

LAND AT BOORLEY GREEN, HAMPSHIRE

SURFACE WATER STRATEGY – PHASE 1 COMPLIANCE REPORT

BOORLEY GREEN CONSORTIUM

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APPENDICES

Appendix 1 **Surface Water Drainage Masterplan, drawing number B641/48**

Appendix 2 **Pollution Hazard Assessment**

1. INTRODUCTION

- 1.1. This 'Surface Water Strategy – Phase 1 – Compliance Report' has been prepared by PFA Consulting on behalf of the Boorley Green Consortium for the proposed residential development and associated uses at Boorley Green, Hampshire subject of outline planning consent reference O/12/71514 and pursuant to planning conditions 18, 19 and 20.
- 1.2. The outline consent was supported by a Flood Risk Assessment (FRA) of September 2012 prepared by Opus International Consultants (UK) Ltd. That document set the over-arching surface water and foul drainage strategy for the development and from which this Statement of Compliance takes its lead.
- 1.3. This Statement specifically relates to the parcels forming Phase 1 and provides additional information to accompany the drainage strategy drawings and documents prepared by OPUS International Consultants (UK) Ltd and as a direct request from Eastleigh Borough Council.
- 1.4. The parcels comprising Phase 2 and Phase 3 are as follow: A1, A2, B1, B2, B3 (part), C1 and C2
- 1.5. This Statement sets out how the original approved drainage strategy for the development at Boorley Green is being followed for the reserved matters application. The Statement does not purport to provide a full engineering technical submission typical of that required for a Section 104 Agreement or similar. Such technical submissions will be made prior to the commencement of construction of each phase/parcel.
- 1.6. The planning conditions are as follows.
 - Condition 18 – No development shall take place until the surface water drainage scheme for the site based on sustainable drainage principles and an assessment of the hydrological and hydrogeological context of the development, has been submitted to and approved.
 - Condition 19 – Detailed proposals for the disposal of foul and surface water (including a programme for implementation) shall be submitted to and approved in writing by the local planning authority before the commencement of the development hereby permitted.
 - Condition 20 – The development hereby permitted shall not be commenced until the scheme related to the disposal of foul and surface water (drainage); and the installation of pollution prevention devices for the surface water drainage scheme have been submitted and approved in writing by the local planning authority. The scheme shall include a programme for implementation and be implemented as approved.
- 1.7. This Statement demonstrates that the application of a SUDS strategy advanced under the outline consent can be continued through Phase 2 and 3, including variations; also the foul drainage strategy of a self-contained network with offsite rising main is maintained.

2. FLOOD RISK STATUS

- 2.1. The Flood Map for Planning (Rivers and Sea) published on the Environment Agency's website remains unchanged from that prevailing at the time of preparing the FRA and the subsequent granting of the outline consent. The Flood Map shows the whole of the built area within the red line as being within Zone 1 which makes it appropriate for all land uses. Any Flood Zone 3 area is associated with the Ford Lake watercourse which runs around the north and eastern sides and from which the built area is separated by a significant green buffer. A copy of the Flood Map appears below.



3. SURFACE WATER DRAINAGE STRATEGY

Sustainable Drainage Systems

- 3.1. Government policy set out in paragraph 103 of the NPPF expects local planning authorities to give priority to the use of sustainable drainage systems (SuDS) in determining planning applications.
- 3.2. Paragraph 51 in Section 21 of the Flood Risk and Coastal Change planning practice guidance to the NPPF (Reference ID: 7-051-20140306) advises that sustainable drainage systems are designed to control surface water runoff close to where it falls and mimic natural drainage as closely as possible. Sustainable drainage systems also provide opportunities (in line with other policies in the NPPF) to:
 - reduce the causes and impacts of flooding;
 - remove pollutants from urban runoff at source;
 - combine water management with green space with benefits for amenity, recreation and wildlife.
- 3.3. In terms of what sort of sustainable drainage system should be considered, paragraph 80 in Section 21 of the Flood Risk and Coastal Change planning practice guidance to the NPPF (Reference ID: 7-080-20150323) advises that, generally, the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable:
 - into the ground (infiltration);
 - to a surface water body;
 - to a surface water sewer, highway drain, or another drainage system;
 - to a combined sewer.
- 3.4. The Government published its 'Non-statutory technical standards for sustainable drainage systems' in March 2015. The technical standards relate to the design, construction, operation and maintenance of sustainable drainage systems and have been published as guidance.
- 3.5. Paragraph 81 in Section 21 of the Flood Risk and Coastal Change planning practice guidance to the NPPF (Reference ID: 7-081-20150323) states that in considering a development that includes a sustainable drainage system the local planning authority will want to be satisfied that the proposed minimum standards of operation are appropriate. Paragraph 82 (Reference ID: 7-082-20150323) advises that the decision on whether a sustainable drainage system would be inappropriate is a matter of judgement for the local planning authority, taking advice from the relevant flood risk management bodies, including on what sort of sustainable drainage system they would consider to be 'reasonably practicable'. Paragraph 82 states that the judgement of what is reasonably practicable should be by reference to the technical standards.
- 3.6. The non-statutory technical standards for sustainable drainage systems set out peak flow control standards (S2 and S3) and volume control technical standards (S4, S5 and S6). For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event. For developments which were previously developed, the corresponding runoff rate for these events must be as close as reasonably practicable to the greenfield runoff rate, but should never exceed the rate of discharge from the development prior to redevelopment for that event.
- 3.7. In terms of volume control, where reasonably practicable, for greenfield development, the runoff volume in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event. For developments which have been previously developed this runoff volume must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume, but should never exceed the runoff volume prior to redevelopment for that event. Where

it is not reasonably practicable to constrain the volume of runoff as described it must be discharged at a rate that does not adversely affect flood risk.

- 3.8. Paragraph 83 in Section 21 of the Flood Risk and Coastal Change planning practice guidance to the NPPF (Reference ID: 7-083-20150323) advises that in terms of the overall viability of a proposed development, expecting compliance with the technical standards is unlikely to be reasonably practicable if more expensive than complying with building regulations provided that where there is a risk of flooding the development will be safe and flood risk is not increased elsewhere.
- 3.9. Guidance on the design and construction of SuDS is also provided in the 'Interim Code of Practice for Sustainable Drainage Systems', published by the National SUDS Working Group in July 2004, in other CIRIA documents including CIRIA C753 'The SuDS Manual' published in November 2015, as well as in the Environment Agency's document entitled 'Sustainable Drainage Systems (SUDS) An Introduction'.
- 3.10. There are a number of potential SuDS techniques that might be used on any particular site. These include rainwater harvesting systems, pervious pavements, infiltration devices such as soakaways and infiltration trenches, as well as flow balancing methods including swales, ponds/detention basins, and underground storage facilities.
- 3.11. Approved Document H of the Building Regulations states at Section 3.2 that surface water drainage should discharge to a soakaway or other infiltration system where practicable; discharge to a watercourse may require consent from the Environment Agency; and where other forms of outlet are not practicable, discharge should be made to a sewer.
- 3.12. The use of soakaways, pervious pavements and infiltration devices to discharge surface water runoff to ground depends upon the underlying strata having a suitable permeability. In addition, the Environment Agency will seek to control discharges into underground strata from areas subject to contamination or where groundwater is judged to be at risk from pollution caused by possible contamination.
- 3.13. The SuDS Manual, and CIRIA C687 'Planning for SuDS - making it happen', promote the use of a SuDS 'management train', which seeks to address the quality and quantity of runoff at all stages of a drainage system. It uses a hierarchy of techniques, namely: i) prevention, ii) source control, iii) site control and iv) regional control. The drainage strategy for the proposed development seeks to follow the concept of a SuDS management train.

Ground Conditions

- 3.14. At the outline planning stage no soil permeability information was available and gross site flow rates and storage volumes were calculated on geological type. Subsequent to this, a detailed soil investigation was undertaken including permeability tests. Those tests indicated that the subsoil is not conducive to the use of infiltration techniques and thus any soakaways would be abnormally large due to poor permeability rates and thus not suitable within a residential layout.
- 3.15. It is therefore considered that infiltration drainage would not provide a suitable means of disposal for surface water runoff from the site.
- 3.16. From an inspection of the Environment Agency's Groundwater Source Protection Zone Map the site is not located within a Groundwater Source Protection Zone.

Surface Water Drainage Masterplan

- 3.17. A sustainable drainage strategy, involving the implementation of SuDS, is proposed for managing the disposal of surface water runoff from the proposed development on the site.

- 3.18. As the use of infiltration devices is not appropriate for the majority of the site flow balancing methods are proposed, comprising a system of ponds, swales, detention basins and underground tanks, in order to attenuate surface water runoff to greenfield runoff rates with discharges to the local watercourse and ditch system.
- 3.19. The surface water drainage strategy within the approved FRA has its main principles as follows:-
- the bulk of the storage would be provided within the permeable pavements.
 - the pavement storage volume will be enhanced to accommodate run-off from other impervious surfaces.
 - minor amounts of storage would be provided by other SUDS infrastructure as suited to particular circumstances at detailed design stage.
 - The storage volume provisions will accord with the W5-revE initial assessments.
 - outflow rates from the storage would be throttled to accord with the W5-revE Greenfield run-off rates.
 - detailed design will accord with the requirements of CIRIA C697 SUDS Manual.
 - the particulars for each area of the site will need to be designed at detailed application stage. The preliminary rates and volumes determined from the current assessments and there will be a co-ordinated approach to detailed design between the SAB, LLFA and LPA. It therefore follows that by detailed application stage there will be a mandatory requirement to liaise with the SAB and obtain the necessary approval of the detailed design.
- 3.20. The proposed drainage strategy varies from that set out above in that it makes greater use of detention basins, tanks, swales etc and moves away from permeable paving for the following reasons:-
- (i) A general lack of allowance within the flows within the stated FRA.
 - (ii) Permeable paving is difficult to control flows when sub-divided into numerous small areas as would be the case on a residential development.
 - (iii) The site is steeply sloping in many areas which is not conducive to permeable paving as a storage medium.
 - (iv) Permeable paving gives rise to additional risks/costs during the construction stage.
- 3.21. The proposed drainage strategy would ensure that surface water arising from the developed site would be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.
- 3.22. A copy of the Surface Water Drainage Masterplan, drawing number B641/48, is included in Appendix 1.
- 3.23. In terms of the SUDS 'management train', the drainage strategy for the proposed development seeks to address the quality and quantity of runoff as follows:-
- (i) Prevention**
- 3.24. Prevention is the use of good site design and housekeeping measures to prevent pollution. Good site design includes the provision of soft landscaping within the site to encourage evapotranspiration. Housekeeping measures cover maintenance of the drainage system and general site maintenance.
- (ii) Source Control**
- 3.25. Source control is the control of runoff at, or near, its source. The use of vegetated detention basins would help to reduce the volume of runoff from the site and planting within the site encourages evapotranspiration. The use of trapped gullies would retain sediment and assist in reducing

pollution from the site. Other source control measures that could be considered within the individual development areas include the following:

- Water butts to reduce the volume of runoff from roofs.
- Pervious paving for large parking areas to reduce the volume of runoff and to provide treatment and subject to suitable topography.
- Rainwater harvesting / reuse measures for commercial, employment and educational buildings.

- 3.26. It is considered that the feasibility of including the above measures would need to be assessed as part of the detailed design of the individual development areas within the site.

(iii) Site Control

- 3.27. Site control is the management of water from several sub-catchments within a site. The proposed surface water drainage system amalgamates the runoff from the roofs, roads, and paved areas, for each area of development on the site, and deals with it in detention basins to reduce the rate of runoff from the site.

(iv) Regional Control

- 3.28. Regional control is the management of runoff from more than one site and so in this case is covered by the site control techniques.

Greenfield Runoff

- 3.29. The 'Interim Code of Practice for Sustainable Drainage Systems' states that further information on the calculation of greenfield runoff can be found in DEFRA/Environment Agency R&D Technical Report W5-074/A 'Preliminary rainfall runoff management for developments'. The latest update of R&D Technical Report W5-074/A/TR/1 Revision E was produced in January 2012. This was updated and published by the Environment Agency as 'Rainfall runoff management for developments' Report – SC030219 in October 2013.

- 3.30. Table 1 in the 'Rainfall Runoff Management for Developments – Interim National Procedure' set out in Report–SC030219 states that The Institute of Hydrology (IH) Report 124 Flood Estimation for Small Catchments (1994) method can be used to estimate the greenfield site flow rate.

- 3.31. Point 8 of the 'Rainfall Runoff Management for Developments – Interim National Procedure' set out in Report – SC030219 states:

"The Environment Agency will normally require that, for the range of annual flow rate probabilities, up to and including the 1% annual probability (1 in 100 year) event, the developed rate of runoff into a watercourse should be no greater than the undeveloped rate of runoff for the same event based on the calculation of QBAR or QMED and the use of FSSR growth curves. Exceptions only apply where it is not practical to achieve this due to either constraints on the size of the hydraulic control unit (see point 17), or excessive storage volumes. The purpose of this is to retain a natural flow regime in the receiving watercourse and not increase peak rates of flow for events of an annual probability greater than 1%. Three annual probabilities are used to define discharge compliance limits though the critical criteria are for the lowest and highest frequency events; 100% (1 year), 3.33% (30 year) and 1% (100 year)."

- 3.32. Point 10 of the 'Rainfall Runoff Management for Developments – Interim National Procedure' set out in Report – SC030219 states that theoretically the stormwater runoff volume from a site should be limited to the greenfield runoff volume for all event frequencies. However this is technically extremely difficult to achieve and therefore compliance to two criteria on runoff volume is required.

- 3.33. The two criteria are: the difference in runoff volume pre- and post- development for the 100 year 6 hour event should be disposed of by way of infiltration, or where this is not feasible due to soil type, discharged from the site at flow rates below 2 l/s/ha; and where compliance to 100 year volumetric criterion is not provided, the limiting discharge for any return period up to the 100 year event shall not be greater than the mean annual peak rate of runoff for the greenfield site (Referred to as QBAR in IH Report 124) or 2 l/s/ha, whichever is greater. As the additional runoff generated cannot be disposed of by infiltration it is proposed that the outflow from the drainage system would be constrained to QBAR, which approximates to a return period of 2.3 years, and hence a reduced rate of runoff for higher return periods.
- 3.34. Greenfield runoff rates were determined within the approved FRA. QBAR has been assessed as 5.4 litres/second/hectare and the FRA states that discussions with the Environment Agency have resulted in the basic requirement that surface water runoff rates are restricted to 5.4 l/s/ha. The FRA states that a discharge rate of QBAR should be used for all return periods from the 1 in 1 year return period up to the 1 in 100 year return period including an allowance for climate change.

Surface Water Flow Balancing

- 3.35. As set out in the FRA approved under the outline consent, the application site is subdivided into a number of topographical catchment areas. The principle of using topographical catchment areas has been continued but refined further such that the drainage is more related to the local topography, proposed site layouts and how the associated land drains its surface water. The catchment areas and associated SUDS facilities are shown on drawing no. B641/48 entitled 'Drainage Catchment Plan and Allowable Discharge'.
- 3.36. Drawing B641/48 includes a table which shows for each sub-catchment the catchment area, base discharge rates, allowable discharge rate, utilised discharge rate and discharge location. Importantly, the table shows that the total utilised discharge rate does not exceed that of the total allowable discharge rate. Therefore the principle agreed under the outline consent that there should be no increase in surface water runoff post development is upheld and thus no increase in flood risk downstream for the selected events.
- 3.37. The storage devices across the site apply the principals of SUDS selection and comprise of ponds, detention basins, swales and underground attenuation tanks. Attenuation tanks are utilised where there is insufficient space to accommodate 'above ground' SUDS due to constraints such as proposed housing layouts, site boundary, tree root protection, proposed rising main location and proposed earthwork requirements. Attenuation tanks are further utilised in catchments that require large attenuation volumes with largely restricted runoff rates.
- 3.38. Where the above ground attenuation basins cannot be used, the storage volume is achieved through the use of underground storage tanks with controlled devices.
- 3.39. As a strategy for SUDS has been developed, below is a short summary of each catchment demonstrating how the attenuation is achieved and the point of discharge.

Catchment 1

- 3.40. Catchment 1 southern section discharges to a Swale then into Basin 5 before final collection in Basin 1, partial areas of the catchment discharge directly to Basin 5 and 1. Flows are discharged as per the overall site strategy via a flow control chamber which discharges through a proprietary water quality device. Flows from the outfall headwall are diffused across the green buffer strip to Ford Lake watercourse but not in a defined channel but more as diffused sheet flow to mimic how the sheet flow runoff reaches the watercourse currently.

Catchment 2

- 3.41. Catchment 2 southern section discharges to a swale then into Basin 2 before outfall towards Ford Lake, partial areas of the catchment discharge directly to Basin 2. Flows are discharged as per the overall site strategy via a flow control chamber. A proprietary water quality device is positioned upstream of the swale. Flows from the outfall headwall are diffused across the green buffer strip to Ford Lake watercourse but not in a defined channel but more as diffused sheet flow to mimic how the sheet flow runoff reaches the watercourse currently

Catchment 3

- 3.42. Catchment 3 discharges through a piped system into Basin 3. Flows are discharged as per the overall site strategy via a flow control chamber which discharges through a proprietary water quality device. Flows from the outfall headwall are diffused across the green buffer strip to Ford Lake watercourse but not in a defined channel but more as diffused sheet flow to mimic how the sheet flow runoff reaches the watercourse currently.

Catchment 4

- 3.43. Catchment 4 discharges through a piped system into Basin 4. Flows are discharged as per the overall site strategy via a flow control chamber which discharges through a proprietary water quality device. Flows from the outfall headwall are diffused across the green buffer strip to Ford Lake watercourse but not in a defined channel but more as diffused sheet flow to mimic how the sheet flow runoff reaches the watercourse currently

Non-statutory technical standards for sustainable drainage system

- 3.44. The Government published its 'Non-statutory technical standards for sustainable drainage systems' in March 2015. The technical standards relate to the design, construction, operation and maintenance of sustainable drainage systems and have been published as guidance. The Government expect these standards to apply to all developments of 10 homes or more and to major commercial development.
- 3.45. The Government's 'Non-statutory technical standards for sustainable drainage systems' set out peak flow control standards (S2 and S3) and volume control technical standards (S4, S5 and S6). For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event. For developments which were previously developed, the corresponding runoff rate for these events must be as close as reasonably practicable to the greenfield runoff rate from the development, but should never exceed the rate of discharge from the development prior to redevelopment for that event.
- 3.46. In terms of volume control, where reasonably practicable, for greenfield development, the runoff volume in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event. Where reasonably practicable, for developments which have been previously developed this runoff volume must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume, but should never exceed the runoff volume prior to redevelopment for that event. Where it is not reasonably practicable to constrain the volume of runoff as described it must be discharged at a rate that does not adversely affect flood risk. This rate corresponds to QBAR.
- 3.47. In terms of flood risk within the development, the Government's 'Non-statutory technical standards for sustainable drainage systems' include standards S7, S8 and S9. Standard S7 states:

The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.

3.48. Standard S8 states:

The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (eg pumping station or electricity substation) within the development.

3.49. Standard S9 states:

The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of 1 in 100 year rainfall event are managed in exceedance routes that minimise the risk to people or property.

3.50. Table B demonstrates how the proposed development complies with the relevant standards of the Government's 'Non-statutory technical standards for sustainable drainage systems'.

Table B: Compliance with Non-statutory technical standards for sustainable drainage systems

Standard	Justification for compliance
Flood risk outside the development	
S1	N/A
Peak flow control	
S2	The peak runoff rate from the development does not exceed QBAR for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event as required by the FRA.
S3	N/A. Greenfield development so S2 applies.
Volume control	
S4	Previously agreed drainage strategy so S6 applies.
S5	N/A Greenfield development so S4 applies.
S6	Previously agreed drainage strategy and the runoff volume is discharged at a rate that does not adversely affect flood risk, corresponding to less than QBAR.
Flood Risk within the development	
S7	The surface water drainage system would be designed so that flooding does not occur on any part of the site occurs for a 1 in 30 year rainfall event.
S8	The surface water drainage system is designed so that flooding does not occur during a 1 in 100 year rainfall event within the development.
S9	The design of the site ensures that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.
Structural integrity	
S10	Components would be designed to ensure structural integrity of the drainage system under anticipated loading conditions over the design life of the development.
S11	The materials specified by the designer at the detailed design stage would be of a suitable nature and quality for their intended use.
Designing for maintenance considerations	
S12	N/A. Pumping is not proposed.
Construction	

S13	N/A
S14	N/A

Surface Water Drainage Pollution & Water Quality

- 3.51. The matter of water quality has been reviewed across each sub-catchment following the ‘simple indices approach’ within the SUDS Manual, CIRIA C753. The results, which are set out in Appendix 2 show that for each sub-catchment incorporating an attenuation pond the mitigation indices are equal to or greater than the hazard indices, therefore adequate treatment prevails within the SUDS proposals to prevent contamination of local watercourses without the need for further pollution control measures. Where underground tanks are used these are not recognised within the SUDS Manual as offering any mitigation benefit. Therefore by observation, those catchments which use tanks as the storage device will have the hazard indices greater than the mitigation indices. Where that situation prevails a proprietary water quality device is identified as being a necessary part of the SUDS treatment drain duly located prior to the outfall.
- 3.52. The typical elements that make up the treatment train are as follows.
- Trapped gullies within all roads.
 - Above ground ‘dry’ and ‘wet’ attenuation ponds
 - Above ground swales/ditches.
 - Diffuser/sediment traps where diffuse flow are proposed across the green buffer.
 - Shallow sheet flows across green buffer prior to watercourse.
 - Use of proprietary water quality devices where outfalls are from underground tanks or in addition to other treatments.

Maintenance

- 3.53. Paragraph 52 in Section 14 of the Flood Risk and Coastal Change planning practice guidance to the NPPF (Reference ID: 7-052-20140306) advises that when planning a sustainable drainage system, developers need to ensure their design allows for maintenance of the system, so that it continues to provide effective drainage for properties.
- 3.54. It is proposed that surface water sewers within the site would be offered for adoption under a Section 104 agreement of the Water Industry Act 1991. The maintenance of surface water sewers would therefore be the responsibility of Southern Water in its role as sewerage undertaker.
- 3.55. Drainage measures, comprising the ponds, swales, detention basins and any future shared source control measures would be maintained by a Management Company, housing association or individual householders as appropriate.
- 3.56. Guidance on the operation and maintenance requirements of sustainable drainage systems is contained in ‘The SuDS Manual’ (CIRIA C753). There are three categories of maintenance: regular, occasional and remedial actions.
- 3.57. Regular maintenance consists of basic tasks including litter and debris removal, grass cutting, and vegetation management, and includes inspections and monitoring to identify potential system failures such as blockages, silt and sediment build-up, eroded or damaged areas, and condition of inlets and outlets.
- 3.58. Occasional Maintenance comprises tasks that are likely to be required periodically, for example sediment removal and vegetation replacement.

- 3.59. Remedial Maintenance comprises intermittent tasks to rectify faults and would comprise inlet/outlet repairs, erosion repairs, and dealing with a spillage event.

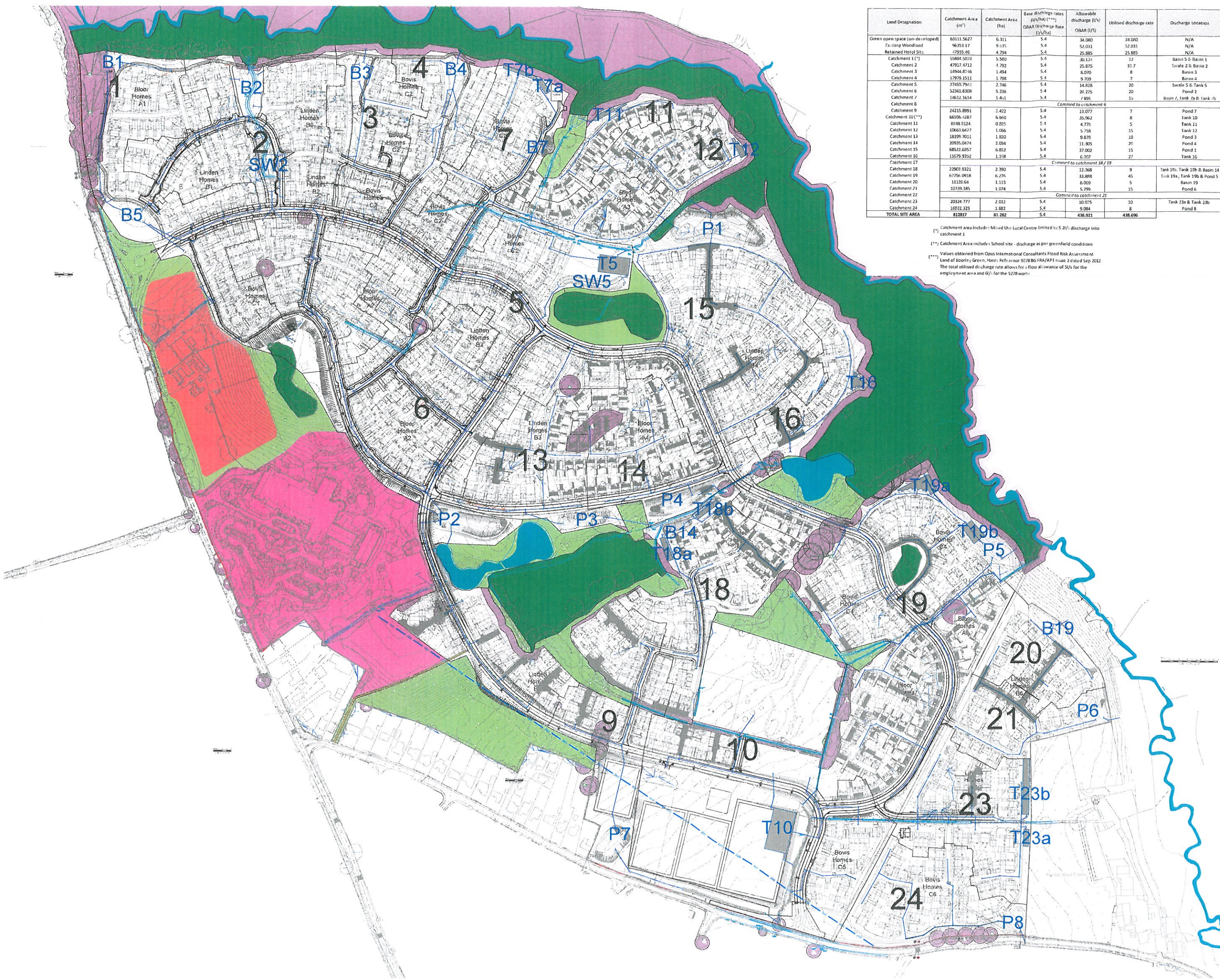
4. CONCLUSIONS

- 4.1. This 'Surface Water Strategy – Phase 1' has been prepared by PFA Consulting on behalf of the Boorley Green Consortium for the proposed residential development and associated uses at Boorley Green, Hampshire subject of outline planning consent reference O/12/71514 and pursuant to planning conditions 18, 19 and 20.
- 4.2. The Statement relates to the parcels forming Phase 1 of the development
- 4.3. This Statement sets out how the original approved drainage strategy for the development at Boorley Green has evolved to support the reserved matters application. The Statement does not purport to provide a full engineering technical submission typical of that required for a Section 104 Agreement or similar. Such technical submissions will be made prior to the commencement of construction of each phase/parcel.
- 4.4. The Flood Map for Planning (Rivers and Sea) published on the EA's website shows the whole of the built area within the application site boundary as being within Zone 1 which makes it appropriate for all land uses. Any Flood Zone 2 and 3 area is associated with Ford Lake watercourse which does not impact on the built area and is offset from the built area by a large buffer strip which materially exceeds the Zone 3 designation.
- 4.5. The approved FRA advanced a SUDS strategy for the application site in respect of surface water drainage. A SUDS approach has been maintained for the reserved matters stage but subject to some variations as the design process has evolved. The surface water strategy provides attenuation discharge rates that will not exceed the current greenfield run-off rates. There will therefore be no adverse impact on the flood flow rates and risks within Ford Lake and related watercourses both within and outside the site. Thus there is no detrimental off-site impact to flood risk.
- 4.6. The purpose of this report is to provide sufficient information to enable Planning Conditions 18, 19 and 20 to be discharged. Condition 18 requires the surface water drainage to be based on a SUDS strategy. This report confirms that a SUDS strategy is being followed across the whole site in the form of attenuation devices (basins, ponds, swales, tanks, diffuse flow) as the ground conditions do not support infiltration.
- 4.7. Condition 19 requires details of the foul and surface water disposal including a programme. The disposal of foul sewage is via a pumped system with a long off-site rising main being implemented by Southern Water under a foul sewer requisition. The foul strategy promotes a standalone system which does not rely on any local foul sewer networks. The surface water drainage will use a SUDS system with controlled discharges to local watercourses that duly mimics what happens in the undeveloped state for selected events. The condition refers to a 'programme for Implementation', typical of a residential development the programme for implementation will concur with each phase/parcel for housing building such that each dwelling has drainage connections prior to occupation.
- 4.8. Condition 20 requires the installation of pollution control devices. Pollution prevention has been achieved within the SUDS drainage system to ensure the mitigation indices are equal to or greater than the hazard indices rendering additional pollution prevention measures unnecessary. Where the mitigation indices are lower than the hazard indices, ie where tanks have been used, then proprietary water quality devices located prior to the point of discharge are proposed.

4.9. In conclusion, this Statement of Compliance demonstrates the following:-

- The built development area remains in Flood Zone 1 making appropriate for all land uses.
- The application site is not located in a ground water source protection zone.
- The SUDS proposals maintain a requirement that there shall be no increase in surface water runoff post development and thus no increase in flood risk downstream for the selected events.
- The report demonstrates how the proposed development complies with the relevant standards of the Government's Non-statutory Technical Standards for SUDS.
- The matter of water quality has been assessed for each sub-catchment to ensure either the mitigation indices are equal to or greater than the hazard indices or proprietary water quality devices used, thus reducing the risk to local watercourses from pollution events.
- Three categories of maintenance of SUDS have been outlined and how they can be achieved by the development.
- The foul strategy is a standard gravity/pumped system which is not reliant on any existing local network. That system will be adopted and maintained by Southern Water as the Sewerage Undertaker.

4.10. The findings of this report show that sufficient information prevails to permit discharge of Planning Conditions 18, 19 and 20 save for confirmation on programing by the developers in due course.



Land Designation	Catchment Area (m²)	Catchment Area (ha)	Base discharge rates (l/s/ha) (**)	Allowable discharge (l/s) QBAR (l/s)	Utilised discharge rate	Discharge Location
Green open space (un-developed)	63111.5627	6.311	5.4	34.080	34.080	N/A
Existing Woodland	96353.17	9.635	5.4	52.031	52.031	N/A
Retained Hotel Site	27935.46	4.794	5.4	25.885	25.885	N/A
Catchment 1(*)	55804.5078	5.580	5.4	30.134	12	Basin 5 & Basin 1
Catchment 2	47917.4732	4.792	5.4	25.875	31.7	Swale 2 & Basin 2
Catchment 3	14944.8746	1.494	5.4	8.070	8	Basin 3
Catchment 4	17978.1511	1.798	5.4	9.709	7	Basin 4
Catchment 5	27450.7942	2.746	5.4	14.828	20	Swale 5 & Tank 5
Catchment 6	52361.6308	5.236	5.4	28.275	20	Pond 2
Catchment 7	14612.1614	1.461	5.4	7.891	19	Basin 7, Tank 7a & Tank 7b
Catchment 8						
Catchment 9	24215.8991	2.422	5.4	13.077	7	Pond 7
Catchment 10(**)	66596.4287	6.660	5.4	35.962	8	Tank 10
Catchment 11	81848.8124	8.185	5.4	4.778	5	Tank 11
Catchment 12	10663.6477	1.066	5.4	5.758	15	Tank 12
Catchment 13	18195.7011	1.820	5.4	9.875	10	Pond 3
Catchment 14	20935.0474	2.094	5.4	11.305	20	Pond 4
Catchment 15	68522.0057	6.852	5.4	37.002	15	Pond 1
Catchment 16	11679.3392	1.168	5.4	6.297	27	Tank 16
Catchment 17						
Catchment 18	22803.8321	2.280	5.4	12.368	9	Tank 18a, Tank 18b & Basin 14
Catchment 19	67756.0918	6.776	5.4	33.888	45	Tank 19a, Tank 19b & Pond 5
Catchment 20	11120.64	1.113	5.4	6.009	5	Basin 19
Catchment 21	10738.185	1.074	5.4	5.799	15	Pond 6
Catchment 22						
Catchment 23	20324.777	2.032	5.4	10.975	10	Tank 23a & Tank 23b
Catchment 24	16222.329	1.622	5.4	8.084	8	Pond 8
TOTAL SITE AREA	812817	81.282	5.4	438.921	438.696	

(*) Catchment area includes Mixed Use Local Centre limited to 5.2l/s discharge into catchment 1
(**) Catchment Area includes School site - discharge as per greenfield conditions
(***) Values obtained from Opus International Consultants Flood Risk Assessment
Land of Boorley Green, Hants. Ref: 06/18 BG FRA/AP1 Issue 2 dated Sep 2012
The total utilised discharge rate allows for a flow allowance of 5l/s for the employment area and 6l/s for the 5278 work

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- NOTES
- Drawing for information only
 - Figures contained within tables are indicative only and are used for the purpose of the runoff assessment only

Key:

- Proposed Shared Open Space Areas
- Proposed Local Mixed Use Area
- Retained Hotel Site
- Existing Woodland
- Catchment Reference
- Basin reference

B	24/09/15	Strategy amended for revised layouts and constraints	MTD	KLW
A	31/08/16	Strategy updated in line with drainage design development	MD	KLW
Rev	Date	Description	Initials	Check

FOR INFORMATION

Client
Linden Homes
Bovis Homes
Boorley Homes

Project
Boorley Green

Drawing Title
Drainage Catchment Plan
& Allowable discharge

Drawing No.
B641/48
Rev: B

Date
July 2016

Scale
NTS @ A0

Drawn By
MTD

Checked By
KIM



LAND AT BOORLEY GREEN, HAMPSHIRE

Pollution Hazard Assessment

A Pollution Hazard Assessment has been undertaken for each catchment following the guidance set out in the SuDS Manual, CIRIA C753, London 2015, Section 26.7 'Method of Managing Pollution Risk'. With reference to that document, the appropriate approach is the "simple index approach" for surface water and groundwater. Extracts from Tables 26.2 and 26.3 are set out below.

Table 26.2 (Part): Pollution Hazard Indices for Different Land Use Classification

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul-de-sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie <300 traffic movements/day	Low	0.5	0.4	0.4
Total		0.7	0.6	0.45

Table 26.3 (Part): Indicative SuDS Mitigation Indices for Discharge to Surface Waters

Type of SuDS component	TSS	Metals	Hydrocarbons
Swale	0.5	0.6	0.6
Pond	0.7	0.7	0.5
Basin	0.5	0.5	0.6

The guidelines recommend that the total SuDS mitigation index must be greater than or equal to the pollution hazard index. Applying the criteria set out in Table 26.2 and 26.3 to each catchment is considered below. Table 26.3 does not include tanks as a means of mitigation, hence other devices are advanced where tanks exist.

Drawing No. B641/94 shows diagrammatic layouts of typical SuDS features and drawing No. B641/148 shows the sediment trap/diffuser headwall in a little more detail.

Catchments 1, 2, 3 and 4 – Residential land use discharging to an attenuation pond with sediment forebay adjacent to the inlet with controlled discharge.

	TSS	Metals	Hydrocarbons
Hazard Indices (as per Table 26.2)	0.7	0.6	0.45
Mitigation Indices (as per Table 26.3) Pond	0.7	0.7	0.5

The mitigation indices are greater than or equal to the hazard indices therefore adequate treatment prevails.