

Summary

Opportunity Area Reference	West Walberton Lane
Local Flood Risk Zone	LFRZ_001
Properties at Risk (1 in 100 Year)	2
Average Annual Damages	£3,693
Preferred Intervention	Inflow and Infiltration reduction entering public foul sewers & SUDS
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£723
Key Stakeholders	SWS, WSCC

Flood History	Flooding issues reported in the area relates to flooding from the public foul sewer system during periods of heavy rainfall.
Constraints	High ground water limiting use of SUDS.
Receptors	Residential dwellings
Opportunities	Inflow and Infiltration reduction entering public foul sewers & SUDS

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Flooding from public foul sewer system. Surface water flooding in highway.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	2	0	£3,693
1 in 100 Year	2	0	
1 in 100 Year + CC (2080's)	2	1	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Options Assessment						
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	Yes	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	Yes	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	Yes	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Infiltration maybe entering via private sewers
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	No	0	0	0	0	0	0	Increasing capacity in the public sewerage may reduce flood risk. However, reducing clearwater inflow would be preferable. Local sewer upsize not considered appropriate
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Optimise existing capacity.
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	No	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	No	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	Yes	Yes	0	2	2	0	0	4	Where practical remove surface water entering foul system. Target discrete surface water systems or large impermeable areas or roofs connecting storm flow into the foul system.
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure sustainable building methods are adopted to reduce risk of surface water and ground water entering public sewer system.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	SWS recommended to conduct I&I investigations.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
SWS (Action 1), WSCC & SWS (Action 2 & 3)

Actions

As Agreed by Partner Organisations	
1	Carry out a detailed investigation of flooding issue and where required develop hydraulic solution. Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience
2	Continue proactive maintenance to highway gullies and jetting of sewers to optimise existing drainage assets.
3	Consider Installation of Water butts / rainwater harvesting.
4	
5	



Summary

Opportunity Area Reference	Elm Grove
Local Flood Risk Zone	LFRZ_002
Properties at Risk (1 in 100 Year)	18
Average Annual Damages	£31,363
Preferred Intervention	Planning activities, reduce surface water inflow and infiltration entering public foul sewers
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£11,984
Key Stakeholders	SWS, WSCC, EA

Flood History	This area has experience severe flooding in winter 1993, 1998 and summer 2012 from surface water and sewer flooding. Flooding of internal properties and property curtilage along south side of Elm Grove is reported. Foul sewer capacity is exceeded after heavy prolonged rain. Combined flooding has been reported within the local school ground, again after prolonged rainfall.
Constraints	High ground water limiting use of SUDS. Negligible green space.
Receptors	Residential dwellings and School.
Opportunities	Planning activities, reduce surface water inflow and infiltration entering public foul sewers

Overview of Key Flood Risk Sources, Mechanisms, and Pathways
Surface water and groundwater flooding properties internally and externally. Flooding from the foul sewer system also occurs due to high inflows of surface and ground water leading to hydraulic overload.

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	11	1	£31,363
1 in 100 Year	16	2	
1 in 100 Year + CC (2080's)	18	2	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7
3	Source	Green Roof	No	No	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9
8	Source	Soakaways	No	No	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7
14	Source	Other Source Measures	No	No	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	No	No	0	0	0	0	0	
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	No	No	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	No	No	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	No	No	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	
29	Strategy	Further Study / Investigations	No	No	0	0	0	0	0	
30	Strategy	Survey, Advise & Monitoring	Yes	Yes	0	1	1	1	2	5
31	Strategy	Community Awareness	No	No	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
SWS (Action 1), WSCC (Action 2), WSCC (Action 3), SWS (Action 4)

Actions

As Agreed by Partner Organisations	
1	Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
2	Establish development principles in the Local Plan / Core Strategy.
3	Undertake permanent monitoring of ground water and consider installing early warning system.
4	SWS to consider, in cooperation with the EA, opening the abandoned overflow in Elm Grove. This will require a full hydraulic assessment to confirm its viability and benefit. EA permission would be required to consent such an option.
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Summary

Opportunity Area Reference	Walberton Village
Local Flood Risk Zone	LFRZ_003
Properties at Risk (1 in 100 Year)	31
Average Annual Damages	£36,918
Preferred Intervention	Planning Activities, Land use management, Attenuation & Retention, surface water inflow and infiltration reduction entering public foul sewers
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£10,881
Key Stakeholders	SWS, WSCC, EA, ADC

Flood History	Driving mechanisms appear to be overland flow from fields to the North of the village exceeding the various drainage ditches and culverts. Water cannot route away from the village as the capacity in the pond is exceeded and the surface water cannot be conveyed adequately via the main river system. Flooding from public foul manholes confirmed.
Constraints	High ground water, downstream flooding issues are reported & predicted in Barnham
Receptors	Residential dwellings flooded from foul sewer system.
Opportunities	Planning Activities, Land use management, Attenuation & Retention, surface water inflow and infiltration reduction entering public foul sewers

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Flooding in highway from foul sewer system. Internal property flooding from surface water in Walberton Village. Main river capacity exceeded and floods rear gardens. Ordinary watercourses and pond capacity exceeded.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	16	4	£36,918
1 in 100 Year	27	4	
1 in 100 Year + CC (2080's)	43	4	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	Yes	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	Yes	Yes	0	1	2	0	2	5	Intersept runoff from the fields to north of village
5	Source	Permeable Paving	Yes	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Infiltration maybe entering via private sewers
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Increasing capacity in the main river system would likley reduce flood risk.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Optimise existing capacity.
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	0	
19	Pathway	Land management practices	Yes	Yes	0	1	1	1	1	4	Ensuring land is managed affectively. Ploughing fields east to west is recommended in the fields to the north of the village to reduce runoff.
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	Yes	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	Yes	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	Flood mitigation to be considered in the area at those properties at risk of surface water flooding.
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	Should be considered for susceptable properties affected by overland flows entering properties.
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure sustainable building methods are adopted to reduce risk of surface water and ground water entering public sewer system. Ensure suitable development contols are in place.
28	Receptor	Temporary demountable flood defences	Yes	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Assess hydraulic schemes in more detail using the integrated model. Fluvial assessment of the main river systems should be undertaken as part of the current EA Rife study (2013/2014).
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSCC (Action 1), WSCC and ADC (Action 2) EA (Action 3), SWS / WSCC (Action 4), EA, ADC & Riparian Owners (Action 5)

Actions

As Agreed by Partner Organisations	
1	Land Use Management + Policy and Planning
2	Investigate attenuation & retention of surface water. Remove weir on main river in Burch Grove. Desilt ditches and culverts at east end of Eastergate Lane.
3	Main River - investigate improved conveyance as part of the EA 2014 ARIFRM project.
4	Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
5	Ditch clearance in West Walberton Lane. Desilt ditches and culverts at the east end of Eastergate Lane. Investigate management and removal of structures as part of ARIFRM project



Summary

Opportunity Area Reference	Maple Road & The Street, Walberton
Local Flood Risk Zone	LFRZ_004
Properties at Risk (1 in 100 Year)	10
Average Annual Damages	£13,692
Preferred Intervention	Surface water and infiltration reduction entering public foul sewers
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£3,298
Key Stakeholders	SWS & WSCC.

Flood History	Surface water flooding was a major issue along The Street. Residents advise that a soakaway or attenuation tank was installed in the vicinity. WSCC confirmed their involvement in the scheme approx. 10 years ago. A new storm system taking highway surface water discharging to a pond to the south of the village was installed. This has reduced surface water flood risk in the area. According to residents, the primary issue at present is flooding from foul / combined sewer along The Street. MH SU197053802 lifts and floods the road and adjacent
Constraints	High ground water limiting use of SUDS.
Receptors	Flooding in highway from foul sewer system and surface water flooding in highway.
Opportunities	Surface water and infiltration reduction entering public foul sewers

Overview of Key Flood Risk Sources, Mechanisms, and Pathways
Surface water is being conveyed from east on Maple Road where it attenuates at a low point in the highway. Flooding from foul manholes is reported in Mapple Road downstream to the west of the highway flooding.

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	9	0	£13,692
1 in 100 Year	10	0	
1 in 100 Year + CC (2080's)	12	1	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Economic	Environmental	Objectiveness	Social	Technical		Total Score
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	Yes	No	0	0	0	0	0	0	Possible future opportunities
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	Yes	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Infiltration maybe entering via private sewers
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Increasing capacity in the public sewerage may reduce flood risk. However, reducing clearwater inflow would be preferable.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	No	No	0	0	0	0	0	0	
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	No	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	No	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	No	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure sustainable building methods are adopted to reduce risk of surface water and ground water entering public sewer system.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	SWS to investigate source of Fat, Oil, Grease which has been reported by residents.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
SWS (Action 1 & 2), WSCC & SWS (Action 3), WSCC (Action 4)

Actions

As Agreed by Partner Organisations	
1	Carry out a detailed investigation of flooding issue and where required develop hydraulic solution.
2	Investigate fat, oil, grease problems reported by residents.
3	Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
4	Continue proactive maintenance of highway gullies and jetting of sewers to optimise existing drainage assets.
5	



Summary

Opportunity Area Reference	Barnham Lane (B)
Local Flood Risk Zone	LFRZ_005
Properties at Risk (1 in 100 Year)	1
Average Annual Damages	£68
Preferred Intervention	Reduce surface water and infiltration entering public foul sewers, Asset Management.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£68
Key Stakeholders	WSCC, ADC, SWS

Flood History	Flooding from foul manholes in the highway after prolonged rainfall at winter time. Floodwaters remain in the highway for up to four weeks after the storm event and do not drain away. Fields at back of properties also experience water logging and pluvial flooding. Worst recent storms: Winter 1999, Summer 2012
Constraints	High ground water limiting use of SUDS.
Receptors	Surface water flooding in highway, foul sewer flooding in highway discharging to drainage ditches. Restricted toilet use reported.
Opportunities	Reduce surface water and infiltration entering public foul sewers, Asset Management.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Highway flooding caused by ponding of surface water as unable to drain into overloaded ditch system. Surface water conveyed from the north to south along Barnham Lane. No spare capacity in Rife system to the west where ditch system and pond are connected. Foul flooding of highway from foul sewer system considered to be the main issue.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	1	0	£68
1 in 100 Year	1	0	
1 in 100 Year + CC (2080's)	1	0	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	Yes	No	0	0	0	0	0	0	Increasing the capacity of the local pond maybe a suitable improvement. The pond off Barnham Lane to the west would require inspection and survey to confirm current capacity. Hydraulic analysis using integrated model could then be completed to assess net benefits of this.
7	Source	Rainwater Harvesting	No	No	0	0	0	0	0	0	
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	To be considered in local area and in the upstream network.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Infiltration maybe entering via private sewers. Conduct I&I study investigations on system upstream.
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	No	No	0	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Clear drainage ditches. Investigate potential restrictions in the ditch systems.
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	No	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	No	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	No	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure sustainable building methods are adopted to reduce risk of surface water and ground water entering public sewer system.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	As detailed in Action 1 and 2.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSCC & ADC (Action 1 & 2), Action 3 SWS & WSCC.

Actions

As Agreed by Partner Organisations	
1	Investigate ditch on northern side of track to North Choller Farm has potentially been filled (vehicular crossing). Some of the highway drainage system in Barnham Lane may discharge into this ditch. The outfall is assumed buried.
2	Investigate the ditch that flows from the highway toward the rife adjacent to the property and establish the reason for the pooling of water off the Highway. Identify if there is a hydraulic restriction.
3	Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
4	
5	



Summary

Opportunity Area Reference	Lake Lane, Barnham
Local Flood Risk Zone	LFRZ_006
Properties at Risk (1 in 100 Year)	163
Average Annual Damages	£277,702
Preferred Intervention	Planning Activities, Asset Management, potential for Attenuation and Retention (EA River Modelling Study to Assess opportunities)
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£76,472
Key Stakeholders	EA, SWS

Flood History	Notable flood events experienced in Dec 1993 / Jan 1994, Summer 2012, Winter 2012 and Winter 2001 at Lake Lane, Warren Way, Dial Close, Yapton Road and Farnhurst Road. Surface water and pluvial flooding has been reported by Partners and residents.
Constraints	Railway, high ground water
Receptors	Highway flooding, public space flooding and external flooding of properties.
Opportunities	Planning Activities, Asset Management, potential for Attenuation and Retention (EA River Modelling Study to Assess opportunities)

Overview of Key Flood Risk Sources, Mechanisms, and Pathways

All reported flooding appears to be driven by three factors. 1) Culvert outlets for Surface Water drains becoming locked when the Rife is high. 2) Poor maintenance of ditched and culverts, reducing their capacity. 3) capacity in the culverts under the railway line throttles the main river.

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	108	15	£277,702
1 in 100 Year	147	16	
1 in 100 Year + CC (2080's)	163	18	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Economic	Environmental	Objectiveness	Social	Technical		Total Score
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	Yes	Yes	0	1	2	0	2	5	Utilise available land upstream of Barnham to attenuate flows from main river. This should be investigated further within the EA River Modelling study.
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	No	0	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	No	0	0	0	0	0	0	
18	Pathway	Increase Gully Assets	Yes	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	Yes	Yes	0	2	2	0	0	4	Control at source see activities 12 & 13
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	No	0	0	0	0	0	0	Should be considered for susceptible properties affected by flood water entering properties.
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure suitable development controls are placed on new developments in this LFRZ to reduce flood risk.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	No	No	0	0	0	0	0	0	
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
EA (Action 1,2 & 5), SWS & WSCC (Action 3), SWS & WSCC (Action 4).

Actions

As Agreed by Partner Organisations	
1	Establish regular inspection programme of culverts under the railway line checking they are maintained to optimise capacity. These culverts act as a throttle on the main river in Barnham during high flows. Investigate as part of the EA 2014 ARIFRM
2	Investigate Attenuation and Retention upstream to reduce flood risk from the Rife in Barnham. Strategic Options likely to be considered with LFRZ_003 and LFRZ_021. Complete as part of the EA 2014 ARIFRM project.
3	Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
4	Investigate Nursery Drainage (Greenhouses)
5	Improve outfall headwall projecting into flow area of Barnham Rife behind Warren Way



Summary

Opportunity Area Reference	Park Farm Road
Local Flood Risk Zone	LFRZ_007
Properties at Risk (1 in 100 Year)	0
Average Annual Damages	£0
Preferred Intervention	Asset Management. Reduce surface water and infiltration entering public foul sewers
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£0
Key Stakeholders	WSSC, ADC

Flood History	Reported surface water flooding in June / July 2012 in vicinity from WSSC. SWWS have reported incidents of sewer flooding in the area. ADC confirmed overflowing foul sewers due to infiltration/inundation/surface water connections. Surface water flooding due to capacity/unmaintained ditch network and groundwater flooding due to spring behind properties on east side of Park Road. Ditch on northern boundary of Kilkenny has a trash screen. This is a poor arrangement and needs improvement. Results in ditch backing up and overflowing. Note that assumed overflow from reservoir to NE of Park Road appears to run continuously.
Constraints	High ground water given presence of spring in area.
Receptors	0
Opportunities	Asset Management. Reduce surface water and infiltration entering public foul sewers

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Flooding from the foul sewer system following prolonged rainfall. Surface water flooding due to poor maintenance of ditch system.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	0	0	£0
1 in 100 Year	0	0	
1 in 100 Year + CC (2080's)	0	0	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Economic	Environmental	Objectiveness	Social	Technical		Total Score
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts.
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure suitable development controls are placed on new developments in this LFRZ to reduce flood risk.
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Investigate current surface water drainage from local nurseries. Investigate the screen arrangement in the ditch on northern boundary of Kilkenny in order to evaluate performance. Investigation the surface water disposal from the greenhouses to assess if improvements can be made to reduce peak flows entering main river. This may reduce flood risk at Meadow Farm. Also consider the affect of the attenuation ponds further in the EA River Modelling Study.

Key Stakeholders

Provisionally Identified	WSSC & ADC (Action 1), ADC, WSSC, ADC (Action 2), WSSC / ADC (Action 3),
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Actions

As Agreed by Partner Organisations	
1	Ditches are overgrown and require maintenance along Lake Lane. It is reported that many of these ditches were cleared a number of years ago. It is recommended a reminder letter is sent to landowners to remind of riparian responsibility to maintain
2	Investigate current surface water drainage from local nurseries. Investigation into the surface water disposal from the greenhouses to assess if improvements can be made to reduce peak flows entering main river. This may reduce flood risk at
3	Investigate the screen arrangement in the ditch on the northern boundary of Kilkenny in order to evaluate performance
4	
5	



Summary

Opportunity Area Reference	Barnham Lane (C)
Local Flood Risk Zone	LFRZ_008
Properties at Risk (1 in 100 Year)	1
Average Annual Damages	£362
Preferred Intervention	Asset Management. Reduce surface water and infiltration entering public foul sewers
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£362
Key Stakeholders	ADC & WSCC, SWS

Flood History	Conversations with residents along Barnham Lane indicate flooding from four manholes in the highway after prolonged rainfall at winter time. Floodwaters remain in the highway for up to four weeks after the storm event and do not drain away. Fields at back of properties also experience water logging and pluvial flooding. Worst recent storms: Winter 1999, Summer 2012 Foul sewer flooding reported in the highway and restricted toilet use in nearby properties.
Constraints	High ground water
Receptors	Surface water flooding in highway, foul sewer flooding in Highway. Restricted toilet use.
Opportunities	Asset Management. Reduce surface water and infiltration entering public foul sewers

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Highway flooding caused by ponding of surface water and flooding from foul manholes. Foul manholes covers are reported to lift along Barnham Lane.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	0	0	£362
1 in 100 Year	1	0	
1 in 100 Year + CC (2080's)	1	0	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Options Assessment						
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	No	No	0	0	0	0	0	0	
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	To be considered in local area and in the upstream network.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Infiltration maybe entering via private sewers. Conduct I&I study investigations on system upstream.
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	No	No	0	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Clear drainage ditches. Investigate potential restrictions in the ditch systems.
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	No	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	No	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	No	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure sustainable building methods are adopted to reduce risk of surface water and ground water entering public sewer system.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	As detailed in Action 1 and 2.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSCC (Action 1), SWS & WSCC (Action 2)

Actions

As Agreed by Partner Organisations	
1	Ditch clearance in Barnham Lane
2	Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
3	
4	
5	



Summary

Opportunity Area Reference	Yapton Road, Yapton
Local Flood Risk Zone	LFMZ_009
Properties at Risk (1 in 100 Year)	3
Average Annual Damages	£429
Preferred Intervention	Asset Management, Reduce surface water and infiltration entering public foul sewers
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£429
Key Stakeholders	WSCC & ADC (Action 1), SWS (Action 2), ADC (Action 3), SWS (Action 4).

Flood History	Two reported flooding incidents as a result of the June / July 2012 floods. Additional reported hydraulic sewer flooding as a result of overloading of Barnham Road Yapton pumping station in 2003. Yapton Road WPS has had its pumped upgraded in the recent past to convey greater combined flows forward. Run off from field on north side of Yapton Road overloads/blocks (soil) highway drainage system in Yapton Road. The highway drainage system also takes a great deal of land drainage since it was constructed over the top of an existing land drainage system. Foul manholes overflow just upstream of pumping station. Tankers are regularly deployed by SWS to assist the pumping station.
Constraints	none
Receptors	Highway flooding, flooding in fields.
Opportunities	Asset Management, Reduce surface water and infiltration entering public foul sewers

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Highway flooding from surface water. An overland flow path from the fields to the east of Yapton Road conveying flow west across the highway and into a piped and ditched system is evident. Foul flooding upstream of the Yapton Road WPS due to hydraulic overload.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	0	0	£429
1 in 100 Year	3	0	
1 in 100 Year + CC (2080's)	3	0	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Economic	Environmental	Objectiveness	Social	Technical		
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0		
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0		
4	Source	Detention Basins (Attenuation / Retention)	Yes	Yes	0	1	2	0	2	5	Investigate opportunity to attenuate surface water in the north-eastern field off of Yapton Road. This will require more detailed investigation.
5	Source	Permeable Paving	No	No	0	0	0	0	0		
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0		
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
8	Source	Soakaways	No	No	0	0	0	0	0		
9	Source	Swales	No	No	0	0	0	0	0		
10	Source	Bioretention Basins	No	No	0	0	0	0	0		
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0		
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
14	Source	Other Source Measures	No	No	0	0	0	0	0		
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	No	0	0	0	0	0		
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0		
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	This should be considered based on findings from CCTV survey on 300 mm dia storm sewer serving highway drainage. This 300mm discharges to the rife to the south west of the LFRZ. CCTV inspection of the last leg of the 150 mm land drain to confirm if there is a blockage / partial collapse which is currently suspected.
18	Pathway	Increase Gully Assets	Yes	No	0	0	0	0	0		
19	Pathway	Land management practices	No	No	0	0	0	0	0		
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0		
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0		
22	Pathway	Seperation of foul and surfacewater	Yes	Yes	0	2	2	0	0	4	Control at source see activities 12 & 13
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0		
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0		
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0		
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0		
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure suitable development controls are placed on new developments in this LFRZ to reduce flood risk.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0		
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Investigate opportunity to attenuate surface water in the north-eastern field off of Yapton Road. This will require more detailed investigation.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0		
31	Strategy	Community Awareness	No	No	0	0	0	0	0		

Key Stakeholders

Provisionally Identified
WSCC & ADC (Action 1), SWS & WSCC (Action 2), ADC (Action 3), SWS (Action 4). SWS (Action 5)

Actions

As Agreed by Partner Organisations	
1	CCTV inspection of the last leg of the 150 mm land drain to confirm if there is a blockage / partial collapse which is currently suspected.
2	Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.

3	Opportunity with landowner to improve drainage in local fields.
4	Consider pumping flows from Yapton Road WPS direct to Ford WTW)
5	



Summary

Opportunity Area Reference	Burndell Road, Yapton
Local Flood Risk Zone	LFRZ_010
Properties at Risk (1 in 100 Year)	5
Average Annual Damages	£4,065
Preferred Intervention	Asset Management, Reduce surface water and infiltration entering public foul sewers. Planning Activities
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£1,722
Key Stakeholders	ADC & WSCC, SWS

Flood History	Runoff from fields behind properties after rainfall confirmed. Ineffective highway drainage lifting manholes and flooding of receptors. Highway drains possibly blocked by poorly maintained receiving ditched behind properties (south of the LFRZ). Possible pluvial waters entering foul network causing surcharge.
Constraints	High ground water
Receptors	Highway and residential properties
Opportunities	Asset Management, Reduce surface water and infiltration entering public foul sewers. Planning Activities

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Hydraulic overload of the foul sewer system due to excessive inflows from groundwater and surface water. Highway drainage system unable to drain highway affectively.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	1	1	£4,065
1 in 100 Year	3	2	
1 in 100 Year + CC (2080's)	5	2	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Investigate conveying surface water away from properties.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Continue to maintain existing drainage assets to optimise existing capacity.
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5	This should be investigated to remove highway flooding.
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	Yes	Yes	0	2	2	0	0	4	Control at source see activities 12 & 13
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Obtain drainage benefits from local development.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Investigate conveying surface water away from properties through the introduction of new land drainage channels and increased capacity in highway drainage. It is considered likely that this intervention would need to fully replace the current highway drainage system. However, utilisation of existing assets / capacity should be considered when this is being assessed in more detail.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified	Land Owner ADC to advise (Action 1), SWS & WSCC (Action 2) WSCC & ADC (Action 3), ADC (Action 4)
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Actions

As Agreed by Partner Organisations	
1	Ensure landowner(s) maintain ditches receiving flows from highway drains.
2	Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
3	Investigate local conveyance solution involving installation of a French drain to the rear of the affected properties connecting into an extended ditch line conveying flow south away from properties. Upgrade of existing highway drainage to connect into the extended ditch line.

4	A new large development to the north of Burndell Road/Goodhew Close is planned. There are old ditch lines on that site that transport surface water southwards towards Ferndale House. ADC shall explore possibilities with the developer to intercept these flows and connect these into their onsite drainage system.
5	



Summary

Opportunity Area Reference	West View Drive, Yapton
Local Flood Risk Zone	LFZRZ_011
Properties at Risk (1 in 100 Year)	4
Average Annual Damages	£0
Preferred Intervention	Asset Management (Monitor performance).
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£0
Key Stakeholders	SWS

Flood History	Two reported incidents of flooding during the June / July 2012 floods. Hydraulic sewer incident reported June / July 2012 - this is considered an extreme event for the sewer network.
Constraints	none
Receptors	Reported flooding of properties from foul sewer system.
Opportunities	Asset Management (Monitor performance).

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Reported flooding of properties from foul sewer system.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	2	1	£0
1 in 100 Year	3	1	
1 in 100 Year + CC (2080's)	3	1	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	No	No	0	0	0	0	0	
3	Source	Green Roof	No	No	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	
7	Source	Rainwater Harvesting	No	No	0	0	0	0	0	
8	Source	Soakaways	No	No	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	No	No	0	0	0	0	0	
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	No	No	0	0	0	0	0	
14	Source	Other Source Measures	No	No	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	No	No	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	No	No	0	0	0	0	0	
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	No	No	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	No	No	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	No	No	0	0	0	0	0	
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	
29	Strategy	Further Study / Investigations	No	No	0	0	0	0	0	
30	Strategy	Survey, Advise & Monitoring	Yes	Yes	0	1	1	1	2	SWS to monitor public sewer performance using their Area Asset Plan prioritisation system to identify emerging issues and priorities future hydraulic investigations.
31	Strategy	Community Awareness	No	No	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
SWS (Action 1)

Actions

As Agreed by Partner Organisations	
1	Continue to monitor impact of any flooding reported, and carry out investigation where necessary, scheme to be developed if required.
2	
3	
4	
5	



Summary

Opportunity Area Reference	Yapton Road, Middleton on Sea
Local Flood Risk Zone	LFRZ_012
Properties at Risk (1 in 100 Year)	5
Average Annual Damages	£4,439
Preferred Intervention	Asset Management, flood resilience, conveyance and attenuation.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£2,197
Key Stakeholders	ADC & WSCC

Flood History	Yapton Road and properties curtilage flooded badly Summer 2012 and Winter 2012. Approximately 20-30 cm floodwater in road and property curtilage. Properties north of LFRZ also flooded badly during these events. No evidence given to suggest flooding from sewers.
Constraints	High ground water
Receptors	Highway and property curtilage
Opportunities	Asset Management, flood resilience, conveyance and attenuation.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	<p>Flooding occurs in highway area caused by pluvial runoff from fields to the west of Yapton Road which inundates ditch system. Highway runoff also occurs from the south from Norton Road and Yapton Road roundabout north into the LFRZ.</p>
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	1	1	£4,439
1 in 100 Year	1	4	
1 in 100 Year + CC (2080's)	1	6	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Economic	Environmental	Objectiveness	Social	Technical		
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0		
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0		
4	Source	Detention Basins (Attenuation / Retention)	Yes	Yes	0	1	2	0	2	5	Investigate conveying surface water away from affected area and attenuate flows. This should be completed after survey of existing drainage assets.
5	Source	Permeable Paving	No	No	0	0	0	0	0		
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0		
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0		
9	Source	Swales	No	No	0	0	0	0	0		
10	Source	Bioretention Basins	No	No	0	0	0	0	0		
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0		
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	No	0	0	0	0	0	0	Not considered a major issue here
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Investigate conveying surface water away from affected area and attenuate flows. This should be completed after survey of existing drainage assets.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5	This should be investigated to remove highway flooding.
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	Yes	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	Yes	Yes	1	0	2	0	2	5	Potentially applicable.
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required to confirm appropriate actions. Update ICM model to assist the investigation.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSCC (Action 1 to 5)

Actions

As Agreed by Partner Organisations	
1	Optimise existing drainage assets. Continue maintenance of ditch system.
2	Monitor flooding to evaluate improvements in the ditch system.
3	Consider increased conveyance and provide attenuation for surface water flows into the fields to the north or east.
4	Consider more gullies along Yapton Lane to intercept highway runoff from Norton Road and Yapton Road.
5	Investigate flood mitigations.



Summary

Opportunity Area Reference	Elmer Sands
Local Flood Risk Zone	LFRZ_013
Properties at Risk (1 in 100 Year)	60
Average Annual Damages	£70,270
Preferred Intervention	As detailed in the Elmer SWMP.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£18,790
Key Stakeholders	WSSC

Flood History	Pluvial Flooding, ground water flooding. Flooding from foul sewer system. Historic flooding from coastline which has since been mitigated by the installation of sea defences.
Constraints	Low elevation.
Receptors	Highway flooding and internal flooding of properties
Opportunities	As detailed in the Elmer SWMP.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Under capacity in surface water drainage network. Capacity in the soakaways affected by high groundwater. Groundwater flood risk in the lowest part of the LFRZ in The Hard.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	35	4	£70,270
1 in 100 Year	56	4	
1 in 100 Year + CC (2080's)	68	4	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing			0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance			0	0	0	0	0	0	
3	Source	Green Roof			0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)			0	0	0	0	0	0	
5	Source	Permeable Paving			0	0	0	0	0	0	
6	Source	Ponds and Wetlands			0	0	0	0	0	0	
7	Source	Rainwater Harvesting			0	0	0	0	0	0	
8	Source	Soakaways			0	0	0	0	0	0	
9	Source	Swales			0	0	0	0	0	0	
10	Source	Bioretention Basins			0	0	0	0	0	0	
11	Source	Bioretention Street Planting			0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies			0	0	0	0	0	0	
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)			0	0	0	0	0	0	
14	Source	Other Source Measures			0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)			0	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)			0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes			0	0	0	0	0	0	
18	Pathway	Increase Gully Assets			0	0	0	0	0	0	
19	Pathway	Land management practices			0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)			0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)			0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater			0	0	0	0	0	0	
23	Receptor	Improve Weather Warning			0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding			0	0	0	0	0	0	
25	Receptor	Social change, education and awareness			0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold			0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).			0	0	0	0	0	0	
28	Receptor	Temporary demountable flood defences			0	0	0	0	0	0	
29	Strategy	Further Study / Investigations			0	0	0	0	0	0	
30	Strategy	Survey, Advise & Monitoring			0	0	0	0	0	0	
31	Strategy	Community Awareness			0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSSC (Action 1)

Actions

As Agreed by Partner Organisations
1 As detailed in the Elmer SWMP and progress with the FDGIA funded investigations.
2
3
4
5



Summary

Opportunity Area Reference	Lodge Close & Willow Brook, Middleton on Sea
Local Flood Risk Zone	LFRZ_014
Properties at Risk (1 in 100 Year)	24
Average Annual Damages	£22,553
Preferred Intervention	Asset Management, Planning activities
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£9,285
Key Stakeholders	WSSC

Flood History	Meadow Walk: Road floods regularly. Flooded internally during Summer 2012 storm. Lodge Close: South end flooded Summer & Winter 2012. Flooding entered ground floor of properties during Summer event. Water frequently pools in road and floods curtilage.
Constraints	High ground water, flat topography, Low elevation 1m above mean High Sea Level (2.65mAOD). No available green space for attenuation.
Receptors	Highway flooding. Internal flooding of properties during extreme rainfall.
Opportunities	Asset Management, Planning activities

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Surface water drainage system is unable to convey surface water away.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	13	2	£22,553
1 in 100 Year	22	2	
1 in 100 Year + CC (2080's)	36	2	

Shortlisting of Interventions

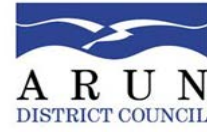
Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Economic	Environmental	Objectiveness	Social	Technical		Total Score
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	No	0	0	0	0	0	0	Not considered a major issue here
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage,Upsize)	Yes	Yes	0	0	2	0	2	4	Investigate conveying surface water away from affected area. This should be completed after survey of existing drainage assets bu OPUS.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5	This should be investigated to remove highway flooding. Await findings from Opus study.
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	Yes	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	Yes	Yes	1	0	2	0	2	5	Potentially applicable.
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required. Update ICM model to assist the investigation. EA River Modelling Study to assess the influence of the main river in the LFRZ.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSSC / ADC (Action 1), EA (Action 2), WSSC & ADC (Action 3)

Actions

As Agreed by Partner Organisations	
1	Would benefit from clearance of ditches to increase conveyance i.e ditch running parallel to Ancton Lodge Lane . Ditch is heavily silted and water is stagnant. Silted pond in Willow Brook. No free outfall from culvert. (Work to be completed by riparian owners)
2	EA to investigate the influence of the main river on the LFRZ as part of the EA 2014 ARIFRM project.
3	Investigate culverts under Ancton Lodge Lane. It is considered these are currently at incorrect levels which is causing the siltation and surcharging upstream in the Lodge Close drainage system.



Summary

Opportunity Area Reference	Sea Way Middleton on Sea
Local Flood Risk Zone	LFRZ_015
Properties at Risk (1 in 100 Year)	8
Average Annual Damages	£14,495
Preferred Intervention	Asset Management, reduce surface water and infiltration entering public foul sewers, Monitor.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£2,965
Key Stakeholders	SWS & WSCC.

Flood History	Historic surface water flooding due to ineffective drainage system. Residents of Sea Way have now installed a new surface water outfall to the sea and improved the drainage on the estate. It is understood that SWS have replaced flap valves on the two public surface water outfalls and removing shingle from those pipes. Potential for more robust measures required to combat wave action on the flap valves.
Constraints	High ground water, flat topography, Low elevation. No available green space for attenuation.
Receptors	Highway and internal flooding
Opportunities	Asset Management, reduce surface water and infiltration entering public foul sewers, Monitor.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Pluvial flooding in highway area, surface water not able to affectively drain away. Internal property flooding reported in 2012 due to pluvial flooding. Flooding from the public foul sewer is reported.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	7	1	£14,495
1 in 100 Year	7	1	
1 in 100 Year + CC (2080's)	7	1	

Shortlisting of Interventions

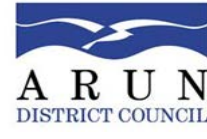
Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	Yes	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	Yes	No	0	0	0	0	0	0	High ground water
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	No	0	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	Yes	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	Yes	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	Yes	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Recommend a detailed hydraulic investigation is required to confirm appropriate actions. Update ICM model to assist the investigation. This will require the introduction of the recent improvement scheme implemented by residents.
30	Strategy	Survey, Advise & Monitoring	Yes	Yes	0	1	1	1	2	5	Monitor performance of the drainage to confirm success of hydraulic scheme.
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
SWS (Action 1), WSCC (Action 2), SWS (Action 3), SWS & WSCC (Action 4)

Actions

As Agreed by Partner Organisations	
1	Consider installation of more robust measures required to combat wave action on the flap valves.
2	Monitor performance of the Sea Way Outfall scheme.
3	Consider conducting a more detailed hydraulic appraisal to investigate the foul flooding and periods of RTU.
4	Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
5	



Summary

Opportunity Area Reference	Golf Links Road
Local Flood Risk Zone	LFRZ_016
Properties at Risk (1 in 100 Year)	2
Average Annual Damages	£524
Preferred Intervention	Asset Management.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£330
Key Stakeholders	ADC, EA

Flood History	Primary risk exists from fluvial sources, originating from the south of the LFRZ.
Constraints	None
Receptors	Golf Course
Opportunities	Asset Management.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Fluvial flood and pluvial flood risk predicted.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	0	1	£524
1 in 100 Year	0	2	
1 in 100 Year + CC (2080's)	1	2	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	Yes	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	No	No	0	0	0	0	0	0	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	No	No	0	0	0	0	0	0	
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	No	No	0	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	No	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Consider increased flood storage in golf course. Sizing of storage would require an independent analysis. Also consider desilting of existing ditches.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
ADC & EA (Action 1), EA (Action 2)

Actions

As Agreed by Partner Organisations
1 Consider ditch maintenance required and creation of additional flood storage on golf course.
2 To consider this flood risk as part of the EA 2014 ARIFRM project.
3
4
5



Summary

Opportunity Area Reference	Felpham Road
Local Flood Risk Zone	LFRZ_017
Properties at Risk (1 in 100 Year)	56
Average Annual Damages	£74,582
Preferred Intervention	Asset Management and increase surface water conveyance
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£22,367
Key Stakeholders	EA

Flood History	Kingsmead and Links Avenue: Regular flooding from Groundwater and surface water. Hydraulic sewer flooding also reported at these locations. Floods occur after prolonged rainfall (usually winter) with the exception of the summer 2012 storm, during which the area flooded badly. Eastover Way: No history of flooding Felpham Road: Flooded from surface water and sewers during the summer 2012 storm. Water sometimes pools in road but usually doesn't enter properties. This was an extreme event.
Constraints	High ground water.
Receptors	Floods highway
Opportunities	Asset Management and increase surface water conveyance

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Pluvial flooding occurs due to limited capacity in surface water drainage system due to poor maintenance. Potentiality of high impact from fluvial source.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	28	18	£74,582
1 in 100 Year	37	19	
1 in 100 Year + CC (2080's)	47	26	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	Yes	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	No	No	0	0	0	0	0	0	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	No	No	0	0	0	0	0	0	
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Improve local conveyance of surface water. Investigate conveying surface water west through the upgrade of existing drainage assets.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	No	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	As per option 15.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
EA & IDB(Action 1), EA (Action 2)

Actions

As Agreed by Partner Organisations
1 Use permissive powers where appropriate to ensure ditches receiving flows from highway drains are maintained.
2 Main River - investigate improved conveyance as part of the EA 2014 ARIFRM project.
3
4
5



Summary

Opportunity Area Reference	Lidsey Road & Oak Tree Lane
Local Flood Risk Zone	LFRZ_018
Properties at Risk (1 in 100 Year)	10
Average Annual Damages	£6,861
Preferred Intervention	Asset Management. Reduce surface water and infiltration entering public foul sewers. Improve surface water conveyance.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£2,406
Key Stakeholders	WSCC, ADC, SWS

Flood History	Pluvial flooding experienced during the summer 2012 storm along Lidsey Road - otherwise flooding has not occurred here in recent history. Hydraulic overload of sewers reported in Oak Tree Lane on 02/01/2013 and on Westergate Street on 29/01/2013 and 09/11/2010.
Constraints	Limited detail on surface water drainage records in this area.
Receptors	Property and Highway
Opportunities	Asset Management. Reduce surface water and infiltration entering public foul sewers. Improve surface water conveyance.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Property flooding caused by pluvial runoff from highway. Flooding from foul manholes in highway due to hydraulic overload.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	8	0	£6,861
1 in 100 Year	10	0	
1 in 100 Year + CC (2080's)	16	1	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Options Assessment						
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Investigate conveying surface water away from properties. This should be completed after survey of existing drainage assets.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets. WSCC and ADC are planning to clear the ditch on the west side of Lidsey Road
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5	This should be investigated to remove highway flooding.
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	Yes	Yes	0	2	2	0	0	4	Control at source see activities 12 & 13
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	No	0	0	0	0	0	0	
28	Receptor	Temporary demountable flood defences	Yes	Yes	1	0	2	0	2	5	Potentially applicable.
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required. As detailed in Option 15.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified	ADC / WSCC (Action 1) SWS (Action 2), ADC (Action 3), SWS WSCC (Action 4)
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Actions

As Agreed by Partner Organisations	
1	Survey private road existing highway drainage and confirm condition and arrangements. Implement clearance of the ditch on the west side of Lidsey Road and investigate capacity downstream of the highway ditch
2	Area to be considered as part of the DSF study.
3	Consider use of flood mitigation to protect properties from pluvial flooding from highway based on outputs from the DSF study
4	Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
5	



Summary

Opportunity Area Reference	Wandleys Lane, Eastergate
Local Flood Risk Zone	LFRZ_019
Properties at Risk (1 in 100 Year)	28
Average Annual Damages	£42,018
Preferred Intervention	Resilience and increase surface water conveyance
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£10,454
Key Stakeholders	Portsmouth Water, ADC, WSCC

Flood History	Residents in Holmdale (which is at highest risk of pluvial flooding) have not experienced flooding in recent history (including June / July 2012). Although many resident had not lived in the area for more than four months. Flooding of Fontwell Avenue during winter storm events from groundwater and surface water sources.
Constraints	High ground water.
Receptors	Property and Highway
Opportunities	Resilience and increase surface water conveyance

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Portsmouth Water borehole has overflowed in the past and is thought to have contributed to the surface water flooding to highways and properties in Hunters Chase previously. Infilling of gravel pit at the junction of Wandley's Lane & Fontwell Avenue has probably compounded problems (ie. loss of flood storage). Existing surface water drainage is exceeded during prolonged rainfall events.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	16	7	£42,018
1 in 100 Year	20	8	
1 in 100 Year + CC (2080's)	20	8	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	Yes	Yes	0	1	2	0	2	5	Consider with Option 15.
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow. Improve performance downstream.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Investigate conveying surface water away from properties. This should be completed after survey of existing drainage assets.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5	This should be investigated to remove highway flooding.
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	No	No	0	0	0	0	0	0	Control at source see activities 12 & 13
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	No	0	0	0	0	0	0	
28	Receptor	Temporary demountable flood defences	Yes	Yes	1	0	2	0	2	5	Potentially applicable.
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally identified
WSCC & ADC (Action 1 and 2.)

Actions

As Agreed by Partner Organisations	
1	Investigate conveyance solution.
2	Assess Portsmouth Water emergency plan for spilling ground water. Confirm recent upgrade works at the abstraction pumping station.
3	
4	
5	



Summary

Opportunity Area Reference	High Ground Lane, Barnham
Local Flood Risk Zone	LFRZ_020
Properties at Risk (1 in 100 Year)	5
Average Annual Damages	£5,916
Preferred Intervention	Reduce surface water and infiltration entering public foul sewers.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£1,885
Key Stakeholders	SWS

Flood History	Winter 2012 was a notable flooding event. Flooding of fields is experienced after prolonged rainfall, usually occurs during winter events.
Constraints	High ground water.
Receptors	Field
Opportunities	Reduce surface water and infiltration entering public foul sewers.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Hydraulic overload of the foul sewer system due to excessive inflows from groundwater and surface water. This leads to flooding in fields and spill of foul flow into the Barnham Rife. Fluvial flooding of floodplain which affects fields.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	3	1	£5,916
1 in 100 Year	4	1	
1 in 100 Year + CC (2080's)	4	2	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Economic	Environmental	Objectiveness	Social	Technical		
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0		
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0		
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0		
5	Source	Permeable Paving	No	No	0	0	0	0	0		
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0		
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
8	Source	Soakaways	No	No	0	0	0	0	0		
9	Source	Swales	No	No	0	0	0	0	0		
10	Source	Bioretention Basins	No	No	0	0	0	0	0		
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0		
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
14	Source	Other Source Measures	No	No	0	0	0	0	0		
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	No	0	0	0	0	0		
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0		
17	Pathway	Improved maintenance regimes	Yes	No	0	0	0	0	0		
18	Pathway	Increase Gully Assets	Yes	No	0	0	0	0	0		
19	Pathway	Land management practices	No	No	0	0	0	0	0		
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0		
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0		
22	Pathway	Seperation of foul and surfacewater	Yes	Yes	0	2	2	0	0	4	Control at source see activities 12 & 13
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0		
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0		
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0		
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0		
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure suitable development controls are placed on new developments in this LFRZ to reduce flood risk.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0		
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	As per item 29 in Marshalls Close (LFRZ_021) investigate the performance of the Marshalls Close Overflow to improve its performance.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0		
31	Strategy	Community Awareness	No	No	0	0	0	0	0		

Key Stakeholders

Provisionally Identified
SWS / WSCC (Action 1)

Actions

As Agreed by Partner Organisations	
1	Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
2	
3	
4	
5	



Summary

Opportunity Area Reference	Marshalls Close / Church Lane, Banrham
Local Flood Risk Zone	LFRZ_021
Properties at Risk (1 in 100 Year)	7
Average Annual Damages	£13,006
Preferred Intervention	Planning activities. Reduce surface water and infiltration entering public foul sewers.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£3,839
Key Stakeholders	EA, SWS

Flood History	Previous problem with locking of an overflow from the foul system into the river. This is now replaced by a pumped overflow. Overloading of the pumped overflow has been reported since this installation. Investigations relating to the performance of the overflow are currently ongoing by SWS. Capacity of Barnham Rife issue (out of bank), and also prevents incoming highway drainage from discharging effectively. Overflowing foul sewers due to infiltration/inundation/surface water connections. Properties in Marshalls Close have been fitted with air brick covers/flood door protection, but water is also now known to come up through floors. Residents confirmed extent of fluvial flooding in Marshalls Close. The extent of flooding is fairly well replicated by the EA flood Zone 1 & 2.
Constraints	High ground water.
Receptors	Public space and residential properties.
Opportunities	Planning activities. Reduce surface water and infiltration entering public foul sewers.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Fluvial flooding from the main river causing external and internal flooding of properties in Marshalls Close. Flooding from foul manholes due to hydraulic overload.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	5	2	£13,006
1 in 100 Year	5	2	
1 in 100 Year + CC (2080's)	5	2	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	No	0	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	No	0	0	0	0	0	0	
18	Pathway	Increase Gully Assets	Yes	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
			Yes	Yes							
22	Pathway	Separation of foul and surfacewater	No	No	0	2	2	0	0	4	Control at source see activities 12 & 13
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
			Yes	No							Should be considered for susceptible properties affected by flood water entering properties.
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
			Yes	Yes							Ensure suitable development controls are placed on new developments in this LFRZ to reduce flood risk.
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	No	No	2	2	2	2	1	9	
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
			Yes	Yes							Utilise available land upstream of Barnham to attenuate flows from main river. This should be investigated further within the EA River Modelling study. Investigate additional flood protection measures in Marshalls Close i.e. sealing floors and walls. Investigate maintenance / design improvements to the Marshalls Close CSO to improve its performance.
29	Strategy	Further Study / Investigations	No	No	1	1	1	1	1	5	
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
SWS (Action 1), EA (Action 2), ADC (Action 3)

Actions

As Agreed by Partner Organisations
1 Investigate the Operation of Marshalls Close CSO
2 Investigate options to reduce flood risk as part of the EA 2014 ARIFRM project.

3	Investigate additional flood protection measures for two properties in Marshalls Close i.e. sealing floors and walls.
4	
5	



Summary

Opportunity Area Reference	Southdean Close, Middleton on Sea
Local Flood Risk Zone	LFRZ_022
Properties at Risk (1 in 100 Year)	16
Average Annual Damages	£9,816
Preferred Intervention	Asset Management.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£4,502
Key Stakeholders	WSCC & ADC

Flood History	Southdean Close is situated in a depression. Surface water routes towards this low point.
Constraints	High ground water. Low topography.
Receptors	0
Opportunities	Asset Management.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	Pluvial flooding caused by ponding of surface water. Surface water not being conveyed away.
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Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	8	1	£9,816
1 in 100 Year	15	1	
1 in 100 Year + CC (2080's)	21	1	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Options Assessment						
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	No	0	0	0	0	0	0	Not considered a major issue here
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Investigate conveying surface water away from affected area. This should be completed after survey of existing drainage assets.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5	This should be investigated to remove highway flooding.
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	Yes	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	Yes	Yes	1	0	2	0	2	5	Potentially applicable.
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required to confirm appropriate actions. Update ICM model to assist the investigation.
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified	WSCC & ADC & SWS (Action 1 & 2), SWS (Action 3)
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Actions

As Agreed by Partner Organisations	
1	Confirm surface water drainage arrangements and condition in Southdean Close.
2	Consider connecting existing or new highway drainage system into the Rose Avenue public storm water system. Evaluate impact on existing system.
3	Consider use of ATAC (Temporary Treatment Plant)
4	
5	



Summary

Opportunity Area Reference	Rudwicks, Broomcroft, The Loop, Jacken, Bramfield, Leverton, Limmer, Burley and Dryad - Felpham
Local Flood Risk Zone	LFRZ_023
Properties at Risk (1 in 100 Year)	45
Average Annual Damages	£40,048
Preferred Intervention	Asset Management. Reduce surface water and infiltration entering public foul sewers.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£17,538
Key Stakeholders	WSCC, ADC, SWS

Flood History	Surface water and foul water flooding. Overflowing foul sewers in far eastern end of Limmer Lane due to infiltration/inundation/surface water connections.
Constraints	High ground water. Low topography. Tide. No available green space for attenuation.
Receptors	0
Opportunities	Asset Management. Reduce surface water and infiltration entering public foul sewers.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Land drainage systems are in poor condition and lack available capacity to convey surface water away from highway and property curtilages. Hydraulic overload of public foul sewer system.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	22	1	£40,048
1 in 100 Year	40	5	
1 in 100 Year + CC (2080's)	55	9	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	Yes	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving / Swales	Yes	Yes	0	1	1	0	2	4	High ground water, but considered to be worth investigating.
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	No	0	0	0	0	0	0	
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Consider increasing capacity if optimisation of existing assets fails to reduce flood risk.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	Yes	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Separation of foul and surfacewater	Yes	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	Yes	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required to evaluate need for increased conveyance using the ICM model to assist the investigation.
30	Strategy	Survey, Advise & Monitoring	Yes	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSCC & ADC (Action 1), SWS & WSCC (Action 2), ADC (Action 3), SWS & WSCC (Action 4), WSCC & ADC (Action 5)

Actions

As Agreed by Partner Organisations	
1	Ensure highway drainage system is fully operational through the responsible asset owners. Complete asset surveys and condition assessments of surface water system.
2	Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
3	Ditches are overgrown, heavily silted and in some cases (as reported by residents), filled in. Complete a condition assessment of these assets and develop a rehabilitation programme.
4	Assess flooding in Limmer Lane and investigate increased conveyance of surface water following asset surveys and condition assessment.
5	Authorities to continue to work with Summerley Estate with view to reinstating fragmented land drainage scheme on the private estate



Summary

Opportunity Area Reference	West Close, Middleton on Sea
Local Flood Risk Zone	LFRZ_024
Properties at Risk (1 in 100 Year)	17
Average Annual Damages	£24,643
Preferred Intervention	Asset Management. Reduce surface water and infiltration entering public foul sewers. Increase surface water conveyance
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£5,608
Key Stakeholders	WSCC, ADC, SWS

Flood History	Feedback from residents suggests that the summer 2012 extreme storm event resulted in internal flooding of properties along West Close, with up to approximately 1ft of floodwaters inside property buildings. Flooding from foul manholes have been reported relatively frequently. At times of flooding SWS tankers are used to draw down water levels in the foul sewer system in West Close. Surface water is considered to inundate the foul sewer system.
Constraints	High ground water. Low topography. Tide. No available green space for attenuation.
Receptors	Highway and property flooding.
Opportunities	Asset Management. Reduce surface water and infiltration entering public foul sewers. Increase surface water conveyance

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Pluvial flooding caused by ponding of surface water. Surface water not being conveyed away due to operational problems in highway .	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	11	3	£24,643
1 in 100 Year	14	3	
1 in 100 Year + CC (2080's)	16	3	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion	
					Economic	Environmental	Objectiveness	Social	Technical		Total Score
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	Yes	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	Yes	Yes	0	1	1	0	2	4	High ground water, but considered to be worth investigating.
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Consider increasing capacity if optimisation of existing assets fails to reduce flood risk.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	Yes	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	Yes	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	This should be considered.
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	This should be considered.
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	Yes	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required to evaluate need for increased conveyance using the ICM model to assist the investigation.
30	Strategy	Survey, Advise & Monitoring	Yes	Yes	0	1	1	1	2	5	Survey surface water drainage assets.
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
SWS / WSCC (Action 1 & 2), SWS & WSCC (Action 3).

Actions

As Agreed by Partner Organisations	
1	Ensure highway drainage system is fully operational through the responsible asset owners.
2	Consideration of increasing conveyance of surface water system either via gravity or pumping to coastal outfall to reduce flood risk. To be undertaken through a detailed investigation.
3	Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
4	
5	



Summary

Opportunity Area Reference	Limmer Lane, Felpham
Local Flood Risk Zone	LFRZ_025
Properties at Risk (1 in 100 Year)	18
Average Annual Damages	£39,629
Preferred Intervention	Conveyance and Asset Management.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£13,084
Key Stakeholders	ADC, SWS

Flood History	Surface water and foul water flooding Capacity of public surface water sewer system is the main issue. (tide locking). Overflowing foul sewers due to infiltration/inundation/surface water connections. Also related flooding at junction of Summerley Lane/Limmer Lane and Felpham Way immediately north
Constraints	High ground water. Low topography. Tide.
Receptors	Highway and external property flooding.
Opportunities	Conveyance and Asset Management.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Land drainage systems are in poor condition and lack available capacity to convey surface water away from highway and property curtilages. Hydraulic overload of public foul sewer system due to excessive inflow of clear water.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	6	1	£39,629
1 in 100 Year	16	2	
1 in 100 Year + CC (2080's)	27	2	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Total Score	Summary of scheme / General discussion
					Economic	Environmental	Objectiveness	Social	Technical		
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	Yes	Yes	0	1	1	0	2	4	High ground water, but considered to be worth investigating.
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment to reduce surface water runoff.
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Consider increasing capacity if optimisation of existing assets fails to reduce flood risk. See figure 9.13.
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	optimisation of existing assets
18	Pathway	Increase Gully Assets	Yes	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	Yes	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	This should be considered.
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	This should be considered.
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Implement SUDS on new brownfield developments
28	Receptor	Temporary demountable flood defences	Yes	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required to evaluate need for increased conveyance using the ICM model to assist the investigation.
30	Strategy	Survey, Advise & Monitoring	Yes	Yes	0	1	1	1	2	5	Survey surface water drainage assets.
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
SWS (Action 1), SWS & WSCC (Action 2). SWS & WSCC (Action 3)

Actions

As Agreed by Partner Organisations	
1	Ensure public surface water drainage system is fully operational. Complete asset surveys and condition assessments of surface water system.
2	Investigate improved surface water conveyance.
3	Investigate and prioritise interventions to reduce clear water inflow and Infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
4	
5	



Summary

Opportunity Area Reference	Eastergate Lane
Local Flood Risk Zone	LFRZ_026
Properties at Risk (1 in 100 Year)	7
Average Annual Damages	£27,116
Preferred Intervention	Planning Activities and Asset Management.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£15,545
Key Stakeholders	WSCC, ADC

Flood History	Surface water flooding due to runoff from fields to north of Dragonfly Paddock. It is reportedly a problem both in summer and winter after heavy rainfall. In winter the flooding on the road can last for several days.
Constraints	Drainage records incomplete. High ground water.
Receptors	Primarily Highway flooding reported.
Opportunities	Planning Activities and Asset Management.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Surface water flooding from fields to the north. Flooding in the road near the junction of Freeman Close and Eastergate Lane.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	4	2	£27,116
1 in 100 Year	4	3	
1 in 100 Year + CC (2080's)	4	3	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Options Assessment						
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	No	No	0	0	0	0	0	0	
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	No	No	0	0	0	0	0	0	
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	No	No	0	0	0	0	0	0	
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	No	No	0	0	0	0	0	0	
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Clear drainage ditches. CCTV culverts
18	Pathway	Increase Gully Assets	Yes	Yes	-2	0	2	1	2	3	Install large gully on highway drainage system.
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	No	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	No	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	No	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	No	No	0	0	0	0	0	0	
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	No	No	0	0	0	0	0	0	
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSCC & ADC (Action 1 & 3), WSCC (Action 2)

Actions

As Agreed by Partner Organisations	
1	Discuss with riparian owner to maintain existing drainage ditches within the LFRZ.
2	Establish development principles in the Local Plan / Core Strategy.
3	Highway drainage improvements in vicinity of "Ashogle"
4	
5	



Summary

Opportunity Area Reference	Downview Road
Local Flood Risk Zone	LFRZ_027
Properties at Risk (1 in 100 Year)	5
Average Annual Damages	£3,794
Preferred Intervention	Planning Activities and Asset Management.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£825
Key Stakeholders	WSCC, ADC, EA

Flood History	The accounts of flooding in the vicinity differ greatly. While some residents reported flooding to the road and gardens, others reported that there were no issues at all. This is also reflected in the questionnaires that have been returned. All residents were aware of the drainage ditch, and that it takes the surface water from the estate. The residents that back onto the new development in Chantry Mead expressed concern about the increase in runoff that may occur due to the development.
Constraints	High Ground Water.
Receptors	Highway, curtilage flooding.
Opportunities	Planning Activities and Asset Management.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways	
Capacity in the drainage ditches is exceeded. Ground water flooding is also considered to be a possible source of flooding.	

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	4	1	£3,794
1 in 100 Year	4	1	
1 in 100 Year + CC (2080's)	4	1	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)						Summary of scheme / General discussion
					Options Assessment						
					Economic	Environmental	Objectiveness	Social	Technical	Total Score	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
3	Source	Green Roof	No	No	0	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	Yes	Yes	0	1	2	0	2	5	Investigate reducing runoff from the fields to the west. Retain surfacewater within the fields.
5	Source	Permeable Paving	No	No	0	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	0	
7	Source	Rainwater Harvesting	No	No	0	0	0	0	0	0	
8	Source	Soakaways	No	No	0	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
14	Source	Other Source Measures	No	No	0	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage,Upsize)	Yes	Yes	0	0	2	0	2	4	store surface water
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0	
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Clear drainage ditches
18	Pathway	Increase Gully Assets	No	No	0	0	0	0	0	0	
19	Pathway	Land management practices	No	No	0	0	0	0	0	0	
20	Pathway	Managing overland flows (above ground storage)	No	No	0	0	0	0	0	0	
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	No	No	0	0	0	0	0	0	
22	Pathway	Seperation of foul and surfacewater	No	No	0	0	0	0	0	0	
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0	
24	Receptor	Improve resilience to flooding	No	No	0	0	0	0	0	0	
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0	
26	Receptor	Raising doorway / access threshold	No	No	0	0	0	0	0	0	
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	Yes	2	2	2	2	1	9	Ensure suitable development controls are placed on new developments in this LFRZ to reduce flood risk.
28	Receptor	Temporary demountable flood defences	No	No	0	0	0	0	0	0	
29	Strategy	Further Study / Investigations	No	No	0	0	0	0	0	0	
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0	
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0	

Key Stakeholders

Provisionally Identified
WSCC, EA & ADC (Action 1 & 3) WSCC & ADC (Action 2)

Actions

As Agreed by Partner Organisations	
1	Confirm ownership of the land drainage ditch which drains field runoff away from Ewens Gardens and Downview Road. Ensure owner(s) of the ditch understand their riparian responsibilities to maintain.
2	Establish development principles in the Local Plan / Core Strategy.
3	Attenuation & Retention of surface water in the fields to the west of Downview Road. Discuss with landowner.
4	
5	