

**Land East of Wandleys
Lane, Fontwell
Flood Risk Assessment**

On behalf of:



WELBECK LAND

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Office Address: Caversham Bridge House, Waterman Place, Reading, Berkshire RG1 8DN



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	Name	Position	Signature	Date
Prepared by:	Dominic Bergeron BEng GMICE	Graduate Engineer	<i>Dominic Bergeron</i>	15/09/17
Reviewed by:	Andy Robertson BSc CEng MICE MCIWEM C.WEM	Associate	<i>Andy Robertson</i>	15/09/17
Approved by:	Chris Downs MEng CEng MICE MCIWEM C.WEM	Director	<i>PP Andy Robertson</i>	15/09/17
For and on behalf of Peter Brett Associates LLP				

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Executive Summary

This Flood Risk Assessment (FRA) has been prepared by Peter Brett Associates LLP (PBA) to support an outline planning application for the proposed development at Land East of Wandleys Lane, Fontwell.

The Environment Agency (EA) Flood Zone map shows that the site is located within Flood Zone 1 'Low Probability' (land assessed as having less than a 1 in 1000 (<0.1%) annual probability of fluvial flooding).

The proposals are for a residential use scheme, which is classified by the National Planning Policy Framework (NPPF) as '*More vulnerable*' development, and is appropriate in Flood Zone 1 (reference Planning Practice Guidance Tables 2 and 3).

The site is located in an area with the lowest probability of flooding, thereby complying with the aims of the sequential approach.

The Arun District Council Strategic Flood Risk Assessments (SFRA) and the West Sussex County Council Preliminary Flood Risk Assessment (PFRA) reports indicate that there are no records of groundwater and surface water flooding at the site, and that the site is not located within a Critical Drainage Area.

The Lidsey Surface Water Management Plan (SWMP) report indicates that part of the site located along the eastern boundary is within the Local Flood Risk Zone (LFRZ) 1. As the ground in this area falls away from site, it is unlikely the flood waters would reach the site.

It is recommended that the ground floor level of the proposed dwellings should be a minimum of 300mm above the general ground level in accordance with the recommendation of the GOV.UK Guidance 'Flood risk assessment: standing advice' February 2017, to mitigate against the flood risk associated with excess surface water in an extreme rainfall event.

The site and the surrounding area are located within Flood Zone 1 'Low Probability', and therefore safe, continuous access is provided for the site.

A surface water drainage study has been prepared and incorporates the use of detention basins to provide attenuation up to the 1 in 100 (1%) annual probability flood event plus 30% allowance for climate change. Flood flow routes have been provided to mitigate any excess flooding from the 1 in 100 (1%) annual probability rainfall event plus 40% allowance for climate change.

As the site is located within an Outer Groundwater Source Protection Zone, appropriate stages of treatment will be provided before surface water runoff is discharged.

In conclusion, the development will be safe and there will be no increase in flood risk elsewhere, in accordance with the principles of the NPPF. The level of information in this FRA is proportionate to support the planning application. The detailed design of the SuDS surface water disposal system will be developed post planning permission.

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1 Introduction

1.1 Scope of FRA

- 1.1.1 This Flood Risk Assessment has been prepared by Peter Brett Associates LLP, on behalf of Welbeck Strategic Land II LLP, to support an outline planning application for proposed development at Land East of Wandleys Lane, Fontwell which will include up to 157 no. dwellings, open green space and all related infrastructure.
- 1.1.2 The FRA focuses on assessing the practical flood risk issues at the site as follows:
- Identification of all the potential sources of flooding at the site (i.e. fluvial, groundwater, surface water and sewer);
 - Assessment of the existing flood risk at the site, the potential impact of the proposals and the options for surface water management at the site; and
 - Consideration of the flood risk implications, taking into account the potential allowance for climate change over the lifetime of the development, and the identification of the measures to mitigate flood risk.
- 1.1.3 PBA has prepared this study in accordance with the GOV.UK Guidance 'Flood risk assessment for planning applications' February 2017', which requires that the FRA be undertaken by flood risk specialist's.
- 1.1.4 PBA has undertaken this FRA using experienced flood risk management staff chartered with the Institution of Civil Engineers (ICE) and the Chartered Institution of Water and Environmental Management (CIWEM). PBA has many years of experience in, amongst other areas, the assessment of flood risk, hydrology, flood defence and river engineering.

1.2 Policy Context

- 1.2.1 This FRA has been prepared in accordance with the relevant national, regional and local planning policy and statutory authority guidance as follows:
- National policy regarding flood risk as contained within **National Planning Policy Framework (NPPF)** (March 2012), and the **Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change'** (March 2014);
 - Local planning policy contained within the **Arun District Council (ADC) Adopted Local Plan** (adopted February 2014), with particular reference to Policy W DM2 'Flood Risk';
 - The **ADC Strategic Flood Risk Assessment (SFRA)** Level 1 Updated in August 2016;
 - The **West Sussex County Council (WSCC) Preliminary Flood Risk Assessment (PFRA)** (May 2011);
 - The **WSCC Lidsey Surface Water Management Plan (SWMP)** revised in October 2014;
 - The **GOV.UK Flood Risk Guidance** (February 2017);
 - The **GOV.UK Guidance 'Flood risk assessments: climate change allowances'** (February 2017).

1.3 Vulnerability and the NPPF Sequential Test

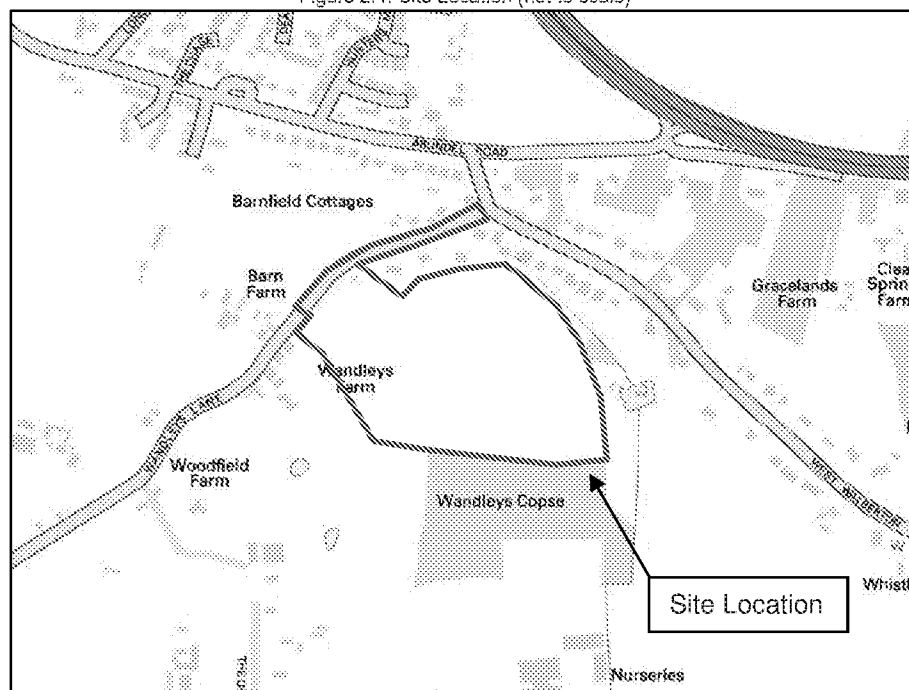
- 1.3.1 The NPPF follows a sequential risk-based approach in determining the suitability of land for development in flood risk areas, with the intention of steering all new development to the lowest flood risk areas.
- 1.3.2 PPG Table 2 confirms the '*Flood risk vulnerability classification*' of a site, depending upon the proposed usage. This classification is subsequently applied to Table 3 to determine whether:
- The proposed development is suitable for the flood zone in which it is located; and
 - Whether an Exception Test is required for the proposed development.
- 1.3.3 The proposal is for residential use ('buildings used for dwelling houses'), which is classified as '*More vulnerable*' development in accordance with PPG Table 2.
- 1.3.4 The EA Flood Zone map shows that the site is located within Flood Zone 1 'Low Probability', and all development is appropriate in this Zone in accordance with PPG Table 3.
- 1.3.5 It is not necessary to undertake the Sequential Test or the Exception Test, since the site is already located in the area at lowest probability of flooding, thereby complying with the aims of the sequential approach.

2 Existing Site and Proposals

2.1 Site Description

- 2.1.1 The site is located in Fontwell, West Sussex; postcode BN18 0QR.
- 2.1.2 The existing site consists of agricultural land with 4no. small storage buildings in the north-western corner.
- 2.1.3 The site lies within the administrative boundary of Arun District Council (ADC). The lead local flood authority (LLFA) for the area is West Sussex County Council (WSCC).
- 2.1.4 The site is bordered to the north and east by residential housing, to the south by Wandleys Copse and residential housing, and Wandleys Lane forms the western boundary extending to the junction to West Walberton Lane.

Figure 2.1: Site Location (not to scale)



2.2 Topography

- 2.2.1 A topographical survey was performed by Maltby Survey Ltd in March 2017 and is shown in drawings 17/071/100-500 located in **Appendix A**.
- 2.2.2 The survey shows the site falls from north-west to south-east from an elevation of approximately 28.30m AOD to 20.60m AOD.

2.3 Proposed Development

- 2.3.1 The proposal is for the re-development of the site into residential housing including: up to 157no. residential dwellings, open green space and all relevant infrastructure. See **Appendix B** for current masterplan.

2.4 Existing Site Drainage

- 2.4.1 The site is greenfield land and does not have an existing drainage system.
- 2.4.2 The Southern Water (SW) sewer records (provided in **Appendix A**) show the presence of two public foul water sewers beneath Wandleys Lane, and another beneath West Walberton Lane. No surface water sewers are shown.
- 2.4.3 An Ordinary Watercourse Map provided by Arun District Council (see **Appendix C**) indicates there are existing surface water ditches along the southern and eastern boundaries of the site.
- 2.4.4 Given the undeveloped nature of the site, it is assumed that the site drains by a combination of natural infiltration and over ground runoff to the existing ditches.

2.5 Geology

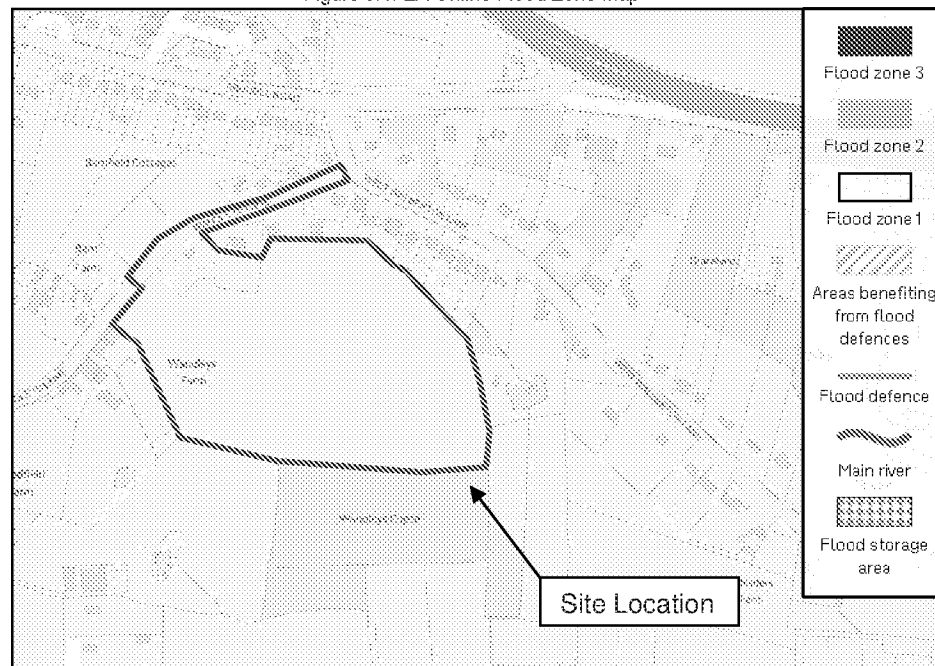
- 2.5.1 The British Geological Society (BGS) Infiltration SuDS Geo Report obtained for the site, which can be found in **Appendix A**, indicates the following conditions on site:
- The bedrock is formed of Lambeth Group clay, silt and sand;
 - There are superficial deposits of gravel, sand, silt and clay;
 - The groundwater table is likely to be less than 3m below the ground surface for at least part of the year but not persistently shallow.
- 2.5.2 The Cranfield University online 'Soilscapes' website provides an overview of the drainage potential of land across Britain. This indicates the site falls within an area designated as 'Freely draining slight acid loamy soils'.
- 2.5.3 Historical Borehole records made available by BGS for the site indicate the superficial ground level is mainly sandy clay and that the ground water level was approximately 1.8m below ground level. There are no dates on the records.

3 Flood Risk

3.1 Environment Agency Information

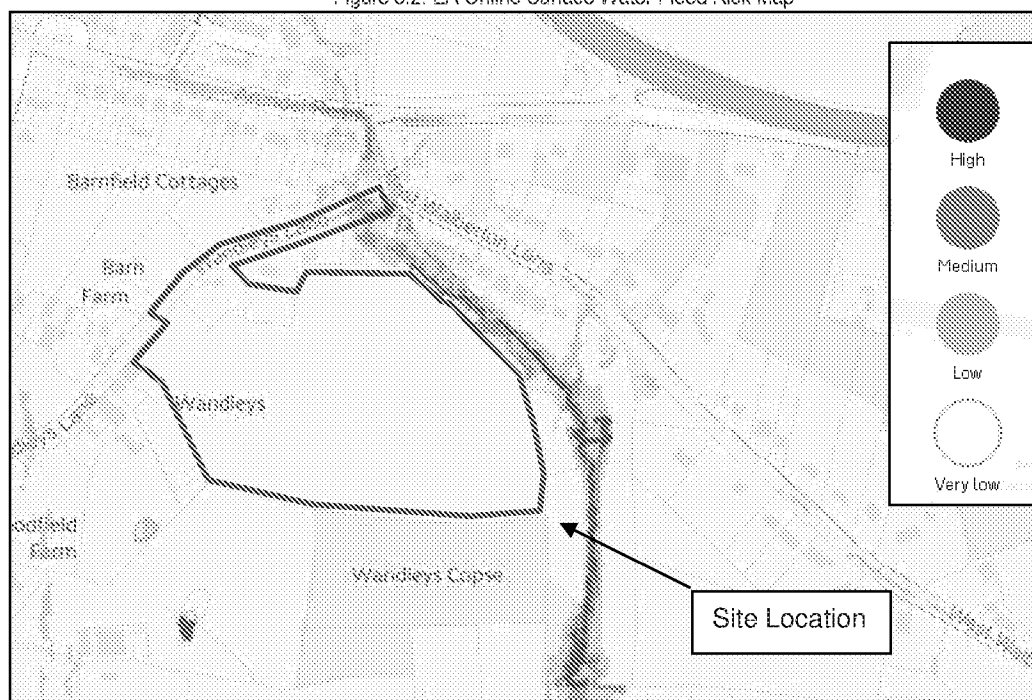
- 3.1.1 The initial phase in identifying whether a site is potentially at risk of flooding is to consult the EA's Flood Zone maps, available on the EA's website and reproduced in **Figure 3.1** below.

Figure 3.1: EA Online Flood Zone Map



- 3.1.2 This indicates that the site lies in the unshaded **Flood Zone 1 'Low Probability'** (land assessed as having less than a 1 in 1000 (<0.1%) annual probability of fluvial flooding).
- 3.1.3 The Flood Risk from Surface Water map, shown in **Figure 3.2**, shows that the majority of the site is at 'Very Low' risk of flooding (less than 1 in 1000 (0.1%) annual probability of surface water flooding).
- 3.1.4 **Figure 3.2** indicates a small region of the northern boundary of the site on Wandleys Lane is between 'Medium' and 'High' risk of flooding (less than 1 in 100 (1%) annual probability and, greater than 1 in 30 (33%) annual probability of flooding respectively).
- 3.1.5 There are small areas along the north-eastern boundary that are between 'Low' and 'High' risk of flooding (less than 1 in 100 (1%) annual probability and, greater than 1 in 30 (33%) annual probability of flooding respectively).

Figure 3.2: EA Online Surface Water Flood Risk Map



- 3.1.6 The EA online groundwater map indicates that the site is located within a Source Protection Zone 2c (outer zone – subsurface activity only). Within the proposed surface water drainage strategy for the site, appropriate levels of treatment have been provided to ensure that there is no detriment to the groundwater body (see Section 4).

3.2 West Sussex County Council (WSCC) Information

Preliminary Flood Risk Assessment (PFRA)

- 3.2.1 The WSCC PFRA was produced in May 2011 and provides flood risk information across the county. The PFRA does not provide any flood information related to the site or the area surrounding it.

Lidsey Surface Water Management Plan (SWMP)

- 3.2.2 The Lidsey SWMP was produced in October 2014 and aims to evaluate flood risk from varying sources within the Southern Water's Lidsey wastewater drainage catchment area and develop an 'Action Plan' to reduce or mitigate flood risk both now and in the future.
- 3.2.3 Part of the eastern side of the site is within the Local Flood Risk Zone (LFRZ) 1 – West Walberton Lane, Walberton. This zone has risk of public sewer flooding due to hydraulic overloading. The relevant extract of the SWMP can be found in **Appendix D**.
- 3.2.4 The topographical survey of the site shows the ground falls away from the site in this area, as such it is unlikely the flood water from Walberton Lane would propagate into the site.

Correspondence

- 3.2.5 Correspondence with WSCC, found in **Appendix D**, has confirmed the site is not located within a Critical Drainage Area.

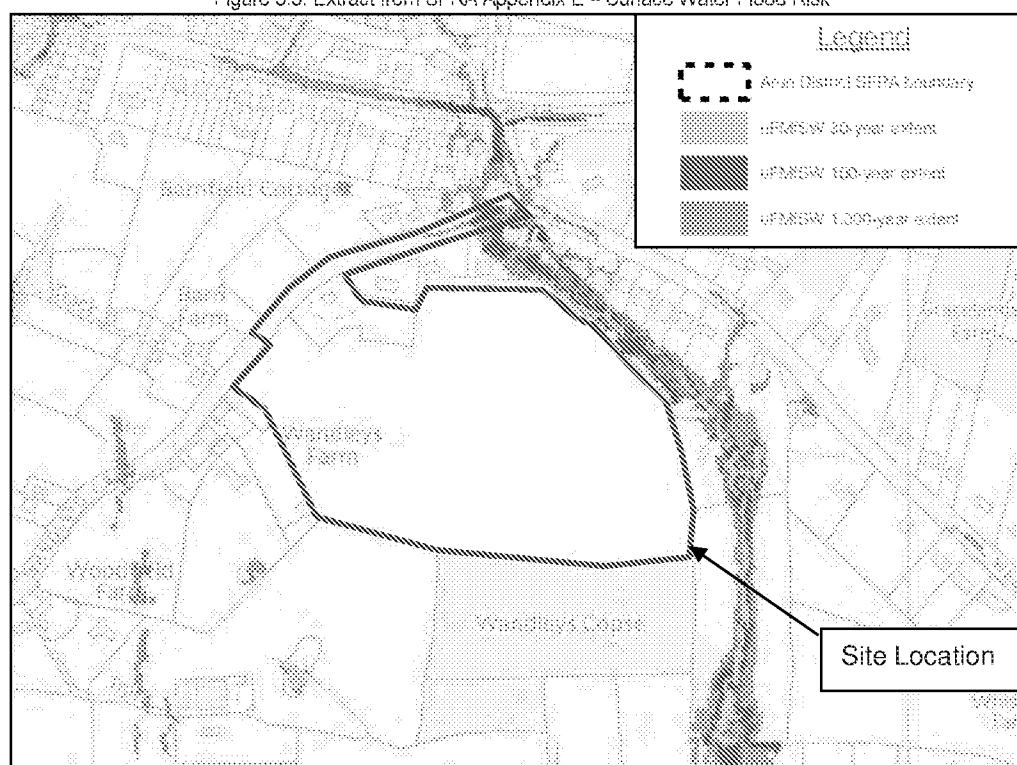
3.3 Arun District Council (ADC) Information

Strategic Flood Risk Assessment (SFRA)

3.3.1 The ADC SFRA was last updated in August 2016 and provides flood risk information on a borough-wide scale. Copies of the referred maps are available in **Appendix C**. The information specific to the site itself is as follows.

- **SFRA Appendix D** indicates the site will not be affected by future flooding up to the year 2111 allowing for climate change.
- **SFRA Appendix E** mimics the data surface water flood risk from the EA flood maps shown in **Section 3.1** and shows that there is possibility of surface water flooding along the north-eastern boundary and the northern region of Wandleys Lane.

Figure 3.3: Extract from SFRA Appendix E – Surface Water Flood Risk



- **SFRA Appendix F** shows that the site is in an area that has a 75% chance or greater to be susceptible to groundwater flooding. This data is based on a 1km square grid, as such only small portions within the grid may actually experience groundwater flooding.
- **SFRA Appendix H** indicates there are no historical floods from any sources recorded within the site area.

Correspondence

3.3.2 Correspondence with ADC, found in **Appendix C**, has indicated they have no records of flooding occurring in this area.

3.3.3 ADC provided an ordinary watercourse map of the area (see **Appendix C**) which confirms the presence of a surface water ditch along the eastern boundary and another between the site

and Wandleys Copse. Both these ditches meet at the south-eastern corner of the site and continue south to a series of maintained watercourses.

3.4 Impact of Climate Change

- 3.4.1 In considering flood risk to the site, it is necessary to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures. PPG Section 7 states that '*residential development should be considered for a minimum of 100 years*' (up to 2120).
- 3.4.2 The GOV.UK Guidance '*Flood risk assessments: climate change allowances*' (supported by the EA Guidance '*Thames Area Climate Change Allowances*') (which support the NPPF) provides allowances for potential increases in peak river flow and rainfall intensity in Tables 1 and 2.
- 3.4.3 The climate change allowance has been used within the surface water drainage strategy to allow for an increase in rainfall intensity.

4 Surface Water & SUDS

4.1 Building Regulations Hierarchy

- 4.1.1 The NPPF recognizes that flood risk and other environmental damage can be managed by minimizing changes in the volume and rate of surface runoff from development sites, and recommends that priority be given to the use of Sustainable Drainage Systems (SuDS) in new development, this being complementary to the control of development within the floodplain.
- 4.1.2 The Building Regulations Requirement H3 stipulates that rainwater from roofs and paved areas is carried away from the surface to discharge to one of the following, listed in order of priority:
- An adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable;
 - A watercourse, or where that is not practicable,
 - A sewer.

4.2 SFRA Guidance on Surface Water Drainage

- 4.2.1 Section 8.6 of the ADC SFRA provides the following guidance on surface water drainage as follows:

'Surface water must not be discharged into the foul sewer system. Infiltration structures include soakaways, basins, swales and permeable paving. Discharge to surface water bodies and surface water sewers must be restricted to an agreed rate.'

'Discharge to a watercourse or surface water sewer must be restricted to the estimated mean greenfield runoff rate (Qbar) by means of a controlled outflow (or restricted to existing runoff rates for brownfield sites). This can be derived from IH124 or a similar approved method. Any storage design must be submitted with groundwater monitoring data where applicable to ensure there will be no detrimental effect on the structure or storage. Storage areas are preferred to be in an 'open' form such as ponds, rather than underground tanks.'

- 4.2.2 The following section outline how the development will meet the requirements of the above guidance.

4.3 Proposed Surface Water Drainage Strategy

- 4.3.1 The proposed surface water drainage arrangements for the site are outlined in Technical Note 38848/4001/TN002 Revision A and are shown on PBA Drawing 38848/4001/001 Revision A (copies provided in **Appendix E**).
- 4.3.2 The Technical Note is summarised below:
- Based on the BGS Infiltration SuDS Report and the PBA site visit (see **Appendix A**), there is the possibility of high groundwater table, thus infiltration is deemed not feasible for the site;
 - It is proposed the surface water runoff be discharge to the existing ditch along the western boundary. A series of 3no. detention basins will attenuate runoff up to the 1 in 100 (1%) annual probability plus 30% climate change rainfall event;

- The surface water runoff will discharge through one outfall at the south east corner of the site to an existing ordinary watercourse;
- Allowance in both proposed storage volume and outfall discharge rates has been provide to accommodate long term runoff water storage in accordance with DEFRA guidance;
- Flood flow routes have been developed to mitigate flooding and damage to properties during extreme flood events up to the 1 in 100 (1%) annual probability plus 40% climate change rainfall event;
- The site is located within an Outer Groundwater SPZ, and appropriate levels of treatment are proposed to be incorporated into the detail design in accordance with CIRIA guidance;

4.3.3 The detailed design of the SuDS surface water disposal system will be developed post planning permission.

5 Residual Risk

- 5.1.1 It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible. However, it is practicable to minimise the risk by allowing a suitable freeboard (safety margin) and by using suitable construction and management techniques.
- 5.1.2 The site and the surrounding area are located in Flood Zone 1 'Low Probability' (less than a 1 in 1000 (<0.1%) annual probability of fluvial flooding).
- 5.1.3 The surface water drainage strategy for the proposed development demonstrates there is no increase in flood risk to the site or third parties, and the proposed SUDS facilities have been designed to accommodate rainfall events up to and including the 1 in 100 (1%) annual probability rainfall event plus 30% allowance for climate change. The 40% allowance is checked and considered through the extreme flood routing from each component and is shown on Drawing 38848/4001/001 Revision A and is confirmed in 38848/4001/TN002 Revision A, copies of which are in **Appendix E**.
- 5.1.4 In line with the GOV.UK Guidance 'Flood risk assessment: standing advice' it is recommended that the ground floor levels should be a minimum of 300mm above the general ground level to mitigate the flood risk associated with excess surface water in an extreme rainfall event.
- 5.1.5 As the site and the surrounding area are located within Flood Zone 1 'Low Probability', continuous safe access is provided.
- 5.1.6 In conclusion, the residual flood risk at the site is considered to be low.

6 Conclusion

- 6.1.1 This Flood Risk Assessment (FRA) has been prepared by Peter Brett Associates LLP (PBA) to support an outline planning application for the proposed residential use development at Land East of Wandleys Lane, Fontwell.
- 6.1.2 The Environment Agency (EA) Flood Zone map shows that the site is located within Flood Zone 1 'Low Probability' (land assessed as having less than a 1 in 1000 (<0.1%) annual probability of fluvial flooding).
- 6.1.3 The proposals include an outline scheme for residential use, which is classified by the National Planning Policy Framework (NPPF) as '*More vulnerable*' development, and is appropriate in Flood Zone 1 (reference Planning Practice Guidance Tables 2 and 3).
- 6.1.4 The site is located in an area with the lowest probability of flooding, thereby complying with the aims of the sequential approach.
- 6.1.5 The Arun District Council Strategic Flood Risk Assessment (SFRA) and the West Sussex Preliminary Flood Risk Assessment (PFRA) reports indicate that there are no records of groundwater and surface water flooding at the site, and that the site is not located within a Critical Drainage Area.
- 6.1.6 The Lidsey Surface Water Management Plan (SWMP) report indicates that part of the site located along the eastern boundary is located with the Local Flood Risk Zone (LFRZ) 1. As the ground in this area falls away from site, it is unlikely the flood waters would reach the site.
- 6.1.7 It is recommended that the ground floor level of the proposed dwellings is set at a minimum of 300mm above the general external ground level to mitigate against the flood risk associated with excess surface water in an extreme rainfall event.
- 6.1.8 The site and the surrounding area are located within Flood Zone 1 'Low Probability', and therefore safe, continuous access is provided for the site.
- 6.1.9 A surface water drainage study has been prepared and incorporates the use of detention basins to provide attenuation up to the 1 in 100 (1%) annual probability flood level plus 30% allowance for climate change. As the site is located within an Inner Groundwater Source Protection Zone, appropriate stages of treatment will be provided before runoff is discharged to the existing ditch on the western boundary.
- 6.1.10 Flood flow routes have been developed to mitigate flooding and damage to properties during extreme flood events up to the 1 in 100 (1%) annual probability plus 40% climate change rainfall event.
- 6.1.11 In conclusion, the development will be safe and there will be no increase in flood risk elsewhere, in accordance with the principles of the NPPF. Surface water will be disposed in a sustainable manner by infiltrating into the natural ground, subject to investigation of any dissolution features.

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Appendix A Existing Site Information

Maltby Surveys Ltd Drawing 17/071/100-500 dated March 2017 – *'Topographical Survey'*

PBA Site Walkover Report dated 19 April 2017

British Geological Survey *'Infiltration SuDS GeoReport'* . Report ID GR_215915/1 dated 28 April 2017

Southern Water *'Drainage and water enquiry'*. Reference LS/K1283649 and dated 23 May 2017

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Appendix B Current Site Layout

ECE Architecture Drawing 6462-01 revision D dated 29 September 2017 – *'Indicative Site Layout'*

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Appendix C Arun District Council Information

Arun District Council Flooding Correspondence

Arun District Council Ordinary Watercourse Map dated 12 June 2017

Arun District Council Strategic Flood Risk Assessment Figures:

- Appendix D – *Climate Change Mapping*
- Appendix E – *Surface Water Flood Risk*
- Appendix F – *Areas Susceptible to Groundwater*
- Appendix H – *Historic Flood Records*

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Appendix D West Sussex County Council Information

Lidsey Surface Water Management Plan extract – 'LFRZ 1'

West Sussex County Council Flooding Correspondence

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Appendix E Surface Water Information

PBA Technical Note 38848/4001/TN002 - Revision A *Land East of Wandleys Lane, Outline Surface Water Drainage Strategy*