

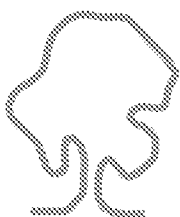
MR M DUGGIN



**LAND AT FONTWELL AVENUE, ALDINGBOURNE,
WEST SUSSEX**

Flood Risk Assessment

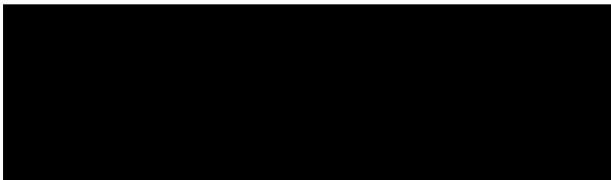
March 2014
(Revised December 2017)



eas ltd

Environmental Assessment Services Ltd

REPORT DATA SHEET

Requirement	Data
Report Ref:	Rodway/FontwellAv/FRA
Date	March 2014
Client	Mr M Duggin
Report type	Flood Risk Assessment
Purpose	Submission to Planning
Revisions	November 2017
Prepared by	Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MIEAust, MCIWEM, MIEnvSc  Signed
Approved by	James Mumford MA, CEng, CEnv, CArb, FICE, FCI Arb  Signed

MR M DUGGIN

LAND AT FONTWELL AVENUE, ALDINGBOURNE, WEST SUSSEX

Flood Risk Assessment

March 2014
(Revised December 2017)

CONTENTS

1. BACKGROUND
2. THE PROPOSED DEVELOPMENT
3. EXISTING FLOOD RISK
4. SEQUENTIAL TEST
5. RISK TO OCCUPIERS
6. IMPACT ON FLOOD RISK ELSEWHERE
7. RESIDUAL FLOOD RISKS AND EXTREME PLUVIAL EVENT
8. FOUL SEWERAGE
9. SUMMARY AND CONCLUSIONS

APPENDIX A - Figures

Figure 1: Site Location Plan
Figure 2: Existing Site Layout & Topography
Figure 3: Proposed Development Plan

APPENDIX B - Environment Agency & SFRA Flood Risk Maps + EA flood risk advice

APPENDIX C – Architect’s Drawing of the Proposed Development

APPENDIX D – Southern Water sewer plans

MR M DUGGIN

LAND AT FONTWELL AVENUE, ALDINGBOURNE, WEST SUSSEX

Flood Risk Assessment

March 2014
(Revised December 2017)

1. BACKGROUND

- 1.1 The site comprises a field to the north of Oaktrees and south of Westfield House, on the west side of Fontwell Avenue. No watercourses cross the site. The nearest watercourse appears to be the Barnham Rife, some 200 m to the south of the site.
- 1.2 The plan area of the site is approximately 0.6 ha. The Ordnance Survey map reference for the centre of the site is SU 9450 0575. The approximate average site elevation is + 13.3 m OD. See Figures 1 and 2 in Appendix A for the site location and the existing site layout and topography.
- 1.3 It is proposed to build five dwellings on the land to the north of Oak Trees residence on Fontwell Avenue in Aldingbourne. See Figure 3 in Appendix A.
- 1.4 The Environment Agency (EA) and Arun District Council Strategic Flood Risk Assessment (SFRA) flood mapping for this location that was current in 2014 showed the western part of the site to lie within Flood Zone 2 (medium risk of flooding). The rest of the site was shown to lie within Flood Zone 1 (low risk of flooding). On this basis, a Flood Risk Assessment as set out in the National Planning Policy Framework (NPPF) of 2012 and its Technical Guidance (TG) of March 2012, was required to support the planning application for the proposed development.
- 1.5 Subsequently, the models on which the EA and SFRA flood mapping is based have been updated and the current EA and Arun District Council SFRA flood mapping now shows the entire site to lie within Flood Zone 1 (low risk of flooding). See Appendix B. A site specific flood risk assessment is not required for a site in Flood Zone 1 where the site area is less than 1 ha. However, as the site's impermeable area will increase as a result of the proposed development, there remain downstream risks associated with the surface water drainage.

2. THE PROPOSED DEVELOPMENT

- 2.1 The proposed development comprises 4 No. four-bedroom semi-detached two-storey houses and 1 No. four-bedroom detached two-storey house with paved parking areas, access driveways and gardens. See architect's drawings showing plans and elevations in Appendix C.

3. EXISTING FLOOD RISK

- 3.1 Flood risk mapping covering the site and the latest advice by the EA is included in Appendix B. The latest flood mapping shows the entire site to lie within Flood Zone 1 (low risk of flooding). The reason for the change in flood risk rating for the site is uncertain. It was known that the previous flood map did not reflect the topography of the site correctly and there may have been improvements to the culvert under Nyton Road/Barnham Road to the south.
- 3.2 The area is covered by Arun District Council's 2008 Strategic Flood Risk Assessment (SFRA), which includes specific recommendations for the Barnham, Eastergate and Westergate (BEW) area. The SFRA Level 2 Detailed Site Summary Tables and associated flood mapping was issued in November 2016. The new mapping shows the site not to be at risk of flooding from fluvial sources under present or future climate change scenarios. The Surface Water flood map shows some risk of surface water flooding to the highway on Fontwell Avenue, but no surface water flood risk to the site. According to the SFRA, there do not appear to be any records of the site being flooded. See Appendix B.
- 3.3 The SFRA Site Summary Tables suggest a high risk of groundwater flooding and high groundwater levels in the vicinity.

4. SEQUENTIAL TEST

- 4.1 Buildings used for dwelling houses are classified as 'More Vulnerable' in Table 2 *Flood risk vulnerability classification* in the Planning Practice Guidance.
- 4.2 Table 3 *Flood risk vulnerability and flood zone 'compatibility'* of the Planning Practice Guidance states that development classified as 'More Vulnerable' is appropriate for Flood Zones 1.
- 4.3 The purpose of the Sequential Test is to guide vulnerable development towards Flood Zone 1, and away from Flood Zones 2 and 3. As the site is now shown to lie entirely within Flood Zone 1, the Sequential Test need not be applied.

5. RISK TO OCCUPIERS

- 5.1 According to the flood mapping, the residents in the proposed houses would not be at risk from flooding and could also come and go without hindrance during a flood event.

6. IMPACT ON FLOOD RISK ELSEWHERE

- 6.1 The roofs and driveways/parking areas in the proposed development will increase the impermeable areas of the site and will reduce the time of concentration for run-off from the site. This could exacerbate flooding downstream from the site.

- 6.2 Accelerated run-off due to increase in impermeable area is normally addressed by Sustainable Drainage Systems (SuDS). The preferred option would be drainage to soakaway. If soakaway is not practicable, the surface water should leave the site at a flow rate no greater than that generated in a Greenfield condition.
- 6.3 Drainage to soakaway relies on the site being on suitably permeable geology. In this case, the British Geological Survey shows the site to lie on Late Pleistocene Valley Gravel, which should be a suitable medium for soakaway drainage. However, the soakaway may have to be relatively shallow if the groundwater level is high. It will be necessary to carry out soakage tests at the site to verify this option.

7. RESIDUAL FLOOD RISK AND EXTREME PLUVIAL EVENT

- 7.1 The only source of flood risk identified at the site is groundwater flooding, as given in the SFRA Site Summary Tables. There is no record of flooding at the site from other sources.
- 7.2 Surface water flooding could be caused by an extreme pluvial event (a storm exceeding the 1 in 100 year return period plus allowance for climate change) or failure of the surface water drainage. In this case, the surface water would be anticipated to flow down-slope and on to Fontwell Avenue, probably to follow a flow path south. This should not result in any unacceptable risk to the proposed residents.

8. FOUL SEWERAGE

- 8.1 The preferred option would be to discharge foul sewage from the proposed houses to the public foul sewer in Fontwell Avenue. A suitable connection point would be at Southern Water chamber 5702, which lies on the eastern edge of the site. It will be necessary to apply to Southern Water for consent to connect to the public foul sewer. See Appendix D.

9. SUMMARY AND CONCLUSIONS

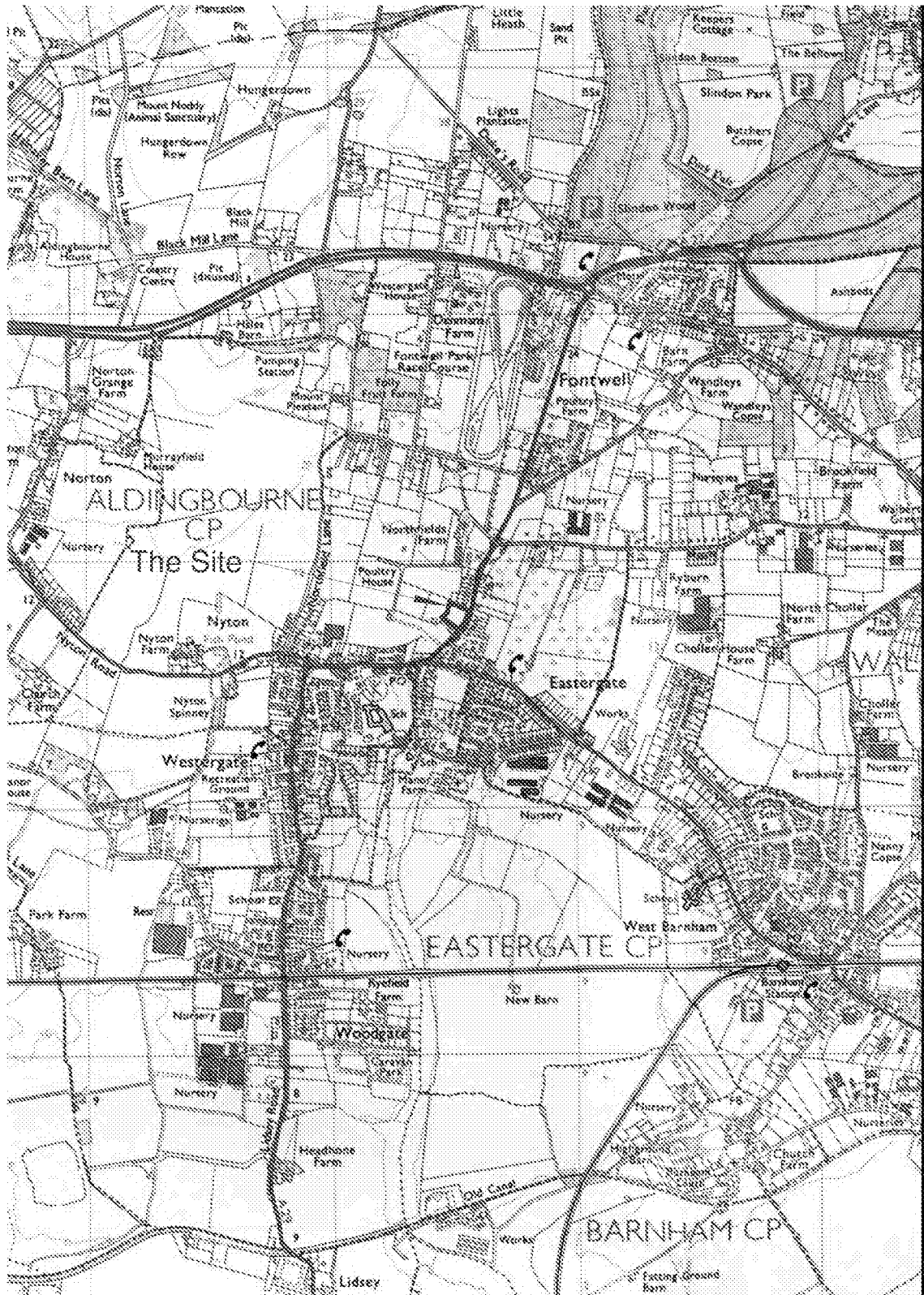
- 9.1 The site comprises a 0.6 ha field to the north of Oaktrees and south of Westfield House, on the west side of Fontwell Avenue. It is proposed to construct 5 No. four-bedroom two-storey houses with gardens, garages and access drives from Fontwell Avenue at the site.
- 9.2 The site specific flood risk assessment was carried out in 2014 as then-current flood mapping showed the eastern half of the site lies within Flood Zone 1, with the western half in Flood Zone 2. This indicated a requirement for a site specific flood risk assessment to support a planning application for development of the site under the National Planning Policy Framework (NPPF) of 2012 and its (then current) Technical Guidance (TG) of March 2012.

- 9.3 Subsequently, the models on which the EA and Arun District Council SFRA flood mapping is based have been updated and the current EA and Arun District Council SFRA flood mapping now shows the entire site to lie within Flood Zone 1 (low risk of flooding). There is no requirement for site specific flood risk assessment for a site in Flood Zone 1 where the site area is less than 1 ha (as is the case in this instance), and the Sequential Test need not be applied. See Appendix B.
- 9.4 The site lies in an area with a risk of groundwater flooding, otherwise no additional flood risks or records of flooding at the site have been found.
- 9.5 As the proposed development will result in an increase in the site's impermeable area, there may be downstream flood risks associated with the surface water drainage.
- 9.6 The recommended sustainable (SuDS) surface water drainage solution for the site would be drainage to soakaway. The underlying geology is Valley Gravel, which should be a suitable medium for soakaway drainage. Percolation testing will need to be carried out at the site to confirm the suitability of drainage to soakaway.
- 9.7 Foul sewage should be arranged to discharge to the public foul sewer in Fontwell Avenue. Consent from Southern Water will be required.

★ ★ ★ ★ ★ ★ ★

APPENDIX A

Figures



Reproduced from the Ordnance Survey 1:25000 plan No. 121 (2009) with permission of the Controller of Her Majesty's Stationery Office © Crown Copyright License No. 100005508



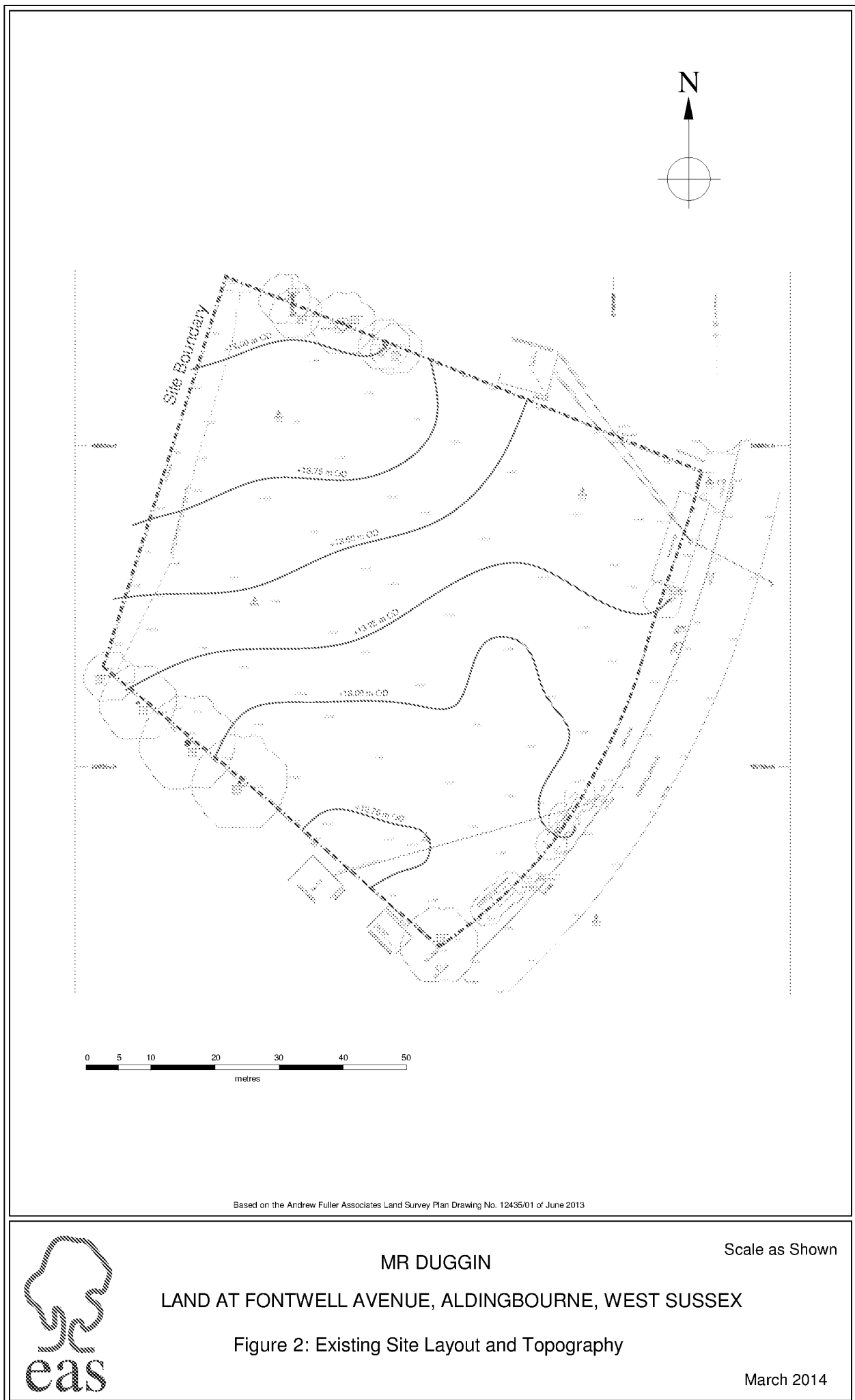
MR DUGGIN

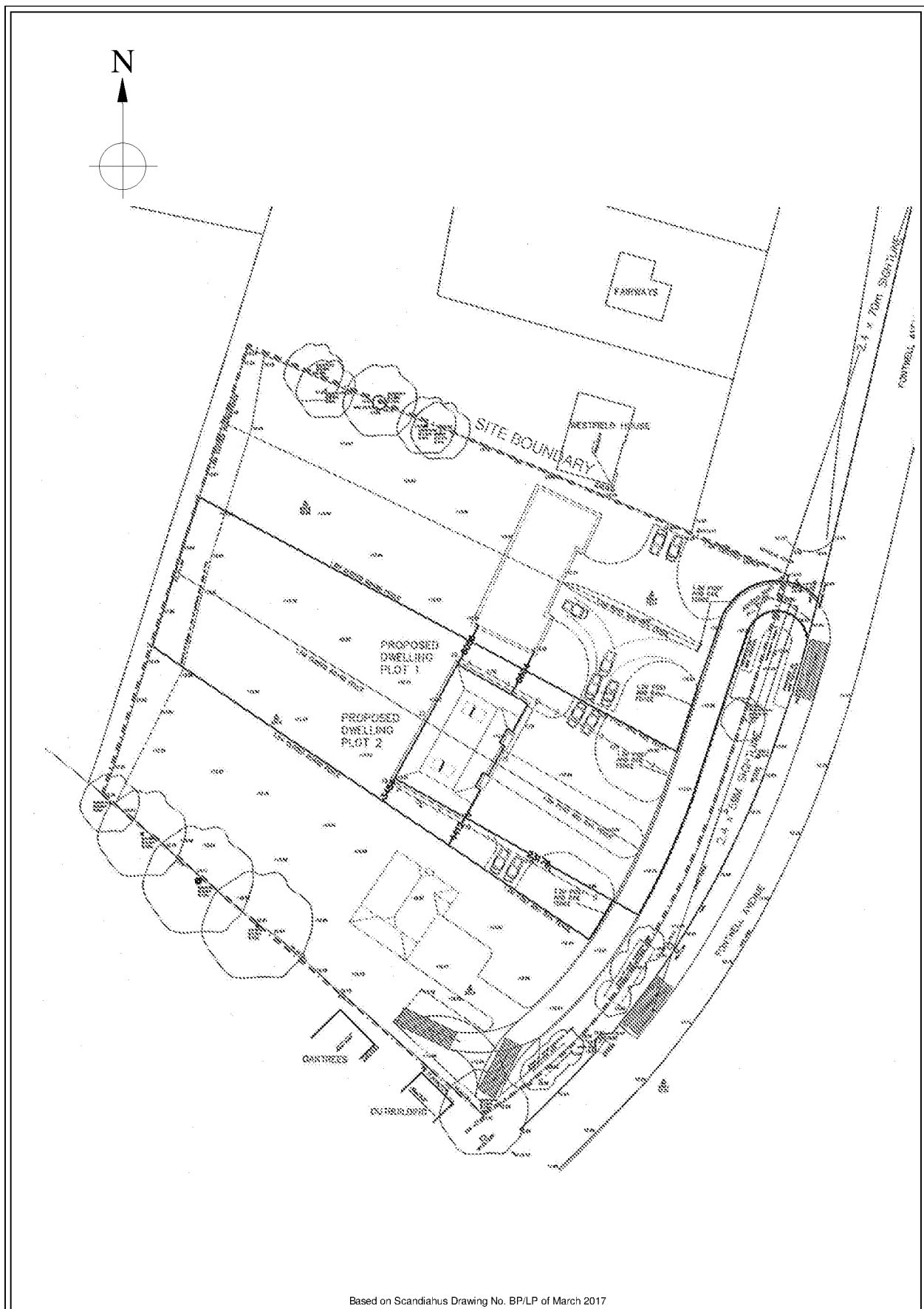
Scale 1:25000

LAND AT FONTWELL AVENUE, ALDINGBOURNE, WEST SUSSEX

Figure 1: Site Location

March 2014





Based on Scandiahus Drawing No. BP/LP of March 2017



MR DUGGIN

Not to Scale

LAND AT FONTWELL AVENUE, ALDINGBOURNE, WEST SUSSEX

Figure 3: Proposed Site Development Plan

December 2017

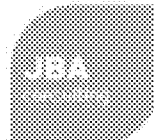
APPENDIX B

Environment Agency & SFRA Flood Risk Maps + EA flood risk advice



Arun District Council Strategic Flood Risk Assessment

Level 2 Detailed Site Summary Tables

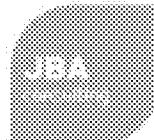


Mapping

Site details	Site Name	Barnham / Eastergate / Westergate (BEW)
	Area	278.6ha
	Current land use	Mixture of greenfield and brownfield (Agriculture and Industrial)
	Proposed site use	Residential
Site overview of actual flood risk		Refer to the mapping of flood risk in the site boundary available at the end of the site summary table (available by clicking the 'Mapping' button at the top-right of this form). Flood risk from rivers, the sea? and intense rainfall (surface water flooding) is generally low for the majority of the site. However, there are areas at moderate to high risk of flooding located in the western side of the site area either side of the Lidsey Rife watercourse. Groundwater flooding across the site is also likely as the available datasets show that the site is located within a 1km grid square where more than 75% of the 1km² area may be susceptible to groundwater flooding. Note: information on the exact location, frequency and magnitude of this flooding is unclear. The site is almost entirely located within Flood Zone 1, the lowest flood risk zone for flooding from the Rivers and Sea. The other flood zones occupy relatively small proportions of the western section of the site through which the Lidsey Rife flows. There are no formal flood defences that are influential at protecting the site from flooding. Therefore, the Flood Zones represent the actual flood risk at the site. Various SuDS measures may be suitable at the site based on a broad scale assessment of measures. However, the high risk of groundwater flooding and possible land contamination issues suggests infiltration SuDS may not be suitable at the site and further testing would be required. The suitability of detention and filtration SuDS is less certain. Please refer to the site recommendations from Arun Strategic Surface Water Management Study: Stage 2 Report (2016) for further information Actual flood risk Given that flood defences are not influential at protecting the site area, the flood risk indicated by Flood Zones is reflective of the actual risk from fluvial flooding from Lidsey Rife. Flood Risk from ordinary watercourses is not captured by this flood risk information and should be considered as development proposals are taken forward. The fourth, fifth and sixth maps provided at the end of the site summary table display the predicted depth, velocity and hazard rating of flood water at the site in the Flood Zone 3a event. Flood depths and velocities are typically predicted to be up to 1.5m and 0.5m/s respectively where flooding is predicted on the site, which is reflective of the flooding from the Lidsey Rife channel and is relatively confined to the floodplain. Consequently, the predicted hazard rating on site is also relatively high. The timing of the rise and fall in flood levels associated with a flood event along Lidsey Rife will be fairly consistent. At the north of the site the duration of flooding from fluvial (river) or surface water (rainfall) sources is likely to be shorter than the south given the southern part of the site is located where the catchment gradient begins to flatten. Ponding of water downstream of the site boundary may be likely during large rainfall or flood events. Groundwater flooding typically lasts for longer durations than fluvial surface water flooding often for periods of days/weeks.
Sources of flood risk	Existing drainage features	Lidsey Rife and several ordinary watercourses. The culverted ordinary watercourse crossing the site should where possible be de-culverted and replaced with open channels.

Arun District Council Strategic Flood Risk Assessment

Level 2 Detailed Site Summary Tables

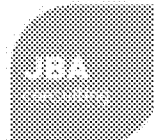


Mapping

Site details	Site Name	Barnham / Eastergate / Westergate (BEW)			
	Area	278.6ha			
	Current land use	Mixture of greenfield and brownfield (Agriculture and Industrial)			
	Proposed site use	Residential			
Sources of flood risk	Flood history	The Environment Agency's historic flood map indicates shows that there has been past flooding within the southern extent of the site associated with Lidsey Rife. Other sources also show that road flooding occurred during November 1960, and a lack of maintenance of the northern boundary ditch caused further flooding at Elm Grove South. Other flood events in or within close proximity to this area are known to have occurred in 1993/94, 2000/01, 2012 and 2013/14.			
	Flood Zones (Rivers and Sea)	Proportion of site at risk (Proportions reported are for the area of land occupied by each zone extent between larger or smaller zones, and therefore not cumulative)			
		FZ3b	FZ3a	FZ2	FZ1
		2%	2%	6%	90%
		The first map provided at the end of the site summary table displays the location of Flood Zones at the site. Although the majority of the site is located within Flood Zone 1, small proportions of the site are located within Flood Zones 3b, 3a and 2. These Flood Zone extents follow the location of the Lidsey Rife. Therefore, fluvial (river) flood risk is predominantly confined to the western side of the site area, near Woodgate and the properties located off Westergate Street, Elmcroft Place and Woodgate Park. Ordinary watercourses may also present a flood risk that is not captured in the Flood Zone information.			
	Surface Water	Proportion of site at risk (uFMfSW) (Proportions reported are for the area of land occupied by each zone extent between larger or smaller zones, and therefore not cumulative)			
		30-year	100-year	1,000-year	
1%		1%	4%		
The majority of the site is located outside of the uFMfSW extent, indicating low risk of surface water flooding at the site. Where surface water flooding is predicted, the extents generally follow the Lidsey Rife and ordinary watercourses on the site.					
Groundwater	ASTGWF mapping indicates that the site is located within a 1km grid area where the susceptibility to groundwater flooding is >=75%.				
Reservoir	This site is not at risk of inundation in the event of reservoir failure.				
Flood risk management infrastructure	Defences Defence within Arun District are discussed in Chapter 6 of the SFRA report.	Defence Type	Standard of Protection		Condition
		N/a	N/a		N/a
		This site is not protected by any formal flood defences although the discharge structures/arrangements at the downstream extent of the Aldingbourne Rife influence fluvial outflows and prevent tidal ingress.			

Arun District Council Strategic Flood Risk Assessment

Level 2 Detailed Site Summary Tables

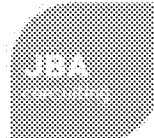


Mapping

Site details	Site Name	Barnham / Eastergate / Westergate (BEW)			
	Area	278.6ha			
	Current land use	Mixture of greenfield and brownfield (Agriculture and Industrial)			
	Proposed site use	Residential			
Flood risk management infrastructure	Residual risk	Residual risk at the site primarily concerns fluvial and surface water (rainfall) flood events occurring larger than those for which the site/development design has been developed. Consideration should be given to implications with respect to emergency response requirements at the site in such events. Site drainage arrangements should be developed so that exceedance pathways are designed into the development form enhancing management of flood water. The potential for overtopping or failure of defences is not predicted to influence the site as no defences are considered to influence the site area.			
Emergency planning	Flood warning	The very southern extent of the site is located within the Flood Warning area for Bognor.			
	Access and egress	Although part of the site is shown to be a risk of fluvial flooding, safe access and egress may be achieved from the roads surrounding the site, including Lidsey Road, Church Lane, Barnham Road and Fontwell Avenue.			
Climate Change	Proportion of site in Flood Zone 3a (including Flood Zone 3b) - Rivers and Sea	Flood Zone 3a (present day)	Flood Zone 3a (2031)	Flood Zone 3a (2061)	Flood Zone 3a (2111)
	(Proportions reported are for the area of land occupied by each zone extent between larger or smaller zones, and therefore not cumulative)	4%	4%	5%	7%
	Implications for the site	Climate change modelling shows consistent increases in the extent of Flood Zone 3a for each future allowance. No new areas of flooding separate from those of the present day are identified.			
Assessment of SuDS	Suitability of SuDS is considered within the table below. Explanation is provided within sections 12.1 of the main SFRA report. Further consideration of SuDS within Arun District is provided in section 8 and 12.2.				
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS constraints (Refer to the Arun Strategic Surface Water Management Study for more detailed analysis of SuDS)	SuDS Type	Comment		
		Source control	Most source control techniques are likely to be suitable. Mapping suggests that permeable paving may have to use non-infiltrating systems given the high risk both to and from groundwater, as well as the possible risk of contaminated lands from designated landfill within the site boundary.		
		Infiltration	Mapping suggests that there is a high risk of groundwater flooding at this location, and areas of the site have been designated as historic landfill. Therefore, it is likely infiltration techniques will not be suitable. However, this should be confirmed via a site investigation and the potential for infiltration techniques should be assessed.		
		Detention	This option may be feasible provided site slopes are < 5% at the location of the detention feature. A liner may be required to prevent the egress of groundwater and address any contamination issues from designated landfill within the site boundary.		

Arun District Council Strategic Flood Risk Assessment

Level 2 Detailed Site Summary Tables

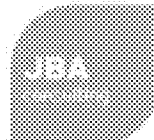


Mapping

Site details	Site Name	Barnham / Eastergate / Westergate (BEW)	
	Area	278.6ha	
	Current land use	Mixture of greenfield and brownfield (Agriculture and Industrial)	
	Proposed site use	Residential	
Requirements for drainage control and impact mitigation	Broad scale assessment of possible SuDS constraints (Refer to the Arun Strategic Surface Water Management Study for more detailed analysis of SuDS)	Filtration	This option is probably suitable provided site slopes are <5% and the depth to the water table is >1m. A liner may be required to prevent the egress of groundwater and address any contamination issues from designated landfill within the site boundary.
		Conveyance	All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner may be required to prevent the egress of groundwater and address any contamination issues from designated landfill within the site boundary.
	Broad assessment of the hydraulic performance of existing artificial drainage	The site is largely greenfield with some brownfield land used for industrial and agricultural purposes. Therefore, some limited existing artificial drainage infrastructure will be present but natural drainage pathways will primarily influence drainage of the site (e.g. infiltration, flow via the adjacent ordinary watercourses and Lidsey Rife). Re-development of the site is likely to involve replacement of any existing drainage infrastructure at the nurseries located in the north of the site. Plans for development should consider potential impacts on any existing drainage routes across the site area, specifically beneath the railway line running through the centre of the site.	
		It is likely that the peak flow rate which is permitted from development at the site will not be greater than the greenfield runoff rate. Guidance on SuDS requirements is provided in section 8 (and particularly 8.6) of the SFRA report. For the purpose of the broad scale assessment, this has been assumed to be 5l/s/ha. It is likely that even with the implementation of SuDS measures at the site, an increase in the volume of water discharged from the site will be apparent compared with the pre-development case. An indicative estimate of this volume has been prepared for the site using 6-hour storm duration 100-year return period rainfall event (indicative average depth for the SFRA area of 71mm), and assuming that impermeable surfaces represent 60% of the site area and produce 100% runoff and permeable surfaces represent 40% of the site area and produce 30% runoff. The resulting volume is 143,000m³. This value is indicative and should be refined at more detailed assessment stages, but highlights that significant volumes of water are predicted to arise from development at the site. Consideration would need to be given to the arrangements required so the additional volumes do not exacerbate flood risk elsewhere (even if the magnitude of peak outflows is constrained the additional volumes generated should be considered). Increased flooding upstream is not considered likely. However, given that developed areas of Woodgate and Lidsey are located adjacent to the site along the Lidsey Rife, it is possible that prolonged discharge from the site at a higher rate could increase the flow in the watercourse at the time of peak flows. It may also not be possible to discharge to the watercourse or receiving surface water system if this is 'locked' by high water levels. This is a mechanism highlighted to have exacerbated flooding in the district previously and should be considered as part of a detailed drainage strategy.	

Arun District Council Strategic Flood Risk Assessment

Level 2 Detailed Site Summary Tables

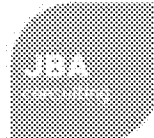


Mapping

Site details	Site Name	Barnham / Eastergate / Westergate (BEW)	
	Area	278.6ha	
	Current land use	Mixture of greenfield and brownfield (Agriculture and Industrial)	
	Proposed site use	Residential	
Requirements for drainage control and impact mitigation	Historic Landfill Site	The site has areas within its boundary designated by the Environment Agency as historic landfill areas. A thorough ground investigation will be required as part of a detailed FRA to determine the extent of the contamination and the impact this may have on SuDS. As such proposed SuDS should be discussed with the relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.	
	Groundwater Source Protection Zone	The site is located with a Source Protection Zone (Inner Zone 1c). As such infiltration techniques should only be used where there are suitable levels of treatment although it is possible that infiltration may not be permitted. Proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.	
	Site recommendations from Arun Strategic Surface Water Management Study: Stage 2 Report (2016) Note: the SSWMS focused on different site boundaries to those of the Level 2 SFRA	Given the high risk of groundwater flooding on site and large amount of storage required for the proposed development, a cascade of detention and conveyance measures was recommended. The report states that shallow detention basins/ponds, lined permeable paving and swales were considered to be appropriate for this site as they would provide additional storage, prevent the egress of and/or capture groundwater, and convey water close to the surface. It is noted that permeable paving and swales would need to be designed so that groundwater flood risk is not increased and free drainage is permitted above the water table. Opportunities for Green Infrastructure were also highlighted. Offsite SuDS measures are also recommended. It has been proposed that the floodplain on the Lidsey Rife could be formalised to provide an additional storage area for site, but further consideration of the viability of this is likely to be necessary.	
	Responsibilities for SuDS maintenance	Development shall not commence until full details of the maintenance and management of the SuDS system is set out in a site-specific maintenance manual and submitted to, and approved in writing, by the Local Planning Authority. The manual is to include: (a) details of financial management of the site including arrangements made in the event that the management company (or any subsequent management company) is no longer able to fulfil its duties; and (b) arrangements for the replacement of major components at the end of the manufacturers recommended design life. Further information on maintenance and management of SuDS is provided in section 8.6 of the main SFRA report.	
Water quality and biodiversity	Designated areas	Various data sources were analysed to identify if the site contains any 'designated' areas with a special protection status that may affect and restrict the type of activity and development permitted. The following designated areas have been identified within the site boundaries: • No designated areas were identified within the site boundaries. (Data sources analysed include Areas of Outstanding Natural Beauty (AONB), Environmentally Sensitive Areas, National and Country Parks, National Nature Reserves, Nature Improvement Areas, Nitrate Sensitive Areas, RAMSAR Sites, Sites of Special Scientific Interest (SSSI), Special Areas of Conservation, and Special Protection Areas).	
	Surface waterbody status	Ecological	Chemical
		Moderate	Good

Arun District Council Strategic Flood Risk Assessment

Level 2 Detailed Site Summary Tables

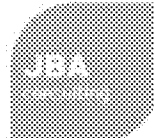


Mapping

Site details	Site Name	Barnham / Eastergate / Westergate (BEW)
	Area	278.6ha
	Current land use	Mixture of greenfield and brownfield (Agriculture and Industrial)
	Proposed site use	Residential
Water quality and biodiversity	Surface waterbody status	Where a Main River or lake was identified within 100m of the site boundaries, the ecological and chemical status of the surface water body has been recorded above. This information has been derived from the South East River Basin Management Plan (2015).
Planning implications	NPPF Exception Test requirements	The Exception Test will be required if: - Highly vulnerable development is proposed to be located in FZ2; - Essential infrastructure and More vulnerable development is proposed to be located in FZ3a; or - Essential infrastructure is proposed to be located in FZ3b. Development will not be permitted if: - Highly vulnerable development is proposed to be located in FZ3a; or - Highly vulnerable, More vulnerable and/or Less vulnerable development is proposed to be located in FZ3b.
	Requirements for site-specific Flood Risk Assessment	- At the planning application stage, a site-specific flood risk assessment will be required if any development is located within Flood Zones 2 or 3 or for any development greater than 1ha in Flood Zone 1. Other sources of flood risk should also be considered. - Mitigation measures will be required if buildings are situated in areas at risk of flooding. Any mitigation measures should be designed to ensure that the development remains safe throughout its lifetime. - Green infrastructure should be considered with the mitigation measures for surface water runoff from any potential development
		- New development and redevelopment should adopt source control SuDS techniques to reduce the risk of frequent but low impact flooding due to post-development runoff. - The peak flows of the Lidsey Rife and the Shrimpney Manor Ditch, and potential flooding of the site, should be considered when designing site drainage and attenuation. - Assessment of runoff should include allowances for climate change effects, and discharge rates from the site should not increase downstream. - Safe access and egress would need to be demonstrated. This should include consideration of the effects of climate change to ensure that access and egress remains safe throughout the lifetime of the development. - New development should seek opportunities to reduce the overall level of flood risk at the site and in surrounding areas. This may include: - reducing volume rate and runoff; - relocating development to zones with lower flood risk, and - creating space (where possible) for flooding - Consultation with the Local Authority and the Environment Agency should be undertaken at an early stage.
	Strategic FRM solutions	Chapter 14 within the SFRA should be referred to for initial consideration of potential flood risk management approaches which could influence site allocations.

Arun District Council Strategic Flood Risk Assessment

Level 2 Detailed Site Summary Tables

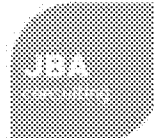


Mapping

Site details	Site Name	Barnham / Eastergate / Westergate (BEW)
	Area	278.6ha
	Current land use	Mixture of greenfield and brownfield (Agriculture and Industrial)
	Proposed site use	Residential
Planning implications	Implications of the Environment Agency's FCERM programme	There are several FCERM schemes that cover different parts of Arun District. It is recommended that the outcomes and actions from these schemes are considered in the development proposals for this site. The FCERM schemes relevant to this site include: - Lidsey Surface Water Management Plan (SWMP) and Actions – the scheme was managed by West Sussex County Council, and the SWMP was published in October 2014 to help understand the flood risk from local sources and establish a long-term action plan for surface water management. - Aldingbourne Rife Integrated Flood Risk Management Project – the project is investigating approaches in which flood risk from combined sources can be managed within the Aldingbourne Rife catchment. The project is managed by the Environment Agency. - Arun Partnership Watercourse Management – extensive capitalised improvement work is planned in order to improve the condition of the assets throughout the District and contribute to recommendations of the local strategies currently being prepared. This scheme is managed by Arun District Council and is expected to commence between 2016 and 2018.
	Implications of potential future development	It is noted in the SFRA that developers should ensure that third party property and land are not adversely affected by future development, both in terms of flood risk and other environmental factors (e.g. water quality and ecology). Future development at this site may have potential to influence the following receptors: - Property and land located in the adjacent areas of Eastergate, Westergate, Woodgate, Barnham and West Barnham; - The Lidsey Rife as well as the ordinary watercourses flowing through the site boundary; Settlements downstream of these watercourses, such as Flansham, Felpham and Bognor Regis.
Mapping Information		
Flood Zones	Flood Zones 2 is based on the Environment Agency's Flood Zone 2 dataset. Flood Zone 3a is based on the Environment Agency's Flood Zone 3 dataset, but supplemented with additional flood extents derived for the Flood Zone 3a present day event simulated as part of the derivation of climate change modelling. The additional Flood Zone 3 information incorporated was associated with fluvial flooding at Pagham Rife and Black Ditch. The SFRA has identified Flood Zone 3b as land which would flood with an annual probability of 1 in 20 years in a defended case event. Flood Zone 3b has been derived from a combination of results from Environment Agency detailed hydraulic models. Where no detailed modelling information exists it is based on the extent of Flood Zone 3a from generalised modelling prepared by the Environment Agency.	
Climate change	Hydraulic modelling was completed as part of this SFRA to provide updated climate change flood mapping in the Arun District for Flood Zone 3a. This modelling followed the latest guidance for climate change in FRAs/SFRAs released by the Environment Agency in February 2016 (and updated in April 2016). Climate change for fluvial events was based on the Higher Central estimates for the years 2031, 2061 and 2111. Arun District is within the South East River Basin District and therefore allowances were: 2031 = +15% flows, 2061 = +30% flows and 2111 = +45% flows. For tidal/coastal models, undefended case still water levels and defended case still water levels with wave overtopping simulations have been completed to inform future flood risk within the Arun District. Again, climate change allowance predictions are for the years 2031, 2061 and 2111, with present day outputs for comparison.	

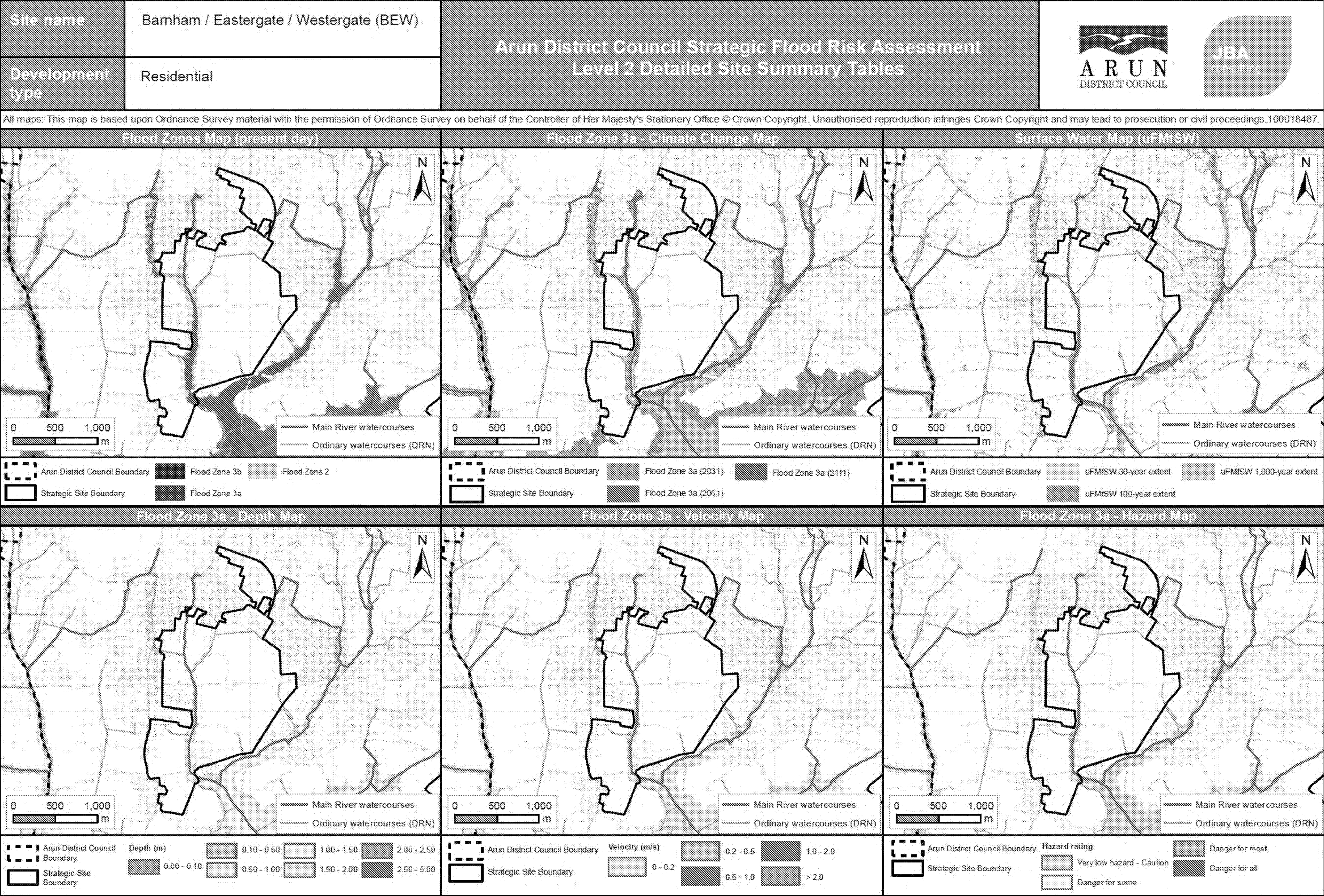
Arun District Council Strategic Flood Risk Assessment

Level 2 Detailed Site Summary Tables



Mapping

Site details	Site Name	Barnham / Eastergate / Westergate (BEW)
	Area	278.6ha
	Current land use	Mixture of greenfield and brownfield (Agriculture and Industrial)
	Proposed site use	Residential
Surface Water	The updated Flood Map for Surface Water (uFMfSW) has been used to define areas at risk from surface water flooding.	
Groundwater	The areas at risk of groundwater flooding are based on the Environment Agency's strategic-scale map which shows the Areas Susceptible to Groundwater Flooding (AStGWF) on a 1km square grid. The data shows the proportion of each 1km grid square, where geological and hydrogeological conditions indicate that groundwater might emerge and has been used to define areas at risk of groundwater flooding.	
Depth, velocity and hazard mapping	Depth, velocity and hazard mapping for the undefended 1 in 100-year event (Flood Zone 3a) have been taken from the Environment Agency's modelling available for the district, supplemented with any additional modelling prepared for this SFRA. As a result, there may be some small discrepancies between the extent of the depth, velocity and hazard grids with the extent of Flood Zone 3a.	



Dear Mr McKerney

Thank you for your request of 30 November 2017 to use Environment Agency Product 4 data for a site on Fontwell Avenue, Eastergate, West Sussex, PO20 3RU.

The Environment Agency's records indicate that the above site is located in Flood Zone 1 (land assessed as having less than 0.1% (1 in 1,000) chance of flooding in any given year from rivers or the sea). Therefore the likelihood of flooding in this area is estimated as 'very low'.

The above site is approximately 90 metres away from Flood Zone 2 and Flood Zone 3.

We are therefore unable to provide data from our detailed fluvial or tidal models which is relevant to your site.

Please be aware that in February 2016 the Environment Agency updated its guidance on climate change allowances. The standard allowance of adding 20% to peak flows – as per previous guidance in the National Planning Policy Framework, may not be applicable for the purposes of informing development proposals. It is possible that our current modelling has under estimated flood risk when taking climate change into consideration. This does not however have an effect on Flood Zone 2 or 3. For further information please visit:

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

<https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments

<https://www.gov.uk/planning-applications-assessing-flood-risk>

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

If you have any queries or would like to discuss the content of this letter further please call us on [REDACTED] or reply to this email.

Yours sincerely

Matthew Murphy

Customers and Engagement

Environment Agency | Chichester Office, Oving Road, Chichester, West Sussex, PO20 2AG

[REDACTED]

Working days: Monday to Friday



APPENDIX C

Architect's Drawings of the Proposed Development

© COPYRIGHT IN THIS DRAWING AND WORK EXECUTED IS AND REMAINS THE PROPERTY OF SCANDIA-HUS LIMITED AND OR ITS SUBSIDIARIES IN ACCORDANCE WITH THE PROVISIONS OF THE COPYRIGHT ACT. PERMISSION TO PRODUCE COPIES OR MODIFIED DRAWINGS IN WHOLE OR IN PART FOR ANY PURPOSE SHOULD BE OBTAINED FROM SCANDIA-HUS LIMITED & ANY SUCH REPRODUCTIONS SHOULD INCLUDE THIS & THE FOREGOING STATEMENT

SCANDIA-HUS BUSINESS PARK,
FELCOURT ROAD, FELCOURT, EAST GRINSTEAD
WEST SUSSEX, RH19 2LP ; TEL 01342 8380

APPENDIX D

Southern Water Sewer Plans



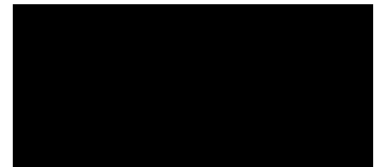
Environmental Assessment Services Limited
Unit 3, Westside
London Road
Haywards Heath
West Sussex
RH17 5LZ

Your ref FontwellAve/Drainage

Our ref 271194

Date 09 December 2017

Contact



Attention: Malcolm Mckemey

Dear Customer

Re: Provision of public sewer record extract

Location: Land Fontwell Avenue, Eastergate, West Sussex PO20 3RU

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

Southern Water Southern House Capstone Road Chatham Kent ME5 7QA www.southernwater.co.uk

Southern Water Services Ltd Registered Office: Southern House Yeoman Road Worthing BN13 3NX Registered in England No. 2366670

VAT receipt

Ordered by:

Environmental Assessment Services Limite
London Road
Haywards Heath
West Sussex
RH17 5LZ

VAT registration number: 813 0378 56
Order reference: 271194
Your reference: FontwellAve/Drainage

Receipt for provision of an extract from the public sewer and/or water main records.

Location	Costs
Land Fontwell Avenue Eastergate West Sussex PO20 3RU	£41.60
Net total	£41.60
VAT	£8.32
Total	£49.92
Paid	Paid in full

Thank you for your payment:

Received on: 6 December 2017

For enquiries regarding the information provided in this receipt, please contact the LandSearch team:

Tel: 0845 270 0212
0330 303 0276 (individual consumers)

Email: searches@southernwater.co.uk

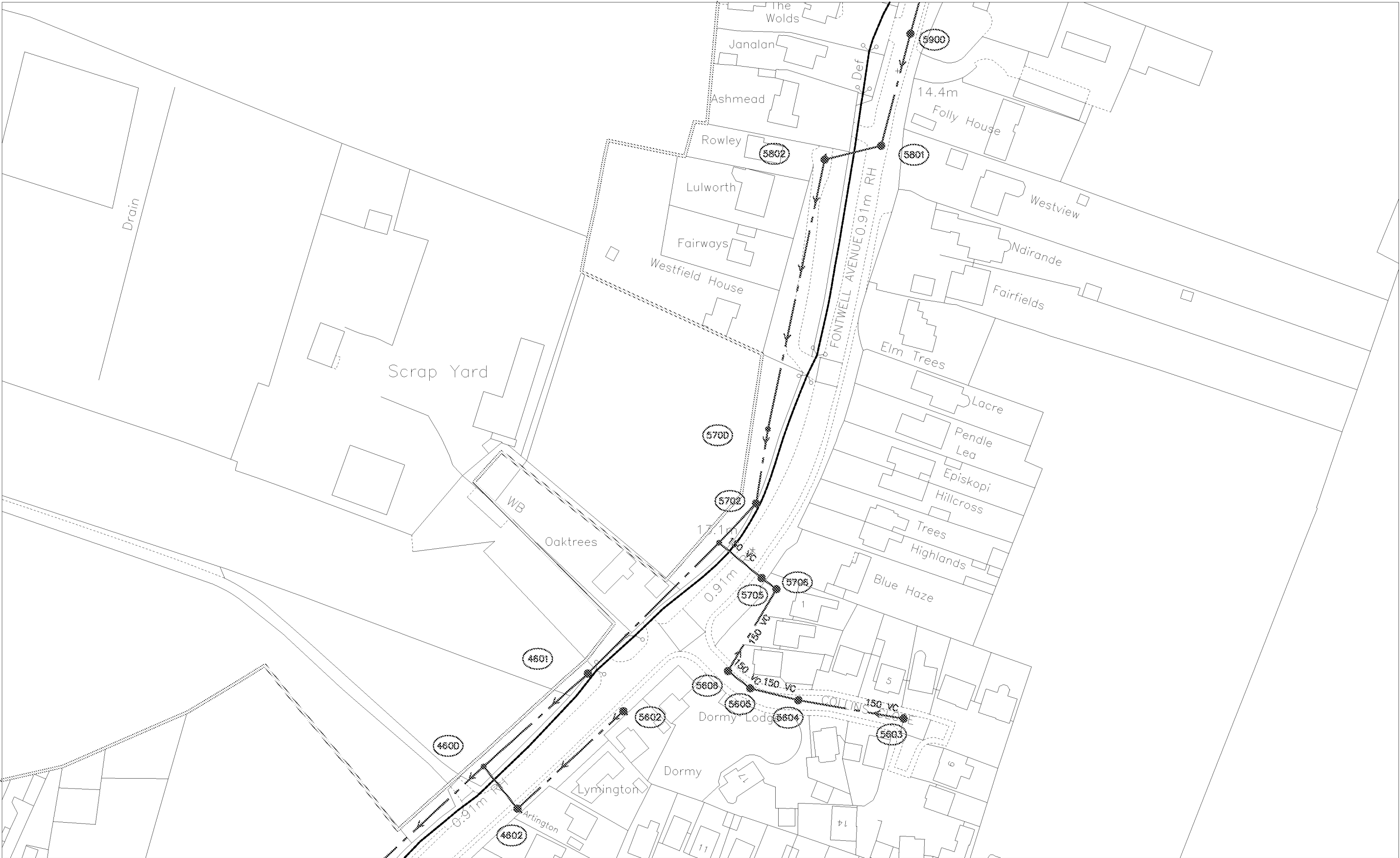
Web: www.southernwater.co.uk

LandSearch
Southern Water Services
Southern House
Capstone Road
Chatham
Kent
ME5 7QA



SEWER RECORDS PAGE 1 OF 2

105920



105632

494293 O.S. REF. SU9405NE	Drawn by: okuneyf	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.	N
	Scale: 1:1250		
	Title: 271194_Land Fontwell Avenue		

494765

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
4601X	12.73	10.91	225	VC	CIRC																		
4602X	12.09	11.14	100	VC	CIRC																		
460DX	12.02	10.02	225	VC	CIRC																		
5602X	12.44	11.68	100	VC	CIRC																		
5603X	14.59	12.99	150	VC	CIRC																		
5604X	14.31	12.74	150	VC	CIRC																		
5605X	14.08	12.62	150	VC	CIRC																		
5606X	13.51	12.49	150	VC	CIRC																		
5702X	13.21		225	VC	CIRC																		
5705X	13.17	12.23	150	VC	CIRC																		
5706X	14.23	12.29	150	VC	CIRC																		
570DX	13.21	11.36	225	VC	CIRC																		
571DX	13.21		225	VC	CIRC																		
5801X	14.03	12.09	225	VC	CIRC																		
5802X	13.76	12.07	225	VC	CIRC																		
5900X	14.46	12.23	225	VC	CIRC																		

LINE STYLES / COLOURS

Brown	-----	Foul
	-----	Foul Siphon Sewer
	-----	Foul Vacuum Main
	-----	Foul Rising Main
Red	-----	Combined
	-----	Combined Siphon Sewer
	-----	Combined Rising Main
	-----	Lateral Drain
Orange	-----	Building Over Agreement Area
Dark Blue	-----	Treated Effluent
Purple	-----	Sludge
	-----	Sewer Catchment
	-----	Section 104 Area
Light Blue	-----	Surface Water
	-----	Surface Water Rising Main
Yellow	-----	Private
Green	-----	Access Shaft
	-----	Decommissioned

MATERIALS

AK	Alkaline
BAC	Bonded Asbestos Cement
BRD	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRD	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vertifed Clay
XXX	Other
ZZZ	Unknown

Manhole (SW)
Manhole (F&C)
Lamp hole (SW)
Lamp hole (F&C)
Pumping Station (SW)
Pumping Station (F&C)
Side entry manhole (SW)
Side entry manhole (F&C)
Blind shaft (SW)
Blind shaft (F&C)
Ejector station (SW)
Ejector station (F&C)
Watertight door (SW)
Watertight door (F&C)
Flushing ch. Min-e (SW)
Flushing ch. Min-e (F&C)
Flushing ch. No-e (SW)
Flushing ch. No-e (F&C)
Demonstration Chamber

LEGEND - SEWERS

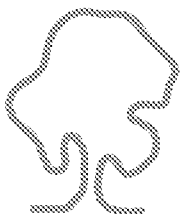
Washout (SW)
Washout (F&C)
Rodding Eye (SW)
Rodding Eye (F&C)
Gauging point (SW)
Gauging point (F&C)
Intercept chamber (SW)
Intercept chamber (F&C)
Storm Tank (SW)
Storm Tank (F&C)
Vortex chamber (SW)
Vortex chamber (F&C)
Label ellipse
Dummy/S24 manhole
Outfall
Penstock chamber
Demiboards
Storm Overflow
Backdrop manhole

Other (s)
Other
Change In sewer (s)
Change In sewer
Rafflux valve
Flap valve
Cascade
Anode
Valve
Closed Valve
Air Valve
Hatch box (SW)
Hatch box (F&C)
Direction arrow
Emptying valve
Catchpit
Soakaway
Inlet
Balancing Pond

Wastewater treatment works
Marine treatment works
Outfall headworks
Vent
Vent column
Tidal storage tank
Blank end
Head of Public Sewer
Micro Pumping Station
SHAPES (S)
A Arched
B Barrel
C Circular
E Egg
H Horseshoe
R Rectangular
S Square
T Trapezoidal
U U Shape
X Other

NODE REFERENCING SYSTEM
1st digit: hundred metre easting identifier
2nd digit: hundred metre northing identifier
3rd digit: sewer type identifier
4th digit: next sequential node

Drawn by:	okuneyf	
Title:	271194_Land Fontwell Avenue	
Date:	08/12/2017	



eas ltd

Environmental Assessment Services Ltd

London Road, Hickstead, Haywards Heath, West Sussex RH17 5LZ UK

Phone : +44 (0) 1444 882 552

Fax : +44 (0) 1444 882 553

email : info@easltd.co.uk

web site : www.easltd.co.uk