

**LAND AT WINGS NURSERY, LIDSEY
ROAD, WOODGATE, CHICHESTER, WEST
SUSSEX PO20 3SU**

RESIDENTIAL DEVELOPMENT

Flood Risk Assessment

Incorporating Foul and Surface Water
Drainage Statement and Lidsey Foul Water
Environmental Assessment Statement

Prepared on Behalf of

ADM Architects

2017/D1382/FRA1.1

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DRAWINGS

SK100 Site Location Plan
SK101 Topographical Survey with Contours
SK200 Impermeable Areas Comparison
SK300 Drainage Strategy
SK301 Contours, Proposed Finished Floor Levels and Overland Flows

APPENDICIES

Appendix A Architects Layout GA
Appendix B Public Sewer Maps
Appendix C EA/LLFA Flood Risk
Appendix D Lidsey SWMP Extracts
Appendix E Historical Borehole Records
Appendix F Microdrainage/Run-off Calculations

1 INTRODUCTION

1.1 Background

- 1.1.1 RGP Design Ltd (RGP) is instructed by ADM Architects to prepare a Site-Specific Flood Risk Assessment (FRA) to support a planning application for a residential development in relation to the Land at Wings Nursery, Lidsey Road, Woodgate, Chichester, West Sussex PO20 3SU.
- 1.1.2 This FRA has been undertaken in accordance with Planning Practice Guidance: Flood Risk and Coastal Change (FRCC) and National Planning Policy Framework Section 10.
- 1.1.3 The proposed development will involve the construction of up to 55 new residential units at the above location, as shown on drawing **SK300**.
- 1.1.4 In preparing this report, RGP has made reference to the following documents and information:
- Environment Agency Flood Maps for Planning
 - Long Term Flood Risk Assessment Surface Water Flood Risk Maps
 - Long Term Flood Risk Assessment Reservoir Flood Risk Maps
 - Local Authorities Strategic Flood Risk Assessment
 - Southern Water and Local Authority Drainage Records
 - British Geological Survey & Records
- 1.1.5 This FRA has been prepared to assess if the proposed development is suitable for the site and confirms if mitigation is required to ensure that flood risk is not increased and that the proposed development remains safe during its design life.
- 1.1.6 This report has been prepared for the benefit of the named Client only.

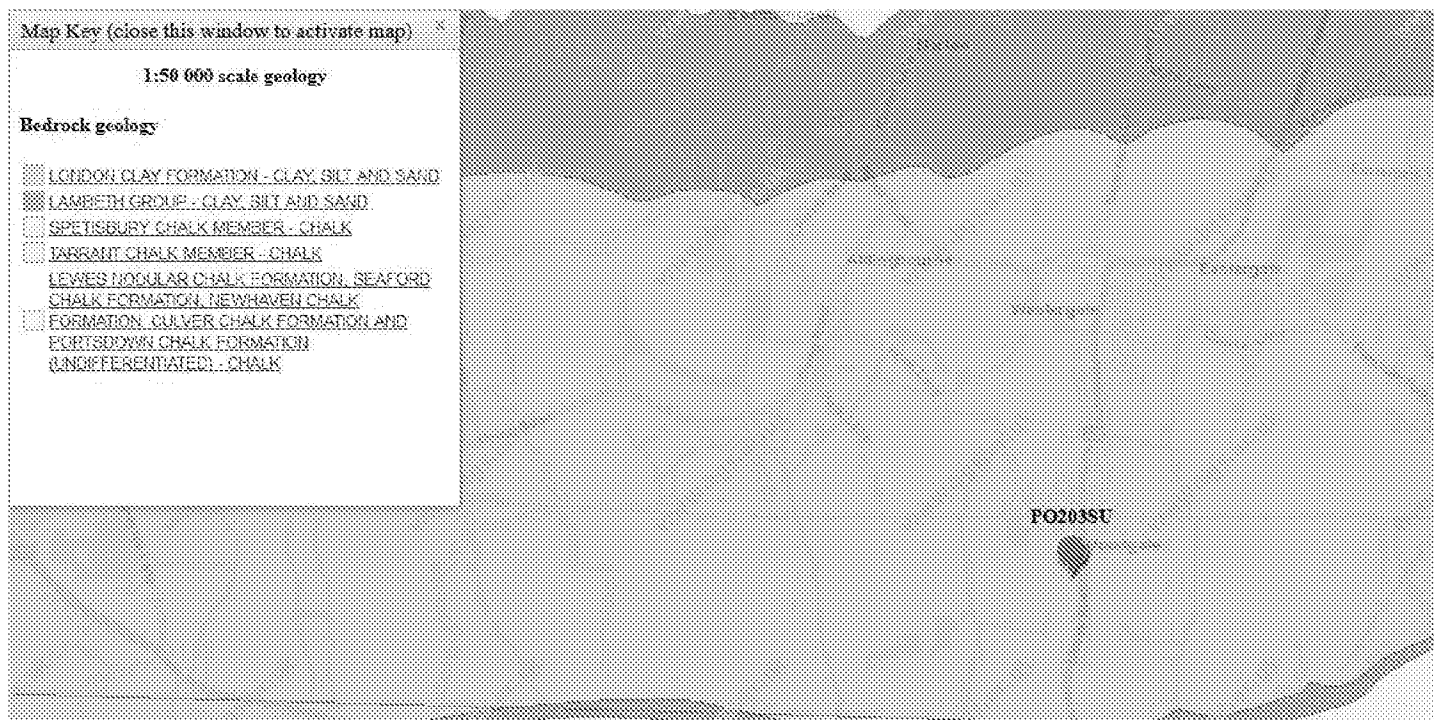
1.2 Site Location and Description

- 1.2.1 The site totals 2.55Ha in size and covers land to the west of Lidsey Road (A29).
- 1.2.2 The site is located approximately 6.44km north of Bognor Regis, 10.94km east of Chichester, 26.07km west of Worthing and 40km east of Portsmouth. The site itself is currently largely an undeveloped greenfield location in a semi-rural/residential area. An area to the south-east of the site is currently occupied by a number of greenhouses with some areas of hardstanding.
- 1.2.3 The topography of the site is demonstrated as lying at approximately 9.51m to 8.19m AOD, generally falling from west to east, as shown on drawing **SK101**. This has been assessed via LiDAR information obtained as no topographical survey has yet been undertaken on site.

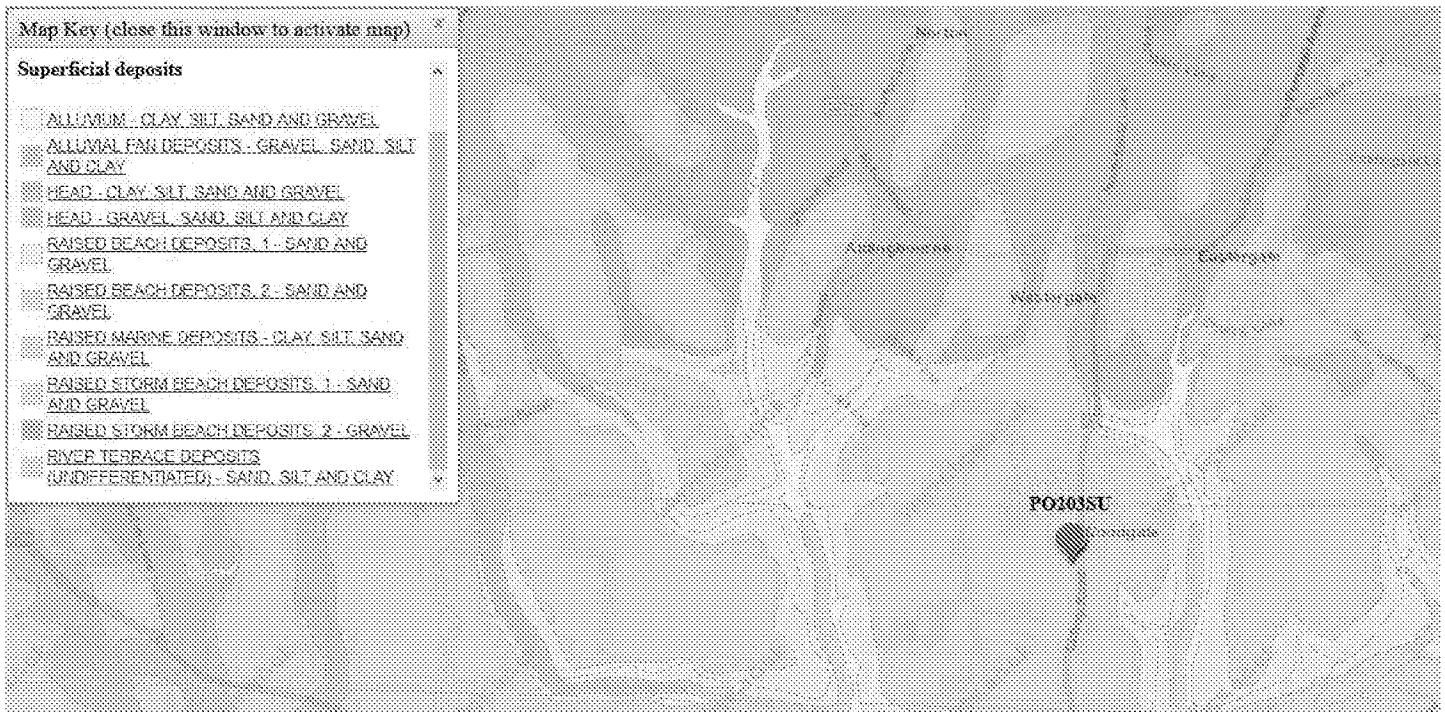
- 1.2.4 A watercourse is present to the east of site which stretches from the south-eastern corner up to the northern boundary of the site. Sections of this watercourse are culverted, including across the frontage of the existing 'Wings Nursery' building(s). It is believed that this watercourse diverts under Lidsey Road, to the east via an existing culvert. In addition to this watercourse, a further open watercourse runs along the western boundary of the site. Both watercourses are unnamed. It is believed the watercourse to the east of the site flows in a northerly direction, whilst the watercourse at the western boundary flows in a southerly direction.
- 1.2.5 The proposed development will involve the construction of 55 no. residential dwellings with associated hard standing for access and off-street parking and shown on drawing **SK300**, as well as in **Appendix A**.
- 1.2.6 The overall site area is 2.55Ha as shown on drawing **SK100**.
- 1.2.7 The existing impermeable area is 1,653m².

1.3 Ground Conditions

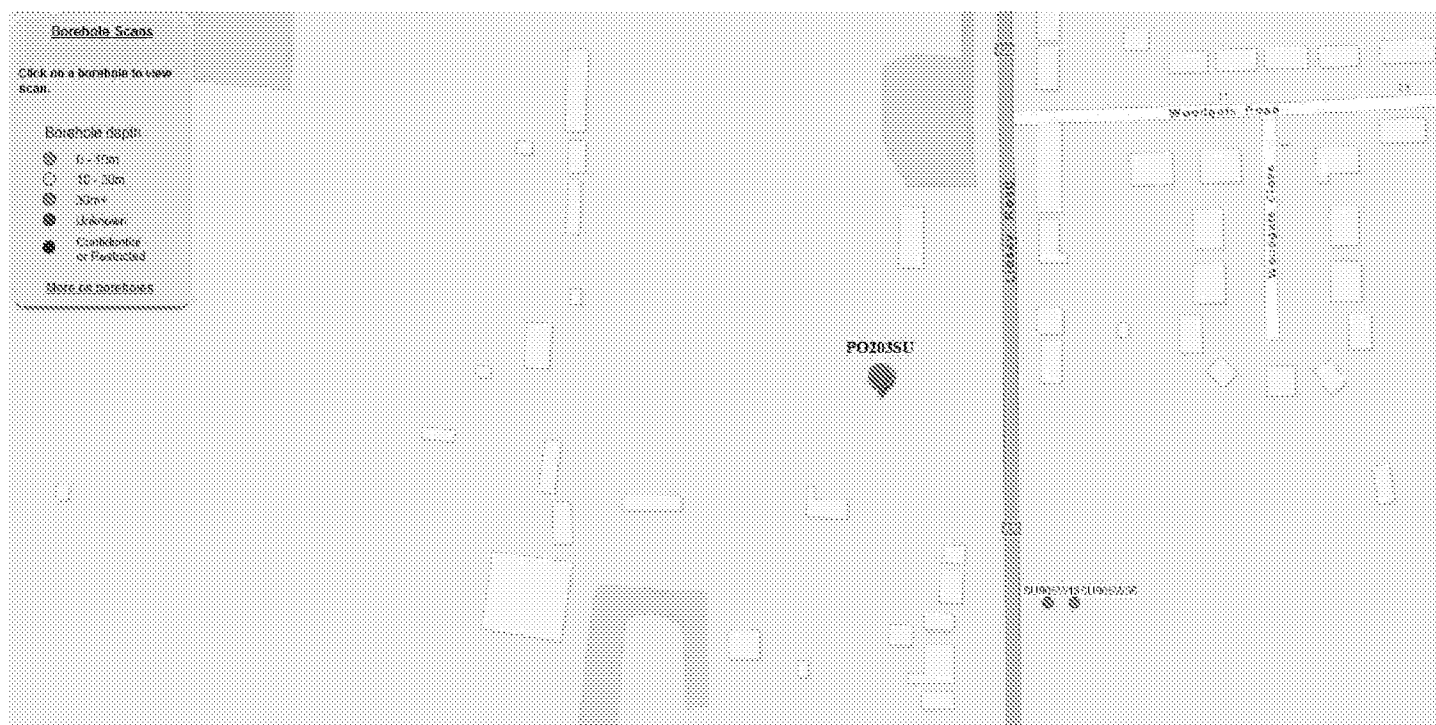
- 1.3.1 An intrusive geotechnical study has not been undertaken for the site, meaning precise infiltration testing results are not available. Furthermore, as a direct result it has not been possible to ascertain or determine the level of Groundwater, as Groundwater monitoring has not been conducted.
- 1.3.2 In view of 1.3.1, reference has instead been made to the British Geological Survey (BGS) website.
- 1.3.3 Bedrock geology is reported by the BGS as being 'London Clay Formation – Clay, Silt and Sand'.



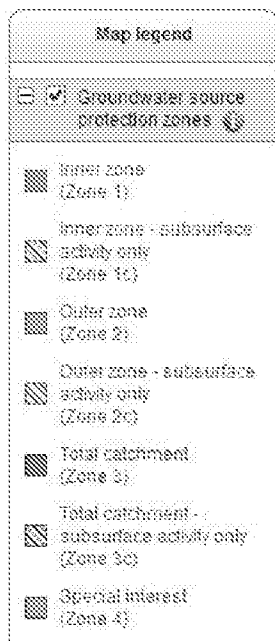
- 1.3.4 The composition of Superficial deposits is demonstrated as being variable. The data available on the BGS website suggests that Superficial deposits consist of 'Raised Beach Deposits 2 – Sand and Gravel', 'Raised Storm Beach Deposits 1 – Sand and Gravel', as well as 'River Terrace Deposits (Undifferentiated) – Sand, Silt and Clay'.



- 1.3.5 An historical borehole (SU90SW56) exists to the south-east of the site, on to the east of Lidsey Road (A29) at OS co-ordinates 493830E and 104000N, which extends to a depth of 156m bgl. Topsoil was recorded as being 0.50m thick, below which 'sandy brown clay', 'clay with stones' and 'bed of gravel' was experienced, to depths of up to 3m bgl. Below this level, 'London Clay Formation' was reported, consisting of 'sandy blue clay' was experienced to a depth of 12m, beneath which 'blue clay with bands of hard stone', 'bed of blue coloured clay', 'very hard black stone with pyrites' and 'blue clay with bands of stone' to depths up to 102m. 'Sandy green/brown clay', 'red mottled clay' and 'dark blue mottled clay', 'red mottled clay', 'red clay with bands of blue/green shale', 'red/blue mottled clay' and 'red clay mottled green and yellow' was recorded up to depths of 136m bgl, after which 'chalk and flints' were experienced for the remainder of the bore, to depths of 156m bgl.

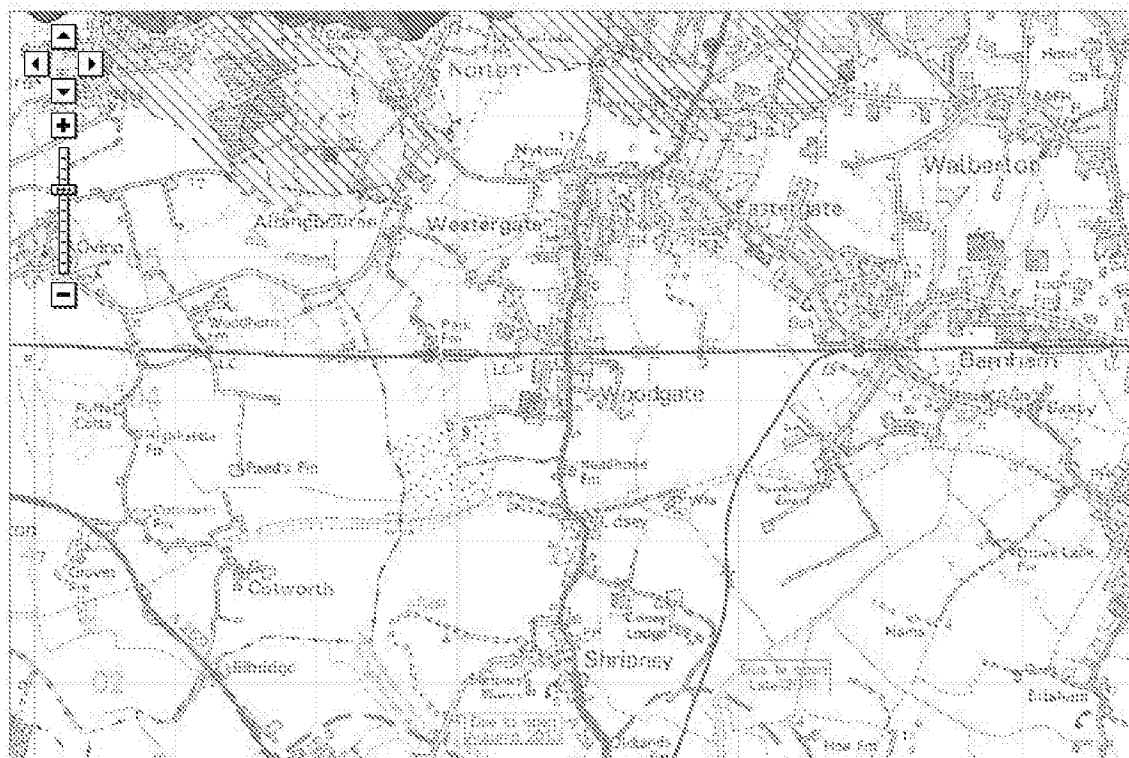


- 1.3.6 It was not possible to ascertain the level at which Groundwater was stuck in relation to this borehole, owing to the method of excavation employed (mud-flush rotary).
- 1.3.7 Information obtained from West Sussex County Council confirms that JBA groundwater mapping suggests groundwater could rise to within 0.025m bgl, meaning infiltration during high periods of groundwater unlikely.
- 1.3.8 Environment Agency Groundwater Mapping indicates that the site is not located nearby to Groundwater Source Protection Zones. The same mapping tool indicates that the site is classified as falling within a 'Minor Aquifer High' Groundwater Vulnerability Zone.



PO20 3SU at scale 1:40,000

Other maps  Data search  Text only version



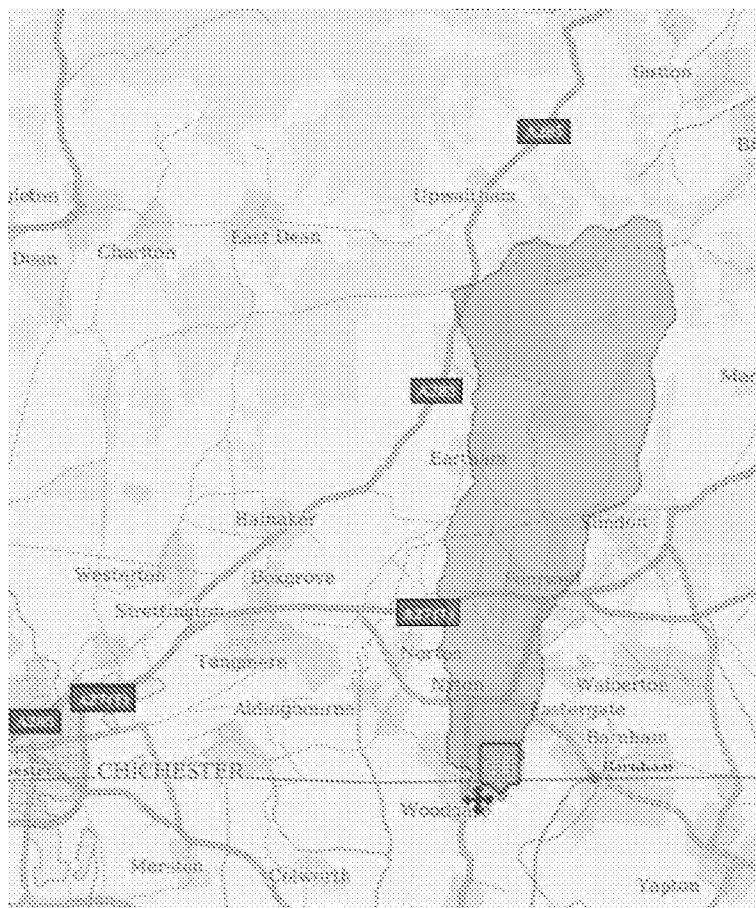
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1.4 Existing Drainage

- 1.4.1 The site falls within the Lidsey Foul Water Treatment Catchment Area, as confirmed by Arun District Council and WSCC. This is recognised as being a sensitive area in terms of drainage for both foul and surface water. WSCC (as LLFA) alongside Southern Water, commissioned The Lidsey Surface Water Management Plan (SWMP) which largely covers the same area as the Lidsey Foul Water Treatment Catchment Area.
- 1.4.2 The existing drainage systems have been identified by reviewing OS mapping along with statutory records obtained from the local Water Authority, Southern Water. It has not been possible to refer to site specific topographical data as a topographical survey has not yet been commissioned in relation to the site.
- 1.4.3 Surface Water:
- The Southern Water public sewer records (**Appendix B**) demonstrate that there are no public surface water sewers located within the vicinity of the site.
 - It is believed that the site is drained partially by infiltration, whilst surface water is also discharged to the existing watercourse(s) located at the eastern and western boundaries of the site, via naturally occurring overland flow routes.
 - The Flood Estimation Handbook (FEH) website data confirms that the site does not fall directly within any significant catchment.



- Greenfield runoff rate (Q_{bar}) has been calculated to be 9.7l/s ($Q_1=8.2l/s$, $Q_{30}=22.0l/s$ and $Q_{100} = 30.9l/s$)
- The Greenfield run-off volume is calculated to be 645.559m³ (Based on FEH, SPR of 37.00%).

1.4.4 Foul Water:

- The Southern Water public sewer records (**Appendix B**) show that there are existing public foul water sewers located within the confines of the site. A 150mm dia. public foul water sewer is located at the southern boundary of the site, flowing in an easterly direction. The sewer then diverts and heads in a northerly direction before leaving the confines of the site, exiting at the eastern boundary and running down the centre of Woodgate Road to the east of the site.

It is understood that the site does not have any existing connections to the public foul water sewers stated in 1.4.4.

1.4.5 Highway Drainage:

- There is existing positive drainage infrastructure which currently serves Lidsey Road. Road gullies exist along Lidsey Road and connect to a piped highway drainage system, the outfall of which has been confirmed by WSCC as being to the south of the site. In addition to this, WSCC have also confirmed that, at present, no future improvements are currently planned in relation to the existing infrastructure.

2 PROBABILITY

2.1 Sources of Information

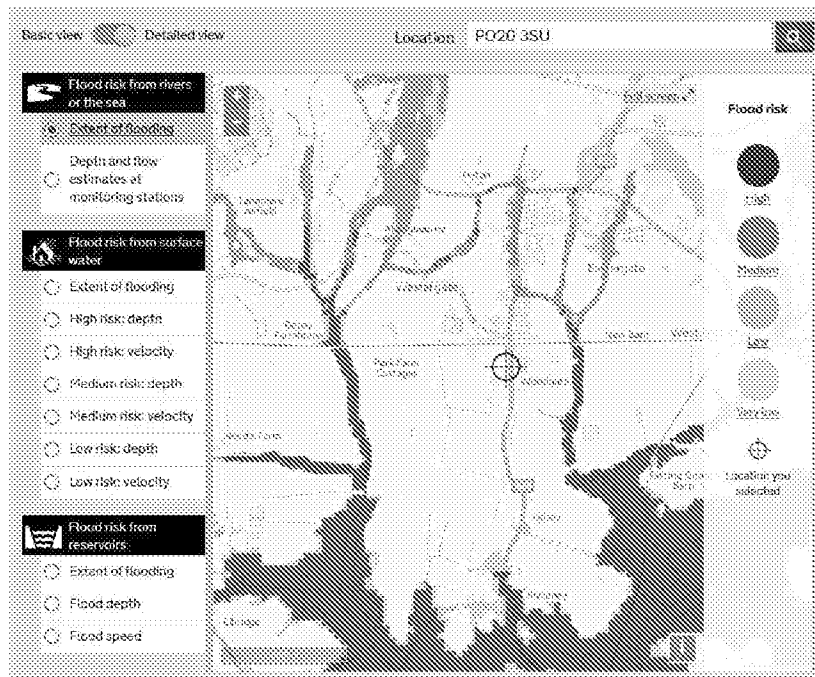
2.1.1 The NPPF requires that all sources of flooding are considered being Tidal, Fluvial, Pluvial, Groundwater, Sewers and Man-made reservoirs/canals.

2.1.2 The likelihood of the site flooding has been established by reviewing the following information:

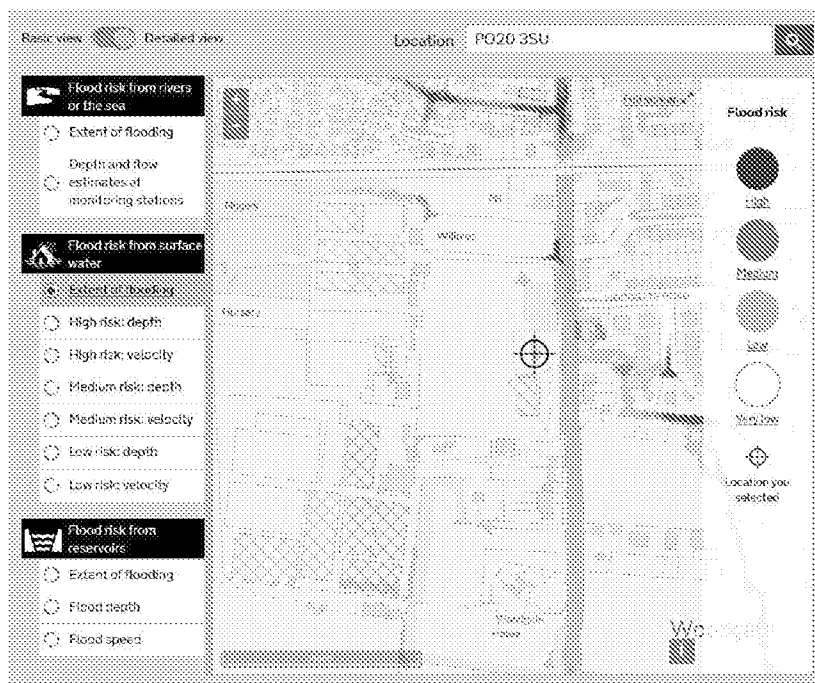
- Environment Agency Flood Maps for Planning
- Long Term Flood Risk Assessment Surface Water Flood Risk Maps
- Long Term Flood Risk Assessment Reservoir Flood Risk Maps
- Local Authorities Strategic Flood Risk Assessment
- Consultation with Local Authority/Lead Local Flood Authority

2.2 Flood Maps and Modelling

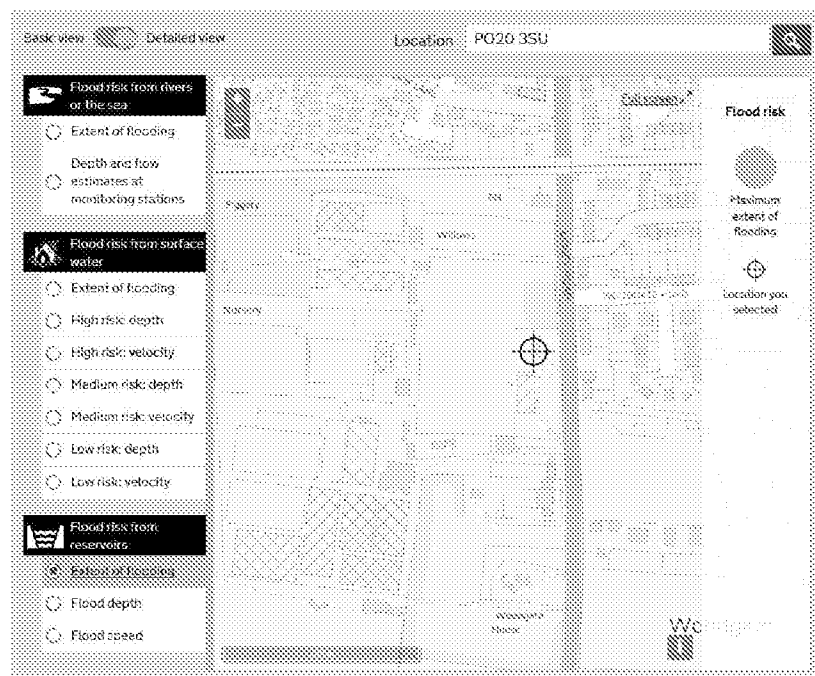
2.2.1 The Environment Agency's on-line Flood Maps for Planning (rivers and sea) show that the site is located fully within flood zone 1, as demonstrated below. This is also confirmed by information and mapping obtained from The Environment Agency, which is consist within other flood risk mapping reviewed.



- 2.2.2 The Long-Term Flood Risk Map for Surface Water show that the site is largely at very low risk of flooding. Small areas to the north-eastern corner of the site are illustrated as being susceptible to low risk of surface water flooding, whilst a small area to the south-western corner of the site is also shown to be susceptible to low risk of surface water flooding. This information is consistent with that provided by WSCC.



- 2.2.3 The Flood Maps for Reservoirs (gov.uk) show that the site is not at risk from this source.



- 2.2.4 The Lidsey Surface Water Management Plan refers to the fact that flooding from sewers has occurred in the past, nearby to the site – specifically in Oak Tree Lane.

- 2.2.5 There are no known artificial sources in the area.

2.3 Strategic Flood Risk Assessment

- 2.3.1 The site falls within the boundaries of West Sussex County Council (WSSC) and Arun District Council (ADC).
- 2.3.2 WSSC has published a Strategic Flood Risk Assessment, dated January 2010. In addition to this, WSSC has also published a Local Flood Risk Management Strategy (May 2014). Flood mapping and information obtained therein is consistent with other flood maps reviewed and detailed within this report. The site is not specifically referenced within the report, although the Lidsey Waste Water Catchment Area is referred to as part of the Surface Water Management Plan (SWMP).

2.4 Historic Flooding

- 2.4.1 The SFRA, Local Authorities & The Environment Agency have all confirmed that they are not aware of any historical flooding within the confines of the site. WSSC have advised, however that this may not mean that flooding has not occurred, simply it has not been reported to the LLFA. It has been confirmed that Lidsey Road has experienced instances of flooding historically, along with Oak Tree Lane, to the north-east of the site. The last reported incident was recorded in 2012, as detailed within the Lidsey SWMP (**Appendix D**).

2.5 Summary of Flood Risk

- 2.5.1 The potential sources of flooding are:

Source of Flooding	Level of Risk
Rivers and Watercourses	Low
The Sea	Low
Surface water	Low
Groundwater	Medium/High
Sewers (*)	High
Artificial Sources	None

3 PROPOSED DEVELOPMENT

3.1 Description of Development

3.1.1 The proposed development will involve the construction of 55 no. dwellings as demonstrated within **Appendix A**.

3.1.2 The type of development falls within the More Vulnerable classification (Flood Risk and Coastal Change Table 2) and is compatible with Flood Zones 1 and 2 (Flood Risk and Coastal Change Table 3).

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	x	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	x	x	x	✓*

3.1.3 The proposed development encompasses land which is currently an un-developed greenfield site with a low amount of existing impermeable areas (approximately 1,653m²/0.1Ha). The proposed development involves the creation of new impermeable areas and will therefore increase the rate or volume of run-off generated by the site. The post-development impermeable area(s) has been determined to be in the region of 11,325m² (1.13Ha).

3.1.4 The increase in impermeable area will result in an increase in surface water run-off, which will be mitigated through the use of SuDS methods and techniques (where conditions and constraints allow) within the bounds of the site. Subject to confirmation of infiltration testing, it is proposed to employ infiltration techniques to deal with the increase in surface water run-off. Further to this, additional surface water could be discharged to the existing watercourse(s) at a restricted rate as so not to exacerbate existing flow rates, to ensure that the development does not increase the risk of flooding both on and off of the site.

3.1.5 The proposed site layout is shown on drawing Site Plan_280917 (**Appendix A**) prepared by ADM Architects.

4 PROPOSED DRAINAGE STRATEGY

4.1 Surface Water

- 4.1.1 The SUDS manual and Building Regulations set out a hierarchy of drainage methods to ensure that developments maximise the use of sustainable drainage techniques. The hierarchy favours infiltration methods of disposal over other methods such as watercourse and sewers.

SUDS Technique	Suitable	Comments
Living Roof	Yes	No initial constraints but may not be suitable due to structural load and maintainability
Basins and Ponds		
- Constructed Wetlands	Yes	No current constraints exist limiting the use of such measures, although anticipated 'land take' should be considered.
- Balancing Ponds	Yes	
- Detention Basins	Yes	
- Retention Ponds	Yes	
Filter strips and swales	Yes	There are no current constraints which would limit the use of such techniques
Infiltration Devices		
- Soakaways	Yes	Infiltration rates have not yet been confirmed, however records held by the BGS along with JBA groundwater mapping suggest that infiltration may not be feasible
- Infiltration trenches and basins	Yes	
Permeable surfaces and filter drains		
- Gravelled areas	Yes	Infiltration rates have not yet been, however records held by the BGS along with JBA groundwater mapping suggests infiltration may not be feasible. Porous paving could be implemented however to provide unsaturated storage.
- Solid paving blocks	Yes	
Porous paviers	Yes	
Tanked systems		
Oversized pipes	Yes	These techniques could be utilised with an outfall to the existing watercourse.
Cellular tanks	Yes	

- 4.1.2 Owing to the fact a site-specific intrusive geotechnical investigation has not yet been undertaken, it has not been possible to confirm precise infiltration rates. Information obtained through the BGS suggests that underlying ground conditions may not be suited to utilising infiltration as a means of dealing with surface water run-off. This should be confirmed by an intrusive geotechnical investigation, however. JBA groundwater mapping also suggests that potentially high levels of groundwater may also dictate that infiltration techniques may not be feasible in terms of dealing with surface water run-off generated by the site.
- 4.1.3 As it has been established, there are no public surface water sewers located within the vicinity of the site to which a connection could be made in order to discharge surface water run-off to from the site.
- 4.1.4 In view of 4.1.2 and 4.1.3, it is proposed to use tanked permeable paving across the site, discharging to the watercourse(s) to the east of the site at a controlled rate of 5l/s to cater for an increase in surface water run-off following development. This will ensure that all surface water is drained via sustainable drainage methods outlined within the SuDS manual as well as Building Regulations, which both seek to maximise the use of sustainable drainage techniques.
- 4.1.5 The watercourses will be re-profiled and re-graded to provide an overall betterment in view of existing conditions.
- 4.1.6 The strategy above will ensure that there is no increase in the rate of run-off leaving the site, therefore no increase in the risk of flooding from this source.

4.2 Treatment

- 4.2.1 The use of permeable paving will ensure that the run-off from the road receives a level of treatment that meets the requirement of the SuDS Manual due to naturally occurring microbes digesting Hydrocarbons entering the system and the filtration effects of the aggregates and geotextiles.
- 4.2.2 Impermeable hard stand areas will be drained by trapped road gullies and/or channel with a sump providing a basic level of treatment by collecting silts and oil pollutants. Catchpits will also be provided to collect silts and oil pollutants.
- 4.2.3 It is also proposed to utilise swales across the site, which in turn will provide an additional level of treatment.
- 4.2.4 The CIRIA SuDS Manual C753 outlines three categories of pollution hazard identification for the various types of land use as follows:
- Total Suspended Solids (TSS).
 - Metals (M).
 - Hydrocarbons (H).
- 4.2.5 In accordance with C753 table 26.2 the proposed land uses at the site are categorised as follows:
- Residential Roofs - very low/TSS-0.2/M-0.2/H-0.05.
 - For other impermeable surfaces - low/TSS-0.5/M-0.4/H-0.4.

- 4.2.6 In accordance with C753 table 26.3 to establish whether a proposed surface water management technique can provide sufficient treatment for runoff, the values are compared. If the treatment score for each pollutant category is higher than the pollution score then the chosen technique is sufficient. If a single technique is not judged to provide enough treatment then other techniques can be added to the system.
- 4.2.7 The treatment afforded by the proposed outline surface water management strategy has been assessed based on the following components:

- Permeable pavement – TSS-0.7/M-0.6/H-0.7

- 4.2.8 In conclusion, permeable pavement can be considered to provide sufficient treatment.

4.3 Foul Water Drainage

- 4.3.1 It is proposed to connect the development to the existing foul water sewer(s) located within proximity of the site. Confirmation of levels will be required, as well as the ability for the existing foul sewers to cope with the increased capacity.
- 4.3.2 In view of the number of units proposed as per this development, a feasibility study has been instructed with Southern Water to establish the feasibility of connecting to the existing public foul water sewer network and whether sufficient capacity and capability is available.
- 4.3.3 Based on the residual design guidance provided in Sewers for Adoption, the proposed foul flow will be 2.55l/s (based on 4,000 l/day Sewers for Adoption 7th Edition), subject to confirmation by Southern Water, further to feasibility study.
- 4.3.4 As the site falls within the Lidsey Foul Water Treatment Catchment Area, as stated in 4.3.2, a feasibility study has been instructed with Southern Water to determine whether sufficient capacity is available within the existing public foul water sewerage network to support the development. Any obligations required either on or off site whereby improvements are required to facilitate the development will be adhered to. Surface water run-off will be stored within the confines of the site and released at a controlled rate to the existing watercourse(s), mitigating potential surface water ingress into the existing foul water sewers. In turn, this will offer an improvement to the current situation and circumstances, whilst safe-guarding the existing public foul water sewer(s).

4.4 Climate Change

- 4.4.1 NPPF sets out percentage increases to be applied to the peak rainfall intensity values used in the design of a surface water drainage system to allow for the effects of climate change.
- 4.4.2 In accordance with NPPF 'climate change allowances' update 12th April 2016, an increase of 20% should be applied for this development and a review should be undertaken to determine the impact of an increase of 40%.
- 4.4.3 The proposed development involves the creation of additional impermeable areas; therefore, rainfall increases need to be incorporated into the existing surface water drainage regime.
- 4.4.4 The available long-term flood maps suggest that the effects of climate change will not increase the 'predicted' fluvial flood zone expanse in the future. Whilst the extent of the site at risk of flooding is predicted to increase for 100 years lifetime, this is not as a result of the minor development proposals, i.e. this will occur to all properties in this location unless further mitigation works are implemented.

5 RESIDUAL RISK AND MITIGATION

5.1 Residual Risk

- 5.1.1 Residual risks have been identified in relation to the proposed development site in the form of the possible presence of high levels of groundwater, as well as potential flooding from sewers, as has been experienced in the past.

5.2 Mitigation

- 5.2.1 A site-specific geotechnical investigation should be conducted to ascertain accurate levels of groundwater.
- 5.2.2 Finished floor levels should be set at a level whereby the property is elevated above the level of supposed risk, if located within areas of a greater risk of flooding from any source. In addition to this, overland flow routes should be directed away from any proposed new dwellings to further mitigate any potential risk of flooding.
- 5.2.3 Although WSCC data advised potential groundwater emergence is high, there have been no historic occurrences which have directly affected the site. Finished floor levels and road corridor levels have been raised to mitigate potentially high levels of groundwater, whilst also providing an unsaturated zone for surface water storage.
- 5.2.4 The existing watercourse(s) could also be improved as part of the overall development of the site, with the possibility of re-profiling and re-grading the banks a realistic option and opportunity.

6 SEQUENTIAL AND EXCEPTION TESTS

6.1 Sequential Test

- 6.1.1 The site is in Flood Zone 1 and is at the lowest risk of flooding. In view of this, the application of the sequential test is not required.

6.2 Exception Test

- 6.2.1 Table 3 within Paragraph 067 of Flood Risk and Coastal Change confirms that developments classified as "More Vulnerable" are suitable for Zones 1 & 2. The proposed development is in flood zone 1 and therefore an exception test is not required.

7 FLOOD RISK MANAGEMENT

7.1 Safe Access and Egress

- 7.1.1 The proposed development falls entirely within Flood Zone 1 and is expected to remain in that zone throughout its design life.
- 7.1.2 The site is confirmed as being at low risk of surface water flooding and, in view of such, the risk of access and egress being affected by flooding is low.

7.2 Flood Warning

- 7.2.1 The site is at low risk of flooding therefore there is no requirement for a Flood Plan or warning system to be implemented.

7.3 Maintenance

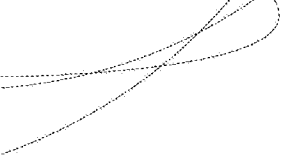
- 7.3.1 Maintenance plays an important part in the long-term performance of a surface water drainage system and will be required to ensure that it remains fully operational.
- 7.3.2 The traditional parts (inspection chambers, pipes, gullies etc.) of any proposed surface water drainage system will need a minimal amount of maintenance similar to other traditional systems.
- 7.3.3 Any SuDS devices employed will require slightly more maintenance focusing on reducing the amount of silt that is allowed to enter the system. Upstream catchpits and gully sumps will need to be regularly emptied of silt.
- 7.3.4 It is important to ensure that any porous paved areas are properly maintained in accordance with the manufacturers recommendations which may include:
- Periodic surface sweeping to reduce silt and debris accumulation.
 - Periodic silt removal from porous paved construction.
 - Redressing the joints on the block paved surface as required.
- 7.3.5 It is recommended that a simple maintenance strategy is prepared by monitoring the proposed drainage system over a specific duration to establish the rate at which silt builds up, which can then inform a programme of regular works.
- 7.3.6 If the site is to continue to rely on the existing watercourse network to convey surface water run-off it is important to remember that the riparian owner of a watercourse is responsible for its maintenance. This is likely to include ensuring all branches of the watercourse are free flowing and de-silted at periodic intervals. Failure to do so could result in an increased risk of flooding upstream and/or downstream of the site.

8 OFFSITE IMPACTS

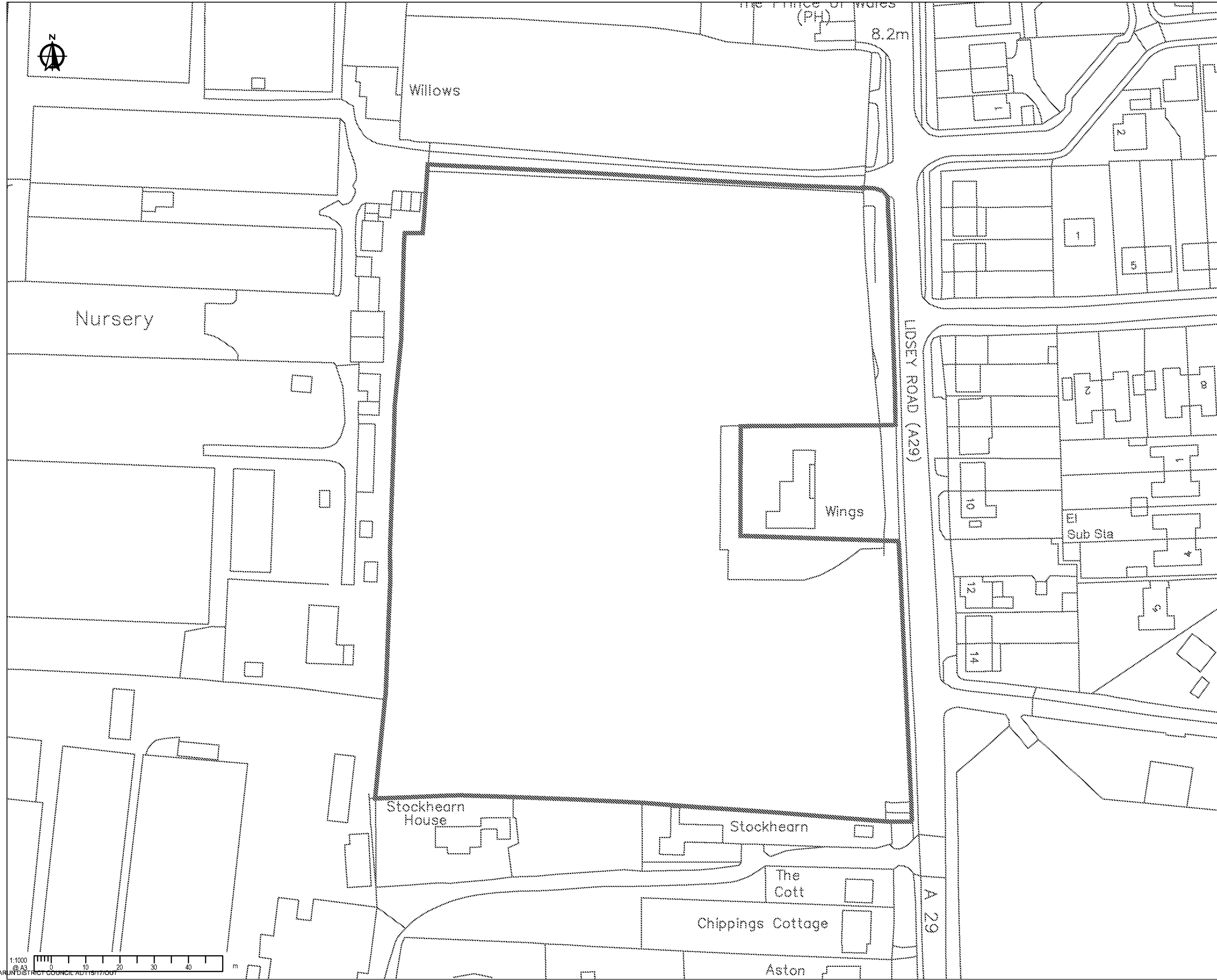
- 8.1.1 The proposed development will not have an impact on flooding issues off-site.
- 8.1.2 The effects of climate change should be considered in the design of the proposed surface water drainage system, to ensure there is no off-site impact.

9 SUMMARY

- 9.1.1 This site-specific flood risk assessment is based on Flood Maps, the Local Authority's Strategic Flood Risk Assessment and Public Sewer Records.
- 9.1.2 The site is currently an undeveloped greenfield site with existing hardstanding areas totalling in the region of 1,653m².
- 9.1.3 The site is located approximately 6.44km north of Bognor Regis, 10.94km east of Chichester, 26.07km west of Worthing and 40km east of Portsmouth. The site itself is currently largely an undeveloped greenfield location in a semi-rural/residential area. An area to the south-east of the site is currently occupied by a number of greenhouses with some areas of hardstanding
- 9.1.4 The development lies within Flood Zone 1 and it is expected to remain unchanged for the duration of the development's life expectancy.
- 9.1.5 The run-off from the site is believed to follow existing overland flow routes discharging to the existing watercourse located within the bounds of the site, as well as by infiltration.
- 9.1.6 Post-development surface water run-off will be managed through sustainable means; through the use of infiltration (porous paving) as well via controlled outfalls to the existing watercourses as so not to worsen the existing situation either on or off of the site.
- 9.1.7 The wastewater from the proposed development will outfall to the existing public foul water sewer located within close proximity of the site, subject to confirmation of available capacity.
- 9.1.8 The site falls within the bounds of the Lidsey Foul Water Treatment Catchment Area, as confirmed by ADC/WSCC. The proposed foul and surface water drainage strategies will bear no negative impact(s) upon this, instead offering improvement/betterment.
- 9.1.9 Following completion of the development the flood risk both on and off the site will remain unchanged.
- 9.1.10 The nature of the development does not permit the sequential test to be applied but this FRA shows that the elements of the Exception test can be passed.
- 9.1.11 In conclusion, from a flood risk point of view the proposed development is suitable.



DRAWINGS



1:1000
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NOTES

A3

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-	02/10/2017	Original Issue	SPB
Rev.	Date	Amendments	Drawn

rgp

Design

Transport Planning and Infrastructure Design Consultants

Metro House, Northgate, Chichester, West Sussex, PO19 1BE

Tel: 01243 210418 Fax: 01483 861682

www.rgp.co.uk

Client

ADM Architects

Project

Land at Wings Nursery,
Lidsey Road, Woodgate PO20 3SU

Drawing Title

Site Location Plan

Scale	1:1000	Drawn By	SPB	Checked By	MJA	Approved By	MJA
Date	October 2017	Drawing No.	2017-D1382-SK100	Rev.	-		



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-KEY-

Minor Contour

Major Contour

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ADM Architects

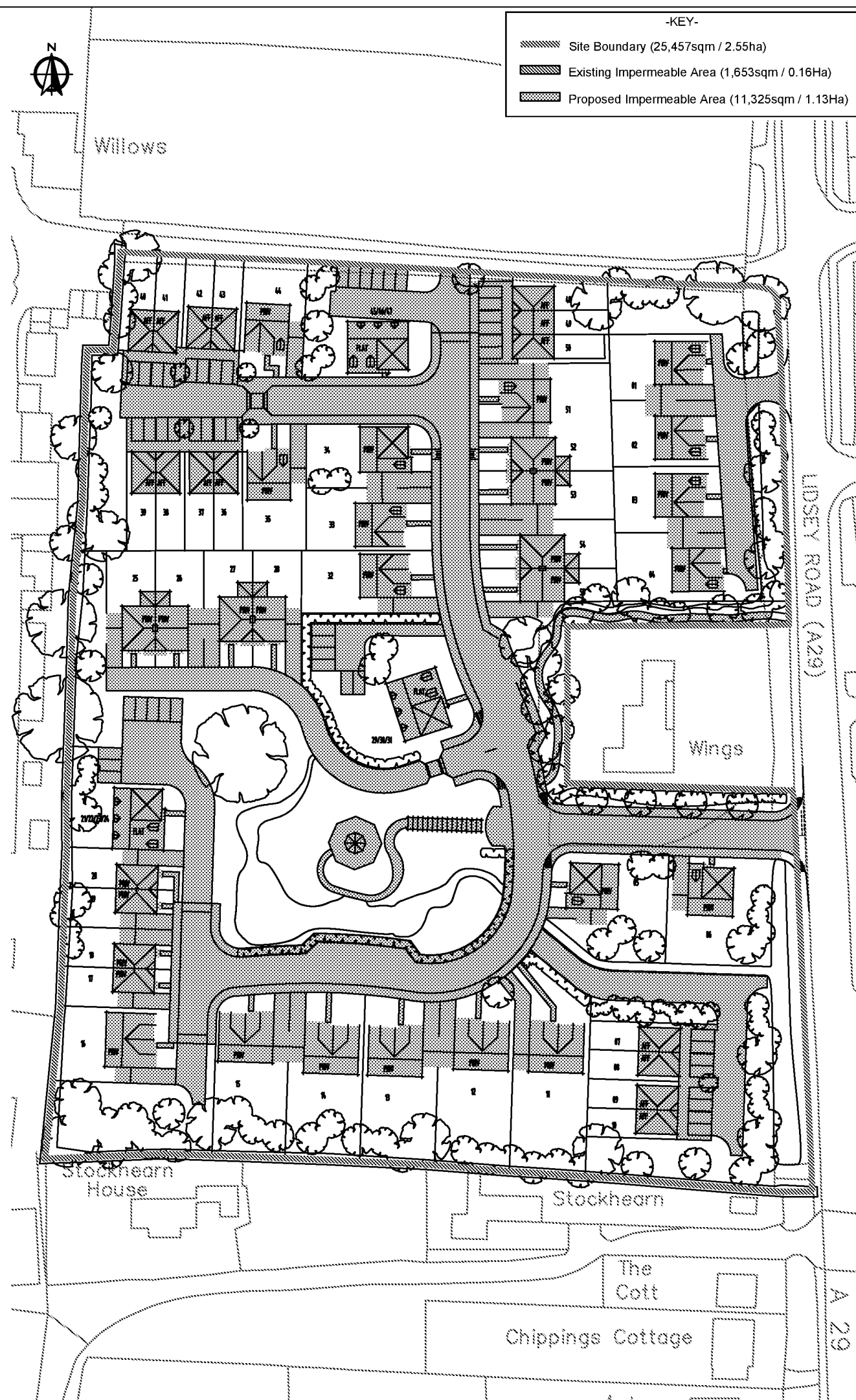
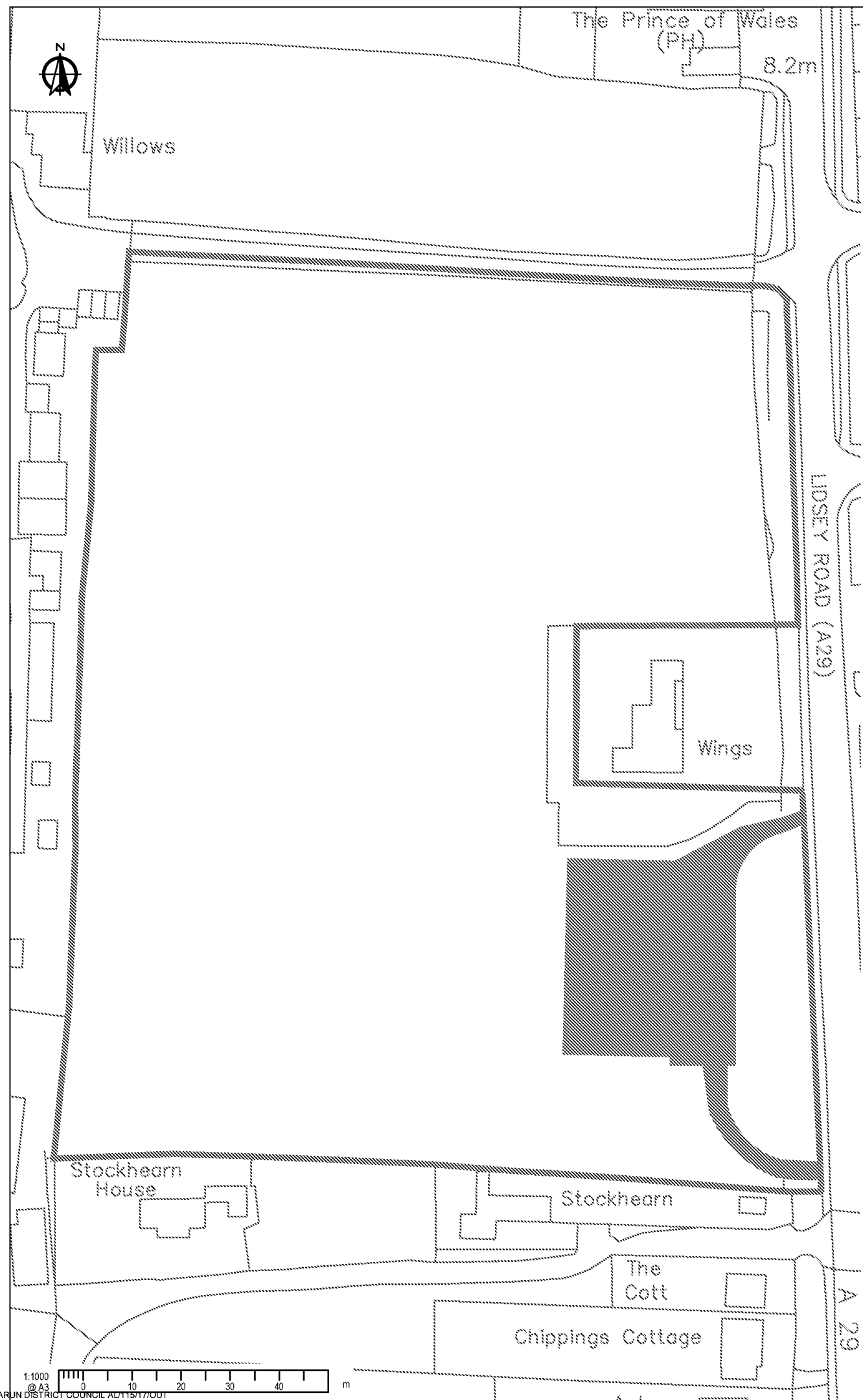
Project

Land at Wings Nursery,
Lidsey Road, Woodgate PO20 3SU

Drawing Title

Existing LiDAR Contours

Scale	1:750	Drawn By	SPB	Checked By	MJA	Approved By	MJA
Date	October 2017	Drawing No.	2017-D1382-SK101	Rev.	-		



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Client	ADM Architects
--------	----------------

Project	Land at Wings Nursery, Lidsey Road, Woodgate PO20 3SU
---------	--

Drawing Title
Impermeable Areas Comparison

Scale 1:1000	Drawn By SPB	Checked By MJA	Approved By MJA
Date October 2017	Drawing No. 2017-D1382-SK200		Rev. -

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4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority, however accuracy is not certain.

-DRAINAGE KEY-

- Existing Public Foul Water Sewer
- Ex. MH ##
CL ##
IL ##
- Existing Public Foul Water Manhole
- Existing Public Surface Water Sewer
- Ex. MH ##
CL ##
IL ##
- Existing Public Surface Water Manhole
- Proposed Public Foul Water Sewer
- Proposed Foul Water Manhole
- Proposed Public Surface Water Sewer
- Proposed Surface Water Manhole
- Proposed Foul Water Pump Station
- Proposed Tanked Porous Paving
- Existing Watercourse
- Existing Culvert
- Maximum 5m Watercourse Buffer Zone
- 3m Sewer Easement

DRAINAGE STRATEGY

Surface Water

- Infiltration techniques do not appear to be achievable owing to the presence of high groundwater across the site as advised by ADC and WSCC. On-site geotechnical investigation to be conducted in order to confirm, prior to detailed design.
- Surface water run-off to be discharged to the existing watercourse(s) located to the east of the proposed development site, adjacent to Lidsey Road at a controlled rate of 5l/s.
- Tanked porous paving will be employed across the site in order to provided storage.
- Land Drainage Consent will be required from ADC in order to discharge surface water run-off to the existing watercourse(s)
- Existing watercourse corridor(s) to be cleared of debris and vegetation as well as locally re-graded and re-profiled

Foul Water

- Foul water will be disposed of via a new sewer connection to the existing public foul water sewer located to the east of the development site
- A Section 106 Application to connect to a public sewer will be required, in view of the Water Industry Act 1991
- A foul water capacity check via Southern Water is required to ascertain whether the existing foul water sewer(s) will be able to support the development (Lidsey Foul Water Catchment Area Obligation)

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A	22/11/2017	Requirements relating to buffer zone updated	SPB
-	23/10/2017	Original Issue	SPB
Rev	Date	Amendments	Drawn



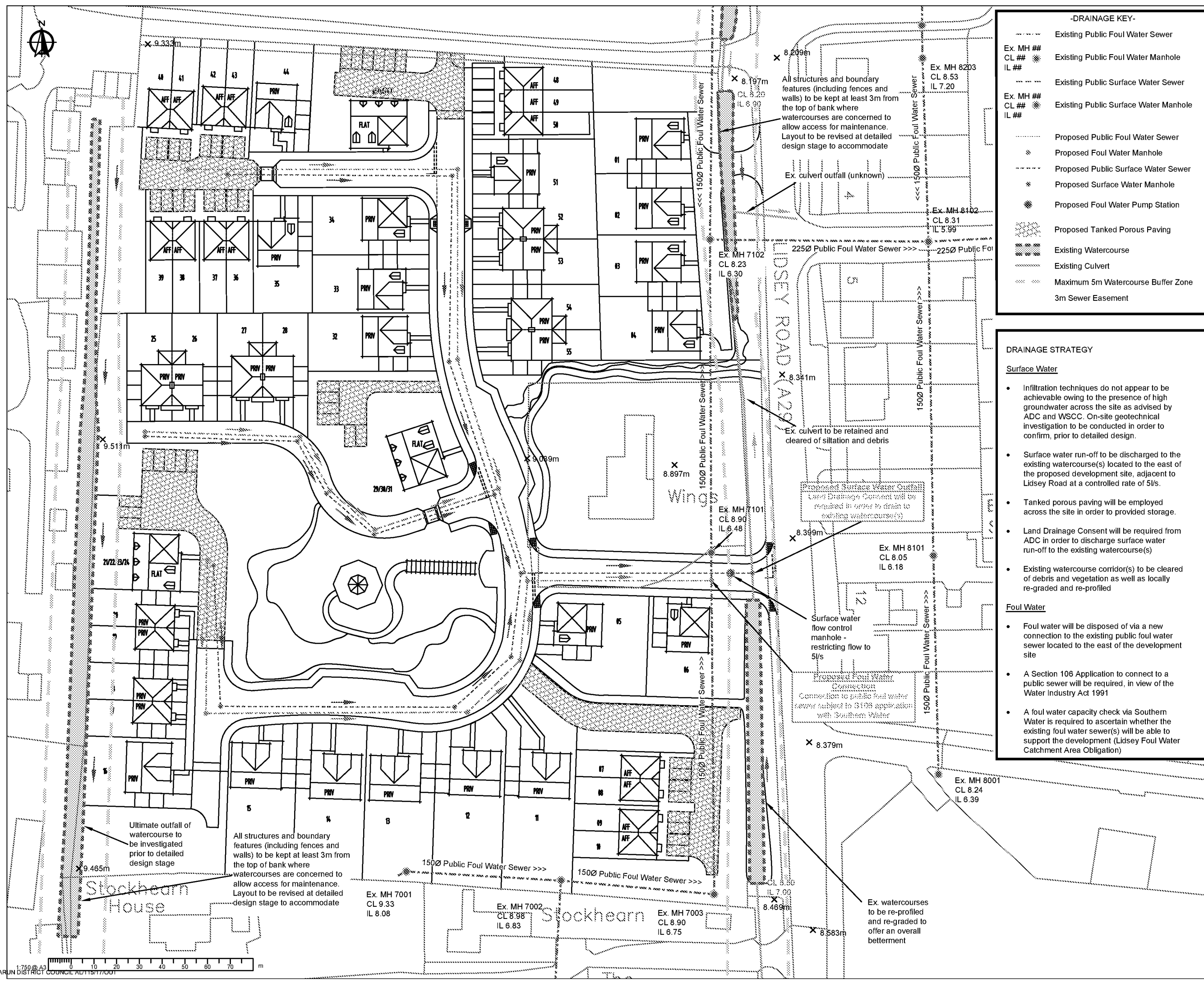
Stratford Planning and Infrastructure Design Consultants
Metro House, Northgate, Chichester, West Sussex, PO19 1BE
Tel: 01243 210418 Fax: 01483 861682 www.rgp.co.uk

Client
ADM Architects

Project
Land at Wings Nursery,
Lidsey Road, Woodgate PO20 3SU

Drawing Title
Drainage Strategy

Scale	1:750	Drawn By	SPB	Checked By	MJA	Approved By	MJA
Date	October 2017	Drawing No.	2017-D1382-SK300	Rev.	A		

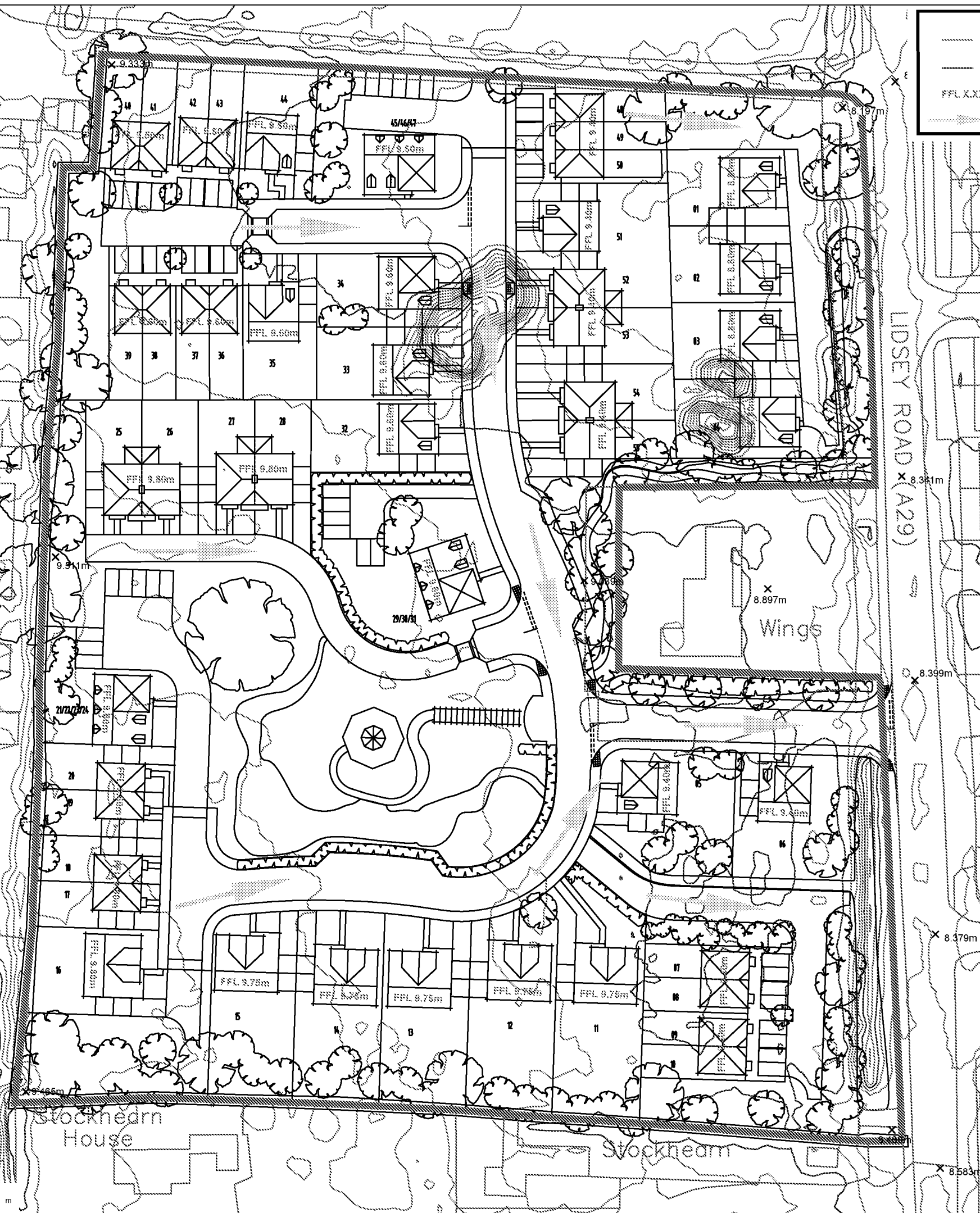


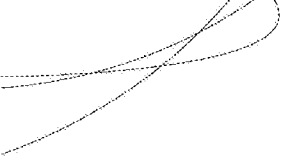
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4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority, however accuracy is not certain.

-DRAINAGE KEY-

- Minor Contour
- Major Contour
- F.F.L. X.XXm Proposed Finished Floor Level
- Overland Flow Route





APPENDICIES

Appendix A Architects Layout GA

Willows

SCALE

5 METRE

25 METRE

50 METRE

LIDSEY ROAD

Wings

Landscape Wildlife area

Stockhearn House

Stockhearn

The
Cott

Chippings Cottage

Aston

A 29

Appendix B Public Sewer Maps

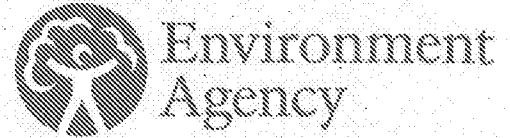


404408

Appendix C EA/LLFA Flood Risk

creating a better place

Dear Stuart,



Thank you for your request of 2nd October 2017 to use Environment Agency Product 4 data, for Land at Wings Nursery, Lidsey Road, Woodgate PO20 3SU.

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 350m away from Flood Zone 2.

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>

In regards to the flood history, we hold no records but recommend you contact the lead local flooding authority - West Sussex County Council, and the Local Council - Arun District Council for a more comprehensive flood history check.

This information is supplied subject to the notice which can be viewed via the following link:
<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Please get in touch if you have any further queries or contact us within two months if you would like us to review the information we have sent.

Kind regards,

Nick Allen

Customer & Engagement Officer



EXTENSION OF PAPER

From: Kevin Macknay [REDACTED]
To: Stuart Burnett [REDACTED]
Cc: Paul Cann <Paul.Cann@arun.gov.uk>
Subject: RE: D1382 Land at Wings Nursery, Lidsey Road, Woodgate PO20 3SU

Stuart,

Further to your recent enquiry. Please find our reply below:

Flood Zones

- Please confirm the Flood Zones for this area.
Please contact to EA for conformation of the flood zone for this area and any associated flood risk from rivers or the sea.
- Please confirm surface water, reservoir flooding, sewer flooding. Please provide plans and depth data from your GIS UFMSW for 30yr, 100yr & 1000yr as applicable (OS Datum).
See attached plan showing surface water flood risk for the site. Current mapping shows the site is not at risk from surface water flooding.
- Please confirm mapping and records for any surface water assets owned or maintained.
See attached plan showing current WSCC Highway gullies. The existing highway drain discharges to the south of the proposed development site.
- Please confirm if there are any future drainage improvements proposed for this area.
None currently planned.
- Please confirm details of existing or planned flood alleviation and defences in this area.
None known of or planned for the area.
- Please confirm if you are aware of any historic flooding within the confines of the site.
We do not have any records of historic flooding within the confines of the proposed site. This should not be taken that this site has never suffered from flooding, only that it has never been reported to the LLFA.
- Please confirm if you are aware of any historic flooding in close vicinity and/or on the public highway.
We are aware that during periods of heavy rain and high ground water the carriageway adjacent to the site has flooded in the past.

Groundwater

- Please confirm details of any groundwater flooding issues in the area, including flood levels, flood extents and any available anecdotal information.
See attached plan showing current JBA ground water mapping for the area. This shows that ground water could rise to within 0.025m below ground. Thus making infiltration during periods of high ground water unlikely.

Assets

- Please confirm mapping and records for any surface water assets owned or maintained.
See attached plan.
- Please confirm if there are any historic culverted watercourses within or in close vicinity to the site.
Please provide map records where available.
Current OS mapping does show the existing site has existing ditches along both western and eastern boundaries. Historic OS mapping does show that the site used to be two fields therefore it is likely that this historic field division may once have been a ditch.
- Please can you provide any map records denoting the highway drainage network. Is this a piped system or soakaways?

See attached plan. The existing highway drainage system is piped and outfalls to the south of the proposed site.

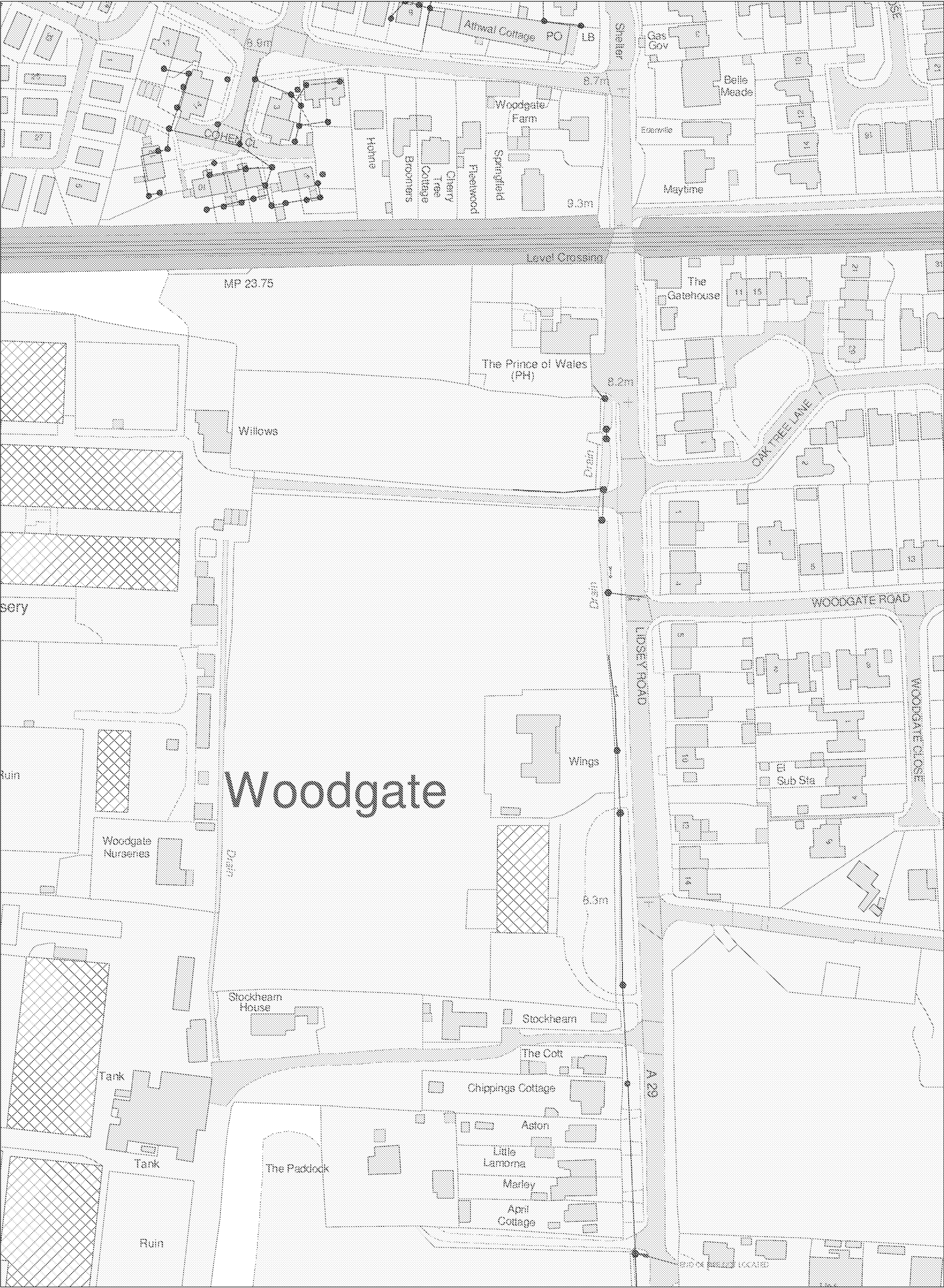
Policy/Future

- Please confirm the most recent Strategic Flood Risk Assessment (SFRA).
WSSC Strategic Flood Risk Assessment – January 2010
WSSC Local Flood Risk Management Strategy – May 2014
- Please confirm if there are any future drainage improvements proposed for this area.
None currently planned.
- Please confirm if any drainage studies and/or SWMP have/are being assess for this area.
The Lidsey Surface Water Management Plan – October 2014 does cover the area of Woodgate.

Kevin Macknay
Flood Risk Management – Team Leader
Economy, Infrastructure and Environment
Highways and Transport
West Sussex County Council

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Arun District Council Maps



Mapping produced by Arun District Council

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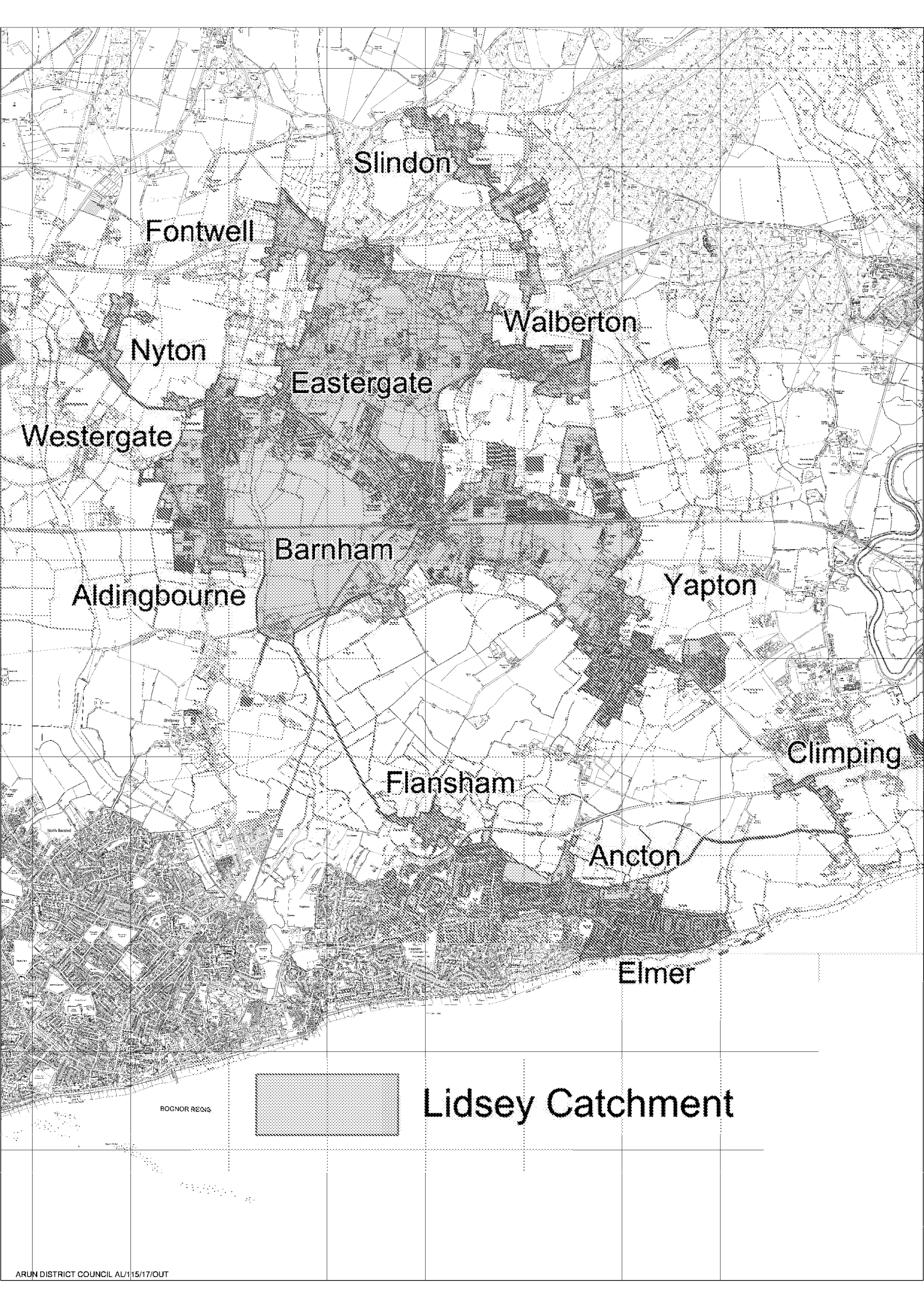
Production Date: 03 October 2017

ARUN DISTRICT COUNCIL AL/115/17/OUT

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Appendix D Lidsey SWMP Extracts



Slindon

Fontwell

Walberton

Nyton

Eastergate

Westergate

Barnham

Aldingbourne

Yapton

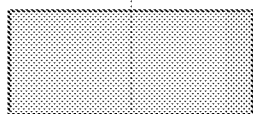
Flansham

Climping

Ancton

Elmer

BOGNOR REGIS



Lidsey Catchment

Lidsey Surface Water Management Plan

West Sussex County Council

ATKINS

A Partnership between:

- West Sussex County Council
- Southern Water
- Arun District Council
- Environment Agency

LFRZ_0018 - Oak Tree Lane, Woodgate

Figure 7.37 - Flood Risk LFRZ_018 (1 in 100 year storm event)



Figure 7.38 - Flood Hazard LFRZ_018 (1 in 100 year storm event)



Table 7-36 - Predicted Residential and Commercial Property Flood Impact LFRZ_018

Rainfall Return Period	Predicted number of properties at risk of flooding	
	Residential	Commercial
1 in 30 Year	8	0
1 in 100 Year	10	0
1 in 100 Year + (Climate Change (2080's))	16	1

Table 7-37 - Summary of local flood risk within the LFRZ_018

Flood Risk Source			
Pluvial Flood Risk	Fluvial Flood Risk	Ground Water Flood Risk	Public Sewer Flood Risk
Medium	Low	Low	High
Flood Mechanism			
Property flooding caused by pluvial runoff from highway. Flooding from foul manholes in highway due to hydraulic overload.			
Flood Risk Receptors			
Residential, commercial properties and highway.			
Flood Hazard			
A 'low' flood hazard is predicted for 1% annual chance storm event (1 in 100 year return period) of Burndell Road			
Validation			
Pluvial flooding experienced during the summer 2012 storm along Lidsey Road - otherwise flooding has not occurred here in recent history. Hydraulic overload of sewers reported in Oak Tree Lane on 02/01/2013 and on Westergate Street on 29/01/2013 and 09/11/2010.			

LFRZ_018 – Oak Tree Lane, Woodgate

Preferred Interventions: Asset Management. Reduce surface water and infiltration entering public foul sewers. Improve surface water conveyance.

Table 10-19 - LFRZ_018 Options

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Economic	Environmental	Objectiveness	Social	Technical	Total Score	Summary of scheme / General discussion
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Investigate conveying surface water away from properties. This should be completed after survey of existing drainage assets. See figure 9.9.
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Optimisation of existing assets. WSCC and ADC are planning to clear the ditch on the west side of Lidsey Road
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5	This should be investigated to remove highway flooding.
22	Pathway	Separation of foul and surface water	Yes	Yes	0	2	2	0	0	4	Control at source see activities 12 & 13
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation.
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation.
28	Receptor	Temporary demountable flood defences	Yes	Yes	1	0	2	0	2	5	Potentially applicable.
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required. As detailed in Option 15.

LFRZ_018 – Oak Tree Lane, Woodgate (Cont.)

Increased Surface Water Conveyance

A: Improve / maintain existing ditch. The conveyance system upgrade may also need to extend further north to the level crossing as the hydraulic model indicates that surface water runoff is predicted to occur north of the railway line. Conveying surface water from Lidsey Road (north of railway crossing) to the south would require construction of a culvert. If practical this would be costly element of works.

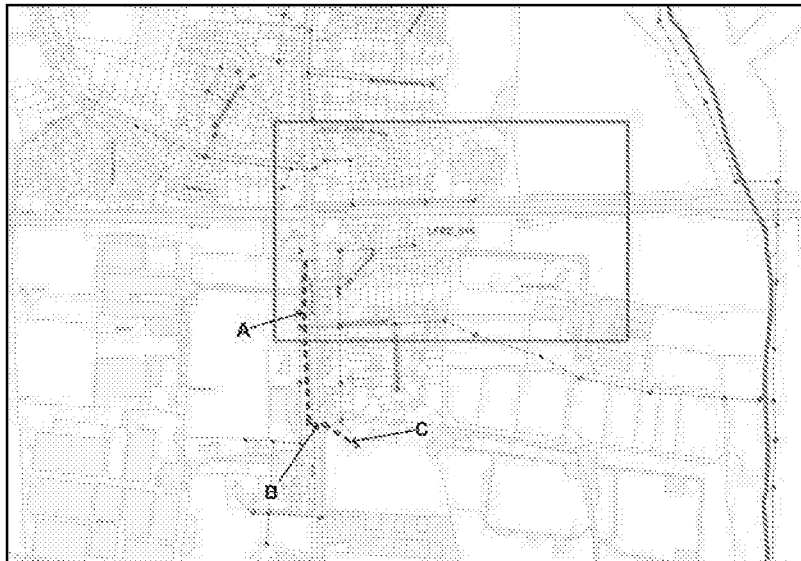
B: New Culvert

C: Install new ditch to convey water to open green space

Note: This option has not been hydraulically modelled.

WSCC and ADC are planning to clear the ditch on the west side of Lidsey Road and are investigating liaising with land owners to ensure capacity is available downstream of the highway ditch.

Figure 10.9 - Oak Tree Lane, Woodgate



Appendix E Historical Borehole Records

GEORGE STOW CO. LTD.

317

453

Waterworks Engineers

READING ROAD - HENLEY-ON-THAMES, OXON.

RECORD OF WELL (SHAFT OR BOREHOLE)

Su 90/93

Borehole No. 9

DATE COMPLETED 1.8.78

All depths to be measured below Ground Level

Work carried out for Southern Water Authority, Sussex River & Water Division (Brighton)
 Locality (Exact Site) Woodgate, Nr. Chichester, Sussex - N.G.R. SU 90 SW (9383 0400)
 Level of Ground Surface above Sea Level (O.D.) 30 m.
 Depth of Shaft 156 (512 ft) m. Diameter 300 (12 in) mm.
 Depth of Bore 156 (512 ft) m. Diameter: At Top 300 mm. At Bottom 200 mm.

Details of Permanent Lining Tubes

Diameter	Length Inserted								
200 mm.	136.65 m.	Plain	NIL	Slotted	Top At	0.15 m	above	Ground	Level

Water Struck at depth of (in m.) X

Rest Level of Water below Ground Level 5.5 m.

Yield in X Hours (est.) Pumping litres per sec. Date

Pump Water level X m. below Ground Level.

Time of Recovery

Remarks X Borehole drilled by mud flush Rotary therefore depth at which water struck not apparent. The borehole was developed by swabbing and jetting.
 No test pumping was carried out.

DETAILS OF STRATA

317/453

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA (and any additional remarks)	THICKNESS	DEPTH
		METRES	METRES
	Topsoil	0.50	0.50
	Sandy brown clay	0.50	1.00
DRIFT	Clay with stones	1.00	2.00
	Bed of gravel	1.00	3.00
	Sandy blue clay	9.00	12.00
LOUPOON CLAY	Blue clay with bands of hard stone	67.00	79.00
	Bed of blue coloured clay	5.00	84.00
	Very hard black stone with pyrites	0.30	84.50
	Blue clay with bands of stone	17.50	102.00
	Sandy/green/brown clay	1.00	103.00
BEODUX	Red mottled clay	9.00	112.00
BEODUX	Dark blue mottled clay	2.00	114.00
	Red mottled clay	2.00	116.00
	Red clay with bands of blue/green shale	2.00	118.00
	Red/blue mottled clay	14.00	132.00
	Red clay mottled green and yellow	2.00	134.00
Upper chalk	Chalk and flints	20.00	154.00
REST 9/78			(512 ft)

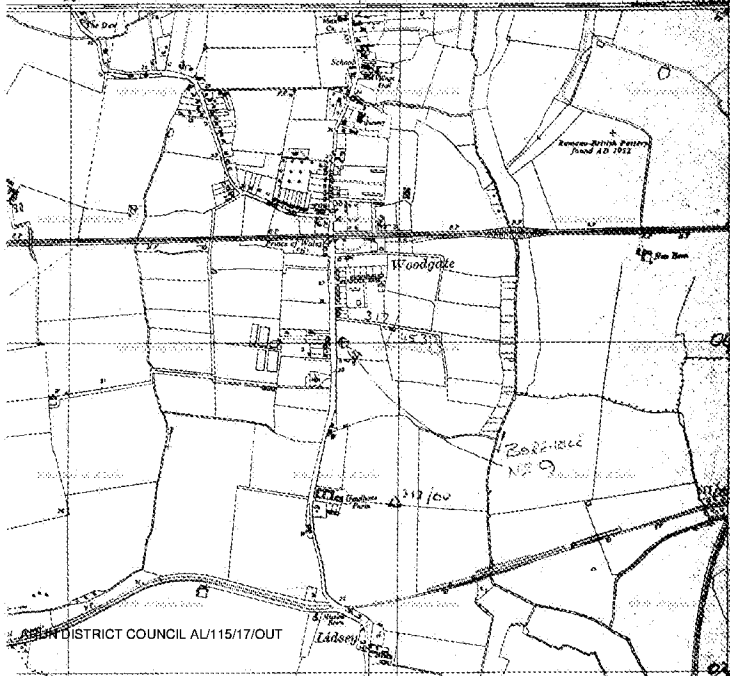
100
CRICHESTER CO CONST
ALDINGBOURNE PH
93

54 90 SW

94

54 90 SW/E

5490/93



ALDINGBOURNE DISTRICT COUNCIL AL/115/17/OUT

Appendix F Microdrainage/Run-off Calculations

RGP Design Limited		Page 1
Metro House Northgate Chichester PO19 1BE		
Date 16/10/2017 17:18 File	Designed by sburnett Checked by	
XP Solutions Source Control 2016.1		

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.400
Area (ha)	2.550	Urban	0.000
SAAR (mm)	770	Region Number	Region 7

Results l/s

QBAR Rural	9.7
QBAR Urban	9.7
Q100 years	30.9
Q1 year	8.2
Q30 years	22.0
Q100 years	30.9

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RGP Design Limited		Page 1
Metro House Northgate Chichester PO19 1BE		
Date 16/10/2017 17:19 File	Designed by sburnett Checked by	
XP Solutions		Source Control 2016.1

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.500
Ratio R	0.333
Areal Reduction Factor	1.00
Area (ha)	2.550
SAAR (mm)	767
CWI	113.645
Urban	0.000
SPR	37.000

Results

Percentage Runoff (%)	38.53
Greenfield Runoff Volume (m ³)	645.559

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D1398 Land at Wings Nursery – Indicative Storage Requirement

Quick Storage Estimate

Map

Variables

Results

Design

Overview 2D

Overview 3D

VI

Variables

F5P Rainfall

Return Period (years)

Region

Map

M5-60 (mm)

Ratio R

Cv (Summer)

Cv (Winter)

Impervious Area (ha)

Maximum Allowable Discharge (l/s)

Infiltration Coefficient (m/hr)

Safety Factor

Climate Change (%)

Analyse

OK

Cancel

Help

Enter Maximum Allowable Discharge between 0.0 and 999999.0

Quick Storage Estimate

Map

Variables

Results

Design

Overview 2D

Overview 3D

VI

Results

Global Variables require approximate storage of between 822 m³ and 1168 m³.

These values are estimates only and should not be used for design purposes.

Analyse

OK

Cancel

Help

Enter Maximum Allowable Discharge between 0.0 and 999999.0