents	Comments
Bishop Auckland	2	1 incident of flooding from River Gaunless and Oakley Cross Beck affecting numerous properties along River Walk and Meadow View. Incident refers to 2000 and 2003. Respondent details flood defences are in place but no details as to the flood measures. This incident is a fluvial flood incident and therefore will not be carried forward as part of this study. The Environment Agency has implemented a flood alleviation scheme for the River

			Gaunless to reduce the fluvial flood risk. 1 incident – unknown cause along Front Street. West Auckland Parish Council is involved in these incidents. No further details have been provided.
	West Auckland	2	1 incident details inadequate drainage along A68 Spring Gardens at an opencast coal site, resulting in flooding of road and adjacent property. 1 incident of flooding in 2004 from Oakley Cross Beck affecting approximately 11 residential and 2 commercial developments along Oakley Green. This incident is a fluvial flood incident and therefore not carried forward as part of this study.

FUTURE SURFACE WATER FLOODING

Properties at risk = **221**

Future Ranking = **9**

Future flood risk is a key issue for this SWRA as it affects a substantial number of properties.

POTENTIAL ADDITIONAL STAKEHOLDERS

West Auckland Parish Council

POTENTIAL DEVELOPMENT SITES

8 SHLAA sites at surface water risk

2 ELR sites at surface water risk

All the SHLAA and ELR sites are heavily at risk from future surface water flooding and should be considered further before any development takes place. These sites are:

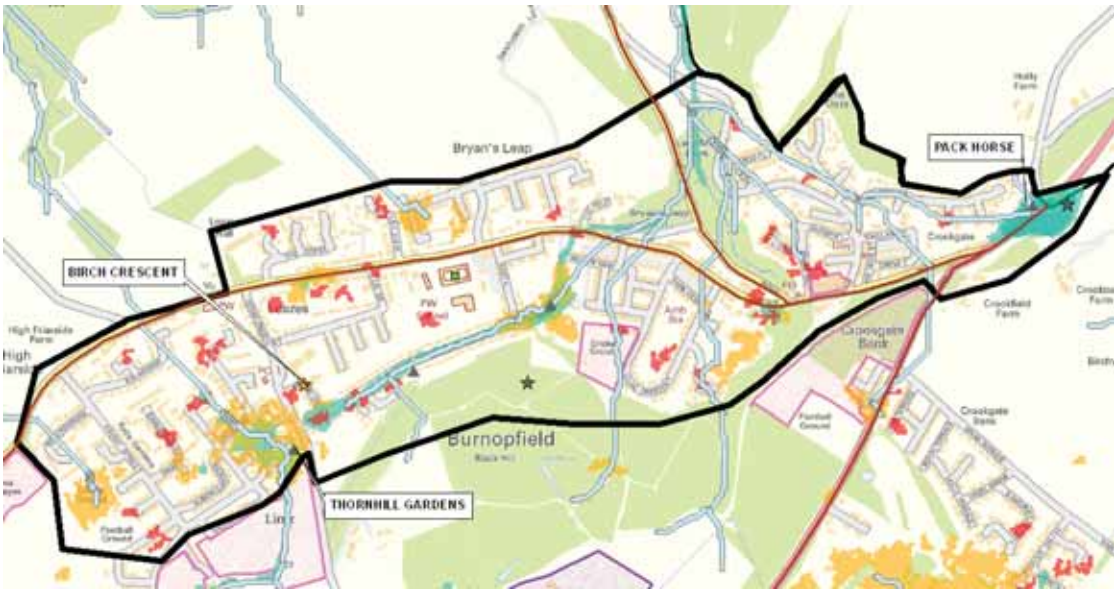
- 3/WA/07 (SHLAA)
- 3/SH/13 (SHLAA)
- 3/WA/01 (SHLAA)
- 3/WA/03 (SHLAA)
- 6/WA/01 (SHLAA)
- 3/WA/02 (SHLAA)
- 3/WA/04B (SHLAA)
- 3/WA/09 (SHLAA)
- ELR 45 (ELR)
- ELR 53 (ELR)

Whilst the flood risk is obviously an issue for the development sites they would also present an opportunity by which to manage the surface water flood risk to the surrounding urban environment.

CONCLUSIONS

The Environment Agency and Durham County Council engineers advised that the SWMP did not need to consider this site, in light of the Environment Agency having implemented a flood alleviation scheme for the River Gaunless to reduce the fluvial flood risk which is the primary cause of flooding in this area.

SITE BUR1 – BURNOPFIELD



LEGEND

- Key SW Risk Area
- Road
- Railway
- Main River
- Schools
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Inadequate drainage
- Unknown

DCC KNOWN FLOODING

- Unknown

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **7**

Current Ranking = **10**

Location	No. of Incidents	Comments
Birch Crescent	4	The Environment Agency and Durham County Council believe the incidents along Birch Crescent could be attributed to a backing up water behind the culvert, due to blockages or an inadequate culvert size, and resulting in surface water runoff along Birch Crescent. Equally an interaction between the surface water sewers and the watercourse into which they outfall could be a potential causative factor. Area known to be at frequent risk form surface water flooding. Burnopfield Community Partnership has some involvement in this area. 3 unknown surface water issues affecting 3 properties. However a flood scheme has been carried out along Birch Crescent in 2009.
Pack	2	2 incidents. Cause unknown

	Horse		
	Thornhill Gardens	1	1 surface water incident affecting 4 properties. Cause unknown

FUTURE SURFACE WATER FLOODING

Properties at risk = **112**

Future Ranking = **13**

POTENTIAL ADDITIONAL STAKEHOLDERS

Burnopfield Community Partnership

POTENTIAL DEVELOPMENT SITES

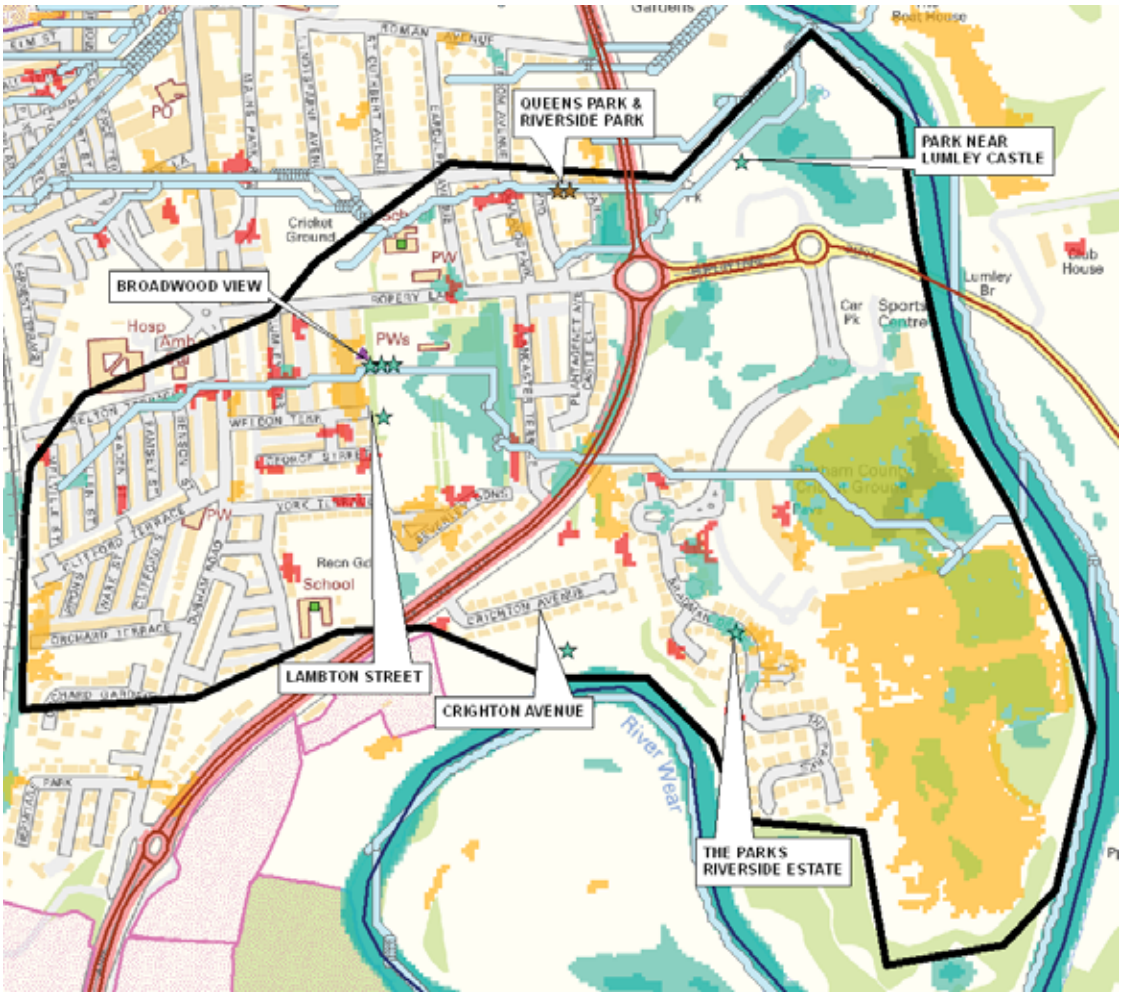
2 SHLAA site at surface water risk

0 ELR sites at surface water risk

CONCLUSIONS

As the causes of six of the seven known surface water incidents are unknown and the future surface water risk falling to outside the top 10 in the rankings, there is not enough information for this SWRA to be carried forward to the Options phase.

SITE CLS1 – CHESTER-LE-STREET



LEGEND

- Key SW Risk Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Drainage Issue
- Surface Water Issue

DCC KNOWN FLOODING

- Blockage and Maintenance Issues

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **10**

Current Ranking = **12**

Location	No. of Incidents	Comments
Broadwood View	4	4 surface water incidents, whereby the water floods un-adopted grassland and then several properties along Broadwood View. Works have been completed along

		the cemetery boundary and the highways gullies, details of the works are unknown. NWL checked the condition and capacity of the sewers, the outcome of the check is not known. Broadwood View is a known area of frequent flooding. 1 incident reports surface water flooding during heavy rainfall with approximately 5 properties flooded. The Central Residents Association has been involved with the incidents along Broadwood View. 1 incident records surface water flooding in 2005, 2006 and 2009. It is recommended that the outlet within the cemetery walls should be cleaned four times a year.
Queens Park and Riverside Park	2	2 incidents of surface water flooding of low lying land caused from inadequate land drainage. A pump has been installed in the underpass.
Lambton Street	1	1 incident of surface water flooding during heavy rainfall along Lambton Street. Possibly linked to the incidents at Broadwood View as they are in close proximity to one another. Approximately 5 properties were affected by the incident. The Central Residents Association has again been involved with this incident.
The Parks Riverside Estate	1	1 incident affecting several properties in The Parks Riverside Estate. The cause of flooding looks to be a combination of surface water and fluvial flooding. The estate floods approximately 1-2 times per year, with three incidents recorded between 2000 and 2002. The land was also known to flood in the 1950's and 1960's prior to development. Flood waters reach the gardens of those properties located nearest to the River Wear. The Environment Agency is aware that 8 of the 10 houses within the estate are at risk from flooding. An earth embankment between 1-1.5m high has been installed on the low lying south western boundary of the estate. Its effectiveness is unknown as it has not yet been tested. The Parks Riverside Estate have been involved with the reported incident, the extent of their involvement is unknown.
Crighton Avenue	1	1 surface water issue in Crighton Avenue. The cause is unknown; however a recent scheme has been completed. No more details are known.
Park near Lumley Castle	1	1 surface water incident at a park near Lumley Castle in July 2009. No more details are known.

CLS1 falls just outside the sites ranked in the top 10. However due to the site being a known incident hotspot and stated as a key issue in the Environment Agency's Environmental Priorities, this SWRA has been analysed.

Northumbrian Water is currently on site undertaking a significant scheme upsizing the

system and putting a new outfall into the river which should reduce the surface water risk in the area.

FUTURE SURFACE WATER FLOODING

Properties at risk = **82**

Future Ranking = **19**

An Environment Agency Environmental Priority for Chester-le-Street is: *"Careful planning of future development in relation to managing and reducing Flood Risk. (Chester-le-Street Cricket Ground and Surface Water Flooding)".* The Cricket Ground is located within CLS1 and is shown to flood under the SFRA and EA surface water maps. The environmental priority does not state whether the cricket ground is at risk form fluvial, surface water flooding or a combination of both.

The environmental priority highlights that the frequency of flooding is expected to increase in the future at Chester-le-Street, with development pressures in flood risk areas.

POTENTIAL ADDITIONAL STAKEHOLDERS

Central Residents Association

Riverside Residents Association

POTENTIAL DEVELOPMENT SITES

0 SHLAA sites at surface water risk

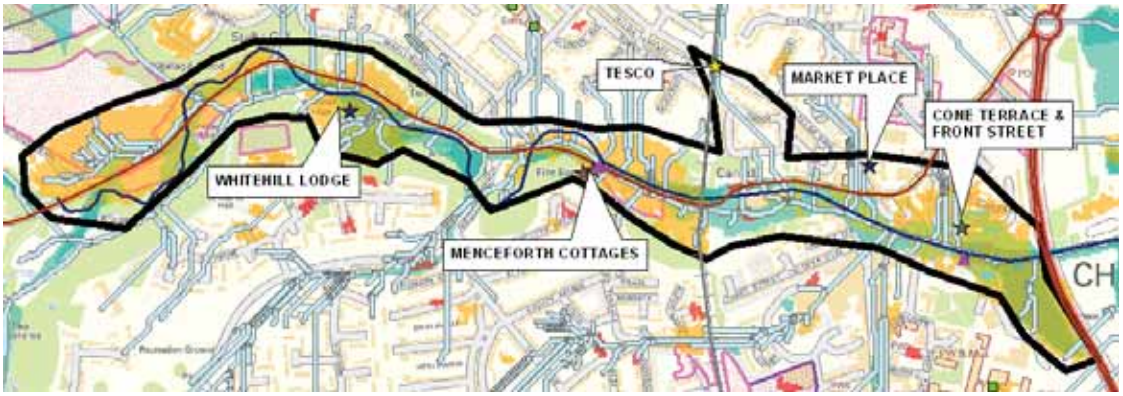
0 ELR sites at surface water risk

The environmental priority document suggests there are development pressures in the flood risk areas around the cricket ground. The Wear CFMP details that the development planning process has a vital role to play in managing future risk of flooding. It should ensure that floodplain areas remain free of development so they can absorb the increasing amounts of flood waters.

CONCLUSIONS

Durham County Council engineers advised that the SWMP did not need to consider this site, in light of Northumbrian Water currently undertaking a scheme involving upsizing the system and putting a new outfall into the river, thereby reducing the surface water risk.

SITE CLS2 – CHESTER-LE-STREET



LEGEND

- Key SW Risk Area
- Road
- Railway
- Main River
- Schools
- Overland Flow Routes
- SHLAA Site
- Employment Site

SFRA LOCALISED FLOODING

- Culvert Issue
- Potential Fluvial Issue
- Sewer Flooding
- Unknown

DCC KNOWN FLOODING

- # Blockage and Maintenance Issues

SURFACE WATER CLASSIFICATIONS

- SFRA Surface Water - Moderate Risk
- SFRA Surface Water -Significant Risk
- EA Surface Water -Intermediate Susceptible
- EA Surface Water - More Susceptible

HISTORIC SURFACE WATER FLOODING

Known flooding incidents = **8**

Current Ranking = **17**

Location	No. of Incidents	Comments
Menceforth Cottages	3	3 incidents of sewer flooding at Menceforth Cottages, caused through blockages and poor maintenance. It is recommended that the highways gullies be cleaned 4 times per year. Meeting was set up with NWL to discuss the surcharging from 2 sewers affecting 4 properties on 19/06/2005. The Environment Agency has built a retaining wall in the area of Menceforth Cottages; however there is still flooding of the highway, with surface water coming from upstream in the Avenues. Durham County Council is looking at a scheme in combination with Northumbrian Water. The type of scheme is unknown.
Cone Terrace	2	2 incidents in the town centre along Cone Terrace and Front Street. DCC own the watercourse but the Environment Agency have an annual routine maintenance schedule of works using permissive powers to undertake capital schemes. Highways flooding regularly occur due to the watercourse overtopping, however the last recorded flood incident was in 2005. This incident looks to be a fluvial flood

		incident and not a surface water incident.
Tesco	1	1 surface incident was recorded at Tesco in July 2009 due to a surcharging culvert. A meeting with DCC occurred, however further details are not known.
Market Place	1	1 potential fluvial flood incident caused by overtopping of Chester Burn, affecting 10 properties at the Market Place. Further flooding has occurred however the dates and flood extents are unknown. This incident looks to be a fluvial flood incident and not a surface water incident.
Whitehill Lodge off Pelton Fell Road	1	1 incident affecting several properties adjacent to Chester Burn. The cause of flooding is due to Chester Burn backing up and overtopping. Further incidents have occurred but have not been recorded. This incident looks to be a combination of surface water and fluvial flooding. The Environment Agency's Environmental Priorities state: *"Surface water flooding occurs at the junction of North Approach and Pelton Fell Road. This water is unable to enter the Chester Burn due to the presence of a wall along Pelton Fell Road. It is suspected that the surface water drains at the top of North Approach do not have sufficient capacity to cope with surface water run-off at all times. Surface water run-off is also suspected to enter North Approach from the adjacent open space".*

CLS2 falls just outside the sites ranked in the top 10 however due to the site being a known incident hotspot and stated as a key issue in the Environment Agency's Environmental Priorities, this site has been analysed. As the majority of flood incidents seem to be caused through a combination of fluvial and surface water problems, further information is required to ascertain the extent to which surface water flooding impacts CLS2 and Chester-le-Street as a whole.

Durham County Council has installed flood gates on properties and air vents and there ought to be a standard of protection of 1 in 100 years although problems still arise. The last incident was in 2006 when it is thought that the STW may have played a role in the flooding.

FUTURE SURFACE WATER FLOODING

Properties at risk = **112**

Future Ranking = **19**

An Environment Agency Environmental Priority for Chester-le-Street is: *"Careful planning of future development in relation to managing and reducing Flood Risk. (Chester-le-Street Cricket Ground and Surface Water Flooding)".* The environmental priority highlights that the frequency of flooding is expected to increase in the future at Chester-le-Street. It is aware Chester Burn is the main cause of the issue due to high flood levels causes Chester Burn to back up and flood the town.

POTENTIAL ADDITIONAL STAKEHOLDERS

Tesco

POTENTIAL DEVELOPMENT SITES

3 SHLAA site at surface water risk

0 ELR sites at surface water risk

The Wear CFMP details that the development planning process has a vital role to play in managing future risk of flooding. It should ensure that floodplain areas remain free of development so they can absorb the increasing amounts of flood waters.

CONCLUSIONS

Even though flood gates on properties and air vents with a standard of protection of 1 in 100 years, and a retaining wall erected, there are still surface water issues. The last incident was in 2006 when it was thought that the Sewage Treatment Works may have played a role in the flooding. Durham County Council engineers advised that there would be some value in considering this SWRA further and will be carried forward to the Options phase.