Appendix A: Broad Scale Assessment

Table A-1: Horsham District Council Strategic Flood Risk Assessment - Level 1 coarse assessment table.

Question	Area (km^2)	% of Area	
Total Area of Horsham administrative Area	529	100%	
Area of Horsham in Zone 3b (Functional Floodplain)	31.35	5.93%	of total area
Area of Horsham in Zone 3a (High Flood Risk)	6.34	1.20%	of total area
Area of Horsham in Zone 2 (Moderate Flood Risk)	0.97	0.18%	of total area
Area of Zone 3 that is defended	0.00	0.00%	of Zone 3
Total Developed Area	33.46	6.33%	of total area
Existing Development in Flood Zone 3b	0.27	0.81%	of dev. area
Existing Development in Flood Zone 3a	0.16	0.48%	of dev. area
Existing Development in Flood Zone 2	0.35	1.04%	of dev. area
Potential New Development Required	3.65	0.69%	of total area
Potential New Development in Zones 3b	0.09	2.46%	of pot. dev.
Potential New Development in Zones 3a	0.02	0.49%	of pot. dev.
Potential New Development in Zones 2	0.06	1.61%	of pot. dev.
Drainage Problem Areas	Minimal Drainage Flooding – records show points rather than areas.		
Area affected by groundwater emergence zone	21.34	4.03%	of total area

Table A-2: Horsham District Council Strategic Flood Risk Assessment – Category 1 & 2 settlements, flooding summary.

Settlement Name	Area (Ha)	FZ2		FZ3 + CC		FZ3a		FZ3b	
		Area	%	Area	%	Area	%	Area	%
Billingshurst	155.34	1.50	0.96%	1.50	0.96%	1.52	0.98%	0.65	0.42%
Henfield	124.56	-	-	-	-	-	-	-	-
Horsham	1,093.59	54.44	4.98%	53.96	4.93%	14.95	1.37%	9.95	0.91%
Pulborough	168.95	1.41	0.83%	8.70	5.15%	6.46	3.82%	5.65	3.34%
Southwater	180.10	-	-	-	-	-	-	-	-
Steyning, Bramber and Upper Beeding	251.29	7.13	2.84%	8.95	3.56%	7.95	3.16%	1.17	0.47%
Storrington	364.85	6.49	1.78%	6.49	1.78%	5.19	1.42%	5.19	1.42%

The EA FZ2 JFLOW extent is less than the modelled extents. The EA are aware of this problem and are working to rectify it. In the interim, it is recommended that FZ3 + Climate change is used as a surrogate for FZ2 in these locations.

Table A-3: Horsham District Council Strategic Flood Risk Assessment – Category 2 settlements, flooding summary.

Settlement Name	Area (Ha)	FZ2		FZ3 + CC		FZ3a		FZ3b	
		Area	%	Area	%	Area	%	Area	%
Adversane	12.96	-	-	-	-	-	-	-	-
Amberley	20.82	0.01	0.05%	1.34	6.43%	0.50	2.41%	0.18	0.88%
Ashington	88.69	3.44	3.88%	3.44	3.88%	3.18	3.58%	3.18	3.58%
Barns Green	31.59	0.08	0.25%	0.08	0.25%	-	-	-	-
Broadbridge Heath	70.29	-	-	-	-	-	-	-	-
Bucks Green	9.43	-	-	-	-	-	-	-	-
Christ's Hospital	40.27	-	-	-	-	-	-	-	-
Codmore Hill	3.61	-	-	-	-	-	-	-	-
Coldwaltham	58.34	0.00	0.00%	1.06	1.81%	0.29	0.49%	0.20	0.35%
Cowfold	33.24	0.21	0.63%	0.21	0.63%	0.14	0.41%	0.14	0.41%
Faygate	7.09	-	-	-	-	-	-	-	-
Lower Beeding	6.53	-	-	-	-	-	-	-	-
Mannings Heath	48.20	-	-	-	-	-	-	-	-
Partridge Green	48.32	-	-	-	-	-	-	-	-
Rudgwick	65.29	-	-	-	-	-	-	-	-
Rushfield	39.72	-	-	-	-	-	-	-	-
Rusper	15.83	-	-	-	-	-	-	-	-
Slinfold	44.63	-	-	-	-	-	-	-	-
Small Dole	44.25	-	-	-	-	-	-	-	-
Thakeham	14.67	-	-	-	-	-	-	-	-
Warnham	33.98	-	-	-	-	-	-	-	-
Washington	16.43	-	-	-	-	-	-	-	-
West Chiltington Common	253.10	4.05	1.60%	4.05	1.60%	3.25	1.29%	1.16	0.46%

The EA FZ2 JFLOW extent is less than the modelled extents. The EA are aware of this problem and are working to rectify it. In the interim, it is recommended that FZ3 + Climate change is used as a surrogate for FZ2 in these locations.

Appendix B: Settlement Level Coarse Assessments

Appendix C: List of Contacts

Organisation	Role	Tel	E-Mail
HDC			
Ollie Boulter	Planning Officer - Main Client Contact	01403 215276	Oliver.Boulter@horsham.gov.uk
Barbara Childs	Team Leader LDF	01403 215181	Barbara.Childs@horsham.gov.uk
Martin Brightwell	Drainage Manager	01403 215063	martin.brightwell@horsham.gov.uk
Chris Sepke	Drainage Engineer		Chris.sepke@horsham.gov.uk
EA			
Karen Harris	Sustainable Construction Technical Specialist	01903 703971	karen.harris@environment-agency.gov.uk
Keeley Mowatt	Flood Risk Mapping and Data Management	01903 703917	
Andy Strudwick	IDBs	01903 702583	
Jamie Fielding	Flood Risk Mapping and Data Management	01903 703833	
Thames Water			
Steve Dummer	Sewer Flooding Coordinator	011892 37346	Steve.Dummer@thameswater.co.uk
Southern Water			
David Nuttall	Senior Engineer - coordinating SFRA Response		david.nuttall@southernwater.co.uk
Capita Symmonds			
Marc Pinnell	Project Manager West Sussex County SFRA	01342 333428	
West Sussex CC			
Gary Tucknott	Highways Flooding	01243 777560	gary.tucknott@westsussex.gov.uk
Neil Smith	Local Highway Manager @ Broadbridge Heath	01403 223912	
Maureen Vaughey	first point of contact for northern highways @ westsussex		highways.northern@westsussex.gov.uk

Appendix D: Data

TITLE	DESCRIPTION	CONFIDENCE
HDC Alternative Development Sites & Boundary Changes	This document sets out a number of sites for development as well as suggested boundary changes.	GOOD
HDC Alternative Development Sites & Boundary Changes - GIS Outputs	GIS Polygons for alternative site allocations	VERY GOOD
HDC Proposals Map (2006) Submission Document	HDC Local Plan, Submission Proposals Map & Next Steps. Appendix 1:Transition from HDC LDF	GOOD
HDC Proposals Map (2006) Submission Document - GIS Layers	GIS Polygons for site allocations	VERY GOOD
HDC Site Specific Allocations of Land. Submission Document (2005)	This document sets out sites allocated for development. It is one of the documents that will make up the LDF and which will govern the long-term spatial planning.	GOOD
25k & 50k Horsham Raster files	Tif and TFW file format Maps	VERY GOOD
Revised Flood Plain (Horsham)	EA agreed 100yr flood plain extent.	GOOD
Horsham District SFRA DATA Provided by the E.A	Flood event files: lines, points & polygons.	GOOD
Parish Council Questionnaire Responses	Completed questionnaires from HDCs consultation exercise, together with maps and photos of flooding in each Parish Council	FAIR
EA Floodmaps for HDC Dec 2006	GIS Polygons for floodzones, defences, area benefiting, flood storage area, historical flood maps:	GOOD
EA Flood Data & Height Data	ArcView format dtm(SAR) files. GIS polygons for Area Benefiting, Flood Zones, Historical Flood Maps	GOOD
EA data received from Horsham District Council. Data files	Model List (Excel), Watercourse data (GIS polygons), Defence Data (GIS polygons), Flood Warning Areas (GIS polygons) Horsham IDB (GIS polygons), Reaches (GIS polygons)	GOOD
Fluvial Depth Grid.	100yr, 1000yr, 1000cc, 100cc.adf files. JFLOW outputs	GOOD

TITLE	DESCRIPTION	CONFIDENCE
EABM's – River Adur Survey	E3&E1 Word docs, CAD & jpeg TBM files for Reach 1-13	GOOD
River Adur Model	Reach 5-8 .txt TEXT FILES ONLY, NO MODEL	FAIR
Tidal Depth Grid	J-Flow Broad-scale modelling - 100yr, 1000yr, 1000cc, 100cc.adf files	GOOD
Upper Arun River Survey	EABM .dgn files, EEBY files, LEV-DAT files, LEV-FIN files, LO .dwg & .xls, ls .dxf files, photo .mdb files, XS-dat folder, xs-db folder, Xs-dxf folder.	GOOD
Drawing Files	Reach 5 - 9 CAD drawings	GOOD
Draft Arun & Western Streams CFMP August 2006	"Managing Flood Risk, River Arun & Western Streams Catchment Flood Management Plan - Consultation Draft Plan - 2006". Appendix A, B & C	VERY GOOD
Horsham District Council Wet Pond Flood Control Structures	This document gives details of some wet pond water bodies are large enough to come under the Reservoirs Act and those that have flood defences in poor condition.	GOOD
Draft River Adur CFMP	"Managing Flood Risk, River Adur Catchment Flood Management Plan - Consultation Draft Plan - 2006".	VERY GOOD
Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS 23), DEFRA – Making Space for Water, 2004. Appendix - Volume 2	National study identifying types and sources of groundwater flooding. Mapping outputs at a national and regional scale	GOOD
EA Hydrometric Network	GIS layers showing location of river flow and rainfall gauges	GOOD
Southern Water Flooding information	Flooding information for Postcodes in Horsham District	GOOD
South East England Regional Assembly – Regional Flood Risk Appraisal	Regional Flood Risk Assessment for the South East	FAIR

Type	Layer	Source	Description of Layer	Included (Y/N)	Comment	Benefits	Limitations
Fluvial	Environment Agency Broad-scale Flood Zone Maps	Provided as GIS layer by EA	Polygon layer showing EA flood zone maps including Flood zone 2 and 3	Y		A quick and easy reference that can be used as an indication of flood risk.	Flood zones may not give an accurate representation of flood risk. The models do not take into account defences; are commonly based on 5m resolution DTM; JFLOW software is commonly used that is generally thought to have inaccuracies. Typically watercourses with a catchment area less than 3km^2 are omitted from Environment Agency mapping unless there is a history of flooding affecting a population. Consequently there will be some locations adjacent to watercourses that on first inspection, it is suggested there is no flood risk.
	CEH Watercourse Network	Centre for Ecology and Hydrology (CEH), Wallingford.	Polyline layer showing streams, ditches, drainage channels and rivers.	Y		Displays all of the watercourses in the study area.	Some minor water features in the query can be missed.
	Main Rivers Centrelines and Critical Ordinary Watercourses	Provided as GIS layer by EA	Polyline layer showing all watercourses designated Main Rivers or as Critical Ordinary Watercourses	Y		Identification of the watercourses for which the EA have discretionary and regulatory powers	There are other watercourses that may be a significant flood source.
	Hydraulic 1D Model Outputs - Upper Arun Model 25yr and 100yr outlines.	Provided as GIS layer by EA	Polyline and polygon data showing the 1D modelled outlines of the Upper Arun.	Y	Limited data	Detailed and calibrated hydraulic model outlines that have been mapped using LiDAR (1m and 2m resolution). These outlines provide a much greater degree of accuracy and therefore confidence than the broad-scale flood zones.	There are watercourses that have not been modelled and therefore the flood risk from these can not be as accurately assessed.
	Hydraulic Model Outputs and Node Locations - Lower Arun Model 100yr + Climate Change model results	Provided as GIS layer by EA	Labelled point data showing 100yr Plus Climate Change levels between Pallingham Weir and Houghton Bridge	Y			
	Hydraulic 1D and 2D Model Outputs - Lower Arun Model outlines for 25yr, 100yr and 100yr + Climate Change	Provided as GIS layer by EA	Polyline and polygon data showing the 1D modelled outlines of the Lower Arun.	Y		Modelled results for 100yr + CC between Pallingham Weir and Houghton Bridge have been coarsely mapped by SW using 5m SAR Data	Modelled results for 100yr + CC between Pallingham Weir and Houghton Bridge have been coarsely mapped by SW using 5m SAR Data - this is sufficient interim approach for use on a strategic and district scale, however, when outlines have been modelled by EA consultants to greater detail, these should be used instead.
	Hydraulic 1D Model Outputs - River Adur Model 25yr, 100yr and 100yr plus 20% peak flow Climate Change	Provided as GIS layer by EA	Polyline and polygon data showing the 1D modelled outlines of the Lower Arun.	Y			
	Hydraulic Model Outputs and Node Locations - Upper Arun to West of Horsham	Provided as CAD layer by HDC and WSP	Polyline and polygon layer showing high resolution 1D modelled outline for 100yr and 100yr plus climate change for reach of Arun immediately to West of Horsham	Y	Limited data	High resolution modelling and mapping for the reach of the River Arun in and around allocations to West of Horsham (CP7). Provides good accuracy and improved detail and confidence over EA broad-scale and EA SFRM modelling.	Only available for reach in and around allocations to West of Horsham (CP7).

Type	Layer	Source	Description of Layer	Included (Y/N)	Comment	Benefits	Limitations
Fluvial	Combined Flood Zone 3b - Functional Floodplain	EA Flood Zone Maps & EA Hydraulic Modelled Data	Polygon layer created using best available data for whole district. Where 1:25yr modelled outlines available, these have been used to represent FFP (with agreement from EA and HDC). Where modelled data is not available, EA broad-scale FZ3 has been used.	Y	Combined data	A single GIS layer created using best available information at time of publication.	Assumption made that where modelled data for 20/25yr event is not available, the 100yr FZ3 broad-scale outline has been used. This could be overly conservative and, where possible, data should be updated as and when available.
	Combined Flood Zone 3a	EA Flood Zone Maps & EA Hydraulic Modelled Data	Polygon layer created using best available data for whole district. Where 1:100yr modelled outlines available, these have been used to represent FZ3a (with agreement from EA and HDC). Where modelled data is not available, EA broad-scale FZ3 has been used.	Y	Combined data	A single GIS layer created using best available information at time of publication.	Assumption made that where modelled data for 100yr event is not available, the 100yr FZ3 broad-scale outline has been used. This could be overly conservative and, where possible, data should be updated as and when available.
	Combined Flood Zone 3 + CC	EA Flood Zone Maps & EA Hydraulic Modelled Data	Polygon layer created using best available data for whole district. Where 1:100yr + CC modelled outlines available, these have been used to represent FZ3 + CC (with agreement from EA and HDC). Where modelled data is not available, EA broad-scale FZ2 has been used.	Y	Combined data	A single GIS layer created using best available information at time of publication.	Assumption made that where modelled data for 100yr+CC event is not available, the 1000yr FZ2 broad-scale outline has been used. This could be overly conservative and, where possible, data should be updated as and when available.
	Combined Flood Zone 2	EA Flood Broad Scale Zone Maps	Polygon layer of 1:1000yr FZ2 outline created for whole district.	Y	Combined data	A single GIS layer created using best available information at time of publication.	All based on FZ2 broad-scale mapping
	Historical Flood Outlines	EA HFM and EA FERS data. Also, Parish council questionnaires	Polygon and point data for whole district showing historical flooding incidents and events	Y	Combined data	A single GIS layer created using best available information at time of publication.	Some of the data is based on circumstantial and subjective evidence.
	Digital Terrain Model	Provided by EA	Reference Only	Y			SAR 5m DTM
	Flood Defence Locations (NFCDD)	EA / DEFRA - National Flood & Coastal Defence Database.	Point and polyline data with meta-data showing defence locations, standard of service and condition	Y		Shows where there are existing defences, heights, type and design standard.	Dataset not fully completed or up-to-date. Many fields contain default values.
Tidal	Environment Agency Broad-Scale 200 year flood plain	Provided as GIS layer by EA	polygon layer showing the area that would be expected to flood from the 1 in 200 year still water tidal level assuming no defences	Y		Shows the zones of the study area at risk from the current 1 in 200 year tidal flood	All based on FZ3 broad-scale mapping
	Tidal Limits	Derived from OS Mapping and information provided by EA	Polyline layer delineating tidal limits on Adur and Arun	Y		Allows HDC to identify where areas may be subject to fluvial or tidal flooding	Does not take into account whether structures are tidal limits can accommodate climate change.
	200 year plus climate change 2060	Provided as GIS layer by EA	Polygon layer showing the area that would be expected to flood from the 1 in 200 year plus climate change allowances EA Extreme Flood Outline	Y		Shows the zones of the study area at risk from the 1 in 200 year tidal flood in 2060	High Resolution 2D modelled outlines. Assume no defences. 100yr Tidal Climate change outlines are being updated and remodelled by EA to PPS25. These were not ready at time of publication, but SFRA should be updated with information as soon as it becomes available.

Type	Layer	Source	Description of Layer	Included (Y/N)	Comment	Benefits	Limitations
Tidal	25 year flood plain (ignoring defences)	Provided as GIS layer by EA	Polygon layer showing the area that would be expected to flood from the 1 in 25 year still water tidal level assuming no defences	Y		Shows the zones of the study area at risk from the current 1 in 20 year tidal flood	These only show the flood zones without defences and therefore do not provide details of the defended flood plain
	1000 year flood plain	Provided as GIS layer by EA	Based on EA Broad-scale modelling Tidal FZ2	Y		Shows the zones of the study area at risk from the current 1 in 1000 year tidal flood.	All based on FZ2 broad-scale mapping
	1000 year flood plain 2060	Provided as GIS layer by EA	Polygon layer showing the area that would be expected to flood from the 1 in 1000 year still water tidal level assuming no defences	Y		Shows the zones of the study area at risk from the 1 in 1000 year tidal flood in 2060	High Resolution 2D modelled outlines. Assume no defences. 100yr Tidal Climate change outlines are being updated and remodelled by EA to PPS25. These were not ready at time of publication, but SFRA should be updated with information as soon as it becomes available.
	Digital Terrain Model	Provided by EA	Reference Only	Y			SAR 5m DTM
	Flood Defence Locations (NFCDD)	EA / DEFRA - National Flood & Coastal Defence Database.	Point and polyline data with meta-data showing defence locations, standard of service and condition	Y		Shows where there are existing defences, heights, type and design standard.	Dataset not fully completed or up-to-date. Many fields contain default values.
Groundwater	Groundwater Vulnerability Maps	Provided as GIS layer by EA	Polygon layers showing major aquifers and their vulnerability	Y		Broadly shows extents of aquifers in the district. Where aquifers are highly vulnerable, they often have a more permeable covering and, together with dry valley and watercourse networks, potential groundwater flooding areas can be identified.	Coarse assessment of potential areas where GW flooding could occur. This is not foolproof and is based on assumptions. Where necessary, detailed groundwater flooding studies should be undertaken at SSFRA.
	Dry Valleys	review of GWV maps and DTM & All watercourse layer	Polyline layer showing areas they may be susceptible to flooding from springhead resurgence	N	Limited data	Dry valleys can easily be seen alongside the rising trends in groundwater data.	Provides possible locations of groundwater resurgence however no frequency or magnitude can be assigned to any possible resurgence and flooding
	CEH Watercourse Network - BFI classification	Centre for Ecology and Hydrology (CEH), Wallingford. SW interpreted BFI classification using FEH CD-ROM (v1) and also outputs from Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS 23), DEFRA – Making Space for Water, 2004	Polyline layer showing watercourses that have a high BFI (Base Flow Index), i.e. watercourses that are predominantly fed by groundwater.	Y		Used in conjunction with GWV maps, dry valley data, and OS Mapping to identify stream and watercourses that may be susceptible to groundwater resurgence	
	Groundwater monitoring points	Locations of groundwater monitoring points provided by the EA	Point data layer for use in groundwater contouring	N	Limited data	Identification of groundwater monitoring points within HDC - potential for future use in gathering groundwater flooding data	There are limited GW monitoring boreholes in HDC.
	South Downs Groundwater Emergence Zone	Derived from Appendix Volume 2, Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS 23), DEFRA – Making Space for Water, 2004	Polygon Layer coarsely created from Groundwater Flooding Scoping Study	Y		Study identified several groundwater emergence zones in region. A more accurate representation of potential groundwater flooding area than methods above.	Very broad scale and no frequency or magnitude can be assigned to any possible resurgence and flooding
	OS Mapping	HDC provided OS Mapping under contractor license	1:25k and 1:50k OS raster maps for use in GIS	Y		Provides background mapping to other GIS layers.	Designed for use at 1:25k and 1:50k scales
	Historical records	From records provided by stakeholders showing evidence/anecdotal evidence of groundwater flooding only	Point data layer to be shown on dry valleys map	N	Very Limited Data	Shows areas that have experienced flooding in the past and therefore potential fro future flooding	Very limited evidence available and most is anecdotal.

Type	Layer	Source	Description of Layer	Included (Y/N)	Comment	Benefits	Limitations
Overland Flow	Dry Valleys	Review of GWV maps and DTM & All watercourse layer	Polyline layer showing areas they may be susceptible to flooding from springhead resurgence	N	Limited data	Dry valleys can easily be seen alongside the rising trends in groundwater data.	Provides possible locations of groundwater resurgence however no return period can be assigned to any possible resurgence and flooding
	OS Mapping	HDC provided OS Mapping under contractor license	1:25k and 1:50k OS raster maps for use in GIS	Y		Provides background mapping to other GIS layers.	Designed for use at 1:25k and 1:50k scales
	Historical records	From records provided by stakeholders showing evidence/anecdotal evidence of groundwater flooding only	Point polygon and polyline data showing areas of overland flow	Y	Limited data	Shows areas that have experienced overland flooding in the past and therefore is likely in the future without intervention.	Very limited dataset. Most instances recorded are circumstantial and subjective.
Other	Sewer Flooding History	Records of sewer flooding from Water company records.	Point data layer showing points of flooding with records of date of incident, location, extent, source, cause	Y		Indicates areas that are most prone to flooding as have experienced flooding in the last 10 years within a postcode area due to hydraulic incapacity.	The extent and source of the flooding is not known and cannot be displayed in this layer.
	OS Mapping	HDC provided OS Mapping under contractor license	1:25k and 1:50k OS raster maps for use in GIS	Y		Provides background mapping to other GIS layers.	Designed for use at 1:25k and 1:50k scales
	Tidal Limits	Derived from OS Mapping and information provided by EA	Polyline layer delineating tidal limits on Adur and Arun	Y		Allows HDC to identify where areas may be subject to fluvial or tidal flooding	Does not take into account whether structures are tidal limits can accommodate climate change.
	Reservoirs and Large Water Bodies	GIS Layer created from EA records (Exeter Office), HDC Drainage Dept. and OS Mapping	Polygon layer showing large water bodies including those falling under Reservoirs Act	Y		Allows identification of areas downstream of large reservoirs and water bodies. Delineation of residual risk to potential future sites.	Condition and capacity of water bodies not known at this time. Breach/overtopping scenarios not available.
Mitigation	Flood Warning areas	Provided as GIS layer by EA	Polygon layer showing areas benefiting from flood warning and emergency plans with query details presenting what is involved in each.	Y		Indicates which areas are covered by the flood warning system,	
	NFCDD	EA / DEFRA - National Flood & Coastal Defence Database.	Point & Polyline layer showing NFCDD entries within the study area protecting from all flood sources and unofficial defences, providing details of the type of structure, operating/responsible authority	Y		Shows where there are existing defences, heights, type and design standard.	Dataset not fully completed or up-to-date. Many fields contain default values.
	Unofficial defences	From a review of topographic data		Y		Indicates where natural landforms or engineered structures may act to provide an unofficial defence from tidal flooding	This can only provide a broad assessment of unofficial defences and may miss smaller features that could look to mitigate flood risk.
	Areas benefiting from defences	Provided as GIS layer by EA	Polygon layer showing areas benefiting from flood defences	N	No data for Horsham		The polygon data is not currently available for the HDC area.
	Groundwater Vulnerability Maps	Provided as GIS layer by EA	Polygon layers showing major aquifers and their vulnerability	Y		Broadly shows extents of aquifers in the district. Where aquifers are highly vulnerable, they often have a more permeable covering and, together with dry valley and watercourse networks, potential groundwater flooding areas can be identified.	Coarse assessment of potential areas where GW flooding could occur. This is not foolproof and is based on assumptions. Where necessary, detailed groundwater flooding studies should be undertaken at SSFRA.
	Source Protection Zones	From inform provided by EA	Polygon layer showing areas covered by Source Protection Zones for use in identifying where SuDS may be appropriate.	Y		Shows clearly the areas where the groundwater is protected by the Environment Agency.	The designation may not consider fractures in the strata at a greater radius where pollutants could reach the source protection zone.

Type	Layer	Source	Description of Layer	Included (Y/N)	Comment	Benefits	Limitations
Planning	LPA/study area Boundary	Provided as GIS Layer by HDC	Polygon layer showing Lap administrative area on 1:50,000 or 1:10,000 base mapping	Y		Clearly identifies the study boundary	
	Urban Areas	Provided as GIS Layer by HDC	Polygon Layer showing urban areas				
	OS Mapping	HDC provided OS Mapping under contractor license	1:25k and 1:50k OS raster maps for use in GIS	Y		Provides background mapping to other GIS layers.	Designed for use at 1:25k and 1:50k scales
	Allocations	Provided as GIS Layer by HDC	Polygon layer showing development site locations & boundaries	Y		Identifies proposed allocation sites	Any additional sites in the future must be added
	Alternative Allocations/Failed Sites	Provided as GIS Layer by HDC	Polygon layer showing alternative development site locations & boundaries	Y		Identifies alternative/failed allocation sites	
	Administrative Areas	Provided as GIS Layer by HDC	Polygon GIS layer showing areas administered by LPAs, EA Area offices, Utility companies. IDBs etc	Y		Clarifies the administrative areas covering the study area	
	Other land use pressures (AONB, SSSIs)	From records provided by stakeholders (English Nature, LPA etc)	Polygon GIS layer showing other land use pressures on Flood Zone 1.	Y		Clearly shows what other land use pressures must be considered when allocating development sites.	

Appendix E: Site assessments for use in Sequential Test

Settlement	LDF Allocation		Easting	Northing	Site Area	Flood Zone 2		Flood Zone 3 CC		Flood Zone 3a		Flood Zone 3b	
	Policy	Notes			(ha)	Area (Ha)	% of Area	Area (Ha)	% of Area	Area (Ha)	% of Area	Area (Ha)	% of Area
Southwater	AL1	Southwater Village Centre	515787.030	126322.510	3.097	-	-	-	-	-	-	-	-
Upper Beeding	AL1	Greenfield Depot Upper Beeding	519675.410	110292.900	0.241	-	-	-	-	-	-	-	-
Pulborough	AL1	Oddstones Stane Street Codmore Hill	505341.180	119743.820	0.769	-	-	-	-	-	-	-	-
Billinghurst	AL1	Trees East Street Billingshurst	509140.010	125855.660	0.579	-	-	-	-	-	-	-	-
Billinghurst	AL1	Station Mills Daux Road Billingshurst	508833.340	125056.220	0.138	-	-	-	-	-	-	-	-
Pulborough	AL1	Wadey Builders Yard Stane Street Billingshurst	508277.890	125152.750	0.430	-	-	-	-	-	-	-	-
Ashington	AL1	Applegarth & Oak Tree Cottage Ashington	513199.340	116678.120	0.490	-	-	-	-	-	-	-	-
Storrington	AL1	Foxmead Meadowside Storrington	509000.660	114197.550	0.387	-	-	-	-	-	-	-	-
Storrington	AL1	Abbey House Ravenscroft Storrington	508853.590	113877.530	0.343	-	-	-	-	-	-	-	-
Storrington	AL1	Birklands Kithurst Lane Storrington	508152.270	114019.720	0.460	-	-	-	-	-	-	-	-
Storrington	AL1	Mogren House Amberley Road Storrington	508095.830	114344.500	0.527	-	-	-	-	-	-	-	-
Broadbridge Heath	AL1	Vauxhall Stevens Broadbridge Heath	514658.200	131554.810	0.889	-	-	-	-	-	-	-	-
Horsham	AL1	1 & 2 Works Cottages Hills Farm Lane Horsham	516108.210	130252.400	0.223	-	-	-	-	-	-	-	-
Horsham	AL1	137 Crawley Road Horsham	519080.910	131904.280	0.180	-	-	-	-	-	-	-	-
Horsham	AL1	183-186 Comptons Lane Horsham	518896.250	131167.330	0.684	-	-	-	-	-	-	-	-
Horsham	AL1	19-27 Forest Road Horsham	519743.990	132061.500	0.479	-	-	-	-	-	-	-	-
Horsham	AL1	64-68 Hurst Road Horsham	517700.680	131284.450	0.209	-	-	-	-	-	-	-	-
Horsham	AL1	9-13 Crawley Road Horsham	518658.770	131730.470	0.292	-	-	-	-	-	-	-	-
Horsham	AL1	Bryce Lodge New Street Horsham	517942.650	130795.190	0.298	-	-	-	-	-	-	-	-

Settlement	LDF Allocation		Easting	Northing	Site Area	Flood Zone 2		Flood Zone 3 CC		Flood Zone 3a		Flood Zone 3b	
	Policy	Notes			(ha)	Area (Ha)	% of Area	Area (Ha)	% of Area	Area (Ha)	% of Area	Area (Ha)	% of Area
Horsham	AL1	Cats Protection League Kings Road Horsham	518195.920	131319.520	0.258	-	-	-	-	-	-	-	-
Horsham	AL1	Council Depot 68-70 East Street Horsham	517487.590	130381.630	0.225	-	-	-	-	-	-	-	-
Horsham	AL1	Grandford House 16 Carfax Horsham	517299.300	130669.480	0.146	-	-	-	-	-	-	-	-
Horsham	AL1	Horsham Football Club	517602.840	130169.800	1.745	-	-	-	-	-	-	-	-
Horsham	AL1	Laundry Site Arun Road Horsham	518114.270	130018.560	0.261	-	-	-	-	-	-	-	-
Horsham	AL1	Northbrook College Hurst Road Horsham	517352.750	131581.440	0.178	-	-	-	-	-	-	-	-
Horsham	AL1	Piggott Court Kennedy Road Horsham	518004.110	130140.080	0.519	-	-	-	-	-	-	-	-
Horsham	AL1	St Leonards School Horsham	518014.540	130695.610	0.473	-	-	-	-	-	-	-	-
Horsham	AL1	Star Reservoir Comptons Brow Lane Horsham	519090.900	131603.820	0.639	-	-	-	-	-	-	-	-
Horsham	AL1	Texaco Garage Crawley Road Horsham	519305.470	131876.370	0.390	-	-	-	-	-	-	-	-
Horsham	AL1	Tyre shop 39B Brighton Road Horsham	518074.700	130203.460	0.116	-	-	-	-	-	-	-	-
Washington	AL1	Bellamys Garage London Road Washington	512105.520	113310.300	0.524	-	-	-	-	-	-	-	-
Rudgwick	AL10	Land at Windacres Farm Rudgwick	509241.400	134122.770	0.524	-	-	-	-	-	-	-	-
Storrington	AL11	St Josephs Abbey Storrington	508704.080	114070.650	1.176	-	-	-	-	-	-	-	-
Sullington	AL12	RAFA Site Sullington	509520.910	114031.330	0.535	-	-	-	-	-	-	-	-
Henfield	AL13	Parsonage Farm Henfield	521042.850	116746.120	6.043	-	-	-	-	-	-	-	-
Horsham	**AL2**	**Lifestyle Ford Bishopric Horsham**	**516717.510**	**130656.250**	**1.400**	**0.074**	**0.053**	**0.074**	**0.053**	**0.074**	**0.053**	**0.065**	**0.046**
Horsham	AL3	Parsonage Farm Horsham	518375.110	131906.340	8.152	-	-	-	-	-	-	-	-
Horsham	AL4	Roffey Sports & Social Club	519200.210	132148.890	3.657	-	-	-	-	-	-	-	-

Settlement	LDF Allocation		Easting	Northing	Site Area	Flood Zone 2		Flood Zone 3 CC		Flood Zone 3a		Flood Zone 3b	
	Policy	Notes			(ha)	Area (Ha)	% of Area	Area (Ha)	% of Area	Area (Ha)	% of Area	Area (Ha)	% of Area
Pulborough	AL5	Riverside Concrete Stane Street Pulborough	505332.530	119496.050	3.720	-	-	-	-	-	-	-	-
Washington	AL6	RMC Engineering Works Sullington	510989.440	113914.260	10.930	-	-	-	-	-	-	-	-
Ashington	AL7	Land at Meiros Farm Ashington	512731.130	116411.320	1.021	-	-	-	-	-	-	-	-
Billinghurst	AL8	Land at Hammonds East Street Billingshurst	509090.720	125985.230	0.820	-	-	-	-	-	-	-	-
Lower Breeding	AL9	Land at the Plough Lower Beeding	521955.000	127250.040	1.215	-	-	-	-	-	-	-	-
Broadbridge Heath	**CP7**	**Land west of Horsham**	**515460.900**	**130191.740**	**50.580**	**0.548**	**0.011**	**0.070**	**0.001**	**0.025**	**0.000**	**-**	**-**
Broadbridge Heath	**CP7**	**Land west of Horsham**	**515460.900**	**130191.740**	**49.030**	**13.930**	**0.284**	**9.829**	**0.200**	**8.762**	**0.179**	**7.421**	**0.151**
Storrington	AL20	Sandgate	510110.080	114295.160	88.240	-	-	-	-	-	-	-	-
Billingshurst / Codmore Hill	**AL14**	**Brinsbury Centre of Excellence Adversane**	**506746.920**	**122558.290**	**58.760**	**1.444**	**0.025**	**1.444**	**0.025**	**1.205**	**0.021**	**1.205**	**0.021**
Steyning / Upper Beeding	**AL15**	**Shoreham Cement Works**	**520351.710**	**108818.620**	**39.420**	**0.182**	**0.005**	**0.215**	**0.005**	**0.215**	**0.005**	**0.215**	**0.005**
Horsham / Warnham	AL16	Warnham & Wealden Brickworks	517232.940	134381.340	23.040	-	-	-	-	-	-	-	-
Southwater	AL18	Fire Station Wilberforce Way Southwater	515996.450	127716.040	0.208	-	-	-	-	-	-	-	-
Billingshurst	AL17	Car Park Link Billingshurst	508644.530	126037.270	0.017	-	-	-	-	-	-	-	-
Storrington	AL19	Meadowside Storrington	509122.580	114081.970	0.080	-	-	-	-	-	-	-	-

Appendix F: Evidence of Sequential Test undertaken in June 2007

The following points summarise the results from the application of the Sequential Test.

- 47 of the potential allocation sites lie within Flood Zone 1, 4 sites had areas within Flood Zones 2 and 3 (see Table 8.1 below).

Table 0-1: Potential allocations sites at risk of flooding identified following Sequential Test by HDC.

LDF Allocation		Grid Ref	Site Area	Flood Zone 2		Flood Zone 3 + CC		Flood Zone 3a		Flood Zone 3b	
Policy	Notes		(ha)	Area (Ha)	% of Area	Area (Ha)	% of Area	Area (Ha)	% of Area	Area (Ha)	% of Area
AL2	Lifestyle Ford Bishopric Horsham	E 516717.51 N 130656.25	1.400	0.074	5.26%	0.074	5.26%	0.074	5.25%	0.065	4.63%
CP7	Land west of Horsham west	E 515460.90 N 130191.74	50.580	0.548	1.08%	0.070	0.14%	0.025	0.05%	0.025	0.05%
	Land west of Horsham east	E 515460.90 N 130191.74	49.030	13.930	28.41%	9.829	20.05%	8.762	17.87%	7.421	15.14%
AL14	Brinsbury Centre of Excellence	E 506746.92 N 122558.29	58.760	1.444	2.46%	1.444	2.46%	1.205	2.05%	1.205	2.05%
AL15	Shoreham Cement Works	E 520351.71 N 108818.62	39.420	0.182	0.46%	0.215	0.55%	0.215	0.55%	0.215	0.55%

- Information presented within the Strategic Flood Risk Assessment has allowed Horsham District Council to redefine land use policies using the sequential approach. This has located all built environment within Flood Zone 1, allowing only informal open spaces and water compatible development within Flood Zones 2 and 3.

- It is recommended that a Level 2 SFRA is not required at present because all development can be located within Flood Zone 1. However, changes to the potential allocation sites would require revision of the Sequential Test and where required may facilitate the application of the Exception Test, thus requiring a Level 2 SFRA.

It is noted that CP7 is a strategically important site and has been adopted within the Core Strategy. Identification of alternative sites was therefore not possible. However, using the sequential approach, Horsham District Council has reallocated areas within these sites to ensure that development is located within areas of lowest flood risk. Appendix H provides the revised site layouts proposed for those sites identified in Table 8.1.

Sites Identified for Development that fall within Flood Zones 2 & 3	Application of Sequential Test	Sequential Test – Passed or Failed?
Land West of Horsham Policy CP7 Core Strategy (2007).	The River Arun flows through the site, which lies on either side of the A24. The river flows to the south of the land allocated in CP7 to the west of the A24 and a small part (0.005 km^2 – 0.5ha) of its Flood Zone 2 floodplain extends within the development boundary. The river flows to the east of the land allocated in CP7 to the east of the A24 and flows across the site thereby dividing it into two. 0.139 km^2 (13.9ha) of this part of the site is affected by the river and its Flood Zone 2 floodplain. The site has been critically assessed for development but the following overriding factors have contributed to the decision to allocate the site for development in Policy CP7 of the Core Strategy (2007): • The development strategy for Horsham District, as set out in the Core Strategy (2007), seeks to make the best use of previously-developed land in the most sustainable locations in the first instance, then identifies land for a strategic location for development as an urban extension to the most sustainable settlement in the District; Horsham. Horsham has a full range of facilities and services, a broad employment base and good transport links to the wider area. • Land to the north, east and south of the town has been assessed for its development potential to accommodate a strategic development of 2,000 homes and other uses but no other appropriate sites have been found. The A264 Northern Bypass has created a firm boundary to the north of the town and land to the east is designated as High Weald Area of Outstanding Natural Beauty. Further expansion to the south is severely constrained by significant landscape features such as Denne Hill. • Land to the west of Horsham is the most sustainable location for a strategic development and can be developed for a mix of uses including a substantial number of affordable homes where there is the greatest demand. This has been taken into account when assessing the site and, following review of the Level 1 SFRA, it is proposed to develop the land outside Flood Zones 2 and 3 and to allocate land adjacent to the River Arun for informal open space in the West of Horsham Masterplan Supplementary Planning Document that is due to be published for public consultation in Autumn 2007.	Passed

Sites Identified for Development that fall within Flood Zones 2 & 3	Application of Sequential Test	Sequential Test – Passed or Failed?
Lifestyle Ford, Bishopric, Horsham **Policy AL2 Site Specific Allocations of Land DPD**	The River Arun flows to the south of the site and a small part (0.0007 km^2 – 0.07ha) of its Flood Zone 2 floodplain extends within the development site boundary. The site has been critically assessed for development but the following overriding factors have contributed to the decision to allocate the site for development: • The development strategy for Horsham District, as set out in the Core Strategy (2007), looks in the first instance to the re-use of suitable previously developed land in the most sustainable locations. • Horsham is the most sustainable location in the District and is identified as a Category 1 settlement. • The Lifestyle Ford site lies within walking distance of the town's services and facilities and close to sustainable travel choices. It is currently in commercial use but the business is looking to relocate possibly within the West of Horsham development area. • The site is in a highly sustainable location and can be developed for a mix of uses including affordable homes where there is the greatest demand. This has been taken into account when assessing the site and, following the Level 1 SFRA, it is proposed to develop the land outside Flood Zones 2 and 3 and to allocate land adjacent to the River Arun for informal open space. Such sustainable town centre sites rarely become available and a majority of the site (around 1.3ha) lies outside the floodplain. The site is allocated in the Site Specific Allocations of Land DPD for a mix of uses, including open space on land included within the floodplain, with the requirement that a detailed site specific FRA is prepared by the developer.	Passed

Sites Identified for Development that fall within Flood Zones 2 & 3	Application of Sequential Test	Sequential Test – Passed or Failed?
Centre of Rural Excellence at Brinsbury Policy AL14 Site Specific Allocations of Land DPD	A small tributary of the River Arun flows through the southern fringe of the Brinsbury College grounds. A small area (0.0144km2 – 1.44ha) of the site lies within Flood Zone 2 and 3. This equates to approximately 2.5% of the total allocation area of 0.58km2 (58ha). Although this site is classified as an employment site, it should be noted that the opportunities for the redevelopment and/or reorganisation of the Campus are not large scale and may include replacement and/or new buildings. The site has been critically assessed for its suitability to accommodate redevelopment of the Campus, but the following overriding factors have contributed to the decision to allocate the site: • To allow Brinsbury College to continue to develop its facilities as a focus for rural enterprise activities and a centre of excellence, a small amount of development is necessary. Developing the Brinsbury Campus as a centre of rural excellence would enable considerable potential gains for the college in the form of vocational training for students, in conjunction with on-site enterprises to help meet the demands of the rural economy. It is likely that any employment provision on the site would be ancillary to the predominant land use. • Although the site is in a rural location, detached from a full range of services and facilities, it has good access to the road network via the A29 and could potentially have improved public transport links via Pulborough and Billingshurst railway stations. • The nature of this site for a Centre of Rural Excellence would require sensitive design and development and should have regard to the rural location of the campus. Nevertheless, it is considered that there are considerable benefits to be gained for the college and its students and the rural economy as a whole. All these factors have been taken into account when assessing this site and it is proposed to develop the land outside Flood Zones 2 and 3 and to allocate land adjacent to the watercourse as informal open space. Within the Site Specific Allocations of Land DPD, Policy AL14, a detailed site specific flood risk assessment is required as a condition of planning permission.	Passed

Sites Identified for Development that fall within Flood Zones 2 & 3	Application of Sequential Test	Sequential Test – Passed or Failed?
Shoreham Cement Works Policy AL15 Site Specific Allocations of Land DPD	The River Adur flows through the Shoreham Cement Works site and marks the boundary between Horsham District and Adur District. A majority of the site (45 of the overall 48 hectares) lies within Horsham District and it is this land that is allocated in Policy AL15. The river flows to the east of the allocated site and part (0.0022 km^2 – 2.2ha) of its floodplain extends within the development site boundary. The site has been critically assessed for development but the following overriding factors have contributed to the decision to allocate the site for development: • Shoreham Cement Works is a large, unsightly disused cement works within the Sussex Downs Area of Outstanding Natural Beauty that is currently being considered for designation as a National Park. The cement works has been closed for over 10 years. • Horsham Council, together with Adur District Council and the Sussex Downs Joint Committee wish to see major environmental and landscape improvements that are compatible with the site's sensitive location. • It is recognised that in order to achieve this objective development, as part of a comprehensive scheme, will be needed. • The site is considered suitable for major employment use, leisure and/or tourism, limited residential development and a waste treatment facility. • The Core Strategy (2007) includes employment development as part of the restoration of this site (Policy CP10) as it will also contribute to the regeneration and economic needs of the Sussex Coast Sub-Region. • The proposal would help the management of resources through waste treatment facilities and help reduce greenhouse gas emissions. All these factors have been taken into account when assessing this site and it is proposed to develop the land outside Flood Zones 2 and 3 and to allocate land adjacent to the River Adur for informal open space, which will be set out in the Development Brief that is required in Policy AL15 of the Site Specific Allocations of Land DPD. Given the size of the site and the potential flood risk, a detailed site specific FRA will be required at Master Planning Stage.	Passed

Appendix G: Sustainable Drainage Systems Review

Traditionally, built developments have utilised piped drainage systems to manage storm water and convey surface water run-off away from developed areas as quickly as possible. Typically, these systems connect to the public sewer system for treatment and/or disposal to local watercourses. Whilst this approach rapidly transfers storm water from developed areas, the alteration of natural drainage processes can potentially impact on downstream areas by increasing flood risk, reduction in water quality, loss of water resource and detriment to wildlife. Therefore, receiving watercourses have greater sensitivity to rainfall intensity, volume and catchment land uses post development.

The up rating of sewer systems to accommodate increased surface water from new development is constrained by existing development and cost. Therefore, the capacity of the system becomes inadequate for the increased volumes and rates of surface water runoff. This results in an increase in flood risk from sewer sources and pollution of watercourses. In addition, the implications of climate change on rainfall intensities, leading to flashier catchment/site responses and surcharging of piped systems may increase.

In addition, as flood risk has increased in importance within planning policy, a disparity has emerged between the design standard of conventional sewer systems (1 in 30 year) and the typical design standard flood (1 in 100 year). This results in drainage inadequacies for the flood return period developments need to consider, often resulting in potential flood risk from surface water/combined sewer systems.

A sustainable solution to these issues is to reduce the volume and/or rate of water entering the sewer system and watercourses.

What are Sustainable Drainage Systems?

PPS25 indicates that Regional Planning Bodies and Local Authorities should promote the use of Sustainable Drainage Systems (SuDS) for the management of surface water runoff generated by development. In addition, drainage of rainwater from roofs and paved areas around buildings should comply with the 2002 Amendment of Building Regulations Part H (3). The requirements are as follows:

1. Adequate provision shall be made for rainwater to be carried from the roof of the building.
2. Paved areas around the building shall be so constructed as to be adequately drained.
3. Rainwater from a system provided pursuant to sub-paragraphs (1) or (2) shall discharge to one of the following in order of priority:

    a) An adequate soakaway or some other adequate infiltration system; or where that is not reasonably practicable;
    b) A watercourse; or where that is not reasonably practicable
    c) A sewer.

SuDS seek to manage surface water as close to its source as possible, mimicking surface water flows arising from the site, prior to the proposed development. Typically this approach involves a move away from piped systems to softer engineering solutions inspired by natural drainage processes.

SuDS should be designed to take into account the surface run-off quantity, rates and also water quality ensuring their effective operation up to and including the 1 in 100 year design standard flood including an increase in peak rainfall up to 30% to account from climate change.

Wherever possible, a SuDS technique should seek to contribute to each of the three goals identified below with the favoured system contributing significantly to each objective. Where possible SuDS solutions for a site should seek to:

1. Reduce flood risk (to the site and neighbouring areas),
2. Reduce pollution, and,
3. Provide landscape and wildlife benefits.

These goals can be achieved by utilising a management plan incorporating a chain of techniques, (as outlined in Interim Code of Practice for Sustainable Drainage Systems 2004), where each component adds to the performance of the whole system:

Prevention	good site design and upkeep to prevent runoff and pollution (e.g. limited paved areas, regular pavement sweeping)
Source control	runoff control at/near to source (e.g. rainwater harvesting, green roofs, pervious pavements)
Site control	water management from a multitude of catchments (e.g. route water from roofs, impermeable paved areas to one infiltration/holding site)
Regional control	integrate runoff management systems from a number of sites (e.g. into a detention pond)

This chapter presents a summary of the SuDS techniques currently available and a review of the soils and geology of the study area, enabling the local authorities to identify where SuDS techniques could be employed in development schemes.

The application of SuDS is not limited to a single technique per site. Often a successful SuDS solution will utilise a combination of techniques, providing flood risk, pollution and landscape/wildlife benefits. In addition, SuDS can be employed on a strategic scale, for example with a number of sites contributing to large scale jointly funded and managed SuDS. It should be noted, each development site must offset its own increase in runoff and attenuation cannot be “traded” between developments.

Planning

All relevant organisations should meet at an early stage to agree on the most appropriate drainage system for the particular development. These organisations may include the Local Authority, the Sewage Undertaker, Highways Authority, and the Environment Agency. There are, at present, no legally binding obligations relating to the provision and maintenance of SuDS. However, PPS25 states that:

'where the surface water system is provided solely to serve any particular development, the construction and ongoing maintenance costs should be fully funded by the developer.'

The most appropriate agreement is under Section 106 of the Town and Country Planning Act. Under this agreement a SuDS maintenance procedure can be determined.

SuDS Techniques

SuDS techniques can be used to reduce the rate and volume and improve the water quality of surface water discharges from sites to the receiving environment (i.e. natural watercourse or public sewer etc). Various SuDS techniques are available and operate on two main principles:

- Infiltration
- Attenuation

All systems generally fall into one of these two categories, or a combination of the two.

The design of SuDS measures should be undertaken as part of the drainage strategy and design for a development site. A ground investigation will be required to access the suitability of using infiltration measures, with this information being used to assess the required volume of on-site storage. Hydrological analysis should be undertaken using industry approved procedures, to ensure a robust design storage volume is obtained.

During the design process, liaison should take place with the Local Planning Authority, the Environment Agency and if necessary, the Water Undertake to establish a satisfactory design methodology and permitted rate of discharge from the site.

Infiltration SuDS

This type of Sustainable Drainage System relies on discharges to ground, where suitable ground conditions are suitable. Therefore, infiltration SuDS are reliant on the local ground conditions (i.e. permeability of soils and geology, the groundwater table depth and the importance of underlying aquifers as a potable resource) for their successful operation.

Various infiltration SuDS techniques are available for directing the surface water run-off to ground. Development pressures and maximisation of the developable area may reduce the area available for infiltration systems but this should not be a limiting factor for the use of SuDS. Either sufficient area is required for infiltration or a combined approach with attenuation could be used

to manage surface water runoff. Attenuation storage may be provided in the sub-base of a permeable surface, within the chamber of a soakaway or as a pond/water feature.

Infiltration measures include the use of permeable surfaces and other systems that are generally located below ground.

Permeable Surfaces

Permeable surfaces are designed to allow water to drain through to a sub-base at a rate greater than the predicted rainfall for a specified event. Permeable surfaces act by directly intercepting the rain where it falls and control runoff at source. Runoff during low intensity rainfall events is prevented by permeable surfaces. During intense rainfall events runoff generation may occur from permeable surfaces. The use of permeable sub-base can be used to temporarily store infiltrated run-off underneath the surface and allows the water to percolate into the underlying soils. Alternatively, stored water within the sub-base may be collected at a low point and discharged from the site at an agreed rate.

Programmes should be implemented to ensure that permeable surfaces are kept well maintained to ensure the performance of these systems is not reduced. The use of grit and salt during winter months may adversely affect the drainage potential of certain permeable surfaces.

Types of permeable surfaces include:

- Grass/landscaped areas
- Gravel
- Solid Paving with Void Spaces
- Permeable Pavements

Sub-surface Infiltration

Where permeable surfaces are not a practical option more defined infiltration systems are available. In order to infiltrate the generated run-off to ground, a storage system is provided that allows the infiltration of the stored water into the surrounding ground through both the sides and base of the storage. These systems are constructed below ground and therefore may be advantageous with regards to the developable area of the site. Consideration needs to be given to construction methods, maintenance access and depth to the water table. The provision of large volumes of infiltration/sub-surface storage has potential cost implications. In addition, these systems should not be built within 5 m of buildings, beneath roads or in soil that may dissolve or erode.

Various methods for providing infiltration below the ground include:

- Geocellular Systems
- Filter Drain
- Soakaway (Chamber)
- Soakaway (Trench)
- Soakaway (Granular Soakaway)

Table H-1: Suitability of Infiltration Methods towards with respect to the wider aims of SuDS.

INFILTRATION METHOD	REDUCE FLOOD RISK (Y/N)	REDUCE POLLUTION (Y/N)	LANDSCAPE AND WILDLIFE BENEFITS (Y/N)
Permeable Surface	Y	Y	N
Sub-surface Infiltration	Y	Y	N

Attenuation SuDS

If ground conditions are not suitable for infiltration techniques then management of surface water runoff prior to discharge should be undertaken using attenuation techniques. This technique attenuates discharge from a site to reduce flood risk both within and to the surrounding area. It is important to assess the volume of water required to be stored prior to discharge to ensure adequate provision is made for storage. The amount of storage required should be calculated prior to detailed design of the development to ensure that surface water flooding issues are not created within the site.

The rate of discharge from the site should be agreed with the Local Planning Authority and the Environment Agency. If surface water cannot be discharged to a local watercourse then liaison with the Sewer Undertaker should be undertaken to agree rates of discharge and the adoption of the SuDS system.

Large volumes of water may be required to be stored on site. Storage areas may be constructed above or below ground. Depending on the attenuation/storage systems implemented, appropriate maintenance procedures should be implemented to ensure continued performance of the system. On-site storage measures include basins, ponds, and other engineered forms consisting of underground storage.

Basins

Basins are areas that have been contoured (or alternatively embanked) to allow for the temporary storage of run-off from a developed site. Basins are designed to drain free of water and remain waterless in dry weather. These may form areas of public open space or recreational areas. Basins also provide areas for treatment of water by settlement of solids in ponded water and the absorption of pollutants by aquatic vegetation or biological activity. The construction of basins uses relatively simple techniques. Local varieties of vegetation should be used wherever possible and should be fully established before the basins are used. Access to the basin should be provided so that inspection and maintenance is not restricted. This may include inspections, regular cutting of grass, annual clearance of aquatic vegetation and silt removal as required.

Ponds

Ponds are designed to hold the additional surface water run-off generated by the site during rainfall events. The ponds are designed to control discharge rates by storing the collected run-off and releasing it slowly once the risk of flooding has passed. Ponds can provide wildlife habitats, water features to enhance the urban landscape and, where water quality and flooding risks are

acceptable, they can be used for recreation. It may be possible to integrate ponds and wetlands into public areas to create new community ponds. Ponds and wetlands trap silt that may need to be removed periodically. Ideally, the contaminants should be removed at source to prevent silt from reaching the pond or wetland in the first place. In situations where this is not possible, consideration should be given to a small detention basin placed at the inlet to the pond in order to trap and subsequently remove the silt. Depending on the setting of a pond, health and safety issues may be important issues that need to be taken into consideration. The design of the pond can help to minimise any health and safety issues (i.e. shallower margins to the pond reduce the danger of falling in, fenced margins).

Various types of ponds are available for utilising as SuDS measures. These include:

- Balancing/Attenuating Ponds
- Flood Storage Reservoirs
- Lagoons
- Retention Ponds
- Wetlands

Table H-2: Suitability of Attenuation Methods towards the Three Goals of Sustainable Drainage Systems.

INFILTRATION METHOD	REDUCE FLOOD RISK (Y/N)	REDUCE POLLUTION (Y/N)	LANDSCAPE AND WILDLIFE BENEFITS (Y/N)
Basins	Y	Y	Y
Ponds	Y	Y	Y

Alternative Forms of Attenuation

Site constraints and limitations such as developable area, economic viability and contamination may require engineered solutions to be implemented. These methods predominantly require the provision of storage beneath the ground surface, which may be advantageous with regards to the developable area of the site but should be used only if methods in the previous section cannot be used. When implementing such approaches, consideration needs to be given to construction methods, maintenance access and to any development that takes place over the storage facility. The provision of large volumes of storage underground also has potential cost implications.

Methods for providing alternative attenuation include:

- Deep Shafts
- Geocellular Systems
- Oversized Pipes
- Rainwater Harvesting
- Tanks
- Green Roofs

In some situations it may be preferable to combine infiltration and attenuation systems to maximise the management of surface water runoff, developable area and green open space.

Broad-scale assessment of SuDS suitability

The underlying ground conditions of a development site will often determine the type of SuDS approach to be used at development sites. This will need to be determined through ground investigations carried out on-site. A broad-scale assessment of the soils and underlying geology allow an initial assessment of SuDS techniques that may be implemented across Horsham District.

Based on a review of the following maps SuDS techniques that are likely to be compatible with the underlying strata can be suggested:

- The Soil Survey of England and Wales 1983 – 1:250,000 Soils Maps (Sheet 6), and
- The Geological Survey of Great Britain (England and Wales) 1:625,000 Series Superficial and Bedrock Edition South of England (2000)
- The Soils Map Legend and Geological Survey Memoir were also consulted as part of this assessment.

In the design of any drainage system and SuDS approach, consideration should be given to site-specific characteristics and where possible be based on primary data from site investigations. The information presented in the following table is provided as a guide and should not be used to accept or refuse SuDS techniques.

NAME	NOTES	General Geology	General Drainage Assessment	Aquifer Type	Groundwater Vulnerability	SuDS Recommendation	Site Area (Ha)	FRA Requirements
AL1	1 & 2 Works Cottages Hills Farm Lane Horsham	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes			Infiltration and Combined Infiltration	0.22	N/A
AL1	137 Crawley Road Horsham	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_H	Attenuation Systems	0.18	N/A
AL1	183-186 Comptons Lane Horsham	Sandstone	Moderately drained	MINOR	MINOR_H	Infiltration and Combined Infiltration/Attenuation Systems	0.68	The site is not presently as at risk of flooding, however, an FRA will be required to determine suitable drainage and SuDS arrangements
AL1	19-27 Forest Road Horsham	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_H	Attenuation Systems	0.48	Site-specific FRA may be required to carefully consider suitable adoption of SuDS, though site area is less than 0.5Ha.
AL1	64-68 Hurst Road Horsham	Chalk with silty and clay soils	Poorly drained soils on steeper slopes	MINOR	MINOR_H	Attenuation Systems	0.21	N/A
AL1	9-13 Crawley Road Horsham	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MINOR	MINOR_H	Infiltration and Combined Infiltration	0.29	N/A
AL1	Abbey House Ravenscroft Storrington	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MAJOR	MAJOR_I	Infiltration and Combined Infiltration/Attenuation Systems	0.34	Site overlies a major aquifer with an intermediate leaching potential. Site-specific FRA may be required to carefully consider suitable adoption of SuDS, though site area is less than 0.5Ha.
AL1	Applegarth & Oak Tree Cottage Ashington	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils			Attenuation Systems	0.49	Site-specific FRA may be required to carefully consider suitable adoption of SuDS, though site area is less than 0.5Ha.
AL1	Bellamys Garage London Road Washington	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MAJOR	MAJOR_I	Infiltration and Combined Infiltration/Attenuation Systems	0.52	Groundwater fed streams nearby (BFI 0.7-0.9) therefore the potential for groundwater flooding should be considered in site specific FRA. Site overlies a major aquifer with an intermediate leaching potential. Site-specific FRA will need to carefully consider suitable adoption of SuDS.
AL1	Birklands Kithurst Lane Storrington	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MAJOR	MAJOR_I	Attenuation Systems	0.46	Site overlies a major aquifer with an intermediate leaching potential. Site-specific FRA will need to carefully consider suitable adoption of SuDS.
AL1	Bryce Lodge New Street Horsham	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_H	Attenuation Systems	0.30	N/A
AL1	Cats Protection League Kings Road Horsham	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_H	Attenuation Systems	0.26	N/A
AL1	Council Depot 68-70 East Street Horsham	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_H	Attenuation Systems	0.22	N/A

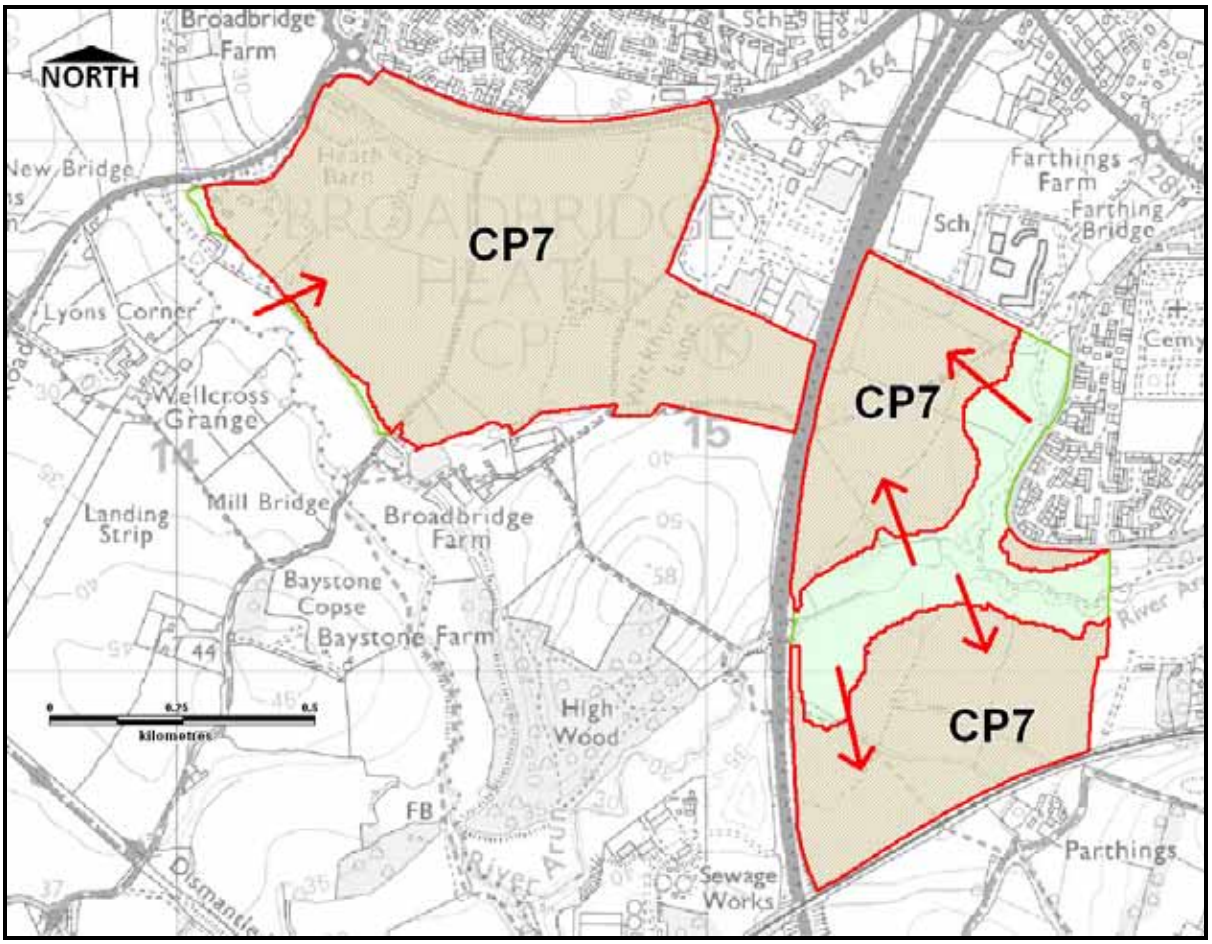
NAME	NOTES	General Geology	General Drainage Assessment	Aquifer Type	Groundwater Vulnerability	SuDS Recommendation	Site Area (Ha)	FRA Requirements
AL1	Foxmead Meadowside Storrington	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MAJOR	MAJOR_I	Infiltration and Combined Infiltration/Attenuation Systems	0.39	Groundwater fed stream nearby (BFI >=0.7) therefore the potential for groundwater flooding should be considered in site specific FRA. Using best available information, the site is not presently shown at risk of flooding. However, given historical flooding, a detailed site specific FRA should be undertaken prior to development.
AL1	Grandford House 16 Carfax Horsham	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MINOR	MINOR_H	Infiltration and Combined Infiltration/Attenuation Systems	0.15	NA
AL1	Greenfield Depot Upper Beeding	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MAJOR	MAJOR_I	Attenuation Systems	0.24	NA
AL1	Horsham Football Club	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MINOR	MINOR_H	Infiltration and Combined Infiltration/Attenuation Systems	1.75	The site is not presently as at risk of flooding, however, an FRA will be required to determine suitable drainage and SuDS arrangements
AL1	Laundry Site Arun Road Horsham	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MINOR	MINOR_H	Infiltration and Combined Infiltration/Attenuation Systems	0.26	NA
AL1	Mogren House Amberley Road Storrington	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MAJOR	MAJOR_I	Attenuation Systems	0.53	Site overlies a major aquifer with an intermediate leaching potential. Site-specific FRA will need to carefully consider suitable adoption of SuDS.
AL1	Northbrook College Hurst Road Horsham	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MINOR	MINOR_H	Infiltration and Combined Infiltration/Attenuation Systems	0.18	NA
AL1	Oddstones Stane Street Codmore Hill	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MAJOR	MAJOR_I	Attenuation Systems	0.77	Site overlies a major aquifer with an intermediate leaching potential. Site specific FRA will need to carefully consider suitable adoption of SuDS.
AL1	Piggott Court Kennedy Road Horsham	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_H	Attenuation Systems	0.52	Site has already been developed.
AL1	Southwater Village Centre	Sandstone	Moderately drained	MINOR	MINOR_L	Infiltration and Combined Infiltration	3.10	Site is located adjacent to a watercourse with no known flood records or risk category. Therefore, a detailed site FRA will be required to assess the potential risk from the watercourse and to determine the most suitable SUDS methods.
AL1	St Leonards School Horsham	Sandstone	Moderately drained	MINOR	MINOR_H	Infiltration and Combined Infiltration	0.47	Site-specific FRA may be required to carefully consider suitable adoption of SuDS, though site area is less than 0.5Ha.
AL1	Star Reservoir Comptons Brow Lane Horsham	Sandstone	Moderately drained			Infiltration and Combined Infiltration	0.64	Using the best available information, the site is not presently at risk of flooding. However, as site is located adjacent to a watercourse, the potential for future flooding should be considered at a site specific FRA together with suitable SuDS methods

NAME	NOTES	General Geology	General Drainage Assessment	Aquifer Type	Groundwater Vulnerability	SuDS Recommendation	Site Area (Ha)	FRA Requirements
AL1	Station Mills Daux Road Billingshurst	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils			Infiltration and Combined Infiltration	0.14	NA
AL1	Texaco Garage Crawley Road Horsham	Sandstone	Moderately drained	MINOR	MINOR_H	Infiltration and Combined Infiltration	0.39	Site-specific FRA may be required to carefully consider suitable adoption of SuDS, though site area is less than 0.5Ha.
AL1	Trees East Street Billingshurst	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_L	Infiltration and Combined Infiltration	0.58	Consideration of suitable SuDS is necessary at Site Specific FRA.
AL1	Tyre shop 39B Brighton Road Horsham	Sandstone - Tunbridge well sands	Moderately drained			Infiltration and Combined Infiltration	0.12	NA
AL1	Vauxhall Stevens Broadbridge Heath	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils			Infiltration and Combined Infiltration	0.89	Consideration of suitable SuDS is necessary at Site Specific FRA.
AL1	Wadey Builders Yard Stane Street Billingshurst	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils			Infiltration and Combined Infiltration	0.43	Site-specific FRA may be required to carefully consider suitable adoption of SuDS, though site area is less than 0.5Ha.
AL10	Land at Windacres Farm Rudgwick	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils			Infiltration and Combined Infiltration/Attenuation Systems	0.52	Consideration of suitable SuDS is necessary at Site Specific FRA.
AL11	St Josephs Abbey Storrington	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately drained soils on gentle slopes	MAJOR	MAJOR_I	Infiltration and Combined Infiltration/Attenuation Systems	1.18	Site overlies a major aquifer with an intermediate leaching potential. In addition, given high housing densities, site specific FRA will need to carefully consider suitable adoption of SuDS.
AL12	RAFA Site Sullington	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately drained soils on gentle slopes	MAJOR	MAJOR_H	Attenuation Systems	0.54	Site overlies a major aquifer with an intermediate leaching potential. In addition, given high housing densities, site specific FRA will need to carefully consider suitable adoption of SuDS.
AL13	Parsonage Farm Henfield	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_I	Infiltration and Combined Infiltration/Attenuation Systems	6.04	Consideration of suitable SuDS is necessary at Site Specific FRA.
AL14	Brinsbury Centre of Excellence Adversane	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_L	Attenuation Systems	58.76	Following Sequential Test, only informal open space to be allocated to portion of site in FZ2 and FZ3. Detailed site specific FRA required to refine Flood Zones and determine overall risk and suitable SuDS methods.
AL15	Shoreham Cement Works	Chalk with silty and clay soils	poorly drained soils on steeper slopes	MAJOR	MAJOR_H	Attenuation Systems	39.42	Following Sequential Test, only informal open space to be allocated to portion of site in FZ2 and FZ3. Detailed site specific FRA required to refine Flood Zones and determine overall risk and suitable SuDS methods.
AL16	Warnham & Wealden Brickworks	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_I	Infiltration and Combined Infiltration/Attenuation Systems	23.04	Consideration of suitable SuDS is necessary at Site Specific FRA.

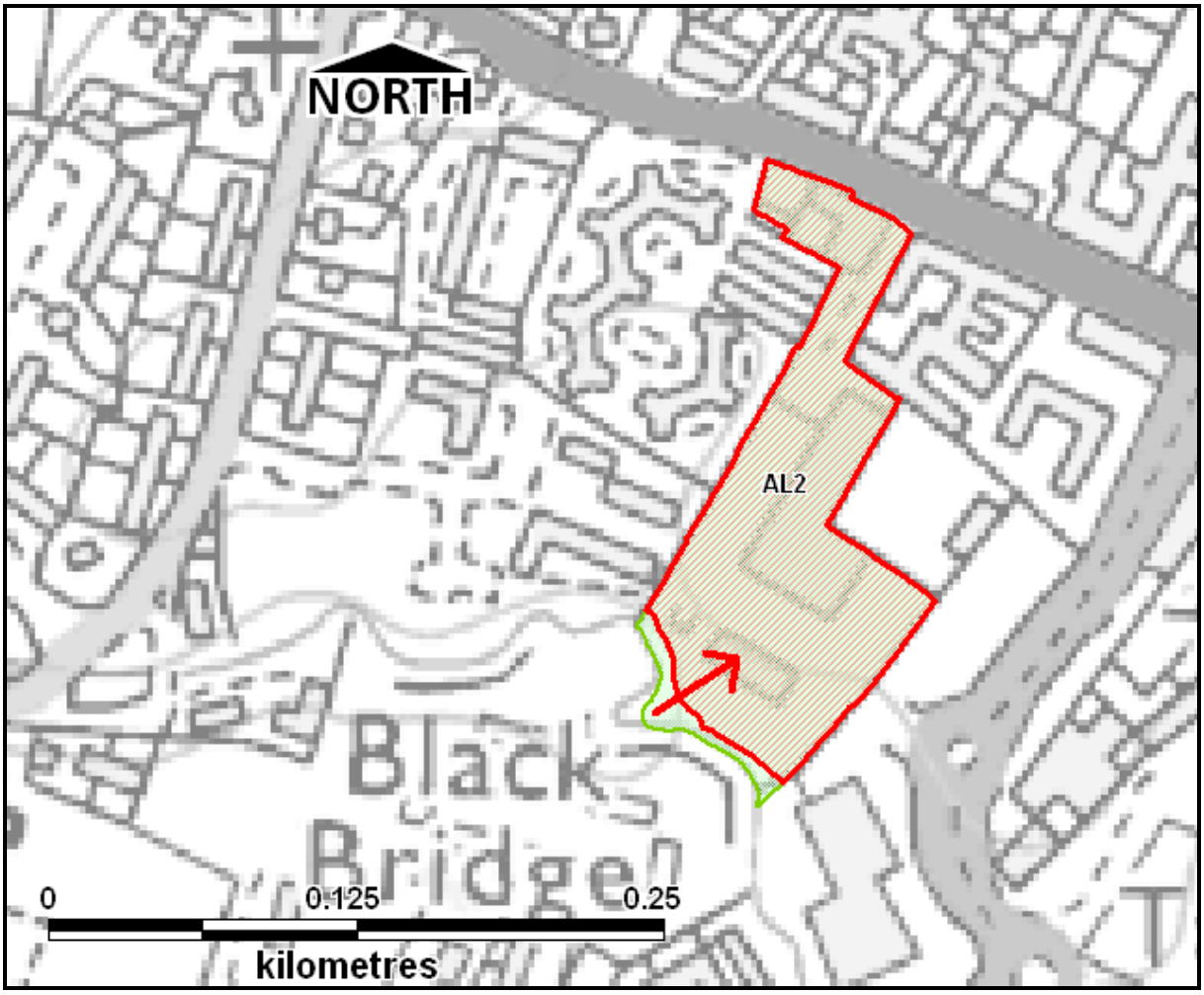
NAME	NOTES	General Geology	General Drainage Assessment	Aquifer Type	Groundwater Vulnerability	SuDS Recommendation	Site Area (Ha)	FRA Requirements
AL17	Car Park Link Billingshurst	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils			Attenuation Systems	0.02	NA
AL18	Fire Station Wilberforce Way Southwater	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_L	Attenuation Systems	0.21	Site-specific FRA may be required to carefully consider suitable adoption of SuDS, though site area is less than 0.5Ha.
AL19	Meadowside Storrington	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately to well drained soils on gentle slopes	MAJOR	MAJOR_I	Attenuation Systems	0.08	NA
AL2	Lifestyle Ford Bishopric Horsham	Sandstone - Tunbridge well sands	Moderately drained	MINOR	MINOR_H	Infiltration and Combined Infiltration	1.40	Following Sequential Test, only informal open space to be allocated to portion of site in FZ2 and FZ3. Detailed site specific FRA required to refine Flood Zones and determine overall risk and suitable SuDS methods.
AL3	Parsonage Farm Horsham	Sandstone - Tunbridge well sands	Moderately drained	MINOR	MINOR_H	Infiltration and Combined Infiltration	8.15	Consideration of suitable SuDS is necessary at Site Specific FRA. Site adjacent to watercourse which should also be assessed in FRA to determine if there is any flood risk.
AL4	Roffey Sports & Social Club	Sandstone - Tunbridge well sands	Moderately drained	MINOR	MINOR_H	Infiltration and Combined Infiltration	3.66	Consideration of suitable SuDS is necessary at Site Specific FRA.
AL5	Riverside Concrete Stane Street Pulborough	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately drained soils on gentle slopes	MAJOR	MAJOR_I	Attenuation Systems	3.72	Site overlies a major aquifer with an intermediate leaching potential. In addition, given high housing densities, site specific FRA will need to carefully consider suitable adoption of SuDS.
AL6	RMC Engineering Works Sullington	Sandstone - Greensand/Gault with fine Sandy Loams	Moderately drained soils on gentle slopes	MAJOR	MAJOR_H	Attenuation Systems	10.93	Site overlies a major aquifer with a high leaching potential. In addition, groundwater fed stream nearby (BFI >=0.8) therefore the potential for groundwater flooding should be considered in site specific FRA together with a careful consideration of suitable adoption of SuDS.
AL7	Land at Meiros Farm Ashington	Sandstone & Mudstone - Weald Clay with deep loamy soils	Moderately drained			Infiltration and Combined Infiltration	1.02	Site not currently shown at direct risk of flooding. Site FRA required to determine suitable SuDS for incorporation into development.
AL8	Land at Hammonds East Street Billingshurst	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_L	Infiltration and Combined Infiltration	0.82	Site FRA required to determine suitable SuDS for incorporation into development.
AL9	Land at the Plough Lower Beeding	Sandstone - Tunbridge well sands	Moderately drained	MINOR	MINOR_I	Infiltration and Combined Infiltration	1.22	Site FRA required to determine suitable SuDS for incorporation into development.
CP7	Land west of Horsham	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_L	Attenuation Systems	50.58	Sequential test has stated that all developed land should be located outside of FZ2 and FZ3. However, an FRA will still be required to assess the impacts of surface water and to carefully consider suitable adoption of SuDS.

NAME	NOTES	General Geology	General Drainage Assessment	Aquifer Type	Groundwater Vulnerability	SuDS Recommendation	Site Area (Ha)	FRA Requirements
CP7	Land west of Horsham	Sandstone & Mudstone - Weald Clay with deep loamy soils	Poorly Drained Soils	MINOR	MINOR_L	Attenuation Systems	50.58	Sequential test has stated that all developed land should be located outside of FZ2 and FZ3. However, an FRA will still be required to assess the impacts of surface water and to carefully consider suitable adoption of SuDS.

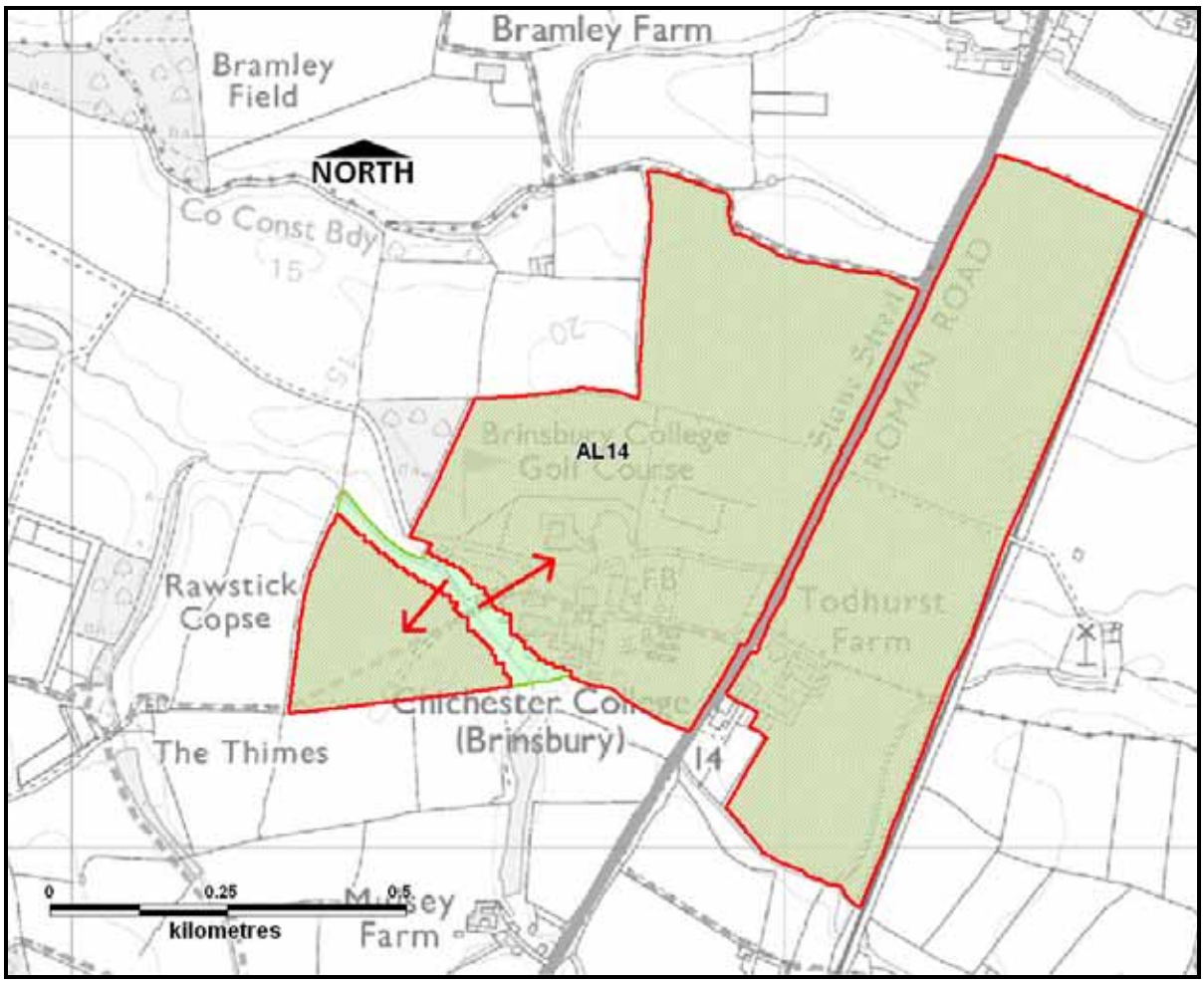
Appendix H: Redefinition of potential allocation site layouts



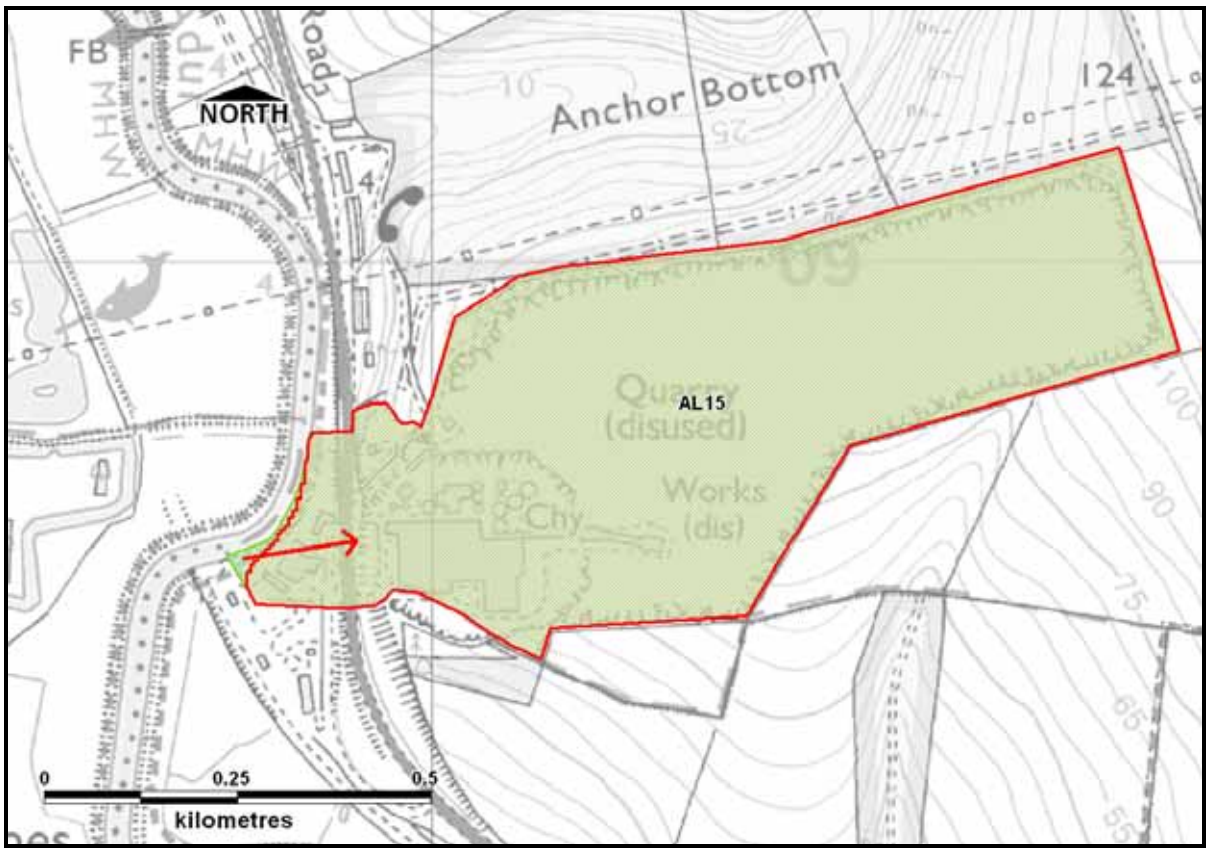
CP7	**Land west of Horsham**	**Part of site lies in FZ2 and FZ3**	**Following Sequential Test, only informal open space to be allocated to portion of site in FZ2 and FZ3. Detailed site specific FRA required to refine Flood Zones and determine overall risk.**



AL2	**Lifestyle Ford Bishopric Horsham**	**Part of site lies in FZ2 and FZ3**	**Following Sequential Test, only informal open space to be allocated to portion of site in FZ2 and FZ3. Detailed site specific FRA required to refine Flood Zones and determine overall risk.**



AL14	**Brinsbury Centre of Excellence Adversane**	**Part of site lies in FZ2 and FZ3**	**Following Sequential Test, only informal open space to be allocated to portion of site in FZ2 and FZ3. Detailed site specific FRA required to refine Flood Zones and determine overall risk.**



AL15	**Shoreham Cement Works**	**Part of site lies in FZ2 and FZ3**	**Following Sequential Test, only informal open space to be allocated to portion of site in FZ2 and FZ3. Detailed site specific FRA required to refine Flood Zones and determine overall risk.**

Appendix I: SFRA Maintenance and Updates

How to maintain and update the SFRA

For an SFRA to serve as a practical planning tool now and in the future, it will be necessary to undertake a periodic review and maintenance exercise. This section lists a series of recommendations ensuring that the SFRA is kept up-to-date and maintained. This will allow the SFRA to follow emerging best practise and developments in policy and climate change predications.

Flood Zones and GIS Layers

As described in Section 3.5 and in the GIS section of Appendix D, the GIS layers used in the SFRA have been created from a number of different sources, using the best and most suitable information available at the time of publishing. Prior to any amendments taking place, the GisS Layers supplied with this SFRA should be securely backed up.

Should new Flood Zone information become available, the data should be digitised and geo-referenced within a GIS system. For example, should updated modelled outlines delineating the tidal FZ3a on the Adur become available, the current combined FZ3a outline should be edited to ensure that the newest data is displayed and that the old data is overwritten. Note that updating the Adur Tidal FZ3a will not involve replacing the entire combined FZ3a GIS layer, only the section that has changed.

For other GIS layers such as the Historical Flood Outlines or the Sewer Flooding Information, it is likely that data will be added rather than be replaced. For example, where a new sewer flooding incident is reported in the catchment, a point should be added to the sewer flooding GIS layer rather than creating a new layer.

All GIS layers used in the SFRA have meta-data attached to them. When updating the GIS information, it is important that the meta-data is updated in the process. Meta-data is additional information that lies behind the GIS polygons, lines and points. For example, the information behind the SFRA Flood Zone Maps describes where the information came from, what the intended use was together with a level of confidence.

For any new data or updated data, the data tables presented in Appendix D should be checked to ensure they are up-to-date.

Climate Change Predictions

The climate change scenarios based in this report are based on the best practise and predictions available at the time of publishing. However, climate change predictions are constantly being updated and refined. New predictions can have a significant effect on flood zones and therefore the SFRA. When a review of the SFRA is undertaken, it is recommended that, in liaison with the EA, the climate change scenarios are reviewed to ensure that the SFRA is still relevant to best practise and the latest available knowledge.

Updates or Additions to Development Sites

Although unlikely at the time of publication, should any updates or additions to development sites become necessary (for example, due to new flooding information), a detailed Level 2 SFRA may be required. This should be carried out according to the guidance given in PPS25 and this document. Once a Level 2 Assessment has been completed, this should be appended to a new version of this document.

For any new or updated sites, the FRA and SuDS tables and recommendations presented in Appendix E and G should be updated.

OS Background Mapping

The SFRA has made use of the OS 1:25000 and 1:50000 digital raster maps. Periodically these maps are updated. Under the HDC OS License, it is likely that these maps will be updated throughout the whole of the HDC GIS system. Updated maps are unlikely to alter the findings of the SFRA but should be reviewed as part of the SFRA maintenance.

CEH Watercourse Networks

The SFRA has made use of the CEH Digital Watercourse Network for the District. Periodic checks should be made to check if there have been any updates to the dataset. This is an important GIS layer as it locates most of the natural watercourses within the District.

Data Licensing Issues

Prior to any data being updated within the SFRA, it is important that the licensing information is also updated to ensure that the data used is not in breach of copyright. The principal licensing bodies relevant to the SFRA at the time of publishing were the Environment Agency (Southern Region), Ordnance Survey, Southern Water and the Centre for Ecology and Hydrology (CEH). Updated or new data may be based on datasets from other licensing authorities and may require additional licenses.

Flooding Policy and PPS25 Practise Guidance Updates

This SFRA was created using guidance that was current in June 2007, principally PPS25 and the accompanying Practise Guidance. The Practise Guidance was a “living draft” at the time of publication (version 1 February 2007) and it is expected that the final version of the will be available in autumn 2007. When the final version of the guidance is released, it should be carefully checked to ensure that the SFRA is still relevant to the guidance. If necessary, an update may be required.

Similarly, should new flooding policy be adopted nationally, regionally or locally, the SFRA should be checked to ensure it is still relevant and updates made if necessary.

Stakeholder Consultation and Notification

The key stakeholders consulted in the SFRA were the District Council, Water Companies and the Environment Agency. It is recommended that a periodic consultation exercise is carried out with the key stakeholders to check for updates to their datasets and any relevant additional or updated information they may hold. If the SFRA is updated, it is recommended that the EA and the County Council Emergency Planning Department are notified of the changes and instructed to refer to the new version of the SFRA for future reference.

Frequency of Updates and Maintenance

It is recommended that the SFRA is reviewed on an annual basis, in liaison with the EA, to assess any maintenance or update work. Should HDC decide any significant changes are necessary, the SFRA should be updated and re-issued.

Reviews and updates should be recorded in the following register.

SFRA Version & Review Register

Version	Date Issued	Reviews / Amendments Made	Stakeholders Notified	Amendments undertaken by:	Document Checked by:	Document Approved by:
1	June 2007	Original SFRA	-	-	-	-

Continue on new page if necessary