

**FLOOD RISK ASSESSMENT ADDENDUM
– FOUL AND SURFACE WATER
DRAINAGE STRATEGY**

OCTOBER 2018

Date : 12 October 2018
Project : Land East of Tye Lane, Walberton
Project Ref : 183240
Report Ref : 183240-02

DOCUMENT CONTROL

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
	DRAFT	AS	JC	GH	12.10.18
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1.0 INTRODUCTION

- 1.1 Ardent Consulting Engineers (hereafter referred to as Ardent) have been appointed by Linden Homes South to advise on the Foul and surface water drainage aspects to support a reserved matters application for the proposed residential development at Land West of Tye Lane, Walberton, West Sussex.
- 1.2 The reserved matters application is pursuant to outline planning permission ref. WA/44/17/OUT. The Flood Risk Assessment Addendum seeks to confirm that flood risk to the site has been assessed based on the climate change allowances and flood modelling data and to provide a compliant surface water drainage strategy.
- 1.3 The proposed development comprises the erection of 175 dwellings with access from B2132 Yapton Lane. Refer to **Appendix A** for a plan of the proposed development.

2.0 EXISTING SITE

Site Location

- 2.1 The proposed development (Hereafter referred to as the "Site") is approximately 11.3 ha (28 acres) and currently 100% Greenfield. It is located in Walberton, West Sussex (NGR 497286 106211) 500 m south from A27 (Arundel Road). The development site is currently bordered by the Avisford Park Golf course to the north, Tye Lane to the west and school and residential dwellings to the south and east.

Topography

- 2.2 A topographic survey was carried out by K.A.Rylance Limited in 2016. Based on the survey the site elevation varies from approximately 21.00 metres Above Ordnance Datum (mAOD) to 14.50 mAOD. Levels generally fall to a south and south westerly direction with an approximate 1:90 gradient. Contours indicate two natural low points within the boundary, at the southern edge as well as at the southwest corner.

3.0 RESERVED MATTERS APPLICATION - CONDITIONS 24, 25, 32 AND 33

- 3.1 To discharge the reserved matters application in relation to conditions 24 and 25, this document and supporting information should be read in conjunction with the Flood Risk Assessment (FRA) for the Site dated June 2017. The report supports the discharge of the outline planning conditions and the RM application.
- 3.2 Condition 24 relates to the foul water drainage scheme for the Site while Condition 25 deals with the surface water strategy. For ease of reference, planning conditions 24 and 25, have been replicated within this document with an Ardent response, immediately below.

Condition 24:

Development shall not commence until a drainage strategy detailing the proposed means of foul disposal and implementation timetable has been submitted to and approved in writing by the Local Planning Authority in consultation with the sewerage undertaker. The development shall be carried out in accordance with the approved scheme and timetable.

3.3 Ardent response

The foul water from the proposed development will discharge to the public sewers in two connection points, located in Avisford Park Road and Tye Lane. Close collaboration with Southern Water will ensure that any necessary upgrades to the public sewerage network are being undertaken so as to facilitate the proposed development.

Condition 25:

Development shall not commence until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority.

The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, the recommendations of the SuDS Manual produced by CIRIA.

Winter groundwater monitoring to establish highest annual ground water levels and Percolation testing to BRE 365, or similar approved, will be required to support the design of any infiltration drainage.

3.4 Ardent response

The proposed surface water drainage strategy employs a sustainable approach to the management of runoff from the developed site. Refer to **Appendix B** for Proposed drainage layout.

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The site has been split into two catchments (eastern and western). Surface water is being stored in lined permeable paving sub base located in shared roads on site. The flow discharging from permeable paving is restricted with flow control - orifices.

Surface water run-off from the site discharges into the infiltration basin in each of the catchments.

The proposed drainage strategy will provide water quality improvements by reducing sediment and contaminants from runoff either through settlement or biological breakdown of pollutants as surface water run-off infiltrates through the permeable pavements, wetland area within infiltration basins and filter drain.

Surface water from the site discharges into permanently wet shallow ponds via a fore bay and then overflows to an infiltration basin designed for up to 100 years plus 40% climate change storage volume.

Winter groundwater monitoring was undertaken in June 2017 by Geo-Environmental, as well as BRE 365 infiltration tests in December 2015 as a part of Ground investigation report.

Condition 32:

Development should not commence until finalised detailed surface water drainage designs and calculations for the site, based on sustainable drainage principles, for the development have been submitted to and approved in writing by the Local Planning Authority. The drainage designs should demonstrate that the surface water run-off generated up to 1 in 100 year, plus climate change, critical storm will not exceed the run-off from the current site following the corresponding rainfall event.

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Surface water from site will discharge into infiltration basin with no outfall, which is a betterment as all the surface water will infiltrate into the ground in two locations. Results of run-off rates calculations are shown in **Table 1** below.

Table 1 Greenfield and proposed run-off rates (l/s).

Catchment	Site Area (ha)	Greenfield run-off rate (l/s)			Proposed run-off rate (l/s) Discharging from infiltration basin			
		1yr	30yr	100yr	1yr	30yr	100yr	100yr+40%
Eastern	6.3	11.08	29.97	41.57	0.0	0.0	0.0	0.0
Western	5.0	8.79	23.79	38.68	0.0	0.0	0.0	0.0

Condition 33:

Development should not commence until full details of maintenance and management of the SUDs system is set out in a site-specific maintenance manual and submitted to, and approved in writing, by the Local Planning Authority. The scheme shall subsequently be implemented in accordance with the approved designs.

3.6 Ardent response

A private management company will be set up to maintain the surface water drainage network. The management company will be financed by a yearly maintenance fee chargeable to the residential development. The name of the Management Company to be advised.

Refer to Appendix C for The SuDs maintenance plan.

4.0 CONCLUSIONS

- Ardent have been appointed by Linden Homes to provide the relevant information on the drainage strategy in relation to support a reserved matters application for the proposed residential development in the land east of Tye Lane, Walberton, West Sussex.
- The reserved matters application is pursuant to outline planning permission ref. WA/44/17/OUT. Conditions 24, 25, 32 and 33 relate to the surface water and foul drainage strategies respectively which this document and attached supporting information seek to discharge.
- The site is situated in Flood Zone 1. Areas within Flood Zone 1 are considered to have a less than 1 in 1,000 year annual probability of flooding (0.1%).
- The development proposals will increase the hardstanding area within the development to 6.49ha (57% impermeable).
- The surface water management strategy proposes to infiltrate surface water run-off from the Site to the two infiltration basins located in the southern area of the development site for rainfalls events up to the 1 in 100 year event including climate change.
- The foul drainage strategy is to discharge to the Southern Water public sewers with two connection points.

Appendix A – Proposed site layout



NOTES

This drawing is the copyright of Thrive Ltd ©. All rights reserved. Ordnance Survey Data © Crown Copyright. All rights reserved. Licence No. 100007359. DO NOT scale from this drawing. Contractors, Sub Contractors and Suppliers are to check all relevant dimensions and levels of the site and building before commencing any shop drawings or building work. Any discrepancies should be recorded to the Architect. Where applicable this drawing is to be read in conjunction with the Consultants' drawings.

REV	DESCRIPTION	DATE	AUTHOR	CHK'D
A	Issued for Planning	10.10.18	MDM/K	

scale 1:1000

KEY:

- Application Boundary
- Property Boundary Line - Ref Boundary Materials Layout and details for detailed specification
- Boundary Walling - Ref Boundary Materials Layout and details for detailed specification
- Shared Ownership
- Affordable/Social Rent
- Garden Gate
- BCP Bin Collection Point

NOTE: For Landscape/Boundary/Surface Materials Please Refer To Hard & Soft Landscape Drawings.

NOTE: For specific location of retaining structures & steps please refer to engineers drawings.

PLANNING

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PROJECT

Land East of Tye Lane
Walberton
For: Linden Homes Southern

DRAWING

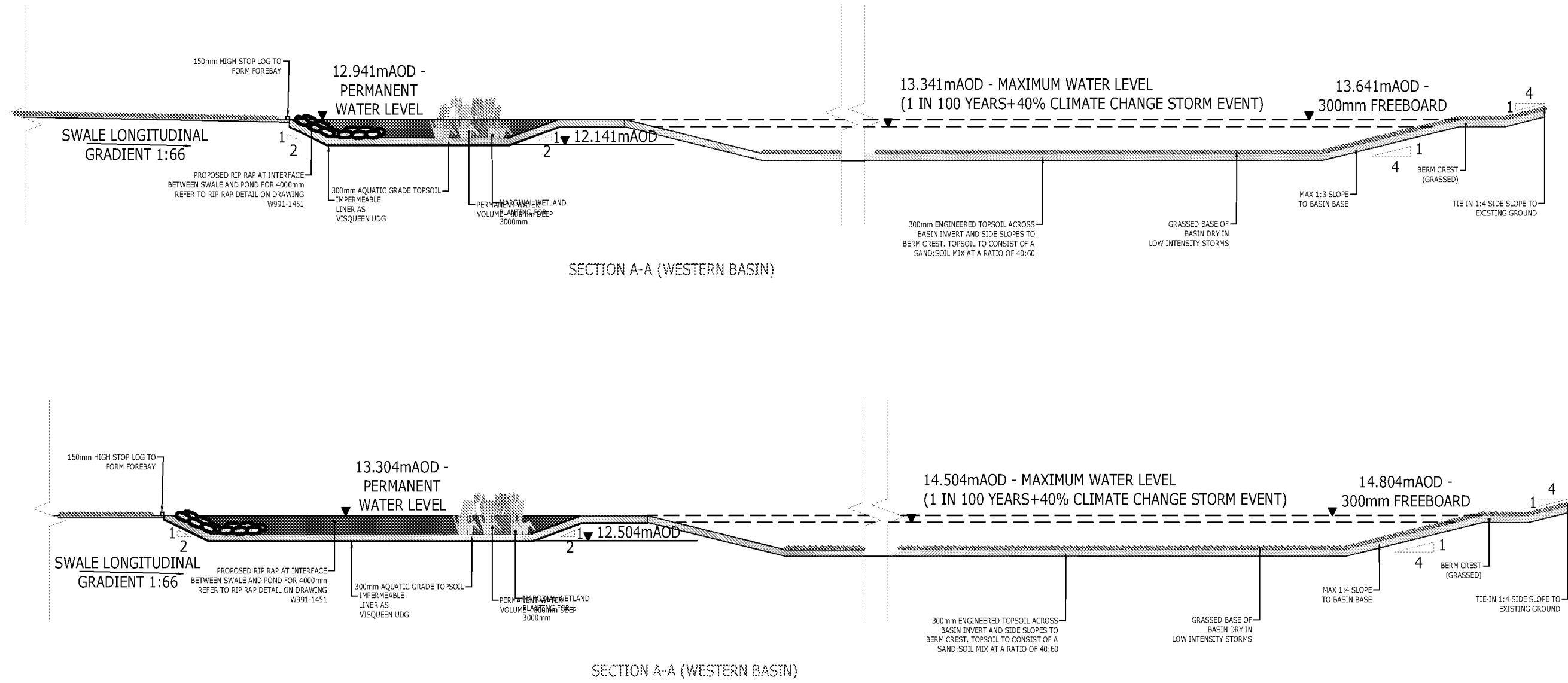
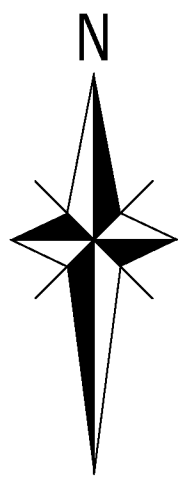
Site Layout

SCALE	DATE	AUTHOR	CHK'D
1:1000@ A1	Aug 18	MD	

JOB NO.	DRAWING NO.	REV
LIND171208	SL.01	A

CLIENT REF.

Appendix B – Proposed drainage layout



KEY				
	SITE BOUNDARY		PROPOSED ADOPTABLE FOUL WATER SEWER & MANHOLE (WITH MANHOLE REF. No.)	
	PROPOSED ADOPTABLE SURFACE WATER SEWER & MANHOLE		PROPOSED PRIVATE SURFACE WATER SEWER & MANHOLE	
	PROPOSED ROAD GULLY WITH 1500 CONNECTION PIPE		PROPOSED SURFACE WATER CONTROL CHAMBER	
	PROPOSED POND		PROPOSED HEADWALL	
	PROPOSED SWALE AND DIRECTION OF FALL		PROPOSED PERMEABLE PAVING	
	TREE ROOT PROTECTION ZONE		PROPOSED SURFACE WATER CONNECTIONS TO PERMEABLE PAVING	
	PROPOSED SURFACE WATER CONNECTIONS TO SWALE		SOAKAWAY TANK	
	LINED FILTER DRAIN		POND - WETLAND PLANTING	

- NOTES**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
 - DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
 - ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES, UNLESS OTHERWISE STATED.
 - ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS.
 - NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS PERMITTED WITHOUT PRIOR PERMISSION FROM THE ENGINEER.
 - ALL HIGHWAYS WORKS TO BE IN ACCORDANCE WITH WEST SUSSEX COUNTY COUNCIL DEVELOPERS CONSTRUCTION MANUAL DATED APRIL 2017.
 - ALL HIGHWAYS DRAINS AND GULLIES ARE TO BE CONSTRUCTED TO WEST SUSSEX COUNTY COUNCIL REQUIREMENTS.
 - ALL SEWERS ARE TO BE DESIGNED TO SEWERS FOR ADOPTION 6TH EDITION AND THAMES WATER REQUIREMENTS

- CDM NOTES:**
- THE ATTENTION OF THE CLIENT, PRINCIPAL DESIGNER, PRINCIPAL CONTRACTOR, DESIGNERS AND CONTRACTORS IS DRAWN TO THE FOLLOWING POTENTIAL RISKS IN CONJUNCTION WITH THE PROPOSED ON-SITE AND OFF-SITE WORKS AS DESIGNED FOR THIS PROJECT:
- WORKS IN THE VICINITY OF LIVE SERVICES INCLUDING GAS, ELECTRICITY AND BT WILL BE NECESSARY AND THE ADVICE OF ALL STATUTORY SERVICE COMPANIES MUST BE SOUGHT BEFORE ANY WORKS COMMENCE.
 - WORKS WITHIN AND ABUTTING THE EXISTING HIGHWAY WILL ENTAIL TRAFFIC HAZARDS AND ALL APPROPRIATE SAFETY MEASURES INCLUDING BARRIERS, SIGNS AND LIGHTING MUST BE UNDERTAKEN TO THE APPROVAL OF THE LOCAL AUTHORITY, THE HIGHWAY AUTHORITY AND THE POLICE DEPARTMENT.
 - HAZARDOUS MATERIALS INCLUDING CEMENT AND BITUMINOUS MATERIALS ARE SPECIFIED AND THE MANUFACTURERS ADVICE ON SAFE HANDLING PROCEDURES MUST BE OBTAINED AND MADE CLEAR TO ALL OPERATIVES.
 - THE CONTRACTOR WILL BE RESPONSIBLE FOR LOCATING ALL EXISTING SERVICES WITHIN THE VICINITY OF THE WORKS HAND DUG AND ENSURE THESE ARE PROTECTED THROUGHOUT THE DURATION OF THE WORKS. ALL UTILITY PLANT SHOULD BE CLEARLY MARKED ON THE GROUND PRIOR TO COMMENCEMENT OF THE WORKS.
 - THE CONTRACTOR MUST ENSURE ALL WORKING AREAS ARE FULLY SECURE.

Rev	Desc	Rev	Rev	Rev	Rev	Rev	Rev	Rev	Rev
1	Rev	1	Rev	1	Rev	1	Rev	1	Rev
1	Rev	1	Rev	1	Rev	1	Rev	1	Rev
1	Rev	1	Rev	1	Rev	1	Rev	1	Rev
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1	Rev	1	Rev	1	Rev	1	Rev	1	Rev
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Client		LINDEN HOMES SOUTH	
Project Title:		LAND EAST OF TYE LANE, WALBERTON	
Drawing Title:		PROPOSED DRAINAGE STRATEGY	
A1 Scale	Date	Designed by	AS
1:1000	16/10/2018	Checked by	JC
Drawn by	AS	Approved by	GH
Drawing Number	183240-001	Rev	-

Appendix C - SuDS Operation and Maintenance Activities

SuDS Management & Maintenance Strategy

1.0 INTRODUCTION

- 1.1 The development at Land East of Tye Lane, Walberton includes a number of Sustainable Drainage Systems (SuDS) as part of the surface water drainage system including permeable paving, infiltration basins, wetlands, filter drain, soakaway and swales. This Technical Note sets out an outline management plan for the aforementioned SuDS components.
- 1.2 The proposed SuDS components, in addition to addressing climate change, will bring a number of benefits in terms of water quality, environmental, and social amenity.
- 1.3 The maintenance of all SuDS components will be in accordance with the best practices and CIRIA document C753 "The SuDS Manual". Typical maintenance activities for the proposed SuDS components have been reproduced from Table 32.1 of "The SuDS Manual" and it is shown in Table 1 below. A private management company will be set up to maintain the surface water drainage network, including on-site SuDS. The management company will be financed by a yearly maintenance fee chargeable to the residential and rentable development. The name of the Management Company to be advised.

Table 1. Typical key SuDS components operation and maintenance activities.

Operation and maintenance activity	SuDS component					
	Detention basin	Wetland	Permeable paving	Filter drain	Soakaway	Swale /bioretention/ trees
Regular maintenance						
Inspection	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■
Grass cutting	■	■	□	■	□	■

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Weed and invasive plant control	☐	☐	☐	☐		
Shrub management	☐	☐	☐			☐
Shoreline vegetation	☐	■				
Aquatic vegetation management	☐	■				
Occasional maintenance						
Sediment management	■	■	■	■	■	■
Vegetation replacement	☐	☐				☐
Vacuum sweeping and brushing			■			
Remedial maintenance						
Structure rehabilitation / repair	☐	☐	☐	☐	☐	☐
Infiltration surface reconditioning	☐		☐		☐	☐
■ will be required □ may be required						

2.0 SuDS MANAGEMENT PLAN

2.1 This long-term Management Plan for the Sustainable Drainage System (SuDS) should be implemented at the Site to ensure that the drainage network functions as designed. Maintenance and cleaning of gullies, surface water manholes, and SuDS components will ensure adequate hydraulic performance.

2.2 This plan is intended to cover all on-site drainage structures. The Site Management Team should oversee and implement the SuDS Management Plan and designate a qualified person who will be responsible for the proper operation and maintenance of the surface water drainage structures.

Water Quality Management

2.3 The surface drainage network has been designed to protect and enhance the quality of surface water runoff through the removal of sediment and pollutants, in accordance with guidance presented in CIRIA C753 'The

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SuDS Management & Maintenance Strategy

SuDS Manual'. Swales, wetland within the infiltration basins and silt trapped gullies will reduce the amount of pollutants entering the system. Preventive maintenance of the system will include a comprehensive source reduction program of regular sweeping and litter removal, prohibitions on the use of pesticides and maintenance of bin areas.

Maintenance Program

- 2.4 The Site Management Team will conduct the SuDS Management Plan set out in this document. The Site Management Team will ensure that inspections and record keeping are timely and accurate. Inspection & Maintenance Log Forms (attached) should include the date and physical conditions of the structures, depth of sediment in structures, evidence of overtopping or debris blockage and maintenance required of each structure. Records of maintenance will be kept on file on-site and copies of Inspection & Maintenance Log sheets indicating all work and inspections will be available to the Council upon request.

The maintenance programme for each of proposed SuDS features is included in tables below.

Table 2. Maintenance programme for soakaways.

SUDS Element	Soakaways	
Maintenance Period	Maintenance Task	Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and flood of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)

SuDS Management & Maintenance Strategy

Occasional Maintenance	Remove sediment and debris from pre-treatment components and flood of inspection tube or chamber and insider concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile(will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Table 3. Maintenance programme for filter drains.

SuDS Element	Filter Drains	
Maintenance Period	Maintenance Task	Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for	Six Monthly

SuDS Management & Maintenance Strategy

	silt accumulation, and establish appropriate silt removal frequencies	
	Remove sediment from pre-treatment devices	Six Monthly or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg. NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforate pipework of blockages	As required

Table 4. Maintenance programme for swales.

SuDS Element	Swales	
Maintenance Period	Maintenance Task	Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut the grass – to retain grass height within specified design range	Monthly (during growing season) or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt	Monthly, or when required

SuDS Management & Maintenance Strategy

	accumulation, record areas where water is ponding for > 48 hours	
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth; alter plant types to better suit conditions, if required	As required or if bare soil is exposed over > 10% of the filter strip area
Remedial Actions	Repair erosion or other damage by re-turfing or reseed	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

SuDS Management & Maintenance Strategy

Table 5. Maintenance programme for detention basins.

SUDS Element	Detention Basin	
Maintenance Period	Maintenance Task	Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass - meadow grass in and around basin	Half yearly (spring, before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets, and overflows for blockages, and clear is required	Monthly
	Inspect banksides, structures, pipework etc. for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlets and forebays	Annually (or as required)
	Manage wetland plants in outlet pool- where provided	Annually

SuDS Management & Maintenance Strategy

Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseedling or returfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven levels and reinstate design levels	As required

SuDS Management & Maintenance Strategy

Table 6. Maintenance programme for wetlands.

SUDS Element	Ponds and Wetlands	
Maintenance Period	Maintenance Task	Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May-October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices eg. penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of	Annually

SuDS Management & Maintenance Strategy

	0.1m above pond base; include max 25% of pond surface)	
	Remove 25% bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Tidy all dead growth (scrub clearance) before the start of the growing season (Note: tree maintenance is usually part of the overall landscape management contract)	Annually
	Remove sediment from any forebay	Every 1-5 years, or as required
	Remove sediment and planting from one quadrant of main body of ponds without sediment forebay	Every 5 years, or as required
Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment this will only be required rarely, eg every 25-50 years
Remedial Actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate inlets, outlets and overflows	As required

SuDS Management & Maintenance Strategy

Regular maintenance should include:

- Inspect channel and gully inlet grates and remove any debris every 6 months or as determined to be reasonable based on experience with the installed systems to ensure that the gullies are working in their intended fashion and that they are free of debris.
- Inspect gully sumps and bottom of drain manholes quarterly; if depth of sediment in sumps exceeds 50% capacity, sediment must be removed. Excessive sediment shall be removed and properly disposed by a licensed drainage cleaning company.
- All litter shall be picked up and removed from the parking areas, external bin store, and soft landscaping.
- Inspect all vegetated areas. Replant bare areas or areas with sparse growth. Trim vegetation every quarter to prevent over-growth and potential blockages of gullies and inlets.
- Inspect external bin stores for spillage and scattered litter must be performed on a regular basis to prevent the spread of pollutants into the surface water drainage network.
- Inspect permeable paving areas for oil spillage on a regular basis to ensure no excessive pollution is entering the subbase and surface water drainage network.
- The inlets, outlet and vents and overflows of SuDS components should be checked annually and after large storms to ensure that they are in good condition and operating as designed. Regular maintenance includes inspection and identification of any areas that are not operating correctly monthly for the first 3 months and then every 6 months after.

SuDS Management & Maintenance Strategy

Winter Maintenance Program

- 2.5 Ensure that drainage structures are not blocked by ice, snow, debris or rubbish during winter months. Inspections and maintenance should be carried out on a more regular basis due to likely adverse weather conditions.

Fertiliser Use

- 2.6 Only slow-release organic low-phosphorous fertilisers will be used in any landscaped areas in order to limit the amount of nutrients that could enter the surface water drainage system.

Operation and Maintenance requirements

- 2.7 Recommendations for the operation and maintenance including typical frequencies are included in **Table 7** below.

SuDS Management & Maintenance Strategy

Table 7: SuDS Operation and Maintenance Requirements

Maintenance Task	Description	Frequency
Regular Maintenance		
Litter management	Pick up all litter in SuDS and hard/soft landscape areas and remove from site.	Monthly.
Grass maintenance	Mow all grass verges, paths and amenity areas at 35-50mm with 75mm max. leaving grass in situ.	As required or monthly.
	Wildflower areas strimmed to 50mm on 3 year rotation (30% each year)	Annually.
Inlets and outlets	Inspect monthly to ensure good conditions and operation. Remove silt from slab aprons and debris. Strim 1m round for access	Monthly and after severe storms.
	Remove manhole covers and ensure water is flowing freely and that exit route is clear. Remove debris and silt.	Annually.
Hard surfaces	Sweep all paving regularly. Sweep and suction brush permeable paving annually in autumn after leaf fall.	Monthly and after severe storms.
	Inspect for evidence of poor operation and silt accumulation.	Quarterly and 48 hours after large storms in first six months
Occasional tasks		
Inspection and control chambers	Annual inspection, remove silt and check free flow	Annually.
Hard surfaces	Stabilise and mow contributing adjacent areas	As required.
	Removal of weeds using glyphosphate applied directly into to the weeds. Use an applicator rather than a spray	Quarterly and after severe storms.
Silt Management	Excavate silt, stack and dry within 10m of the SuDS feature, but outside the design profile where water flows, spread, rake and overseed.	As required.

SuDS Management & Maintenance Strategy

Remedial work		
General inspection	Inspect SuDS system regularly to check for damage or failure. Undertake remedial work as required.	As required.
Hard surfaces	Specialist sweeping, water jetting and vacuuming with oscillating rotating brushes to restore surface infiltration rate.	As required. Every 10 years as a minimum.
	Remedial works to any depressions, rutting or cracked and broken paving elements considered detrimental to the structural performance or a hazard to users. Replace lost jointing material	As required.
Inlets, Outlets, Chambers, Overflows and Vents	Repair damaged components associated with SuDS and pre-treatment structures as required. Damage should be noted during the monitoring regime.	As required.
	Repair physical damage and surrounding stone. Repair and repack stone to design detail as necessary.	As required.

Spillages – Emergency Action

- 2.8 Small spillages of oil and/or waste material should be removed using soak mats, or similar, as recommended by the Environment Agency.
- 2.9 Serious spillages, either by volume or substance (i.e. toxic) should be isolated with the use of soil, turf or fabric. Outlet pipes should be blocked downstream of the spillage using bung(s) made by wrapping soil and/or turf in a plastic sheet or close woven fabric. The Environment Agency should be contacted immediately.

SuDS Management & Maintenance Strategy

Hydrobrakes / Flow Control Devices

- 2.10 Flow control devices have been specified for the surface water outfalls from the Site. As these are situated downstream of the proposed SuDS features it is necessary for these to also be maintained. Hydro-International have been consulted who have provided the following information on the required maintenance regime.
- 2.11 A response was received from Hydro International on 29th March 2018 and is included in **Appendix B**. In summary, the document provided in the response notes the following with regards to maintenance of the system;
- If blockage of the inlet occurs, a pivoting bypass door allows the manhole chamber to be drained
 - Smaller units are supplied with rodding facilities or suppressor pipes as standard
 - All extraneous building materials should be removed from the unit and chamber immediately after construction
 - Once operational, all units should be inspected monthly for the first three months and thereafter six monthly
 - Hose down units to clear, as required

Exclusions

- 2.12 This SuDS Management and Maintenance Strategy does not allow for the maintenance of roof drainage and downpipes or any pump chambers.

Additional Support

- 2.13 In the event of concern or failure of a SuDS feature, the relevant manufacturer should be contacted. Manufacturer details can be found in the Construction Operations and Maintenance (O&M) Manual.

Appendix D – Microdrainage calculation results

Ardent Consulting Engineers		Page 1
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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 7 Number of Storage Structures 9 Number of Real Time Controls 0

Synthetic Rainfall Details

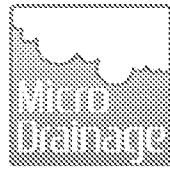
Rainfall Model FSR Ratio R 0.325
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.600 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 100
 Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
W1.000	W1	15 Winter	100	+40%	100/15 Winter				16.702
W1.001	W1	15 Winter	100	+40%	100/15 Summer				16.715
W2.000	WPP6	60 Winter	100	+40%	100/15 Summer				16.933
W2.001	W3	60 Winter	100	+40%	100/15 Summer				16.904
W1.002	W3	15 Winter	100	+40%	100/15 Summer				16.390
W1.003	W2	15 Winter	100	+40%	100/15 Summer				16.330
W3.000	WPP10	15 Winter	100	+40%					15.431
W3.001	W3	15 Winter	100	+40%	100/15 Summer				16.032
W1.004	W3	15 Winter	100	+40%	100/15 Summer				16.033
W4.000	WPP7	60 Winter	100	+40%	100/15 Summer				15.936
W4.001	W4	120 Winter	100	+40%	100/15 Summer				16.065
W1.005	W4	15 Winter	100	+40%	100/15 Summer				15.944
W1.006	W5	15 Winter	100	+40%	100/15 Summer				15.876
W5.000	WPP9	60 Winter	100	+40%	100/15 Summer				16.421
W5.001	W6	15 Winter	100	+40%	100/15 Summer				17.116
W5.002	W6	15 Winter	100	+40%	100/15 Summer				16.231
W5.003	W7	15 Winter	100	+40%	100/15 Summer				16.032
W6.000	WPP8	60 Winter	100	+40%	100/15 Summer				16.313

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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
W1.000	W1	0.052	0.000	0.16		2.5	SURCHARGED	
W1.001	W1	0.168	0.000	0.96		35.1	SURCHARGED	
W2.000	WPP6	0.233	0.000	0.23		4.7	SURCHARGED	
W2.001	W3	0.734	0.000	0.38		4.7	SURCHARGED	
W1.002	W3	0.515	0.000	1.02		36.8	SURCHARGED	
W1.003	W2	0.572	0.000	0.83		65.7	SURCHARGED	
W3.000	WPP10	-0.069	0.000	0.20		2.1	OK	
W3.001	W3	0.669	0.000	1.39		12.0	SURCHARGED	
W1.004	W3	0.953	0.000	0.87		88.8	SURCHARGED	
W4.000	WPP7	0.161	0.000	0.44		12.2	SURCHARGED	
W4.001	W4	0.308	0.000	0.10		11.5	SURCHARGED	
W1.005	W4	1.012	0.000	1.09		147.0	SURCHARGED	
W1.006	W5	1.008	0.000	0.90		193.9	SURCHARGED	
W5.000	WPP9	0.221	0.000	0.64		3.0	SURCHARGED	
W5.001	W6	0.944	0.000	0.37		5.0	FLOOD RISK	
W5.002	W6	0.160	0.000	0.97		13.6	SURCHARGED	
W5.003	W7	0.237	0.000	1.23		43.9	SURCHARGED	
W6.000	WPP8	0.118	0.000	1.03		5.1	SURCHARGED	

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Western SW</u>									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
W6.001	W9	15 Winter	100	+40%	100/15 Summer				17.190
W5.004	W8	15 Winter	100	+40%	100/15 Summer				15.945
W1.007	W6	15 Winter	100	+40%	100/15 Summer				15.646
W1.008	W7	15 Winter	100	+40%	100/15 Summer				15.309
W7.000	WPP11	60 Winter	100	+40%					14.900
W7.001	W22	15 Winter	100	+40%					14.895
W1.009	W8	15 Winter	100	+40%	100/15 Summer				14.989
W8.000	W12	60 Winter	100	+40%					15.050
W1.010	W9	15 Winter	100	+40%	100/15 Summer				14.334
W9.000	WPP12	15 Winter	100	+40%					14.317
W9.001	W14	15 Winter	100	+40%	100/15 Summer				14.391
W1.011	W10	120 Winter	100	+40%	100/15 Summer				14.185
W10.000	WPP13	60 Winter	100	+40%					14.480
W10.001	W23	30 Winter	100	+40%					14.606
W11.000	W24	15 Winter	100	+40%					18.083
W11.001	W25	15 Winter	100	+40%					17.777
W11.002	W26	15 Winter	100	+40%					16.300
W11.003	W27	15 Winter	100	+40%					15.844
W11.004	W28	15 Winter	100	+40%					15.414
W11.005	W29	15 Winter	100	+40%					14.668
W1.012	WW POND	120 Winter	100	+40%	100/15 Summer				14.174
W1.013	W32	120 Winter	100	+40%					14.168
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
W6.001	W9	1.022	0.000	1.16		12.0	FLOOD RISK		
W5.004	W8	0.251	0.000	0.64		87.1	SURCHARGED		
W1.007	W6	1.060	0.000	2.06		286.0	SURCHARGED		
W1.008	W7	0.802	0.000	3.15		315.2	SURCHARGED		
W7.000	WPP11	-0.100	0.000	0.00		0.0	OK		
W7.001	W22	-0.077	0.000	0.01		0.1	OK		
W1.009	W8	0.511	0.000	1.20		340.8	SURCHARGED		
W8.000	W12	-0.100	0.000	0.00		0.0	OK		
W1.010	W9	0.316	0.000	1.30		352.4	SURCHARGED		
W9.000	WPP12	-0.033	0.000	0.71		7.7	OK		
W9.001	W14	0.071	0.000	0.85		17.9	SURCHARGED		
W1.011	W10	0.181	0.000	1.04		206.9	SURCHARGED		
W10.000	WPP13	-0.550	0.000	0.00		0.0	OK		
W10.001	W23	-0.644	0.000	0.00		11.0	OK		
W11.000	W24	-0.717	0.000	0.01		21.7	OK		
W11.001	W25	-0.723	0.000	0.01		18.6	OK		
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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Pipe Flow	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	(l/s)		
W11.002	W26	-0.600	0.000	0.04		119.9	OK	
W11.003	W27	-0.606	0.000	0.04		169.9	OK	
W11.004	W28	-0.586	0.000	0.05		174.6	OK	
W11.005	W29	-0.557	0.000	0.06		194.2	OK	
W1.012	WW POND	0.633	0.000	0.48		0.9	FLOOD RISK	
W1.013	W32	-0.073	0.000	0.17		0.5	FLOOD RISK*	

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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 7 Number of Storage Structures 9 Number of Real Time Controls 0

Synthetic Rainfall Details

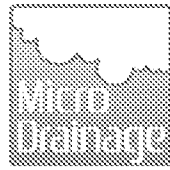
Rainfall Model FSR Ratio R 0.325
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.600 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 30
 Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
W1.000	W1	60 Winter	30	+0%					16.500
W1.001	W1	15 Winter	30	+0%					16.479
W2.000	WPP6	30 Winter	30	+0%	30/15 Summer				16.785
W2.001	W3	30 Winter	30	+0%	30/15 Summer				16.761
W1.002	W3	15 Winter	30	+0%					15.789
W1.003	W2	15 Winter	30	+0%					15.654
W3.000	WPP10	15 Winter	30	+0%					15.404
W3.001	W3	15 Summer	30	+0%	30/15 Summer				15.558
W1.004	W3	15 Winter	30	+0%					14.950
W4.000	WPP7	30 Winter	30	+0%					15.770
W4.001	W4	120 Winter	30	+0%	30/30 Winter				15.823
W1.005	W4	15 Winter	30	+0%					14.884
W1.006	W5	15 Winter	30	+0%					14.833
W5.000	WPP9	60 Winter	30	+0%	30/15 Summer				16.292
W5.001	W6	15 Winter	30	+0%	30/15 Summer				16.514
W5.002	W6	15 Winter	30	+0%					16.014
W5.003	W7	15 Winter	30	+0%					15.719
W6.000	WPP8	30 Winter	30	+0%	30/15 Summer				16.247

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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

		Surcharged		Flooded		Pipe			
	US/MH	Depth	Volume	Flow /	Overflow	Flow		Level	
PN	Name	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded	
W1.000	W1	-0.150	0.000	0.00		0.0		OK	
W1.001	W1	-0.068	0.000	0.58		21.0		OK	
W2.000	WPP6	0.085	0.000	0.36		7.2	SURCHARGED		
W2.001	W3	0.591	0.000	0.35		4.3	SURCHARGED		
W1.002	W3	-0.086	0.000	0.69		25.0		OK	
W1.003	W2	-0.104	0.000	0.56		44.6		OK	
W3.000	WPP10	-0.096	0.000	0.01		0.1		OK	
W3.001	W3	0.195	0.000	1.36		11.2	SURCHARGED		
W1.004	W3	-0.130	0.000	0.71		72.7		OK	
W4.000	WPP7	-0.005	0.000	0.32		8.9		OK	
W4.001	W4	0.066	0.000	0.07		8.1	SURCHARGED		
W1.005	W4	-0.048	0.000	0.78		105.3		OK	
W1.006	W5	-0.036	0.000	0.60		129.5		OK	
W5.000	WPP9	0.092	0.000	0.51		2.4	SURCHARGED		
W5.001	W6	0.342	0.000	0.26		3.5	SURCHARGED		
W5.002	W6	-0.057	0.000	0.67		9.4		OK	
W5.003	W7	-0.076	0.000	0.75		26.8		OK	
W6.000	WPP8	0.047	0.000	0.86		4.3	SURCHARGED		

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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)			
W11.002	W26	-0.651	0.000	0.02		65.7	OK	
W11.003	W27	-0.658	0.000	0.02		92.7	OK	
W11.004	W28	-0.641	0.000	0.03		95.6	OK	
W11.005	W29	-0.622	0.000	0.04		108.5	OK	
W1.012	WW POND	0.288	0.000	0.40		0.8	SURCHARGED	
W1.013	W32	-0.412	0.000	0.00		0.0	OK*	

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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 7 Number of Storage Structures 9 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.325
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.600 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1
 Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
W1.000	W1	60 Winter	1	+0%					16.500
W1.001	W1	15 Winter	1	+0%					16.441
W2.000	WPP6	30 Winter	1	+0%	1/15 Summer				16.707
W2.001	W3	30 Winter	1	+0%	1/15 Summer				16.686
W1.002	W3	15 Winter	1	+0%					15.733
W1.003	W2	15 Winter	1	+0%					15.603
W3.000	WPP10	60 Winter	1	+0%					15.400
W3.001	W3	15 Winter	1	+0%					15.319
W1.004	W3	15 Winter	1	+0%					14.839
W4.000	WPP7	30 Winter	1	+0%					15.676
W4.001	W4	120 Summer	1	+0%					15.684
W1.005	W4	15 Winter	1	+0%					14.663
W1.006	W5	15 Winter	1	+0%					14.575
W5.000	WPP9	30 Winter	1	+0%	1/15 Summer				16.218
W5.001	W6	15 Winter	1	+0%	1/15 Summer				16.249
W5.002	W6	15 Winter	1	+0%					15.978
W5.003	W7	15 Winter	1	+0%					15.651
W6.000	WPP8	15 Winter	1	+0%	1/15 Summer				16.206

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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
W1.000	W1	-0.150	0.000	0.00		0.0	OK	
W1.001	W1	-0.106	0.000	0.19		6.8	OK	
W2.000	WPP6	0.007	0.000	0.33		6.6	SURCHARGED	
W2.001	W3	0.516	0.000	0.33		4.0	SURCHARGED	
W1.002	W3	-0.142	0.000	0.29		10.4	OK	
W1.003	W2	-0.155	0.000	0.21		16.5	OK	
W3.000	WPP10	-0.100	0.000	0.00		0.0	OK	
W3.001	W3	-0.044	0.000	0.59		5.1	OK	
W1.004	W3	-0.241	0.000	0.27		27.2	OK	
W4.000	WPP7	-0.099	0.000	0.20		5.4	OK	
W4.001	W4	-0.073	0.000	0.05		5.6	OK	
W1.005	W4	-0.269	0.000	0.34		45.5	OK	
W1.006	W5	-0.294	0.000	0.26		55.7	OK	
W5.000	WPP9	0.018	0.000	0.42		2.0	SURCHARGED	
W5.001	W6	0.077	0.000	0.18		2.3	SURCHARGED	
W5.002	W6	-0.092	0.000	0.31		4.4	OK	
W5.003	W7	-0.143	0.000	0.28		10.1	OK	
W6.000	WPP8	0.006	0.000	0.64		3.2	SURCHARGED	

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Western SW</u>									
Water									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
W6.001	W9	15 Winter	1	+0%	1/15 Summer				16.241
W5.004	W8	15 Winter	1	+0%					15.530
W1.007	W6	15 Winter	1	+0%					14.422
W1.008	W7	15 Winter	1	+0%					14.368
W7.000	WPP11	60 Winter	1	+0%					14.900
W7.001	W22	60 Winter	1	+0%					14.872
W1.009	W8	15 Winter	1	+0%					14.198
W8.000	W12	60 Winter	1	+0%					15.050
W1.010	W9	15 Winter	1	+0%					13.806
W9.000	WPP12	15 Winter	1	+0%					14.263
W9.001	W14	15 Winter	1	+0%					14.263
W1.011	W10	15 Winter	1	+0%					13.698
W10.000	WPP13	60 Winter	1	+0%					14.480
W10.001	W23	120 Winter	1	+0%					14.501
W11.000	W24	15 Winter	1	+0%					18.036
W11.001	W25	15 Winter	1	+0%					17.733
W11.002	W26	15 Winter	1	+0%					16.185
W11.003	W27	15 Winter	1	+0%					15.733
W11.004	W28	15 Winter	1	+0%					15.291
W11.005	W29	15 Winter	1	+0%					14.527
W1.012	WW POND	120 Winter	1	+0%					13.445
W1.013	W32	120 Winter	1	+0%					13.433
Surcharged Flooded									
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
W6.001	W9	0.073	0.000	0.47		4.8	SURCHARGED		
W5.004	W8	-0.164	0.000	0.16		22.1	OK		
W1.007	W6	-0.164	0.000	0.55		76.9	OK		
W1.008	W7	-0.139	0.000	0.82		81.7	OK		
W7.000	WPP11	-0.100	0.000	0.00		0.0	OK		
W7.001	W22	-0.100	0.000	0.00		0.0	OK		
W1.009	W8	-0.280	0.000	0.30		86.1	OK		
W8.000	W12	-0.100	0.000	0.00		0.0	OK		
W1.010	W9	-0.272	0.000	0.47		93.9	OK		
W9.000	WPP12	-0.087	0.000	0.02		0.2	OK		
W9.001	W14	-0.057	0.000	0.23		4.9	OK		
W1.011	W10	-0.306	0.000	0.48		96.7	OK		
W10.000	WPP13	-0.550	0.000	0.00		0.0	OK		
W10.001	W23	-0.749	0.000	0.00		1.5	OK		
W11.000	W24	-0.764	0.000	0.00		4.9	OK		
W11.001	W25	-0.767	0.000	0.00		4.3	OK		
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Summary of Critical Results by Maximum Level (Rank 1) for Western SW

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
W11.002	W26	-0.715	0.000	0.01		23.2	OK	
W11.003	W27	-0.717	0.000	0.01		32.2	OK	
W11.004	W28	-0.709	0.000	0.01		33.8	OK	
W11.005	W29	-0.698	0.000	0.01		38.4	OK	
W1.012	WW POND	-0.096	0.000	0.01		0.0	OK	
W1.013	W32	-0.808	0.000	0.00		0.0	OK*	

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Summary of Critical Results by Maximum Level (Rank 1) for Eastern SW

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.325
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.600 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 100
 Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
E1.000	E1	15 Winter	100	+40%	100/15 Summer				19.219
E1.001	E2	15 Winter	100	+40%	100/15 Summer				19.200
E1.002	E3	15 Winter	100	+40%	100/15 Summer				18.399
E1.003	E4	15 Winter	100	+40%	100/15 Summer				18.006
E1.004	E5	15 Winter	100	+40%	100/15 Summer				17.917
E2.000	EPP1	240 Winter	100	+40%	100/60 Summer				18.225
E2.001	E6	480 Winter	100	+40%	100/15 Summer				18.392
E1.005	E6	15 Winter	100	+40%					17.679
E3.000	E8	15 Winter	100	+40%	100/15 Summer				17.166
E4.000	EPP3	30 Winter	100	+40%					18.295
E4.001	E8	60 Winter	100	+40%	100/15 Summer				18.302
E3.001	E8	15 Winter	100	+40%	100/15 Summer				17.129
E3.002	E9	15 Winter	100	+40%	100/15 Summer				16.907
E3.003	E10	15 Winter	100	+40%	100/15 Summer				16.793
E5.000	EPP2	360 Winter	100	+40%	100/15 Winter				18.323
E5.001	E12	1440 Winter	100	+40%	100/15 Summer				18.436
E3.004	E11	15 Winter	100	+40%	100/15 Summer				16.539
E3.005	E12	15 Winter	100	+40%	100/15 Summer				16.426

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Summary of Critical Results by Maximum Level (Rank 1) for Eastern SW

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
E1.000	E1	0.479	0.000	0.40		3.0	SURCHARGED	
E1.001	E2	0.720	0.000	1.54		9.8	SURCHARGED	
E1.002	E3	0.269	0.000	1.61		9.3	SURCHARGED	
E1.003	E4	0.044	0.000	1.38		16.6	SURCHARGED	
E1.004	E5	0.006	0.000	1.02		39.0	SURCHARGED	
E2.000	EPP1	0.100	0.000	0.16		4.3	SURCHARGED	
E2.001	E6	0.557	0.000	0.09		3.4	SURCHARGED	
E1.005	E6	-0.066	0.000	0.84		91.3	OK	
E3.000	E8	0.466	0.000	0.49		33.2	SURCHARGED	
E4.000	EPP3	-0.030	0.000	0.67		18.2	OK	
E4.001	E8	0.977	0.000	0.11		14.2	SURCHARGED	
E3.001	E9	0.700	0.000	1.10		91.6	SURCHARGED	
E3.002	E9	0.636	0.000	1.52		128.9	SURCHARGED	
E3.003	E10	0.585	0.000	1.00		148.1	SURCHARGED	
E5.000	EPP2	0.173	0.000	0.22		2.8	SURCHARGED	
E5.001	E12	0.327	0.000	0.03		2.4	SURCHARGED	
E3.004	E11	0.579	0.000	1.25		172.2	SURCHARGED	
E3.005	E12	0.593	0.000	1.46		191.2	SURCHARGED	

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Eastern SW</u>								
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.
E1.006	E7	15 Winter	100	+40%	100/15 Summer			
E6.000	EPP5	30 Winter	100	+40%				
E6.001	E16	15 Winter	100	+40%	100/15 Summer			
E1.007	E8	960 Winter	100	+40%	100/15 Summer			
E7.000	EPP4	60 Winter	100	+40%				
E7.001	E19	120 Winter	100	+40%				
E8.000	E25	60 Winter	100	+40%				
E8.001	E25	60 Winter	100	+40%				
E7.002	E20	15 Winter	100	+40%	100/15 Summer			
E9.000	E24	15 Summer	100	+40%				
E9.001	E28	15 Summer	100	+40%				
E9.002	E29	15 Winter	100	+40%				
E10.000	E30	60 Winter	100	+40%				
E9.003	E30	15 Winter	100	+40%				
E1.008	E19	960 Winter	100	+40%				
E1.009	EE POND	960 Winter	100	+40%	100/15 Summer	100/120 Winter		
E1.010	E25	240 Winter	100	+40%				
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Pipe Flow / Overflow Cap.	Pipe Flow (l/s)	Status	Level Exceeded
E1.006	E7	16.306	0.471	0.000	1.25	288.3	SURCHARGED	
E6.000	EPP5	17.308	-0.042	0.000	0.56	3.3	OK	
E6.001	E16	17.942	0.638	0.000	0.64	38.5	SURCHARGED	
E1.007	E8	15.941	0.483	0.000	0.29	47.5	SURCHARGED	
E7.000	EPP4	16.980	-0.065	0.000	0.47	14.1	OK	
E7.001	E19	16.982	-0.028	0.000	0.16	13.0	OK	
E8.000	E25	16.800	-0.100	0.000	0.00	0.0	OK	
E8.001	E25	16.774	-0.100	0.000	0.00	0.0	OK	
E7.002	E20	15.939	0.554	0.000	1.19	36.4	SURCHARGED	
E9.000	E24	19.447	-0.353	0.000	0.07	35.9	OK	
E9.001	E28	18.463	-0.457	0.000	0.09	98.1	OK	
E9.002	E29	18.280	-0.370	0.000	0.09	97.1	OK	
E10.000	E30	17.600	0.000	0.000	1.34	8.1	SURCHARGED*	
E9.003	E30	18.254	-0.446	0.000	0.10	112.8	OK	
E1.008	E19	15.939	-1.661	0.000	0.00	74.7	OK	
E1.009	EE POND	15.939	1.435	334.647	5.11	4.6	FLOOD	11
E1.010	E25	15.404	0.000	0.000	1.11	4.0	FLOOD RISK*	
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Summary of Critical Results by Maximum Level (Rank 1) for Eastern SW

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.325
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.600 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 30
 Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
E1.000	E1	15 Summer	30	+0%					18.683
E1.001	E2	15 Winter	30	+0%	30/15 Summer				18.665
E1.002	E3	15 Winter	30	+0%	30/15 Summer				18.206
E1.003	E4	15 Winter	30	+0%					17.926
E1.004	E5	15 Winter	30	+0%					17.818
E2.000	EPP1	120 Winter	30	+0%					18.028
E2.001	E6	120 Winter	30	+0%	30/15 Summer				18.080
E1.005	E6	15 Winter	30	+0%					17.633
E3.000	E8	15 Summer	30	+0%					16.523
E4.000	EPP3	30 Winter	30	+0%					18.202
E4.001	E8	30 Winter	30	+0%	30/15 Summer				17.804
E3.001	E8	15 Winter	30	+0%					16.329
E3.002	E9	15 Winter	30	+0%					16.238
E3.003	E10	15 Winter	30	+0%					16.057
E5.000	EPP2	360 Winter	30	+0%	30/240 Winter				18.155
E5.001	E12	960 Summer	30	+0%	30/15 Summer				18.195
E3.004	E11	15 Winter	30	+0%					15.856
E3.005	E12	15 Winter	30	+0%					15.783

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Summary of Critical Results by Maximum Level (Rank 1) for Eastern SW

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
E1.000	E1	-0.057	0.000	0.37		2.8	OK	
E1.001	E2	0.195	0.000	1.16		7.4	SURCHARGED	
E1.002	E3	0.076	0.000	1.22		7.0	SURCHARGED	
E1.003	E4	-0.036	0.000	0.91		11.4	OK	
E1.004	E5	-0.093	0.000	0.63		24.3	OK	
E2.000	EPP1	-0.097	0.000	0.12		3.3	OK	
E2.001	E6	0.245	0.000	0.08		3.4	SURCHARGED	
E1.005	E6	-0.112	0.000	0.50		54.6	OK	
E3.000	E8	-0.177	0.000	0.31		20.8	OK	
E4.000	EPP3	-0.123	0.000	0.42		11.4	OK	
E4.001	E8	0.479	0.000	0.09		10.9	SURCHARGED	
E3.001	E8	-0.100	0.000	0.74		62.2	OK	
E3.002	E9	-0.013	0.000	1.00		84.5	OK	
E3.003	E10	-0.150	0.000	0.66		97.6	OK	
E5.000	EPP2	0.005	0.000	0.17		2.2	SURCHARGED	
E5.001	E12	0.086	0.000	0.03		2.0	SURCHARGED	
E3.004	E11	-0.104	0.000	0.82		112.6	OK	
E3.005	E12	-0.104	0.000	0.94		122.6	OK	

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<table><tr><th></th><th>US/MH</th><th></th><th>Return</th><th>Climate</th><th>First (X)</th><th>First (Y)</th><th>First (Z)</th><th>Water</th></tr><tr><th>PN</th><th>Name</th><th>Storm</th><th>Period</th><th>Change</th><th>Surcharge</th><th>Flood</th><th>Overflow</th><th>Level</th></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Act.</td><td>(m)</td></tr><tr><td>E1.006</td><td>E7</td><td>15 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>15.704</td></tr><tr><td>E6.000</td><td>EPP5</td><td>15 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>17.269</td></tr><tr><td>E6.001</td><td>E16</td><td>15 Winter</td><td>30</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td>17.488</td></tr><tr><td>E1.007</td><td>E8</td><td>15 Winter</td><td>30</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td>15.464</td></tr><tr><td>E7.000</td><td>EPP4</td><td>60 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>16.909</td></tr><tr><td>E7.001</td><td>E19</td><td>60 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>16.901</td></tr><tr><td>E8.000</td><td>E25</td><td>60 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>16.800</td></tr><tr><td>E8.001</td><td>E25</td><td>60 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>16.774</td></tr><tr><td>E7.002</td><td>E20</td><td>15 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>15.424</td></tr><tr><td>E9.000</td><td>E24</td><td>15 Summer</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>19.407</td></tr><tr><td>E9.001</td><td>E28</td><td>15 Summer</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>18.401</td></tr><tr><td>E9.002</td><td>E29</td><td>15 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>18.203</td></tr><tr><td>E10.000</td><td>E30</td><td>60 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>17.600</td></tr><tr><td>E9.003</td><td>E30</td><td>15 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>18.184</td></tr><tr><td>E1.008</td><td>E19</td><td>15 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>15.249</td></tr><tr><td>E1.009</td><td>EE POND</td><td>960 Winter</td><td>30</td><td>+0%</td><td>30/30 Winter</td><td></td><td></td><td>14.889</td></tr><tr><td>E1.010</td><td>E35</td><td>960 Winter</td><td>30</td><td>+0%</td><td></td><td></td><td></td><td>14.889</td></tr></table>										US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Water	PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Level								Act.	(m)	E1.006	E7	15 Winter	30	+0%				15.704	E6.000	EPP5	15 Winter	30	+0%				17.269	E6.001	E16	15 Winter	30	+0%	30/15 Summer			17.488	E1.007	E8	15 Winter	30	+0%	30/15 Summer			15.464	E7.000	EPP4	60 Winter	30	+0%				16.909	E7.001	E19	60 Winter	30	+0%				16.901	E8.000	E25	60 Winter	30	+0%				16.800	E8.001	E25	60 Winter	30	+0%				16.774	E7.002	E20	15 Winter	30	+0%				15.424	E9.000	E24	15 Summer	30	+0%				19.407	E9.001	E28	15 Summer	30	+0%				18.401	E9.002	E29	15 Winter	30	+0%				18.203	E10.000	E30	60 Winter	30	+0%				17.600	E9.003	E30	15 Winter	30	+0%				18.184	E1.008	E19	15 Winter	30	+0%				15.249	E1.009	EE POND	960 Winter	30	+0%	30/30 Winter			14.889	E1.010	E35	960 Winter	30	+0%				14.889
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Water																																																																																																																																																																																				
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Summary of Critical Results by Maximum Level (Rank 1) for Eastern SW

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.325
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.600 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1
 Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
E1.000	E1	15 Summer	1	+0%					18.666
E1.001	E2	15 Winter	1	+0%					18.431
E1.002	E3	15 Winter	1	+0%					18.083
E1.003	E4	15 Winter	1	+0%					17.877
E1.004	E5	15 Winter	1	+0%					17.760
E2.000	EPP1	240 Winter	1	+0%					17.938
E2.001	E6	15 Winter	1	+0%	1/15 Winter				17.873
E1.005	E6	15 Winter	1	+0%					17.585
E3.000	E8	15 Summer	1	+0%					16.476
E4.000	EPP3	60 Winter	1	+0%					18.150
E4.001	E8	60 Winter	1	+0%					17.200
E3.001	E8	15 Winter	1	+0%					16.233
E3.002	E9	15 Winter	1	+0%					16.034
E3.003	E10	15 Winter	1	+0%					15.957
E5.000	EPP2	360 Winter	1	+0%					18.053
E5.001	E12	15 Winter	1	+0%	1/15 Winter				18.112
E3.004	E11	15 Winter	1	+0%					15.694
E3.005	E12	15 Winter	1	+0%					15.623

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Summary of Critical Results by Maximum Level (Rank 1) for Eastern SW

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
E1.000	E1	-0.074	0.000	0.15		1.1	OK	
E1.001	E2	-0.049	0.000	0.50		3.2	OK	
E1.002	E3	-0.047	0.000	0.55		3.2	OK	
E1.003	E4	-0.085	0.000	0.39		4.9	OK	
E1.004	E5	-0.151	0.000	0.23		9.0	OK	
E2.000	EPP1	-0.187	0.000	0.07		1.8	OK	
E2.001	E6	0.038	0.000	0.06		2.5	SURCHARGED	
E1.005	E6	-0.160	0.000	0.18		19.9	OK	
E3.000	E8	-0.224	0.000	0.12		8.4	OK	
E4.000	EPP3	-0.175	0.000	0.11		3.0	OK	
E4.001	E8	-0.125	0.000	0.02		3.0	OK	
E3.001	E8	-0.195	0.000	0.26		21.9	OK	
E3.002	E9	-0.218	0.000	0.37		31.0	OK	
E3.003	E10	-0.251	0.000	0.24		35.2	OK	
E5.000	EPP2	-0.097	0.000	0.09		1.2	OK	
E5.001	E12	0.003	0.000	0.03		1.9	SURCHARGED	
E3.004	E11	-0.266	0.000	0.31		42.5	OK	
E3.005	E12	-0.263	0.000	0.36		46.6	OK	

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Micro Drainage				Network 2017.1.2					
<u>Summary of Critical Results by Maximum Level (Rank 1) for Eastern SW</u>									

Appendix E – Outline planning decision notice



Town & Country Planning Act 1990 (as amended)
Town & country Planning (Development Management
Procedure) (England) Order 2015 - Article 5
Application for Outline Consent
DECISION NOTICE

Application Ref: WA/44/17/OUT

1 To Addressee

McLaren Clark Group
Unit 4 Park Farm
Chichester Road
Arundel
West Sussex
BN18 0AG

2 Site Address

Land East of Tye Lane
Walberton

3 Description of Development

Outline application with some matters reserved for up to 175 dwellings, new vehicular access, together with associated car parking, landscaping & community facilities to include allotments, play space & community orchard. This application is a Departure from the Development Plan & may affect the character & appearance of the Walberton Village Conservation Area.

In pursuance of their powers under this Act and related Orders and Regulations the Council **PERMIT** this development to be carried out in accordance with the application and plans and subject to compliance with the following conditions and Section 106 Agreement.

- 1 Details of the appearance, landscaping and layout, (hereinafter called 'the reserved matters') shall be submitted to and approved in writing by the Local Planning Authority before any development begins and the development shall be carried out as approved.

Reason: To enable the Local Planning Authority to control the development in detail and to comply with Section 92 of the Town and Country Planning Act 1990 (as amended).

- 2 Application for approval of the reserved matters shall be made to the Local Planning Authority not later than five years from the date of this permission.

Reason: To enable the Local Planning Authority to control the development in detail and to comply with Section 92 of the Town and Country Planning Act 1990 (as amended).

- 3 The development hereby permitted shall begin not later than two years from the date of approval of the first of the reserved matters to be approved.
- Reason: To enable the Local Planning Authority to control the development in detail and to comply with Section 92 of the town and Country Planning Act 1990 (as amended).
- 4 The planning permission relates to the following approved plans:
- 2507-A-1000- A Site Location Plan
 2507-A-1100-A Parameters Plan
 ITB11324-GA-001 Rev F Proposed Site Access to Yapton Lane
- Reason: For the avoidance of doubt and in the interests of amenity and the environment in accordance with Policy GEN7 of the Arun District Local Plan.
- 5 The details referred to in condition 1 shall include details of the materials and external finishes of the buildings, surfaces for roads/footpaths, means of enclosure and the parking of vehicles, and the provision of samples of such materials and finishes as required. Development shall be carried out in accordance with the approved details unless otherwise agreed with the Local Planning Authority.
- Reason: To enable to the Local Planning Authority to control the development in detail in the interests of amenity in accordance with Policy GEN7 of the Arun District Local Plan.

- 6 No development shall take place, including any works of demolition, until a Construction Management Plan has been submitted to, and approved in writing by, the Local Planning Authority. The approved Plan shall be adhered to throughout the construction period. The Plan shall provide for:
- An indicative programme for carrying out of the works
 - The arrangements for public consultation and liaison during the construction works
 - Measures to minimise the noise (including vibration) generated by the construction process to include hours of work, proposed method of piling for foundations, the careful selection of plant and machinery and use of noise mitigation barrier(s)
 - Details of any floodlighting, including location, height, type and direction of light sources and intensity of illumination
 - the parking of vehicles of site operatives and visitors
 - loading and unloading of plant and materials
 - storage of plant and materials used in constructing the development
 - the erection and maintenance of security hoarding including decorative displays and facilities for public viewing, where appropriate
 - the provision of effective wheel washing facilities and other works required to mitigate the impact of construction upon the public highway (including the provision of temporary Traffic Regulation Orders),
 - effective measures to control the emission of dust and dirt during construction
 - a scheme for recycling/disposing of waste resulting from demolition and construction works.
 - the traffic management to be used by construction vehicles to enter and exit the site;
 - building, engineering and other operations to be carried out only between the hours of 0800 and 1800 Monday to Friday, 0800 to 1300 Saturdays and shall not be carried out at any time on Sundays or Public Holidays;
 - noise and vibration controls.
- Development shall be carried out in accordance with the approved Construction Method Statement.

Reason: To enable to the Local Planning Authority to control the development in detail in the interests of amenity in accordance with Policy GEN7 of the Arun District Local Plan. It is considered necessary for this to be a pre-commencement condition because of the safety and amenity issues that need to be addressed.

- 7 Each home should have an Electric Vehicle charge point.

Reason: Petrol and diesel cars and vans will not be sold beyond 2040, and to mitigate against any potential adverse impact of the development on local air quality, in accordance with Policy GEN7 of the Arun District Local Plan.

- 8 The development hereby permitted shall not be carried out except in substantial accordance with the Design and Access Statement incorporating Design Guidance dated June 2017.

Reason: For the avoidance of doubt and in the interests of amenity and the environment in accordance with Policy GEN7 of the Arun District Local Plan.

9

The landscaping and layout particulars to be submitted in accordance with Condition 1 shall include:

- i. Details of all existing trees and hedgerows on the land, showing which are to be retained and which removed;
- ii. Details of the positions, height, design, materials and type of boundary treatment to be provided;
- iii. Details of any proposed alterations in existing ground levels, and of the position of any proposed excavation, within the crown spread of any retained tree.
- iv. The detailed landscape design for the development including the layout and design of the public realm within the development.
- v. Details of the play areas and public open spaces.
- vi. Details of the surfacing, lighting, and signage of all footpaths, cycle routes and a phasing plan for their provision;

No hedge or tree shall be felled, uprooted or otherwise removed before, during or after the construction period except where removal is indicated on a plan approved by the Local Planning Authority.

Reason: In the interests of amenity and of the environment of the development in accordance with Policy GEN7 of the Arun District Local Plan.

10

- a. Prior to the commencement of development or other operations likely to affect trees being undertaken on site a scheme for the protection of the retained trees produced in accordance with BS5837 (Trees in Relation to Construction 2005: Recommendations), which provides for the retention and protection of trees, shrubs and hedges growing on or adjacent to the site, shall be submitted to and approved in writing by the Local Planning Authority.

No development or other operations shall take place except in complete accordance with the approved protection scheme.

- b. No operations affecting trees shall be undertaken on site in connection with the development hereby approved (including any tree felling, tree pruning, demolition works, soil moving, temporary access construction and/or widening of any operations involving the use of motorised vehicles or construction machinery) until the protection works required by the approved protection scheme are in place.

- c. No excavations for services, storage of materials or machinery, parking of vehicles, deposit or excavation of soil or rubble, lighting of fires or disposal of liquids shall take place within any area designated as being fenced-off or otherwise protected in the approved scheme.

- d. Protective fencing shall be retained intact until completion of the development hereby approved and shall not be removed or re-positioned without the prior written approval of the Local Planning Authority.

Reason: In the interests of amenity and of the environment of the development in accordance with Policy GEN7 of the Arun District Local Plan.

- 11 No development above damp proof course (DPC) level shall take place until there has been submitted to, and approved by, the Local Planning Authority, a landscaping scheme including details of hard and soft landscaping and details of existing trees and hedgerows to be retained, together with measures for their protection during the course of the development. The approved details of the landscaping shall be carried out in the first planting and seeding season, following the occupation of the buildings or the completion of the development, whichever is the sooner, and any trees or plants which, within a period of five years from the completion of development, die, are removed or become seriously damaged or diseased, shall be replaced in the next planting season with others of similar size and species, unless the Local Planning Authority gives written consent to any variation.

Reason: In the interests of amenity and of the environment of the development in accordance with Policy GEN7 of the Arun District Local Plan.

- 12 Development shall not begin until further ecological surveys have been carried out and submitted to the Local Planning Authority. These surveys shall relate to water voles, bats, birds, invertebrates and reptiles.

Reason: In order to secure adequate habitat enhancement and mitigation of potential impacts of the development in accordance with Policy GEN7 of the Arun District Local Plan. It is considered necessary for this to be a pre-commencement condition because of the need to ensure measures are in place to protect wildlife and habitats on site prior to any disturbance.

- 13 Prior to the commencement of construction works or any preparatory works detailed Ecological Management and Mitigation Plan including a Schedule of Works shall be submitted to the LPA for approval and will be based on the recommendations within the supporting Preliminary Ecological Appraisal Report, and the Bat and Reptile Survey Report (September 2017) . All approved details shall then be implemented in full and in accordance with the agreed timings and details.

The Ecological Management and Mitigation Plan shall include but not be restricted to:

- timings for clearance of trees or scrub to avoid impacts on breeding birds
- two phased cutting of grassland along site boundaries to deter reptiles and amphibians
- details of compensatory and additional tree planting
- details of compensatory boundary habitat planting
- details and location of bird and bat boxes, log piles around the site boundaries
- creation of at least three wildlife ponds
- boundary features to measure at least 5m width for the majority of the site to allow for commuting badgers
- measures to minimise the disturbance of badgers

Should the detailed layout of the site require the removal of further trees which have the potential to support bats, a climbed tree inspection survey will be required.

Reason: This condition is necessary to ensure the protection of wildlife and supporting habitat and secure opportunities for the enhancement of the nature conservation value of the site in line with national guidance and Policy GEN23 and GEN29 of the Arun District Local Plan (2003). It is considered necessary for this to be a pre-commencement condition because of the need to ensure measures are in place to protect wildlife and habitats on site prior to any disturbance.

- 14 Prior to development, full details of the construction compound, including arrangements for turning delivery vehicles and areas set aside for construction staff parking, shall be submitted to and approved in writing by the Local Planning Authority. Development shall be carried out in accordance with the approved details.

Reason: In the interests of amenity in accordance with Arun District Local Plan Policy GEN7.

- 15 Prior to the commencement of development, details of the layout and specification of and construction programme for the roads, footpaths, cycleways and parking areas, including tracking details for refuse vehicles shall be submitted to and approved in writing by the Local Planning Authority. No dwelling shall be occupied until it is provided with access constructed in accordance with such approved details to the highway network.

Reason: In the interests of road safety and to accord with approved policy in accordance with Policy GEN7 of the Arun District Local Plan. It is considered necessary for this to be a pre-commencement condition because of the safety and amenity issues that need to be addressed..

- 16 No dwelling shall be occupied until refuse and recycling bins have been provided and space has been laid out for their storage in relation to that dwelling in accordance with details that shall have been submitted to and approved in writing by the Local Planning Authority. Thereafter these areas shall not be used for any purpose other than the storage of refuse and recycling bins.

Reason: In the interests of the amenity of occupiers of nearby properties in accordance with Arun District Local Plan Policy GEN7 and DEV26.

- 17 No dwelling shall be occupied until space for that dwelling has been laid out for the parking of cars, motorcycles and cycles in relation to that dwelling in accordance with a drawing and schedule to be submitted to and approved in writing by the Local Planning Authority. These areas shall thereafter not be used for any purpose other than the parking of cars, motorcycles and cycles.

Reason: In the interests of road safety and to accord with approved policy in accordance with Policy GEN7 of the Arun District Local Plan.

- 18 Garages provided on the site shall measure a minimum of 6 metres x 3 metres internally.

Reason: To ensure that adequate and satisfactory provision is made for the parking (and garaging) of vehicles clear of all highways in accordance with Policy GEN7 of the Arun District Local Plan.

- 19 No development hereby permitted shall be commenced until a scheme for the location and installation of fire hydrants has been submitted to and approved in writing by the Local Planning Authority. For the purposes of this condition the scheme shall be in accordance with the Guidance Note: The Provision of Fire Hydrants and an Adequate Water Supply for Fire Fighting as published by West Sussex Fire and Rescue Services (as amended from time to time). No building hereby permitted shall be occupied until the fire hydrant(s) required to serve that building have been installed in accordance with the approved scheme.

Reason: In order to provide adequate infrastructure for emergency services, in accordance with Policy GEN7 of the Arun District Local Plan. It is considered necessary for this to be a pre-commencement condition because of the need to ensure the safety of residents on the site.

- 20 At least 10% of the energy supply of the development shall be secured from decentralised and renewable or low carbon energy sources (as described in the glossary at Annex 2 of the National Planning Policy Framework, March 2012). Details and a timetable of how this is to be achieved for each phase or sub phase of development, including details of physical works on site, shall be submitted to and approved in writing by the Local Planning Authority before any development in that phase or sub phase begins. The development shall be implemented in accordance with the approved details and timetable and retained as operational thereafter, unless otherwise agreed in writing by the Local Planning Authority.

Reason: In order to secure on site renewable energy in accordance with national planning policy, in accordance with Policy GEN7 of the Arun District Local Plan.

- 21 Prior to the commencement of development, a strategy for the provision of the highest available headline speed of broadband provision to future occupants of the site shall be submitted to and approved in writing by the Local Planning Authority. The strategy shall take into account the timetable for the delivery of 'superfast broadband' (defined as having a headline access speed of 24Mb or more) in the vicinity of the site (to the extent that such information is available). The strategy shall seek to ensure that upon occupation of a dwelling, the provision of the highest available headline speed of broadband service to that dwelling from a site-wide network is in place and provided as part of the initial highway works and in the construction of frontage thresholds to dwellings that abut the highway. Unless evidence is put forward and agreed in writing by the Local Planning Authority that technological advances for the provision of a broadband service for the majority of potential customers will no longer necessitate below ground infrastructure, the development of the site shall be carried out in accordance with the approved strategy.

Reason: To safeguard the amenities of residents in accordance with Arun District Local Plan policies GEN7. It is considered necessary for this to be a pre-commencement condition because the provision of broadband needs to be incorporated into the design for the site.

- 22 If during development, contamination not previously identified, is found to be present at the site then no further development (unless otherwise agreed in writing with the Local Planning Authority) shall be carried out until the developer has submitted, and obtained written approval from the Local Planning Authority for, an amendment to the remediation strategy detailing how this unsuspected contamination shall be dealt with.

Reason: To ensure that the development complies with approved details in the interests of protection of the environment and prevention of harm to human health in accordance with Arun District Plan policy GEN7.

- 23 No development shall begin until an Air Quality Assessment and a Noise Impact Assessment have been submitted and approved in writing by the Local Planning Authority. Thereafter, the development shall be carried out in accordance with the approved schemes and any subsequent amendments shall be approved in writing by the Local Planning Authority.
- Reason: To ensure that the development complies with approved details in the interests of protection of the environment and prevention of harm to human health in accordance with Arun District Plan policy GEN7. It is considered necessary for this to be a pre-commencement condition because of the need to protect the health of the residents.
- 24 Development shall not commence until a drainage strategy detailing the proposed means of foul disposal and implementation timetable has been submitted to and approved in writing by the Local Planning Authority in consultation with the sewerage undertaker. The development shall be carried out in accordance with the approved scheme and timetable.
- Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan. It is considered necessary for this to be a pre-commencement condition because the site needs to have adequate drainage.
- 25 Development shall not commence until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority.
- The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, the recommendations of the SuDS Manual produced by CIRIA.
- Winter groundwater monitoring to establish highest annual ground water levels and Percolation testing to BRE 365, or similar approved, will be required to support the design of any Infiltration drainage.
- Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan. It is considered necessary for this to be a pre-commencement condition because the site needs to have adequate drainage.
- 26 Immediately following implementation of the approved SuDS scheme and prior to occupation of any part of the development, the developer/applicant shall provide the local planning authority with as-built drawings of the implemented scheme together with a completion report prepared by an independent engineer that confirms that the scheme was built in accordance with the approved drawing/s and is fit for purpose. There shall be no deviation to the approved scheme other than with the written consent of the Local Planning Authority. The scheme shall thereafter be maintained in perpetuity.
- Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan.

- 27 The development shall not proceed until formal consent has been approved in writing from the Lead Local Flood Authority (WSSC) or its agent (ADC) for the discharge of any flows to watercourses, or the culverting, diversion, infilling or obstruction of any watercourse on the site.

Any discharge to a watercourse must be at a rate no greater than the pre-development run off values.

Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan.

- 28 Development shall not commence until full details of the maintenance and management of the SuDS system is set out in a site-specific maintenance manual and submitted to, and approved in writing, by the Local Planning Authority. The manual is to include (a) details of financial management of the site including arrangements made in the event that the management company (or any subsequent management company) is no longer able to fulfil its duties; and (b) arrangements for the replacement of major components at the end of the manufacturers recommended design life.

Reason: To ensure the efficient maintenance and on-going operation of the SuDS system and to ensure the best practice in line with guidance set out in 'The SuDS Manual' CIRIA publication ref: C753 Chapter 32. It is considered necessary for this to be a pre-commencement condition because the site needs to have adequate drainage.

- 29 Upon completed construction of the SuDS System but prior to occupation of any part of the scheme, the owner or management company shall either provide the local planning authority with an updated copy of the management manual incorporating any changes as a result of construction/implementation or confirm in writing that no changes are required to the manual.

No further changes shall be made to the approved SuDS Maintenance & Management Plan/Regime including the management company responsible or the financial arrangements between the owners of the dwellings & the management company other than with the written consent of the Local Planning Authority.

The owner or management company shall thereafter strictly adhere to and implement the recommendations contained within the manual to ensure that the system is maintained in perpetuity.

Reason: To ensure the efficient maintenance and on-going operation of the SuDS system and to ensure the best practice in line with guidance set out in 'The SuDS Manual' CIRIA publication ref: C753 Chapter 32, in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan.

30 The development layout shall not be agreed until such time that arrangements for the future access and maintenance of any watercourse or culvert (piped watercourse) crossing or abutting the site has been submitted and approved in writing by the Local Planning Authority.

No construction is permitted, which will restrict current and future land owners from undertaking their riparian maintenance responsibilities of any watercourse on or adjacent to the site.

Reason: To ensure that the duties and responsibilities, as required under the Land Drainage Act 1991, and amended by the Flood and Water Management Act 2010, can be fulfilled without additional impediment following the development completion, in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan.

31 No development should take place within 5 metres of any ordinary watercourse and access of future maintenance must be considered during planning. If works are undertaken within, under, over or up to an Ordinary Watercourse, even if this is temporary, an Ordinary Watercourse Consent (OWC) may need to be applied for from the District or Borough Council.

Reason : To ensure that the proposed development is satisfactorily drained in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan.

32 Development should not commence until finalised detailed surface water drainage designs and calculations for the site, based on sustainable drainage principles, for the development have been submitted to and approved in writing by the Local Planning Authority. The drainage designs should demonstrate that the surface water run-off generated up to and including the 1 in 100 year, plus climate change, critical storm will not exceed the run-off from the current site following the corresponding rainfall event.

Reason : To ensure that the proposed development is satisfactorily drained in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan.

33 Development should not commence until full details of the maintenance and management of the SUDs system is set out in a site-specific maintenance manual and submitted to, and approved in writing, by the Local Planning Authority. The scheme shall subsequently be implemented in accordance with the approved designs.

Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies GEN7 and GEN9 of the Arun District Council Local Plan. It is considered necessary for this to be a pre-commencement condition because the site needs to have adequate drainage.

- 34 No development shall take place within the area indicated until the applicant has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation which has been submitted by the applicant and approved by the Planning Authority.

Reason: The site is of archaeological significance in accordance with Arun District Local Plan Policy GEN7. It is considered necessary for this to be a pre-commencement condition because archaeology can only be investigated before construction commences.

- 35 The Local Planning Authority shall be informed in writing immediately of any items of archaeological interest unearthed during the building operation and given a reasonable opportunity for an examination of the artefact and the site where it was found.

Reason: To enable items of archaeological interest to be recorded in accordance with Arun District Local Plan Policy GEN7.

36

The existing trees/bushes/hedges shall be/retained/protected in a manner to be agreed with the Local Planning Authority before the development commences for the duration of the development and shall not be damaged, destroyed, uprooted, felled, lopped or topped during that period without the previous written consent of the Local Planning Authority. Any trees removed without such consent or dying or being seriously damaged or becoming seriously diseased during that period shall be replaced in the following planting season with trees of such size and species as may be agreed with the Local Planning Authority.

No trees/or bushes/growing/and to be retained/on the site shall be damaged, uprooted, felled, topped or lopped without the prior written consent of the Local Planning Authority until 2 years after completion of the development hereby permitted. Any trees removed without such consent or being severely damaged or becoming seriously diseased or dying before the end of that period shall be replaced with trees of such size and species as may be agreed with the Local Planning Authority.

No development including site access, demolition or associated construction activities, shall take place on the site unless and until all the existing trees/bushes/hedges to be retained on the site have been protected by a fence in accordance with BS5837 (2012) and Section 9, to be approved by the Local Planning Authority for erection around each tree, group of trees and vegetation to a distance of 15m or to the Root Protection Area (RPA) as calculated in accordance with Table 2 of BS5837 (2012) to be agreed in writing by the Local Planning Authority. Within the areas so fenced off the existing ground must not be cultivated, nor must it be lowered or raised or added to by the importation and spreading of top soil unless agreed by the Local Planning authority. There must be no materials, temporary buildings, plant machinery or surplus soil shall be placed or stored thereon without prior written approval of the Local Planning Authority.

No trenching should occur within the protective fencing surrounding the Root Protection Area. If however there is no alternative but to locate the services then its encroachment into the Root Protection Area must be kept to a minimum and where the roots should be exposed using compressed air technology, such as the air spade to reduce damage caused by mechanical methods. If roots requiring severance to allow for the passage of services is necessary then an arboriculturist would be required to assess and determine whether the loss of the roots would be detrimental to the continued health and stability of the affected tree.

Reason: To ensure the retention of vegetation important to the visual amenity, /the ecological quality/and for the environment of the area in accordance with policy GEN7 of the Arun District Local Plan.

37

Any works to the trees or vegetation clearance on the site should only be undertaken outside of the bird breeding season which takes place between 1st March - 1st October. If works are required within this time an ecologist will need to check the site before any works take place (with 24 hours of any work).

Reason: In the interests of amenity in accordance with Arun District Local Plan policies GEN7 of the Arun District Local Plan. It is considered necessary for this to be a pre-commencement condition because the trees need to be protected during the construction works.

- 38 Prior to start on site a badger survey should be undertaken to ensure badgers are not using the site.
- Reason: For the avoidance of doubt and in the interests of amenity and the environment in accordance with Policy GEN7 of the Arun District Local Plan. It is considered necessary for this to be a pre-commencement condition because badgers are a protected species.
- 39 A Landscape Management Plan is submitted at Reserved Matters stage, which details the ongoing management and aftercare of the site once construction is complete. The Landscape Management Plan should include the following requirements:
- any trees removed should be replaced at a ratio of 2:1;
 - a wildflower meadow should be planted;
 - filling any gaps in tree lines or hedgerows with native species;
 - bat, bird and barn owl boxes installed on the site;
 - grassland areas managed to benefit reptiles;
 - log piles provided on-site.
- Reason: For the avoidance of doubt and in the interests of amenity and the environment in accordance with Policy GEN7 of the Arun District Local Plan.
- 40 No development shall commence until the vehicular access serving the development has been constructed in accordance with the approved planning drawing.
- Reason: In the interests of road safety in accordance with Policy GEN7 of the Arun District Local Plan. It is considered necessary for this to be a pre-commencement condition because the site needs to have safe access off the highway before construction commences.
- 41 No part of the development shall be first occupied until a revised Travel Plan has been submitted to and approved in writing by the Local Planning Authority. The Travel Plan once approved shall thereafter be implemented as specified within the approved document. The revised Travel Plan shall be completed in accordance with the latest guidance and good practice documentation as published by the Department for Transport or as advised by the Highway Authority.
- Reason: To encourage and promote sustainable transport in accordance with Policy GEN7 of the Arun District Local Plan.
- 42 No part of the development shall be first occupied until the car parking spaces have been constructed in accordance with plans and details submitted to and approved in writing by the Local Planning Authority. These spaces shall thereafter be retained at all times for their designated use.
- Reason: To provide car-parking space for the use in accordance with Policy GEN7 of the Arun District Local Plan.

43

No part of the development shall be first occupied until covered and secure cycle parking spaces have been provided in accordance with plans and details submitted to and approved by the Local Planning Authority.

Reason: To provide alternative travel options to the use of the car in accordance with current sustainable transport policies and in accordance with Policy GEN7 of the Arun District Local Plan.

INFORMATIVE: There may be a ditch / culvert on the western boundary of the site alongside Tye Lane, for which the landowner will have responsibility. If this ditch / culvert exists then the applicant is urged to discuss this with the Drainage Engineer(s) at Arun District Council.

INFORMATIVE: Section 278 Agreement of the 1980 Highways Act - Works within the Highway
The applicant is advised to enter into a legal agreement with West Sussex County Council, as Highway Authority, to cover the off-site highway works. The applicant is requested to contact The Implementation Team Leader (01243 642105) to commence this process. The applicant is advised that it is an offence to undertake any works within the highway prior to the agreement being in place.

INFORMATIVE: Traffic Regulation Order

The applicant is advised to contact the WSCC Traffic Regulation Order team (01243 642105) to obtain the necessary paperwork and commence the process associated with the proposed speed limit changes. The applicant would be responsible for meeting all costs associated with this process. The applicant should note that the outcome of this process cannot be guaranteed.

Case Officer: Michael Eastham

Date of Decision:

23 February 2018



Neil Crowther
Group Head of Planning

Arun District Council
The Arun Civic Centre
Maltravers Road
Littlehampton
West Sussex BN17 5LF

IT IS IMPORTANT THAT YOU READ THE NOTES ATTACHED TO THIS DOCUMENT

APPEALS TO THE SECRETARY OF STATE

If you are aggrieved by the decision of your local planning authority to refuse permission for the proposed development or to grant it subject to conditions, then you can appeal to the Secretary of State under section 78 of the Town and Country Planning Act 1990.

If this is a decision on a planning application relating to the same or substantially the same land and development as is already the subject of an enforcement notice, and you want to appeal against this planning application decision, then you must do so within 28 days of the date of this notice.

If an enforcement notice is served relating to the same or substantially the same land and development as in your application and you want to appeal against this planning application decision, then you must do so within 28 days of the date of service of the enforcement notice, or within 12 weeks of the date of this notice, whichever period expires earlier.

Otherwise, if you want to appeal against this decision then you must do so within 6 months of the date of this notice.

Appeals must be using a form which you can get from the Secretary of State at Temple Quay House, 2 The Square, Temple Quay, Bristol BS1 6PN (Tel: 0303 444 5000) or online at <http://acp.planninginspectorate.gov.uk>

The Secretary of State can allow a longer period for giving notice of an appeal but will not normally be prepared to use this power unless there are special circumstances which excuse the delay in giving notice of appeal.

The Secretary of State need not consider an appeal if it seems to the Secretary of State that the local planning authority could not have granted planning permission for the proposed development or could not have granted it without the conditions they imposed, having regard to the statutory requirements, to the provisions of any development order and to any directions given under a development order.

PURCHASE NOTICES

If either the local planning authority or the Secretary of State refused permission to develop land or grants it subject to conditions, the owner may claim that he can neither put the land to a reasonably beneficial use in its existing state nor render the land capable of a reasonably beneficial use by the carrying out of any development which has been or would be permitted.

In these circumstances, the owner may serve a purchase notice on the Council (that is, where the land is situated in a National Park, the National Park authority for the Park, or in any other case the district council in whose area the land is situated). This notice will require the Council to purchase the owner's interest in the land in accordance with the provisions of Chapter 1 of Part VI of the Town & Country Planning Act 1990.

Please note that this decision notice only relates to matters under the Planning Acts and does not give consent under any other legislation that may apply to the development. You will need to carry out your own checks to determine whether any other consents or permissions are required. For example, the Building Regulations are likely to apply to most developments, and a Highways Licence may be required from West Sussex County Council for any development within the public highway (including the placing of skips on highway land).