



Proposed Residential
Development,

Land at West Sompting,
West Sussex BN15 0DZ

Phase 2
Drainage Strategy Report

prepared on behalf of
Persimmon Homes Thames
Valley Limited

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MILESTONE
TRANSPORT PLANNING

Land at West Sompting, West Sussex, BN15 0DZ – Phase 2 Residential Development

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1. INTRODUCTION

Background

This document should be read in conjunction with the Flood Risk and Drainage Strategy report (2017/D1358/FRA 1.4) as prepared by RGP Design Ltd, dated 06 February 2019.

This drainage strategy has been prepared in light of the information contained within the abovementioned report, and in recognition of additional ground investigation works undertaken since the above report was produced.

The additional investigation was undertaken by IBEX Geotechnical between October 2021 and end of January 2022.

Site Location and Description

The site is subject to a Hybrid planning application. (1) Outline planning permission (all matters reserved with the exception of access) for the erection of up to and including 520 dwellings, community orchard/growing space, non-vehicular links between the site and Worthing, traffic calming measures, associated landscaping, open space / recreation areas, provision of formal playing pitches, ecological enhancements including improvements and extension to Cokeham Brooks Local Wildlife Site, and all other associated development works. (2) Full planning permission for 96 dwellings and other associated development works (Phase1).

The site is located approximately 2km west of Lancing, 3.6km east of Worthing, 8.6km west of Shoreham by Sea and 19km west of Brighton.

Phase 2 of the development is located to the south of A27 Upper Brighton Road and west of Dankton Lane, covering an area in the order of 78072m² (7.81Ha) and will involve the construction of 91 No. residential dwellings.

Ground Conditions

A site-specific geotechnical investigation has been undertaken at the site, conducted by Resource & Environmental Consultants (REC), dated July 2014. The report includes information on ground conditions (including groundwater) and soil composition as well as infiltration testing results.

The trial pit logs for pits SA1 to SA3 located within the bounds of Phase 2 of the development are contained within Appendix B of this report.

The underlying geology was identified in pits SA1 to SA3 as consisting of 'Brown slightly gravelly SILT' (Made Ground), 'Light brown slightly clayey gravelly SILT' (Head Deposits), 'Light brown clayey GRAVEL' (Head Deposits) and 'Yellowy slightly gravelly SAND' (Head Deposits).

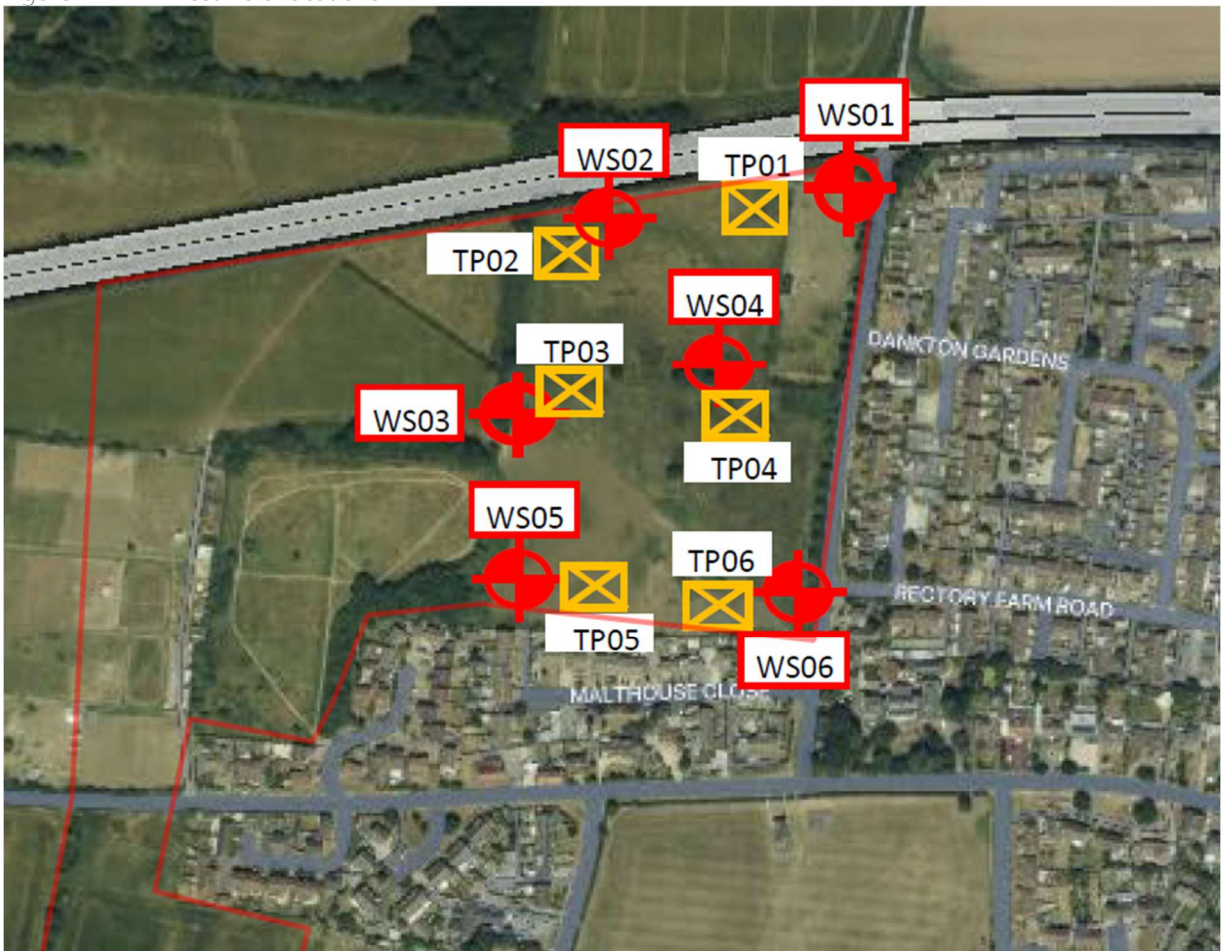
As part of this investigation, infiltration testing was undertaken with the relevant results contained in Appendix C and are summarised in the table below.

Table 1 REC Infiltration Rates

Location	Trial Pit Depth (m bgl)	Material	Permeability Rate (m/s)
SA1	2.00	Head Deposits	9.38E-06
SA2	2.00	Head Deposits	5.24E-05
SA3	2.00	Head Deposits	2.36E-05

Additional site works were undertaken for both Phases 2 and 3 of the development in October 2021 by IBEX Consulting Engineers with shallow infiltration testing. Within Phase 2 six trial pits (TP01 to TP06), see Figure 1, were excavated to depths of 1.0m to 1.45m to allow infiltration testing to be carried out. The details of this work are contained in the letter report dated 22/10/2021 included in Appendix D of this report.

Figure 1 – IBEX Test hole locations



The additional investigation confirmed the underlying geology as described above based on the REC report.

The IBEX infiltration results achieved at each trial pit location are summarised in the following table.

Table 2 IBEX Consulting Infiltration rates with lowest results highlighted

Reference	Geology	Calculated Infiltration Rates (m/s)		
		1 st Cycle	2 nd Cycle	3 rd Cycle
TP01	Head Deposits	1.1X10 ⁻⁵	1.4X10 ⁻⁵	1.4X10 ⁻⁵
TP02	Head Deposits	5.3X10 ⁻⁶	8.4X10 ⁻⁶	7.6X10 ⁻⁶
TP03	Head Deposits	3.2X10 ⁻⁵	5.8X10 ⁻⁵	4.1X10 ⁻⁵
TP04	Head Deposits	1.0X10 ⁻⁵	1.2X10 ⁻⁵	6.7X10 ⁻⁶
TP05	Head Deposits	1.6X10 ⁻⁵	2.1X10 ⁻⁵	2.5X10 ⁻⁵
TP06	Head Deposits	1.5X10 ⁻⁴	6.3X10 ⁻⁵	6.4X10 ⁻⁵

The results of the IBEX testing were used in the preliminary design of the infiltration systems proposed for the Phase 2 surface water drainage design.

In addition to the infiltration testing IBEX also undertook winter groundwater monitoring between October 2021 and January 2022. The results of this work are contained in both the letter report dated October 2021 included in Appendix D and for the ground water monitoring between October 2021 and January 2022; the results are included in Appendix E.

The Phase 2 ground water monitoring was carried out in six window sample boreholes, WS01 to WS06. Apart from test hole WS06 the holes were all found to be dry on the date's records were taken. The following table summarises the condition of the test holes and in the case of WS06 the highest ground water level of the 7 No. readings obtained.

Table 3 – Results of winter ground water monitoring

Window Sample Location	Depth of test hole (m)	Peak (Highest) Ground Water Level
WS01	5	Dry
WS02	5	Dry
WS03	3.8	Dry
WS04	1.8	Dry
WS05	4.74	Dry
WS06	2.7	2.45 BGL 11.66AOD

Existing Drainage

Surface Water

Public sewer records provided by Southern Water (refer to Appendix F) confirm that there are no public surface water sewers located within the vicinity of the Phase 2 site.

There are no existing watercourses within the Phase 2 site boundary.

It is understood that the site currently drains via infiltration, with run-off also following the natural topography of the site and naturally occurring overland flow routes.

Foul Water

The public sewer records provided by Southern Water (refer to Appendix F) confirm that there is a public foul water sewer located within Dankton Lane, to the east of the Phase 2 development. It is understood that this sewer pipe is 150mm in diameter and has a recorded depth to invert in the range of 1.59m to 1.79m.

2. PROPOSED DEVELOPMENT

Description of Development

Phase 2 of the development seeks to utilise an area totalling 78072m² (7.81Ha).

The total impermeable area, post development, has been determined to be 11,830m² (1.18Ha) as demonstrated by drawing 601-190-213 – ‘Phase 2 Impermeable – Permeable Areas’.

The total impermeable and permeable areas have been split into various catchments, as detailed in the table, below. This information is also illustrated on drawing 601-190-205 – ‘Phase 2 Preliminary Drainage – Catchment Areas’.

Table 4 Summary of Local Amenities

Catchment Type	Catchment Area	Catchment Area + 10% Urban Creep Allowance
Permeable Paving	5988m ²	6587m ²
Roofs	55440m ²	5984m ²
Highways	5376m ²	5914m ²
Paths	883m ²	971m ²
Patios	541m ²	594m ²

West Sussex County Council (as Lead Local Flood Authority) has published updated guidance on ‘Policy for the Management of Surface Water’ dated 27 November 2018.

Further to the West Sussex County Council’s ‘Policy for the Management of Surface Water’, a maximum allowance of 10% has been included where the total impermeable area is concerned and has been included within each individual catchment, as detailed in the table, above.

Adur & Worthing Councils have also published ‘Supplementary Requirements for Surface water Proposals’.

3. PROPOSED DRAINAGE STRATEGY

Surface Water

It is proposed that surface water from Phase 2 of the development will be wholly drained by infiltration methods and techniques, as follows:

- Private drives, private estate roads and parking – permeable paving;
- Roofs to buildings – Individual or shared house soakaways/infiltration trenches.
- Adoptable roads - piped networks outfalling to cellular soakaways.

As confirmed the additional infiltration test rates provided by IBEX have been used to undertake the preliminary design.

The drainage strategy has been designed to accommodate a 1 in 100 year storm event, with the inclusion of an allowance of 45% for climate change. A further consideration has been made for Urban Creep, with an allowance of 10% incorporated within the total impermeable area associated with Phase 2 of the development and subsequent MicroDrainage calculations.

The surface water drainage proposals are shown on drawings 601-190-201 to 204 inclusive 'Preliminary Drainage Strategy' contained within Appendix J of this report.

Permeable paving

Within Phase 2 it is proposed that permeable paving will be introduced for the non-highway adopted paved areas comprising private estate roads, shared parking areas and private driveways.

The total plan area for the extents which are proposed to be constructed using permeable features is 6139m² (inclusive of 10% urban creep allowance). Preliminary calculations contained within Appendix G of this report confirm that a 350mm sub-base with a void ratio of 30% will provide sufficient storage and allow adequate infiltration to drain the impermeable areas.

In view of the additional infiltration testing undertaken by IBEX Consulting at shallow depths as associated with traditional permeable paving construction, consideration will be afforded to the varying rate(s) of infiltration established through the additional testing undertaken. The 'catchments' associated with each infiltration rate established by IBEX Consulting will be related to the proposed site layout to ensure that assessment and calculations are accurate and are a fair reflection of the associated soils' abilities where infiltration is concerned.

House Soakaways

The roof areas associated with each plot within the proposed development will total 5920m² (inclusive of 10% urban creep allowance). An assessment has been conducted, again in view of the varying rates of infiltration at 'shallow' depths across the site, to ascertain the effectiveness of proposed soakaways to drain those roof areas. Preliminary calculations contained within Appendix H of this report are indicative of the required provision that will be determined for each plot at detailed design, based on the appropriate rate of infiltration.

Adoptable roads

It is understood that the main access road will be offered for adoption by the local Highways Authority. The access road and public footways will be drained via a positive, piped drainage system, which will outfall to 3 No. cellular soakaway features. Preliminary supporting calculations are contained within

Appendix I whilst drawings 601-190-201 to 204 'Phase 2 Preliminary Drainage Strategy' have been prepared to assist in the understanding of the models produced.

The table, below, has been provided for quick interpretation and understanding of the soakaways designed in relation to Phase 2 of the development, to support the proposed adoptable highway extents.

Table 5 – Preliminary crate attenuation soakaway details

Soakaway ID	SA2/1	SA2/2A	SA2/B	SA2/3
Cover Level	14.9	14.635	14.635	13.540
Depth of cover	1.05m	1.035m	1.235m	1m
Top of Tank	13.900	13.600	13.400	12.540
Tank Invert	12.700	12.400	12.600	11.740
Groundwater Level Peak	2.45m BGL 11.66m AOD	2.45m BGL 11.66m AOD	2.45m BGL 11.66m AOD	Dry
Groundwater freeboard	-	0.74m	0.94m	-
Soakaway size (m ² x D)	130.5m ² x1.2m	91m ² x1.2m	162m ² x0.8m	110m ² x0.8m

Freeboard has been provided in view of the 'peak' (highest) groundwater levels established within the vicinity of the proposed soakaway locations. The locations for monitoring were selected in view of the anticipated location(s) of the soakaway features, albeit in relation to an earlier revision of the current site arrangement, which has since developed to the revision as contained within this report. It is possible that the amount of freeboard may be increased at detailed design stage, subject to increased ground levels on site and/or through alterations to the proposed soakaways (i.e. plan area extents and depths).

Foul Water

It is proposed that Phase 2 of the development will utilise a connection to the existing 150mm dia. public foul water sewer located within Dankton Lane, to the east of the development area. An assessment of preliminary site levels showed that draining to the existing sewer by gravity will not be possible.

It is therefore proposed to provide an adoptable foul water pumping station to be located within the southwest corner of the site as shown on drawing nos.601-190- 202 & 203.

From the drawings it can be seen that the majority of the site will drain by gravity to the pumping station. After which foul water will be conveyed through a pumped rising main to a receiving manhole beyond which the foul water will continue to drain by gravity to the existing public sewer in Dankton Lane.

A S106 application will need to be submitted to Southern Water as a means of establishing the required connection within Dankton Lane.

Post development peak foul water flows will amount to 4.40l/s, based on 4000 litres per day (Design and Construction Guidance, 2020).

4. SUMMARY

Phase 2 of the development covers land totalling 78072m² (7.81Ha).

The proposed impermeable/permeable area for Phase 2 will total 13707m² (1.92Ha) (inclusive of 10% creep).

Phase 2 surface water run-off will be discharged fully via various infiltration methods and techniques.

Varying infiltration rates will be used across the site at shallow depths for the provision of soakaways at to support the roof area(s) of the proposed dwellings, as well as permeable paving.

Phase 2 foul water flows will discharge to the existing public foul sewer network, with a connection point in Dankton Lane (via a new manhole) subject to S106 approval from Southern Water.

Post development peak foul water flows have been determined to be 4.44l/s, based on 4000 litres per day (Design and Construction Guidance, 2020).

DRAWINGS

601-190-201	Phase 2 Preliminary Drainage Strategy Sheet 1 of 3
601-190-202	Phase 2 Preliminary Drainage Strategy Sheet 2 of 3
601-190-203	Phase 2 Preliminary Drainage Strategy Sheet 3 of 3
601-190-204	Phase 2 Preliminary Drainage Strategy Site Wide Layout
601-190-205	Phase 2 Preliminary Drainage Catchment Areas
601-190-213	Phase 2 Preliminary Impermeable / Permeable Areas
601-190-214	Phase 2 Drainage Maintenance Responsibilities Plan

APPENDIX A

Site layout Plan

APPENDIX B

REC Ground Investigation Plan and soil Records

APPENDIX C

REC Soil Infiltration Testing

APPENDIX D

IBEX Consulting Letter Report date 22/10/2021

APPENDIX E

IBEX Ground Water Monitoring results

APPENDIX F

Southern Water Records

APPENDIX G

MicroDrainage Output for Permeable Paving Example

APPENDIX H

MicroDrainage Output for House Soakaway Example

APPENDIX I

MicroDrainage Outputs for Adoptable Highway Soakaways

APPENDIX J

Drawings

601-190-201	Phase 2 Preliminary Drainage Strategy Sheet 1 of 3
601-190-202	Phase 2 Preliminary Drainage Strategy Sheet 2 of 3
601-190-203	Phase 2 Preliminary Drainage Strategy Sheet 3 of 3
601-190-204	Phase 2 Preliminary Drainage Strategy Site Wide Layout
601-190-205	Phase 2 Preliminary Drainage Catchment Areas
601-190-213	Phase 2 Preliminary Impermeable / Permeable Areas
601-190-214	Phase 2 Drainage Maintenance Responsibilities Plan