

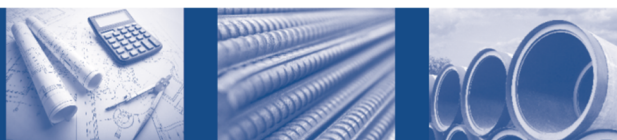
**SOUTHMERE FIELD
LANGSTONE ROAD
LANGSTONE
HAVANT
HAMPSHIRE
PO9 1RB**

DEVELOPMENT DRAINAGE STRATEGY

PERSIMMON HOMES SOUTH COAST

JULY 2021

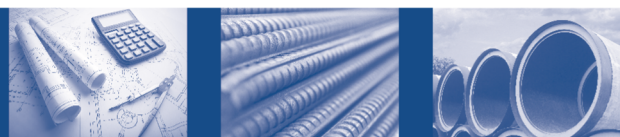
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APPENDICES

Appendix A - Foul & Surface Water Drainage Strategy

1 Introduction

1.1 Scope

Persimmon Homes (South Coast) is seeking outline planning permission for the construction of up to 65No. residential dwellings including public open space and related infrastructure at land associated with Southmere Field in the village of Langstone, Hampshire.

The application is to include new vehicular access from the Mallards with all other matters reserved.

1.2 MJA Consulting has been appointed to undertake a Development Drainage Strategy to provide a suitable strategy for the disposal of surface and foul water from the proposed development.

1.3 The objective of this report is:

- To detail a suitable strategy for the management of foul and surface water generated from the proposed development allowing for future climate change.
- To satisfy the approving planning authority that the most sustainable foul and surface water drainage solutions have been considered, in line with Environment Agency guidance, The Building Regulations (Document H 2002) and government legislation such as the Flood and Water Management Act 2010 (Defra) and The National Planning Policy Framework (NPPF & PPG).

2 Surface Water Drainage Strategy

- 2.1 The National Planning Policy Framework (NPPF) requires that developments do not exacerbate flood risks both to the development site and to offsite parties and land, which means there is a need to control surface water drainage and overland runoff to ensure there are no increases in peak rates and volumes of runoff as a result of the development.
- 2.2 Environment Agency guidance and government legislation such as the Flood and Water Management Act (Defra 2010) requires surface water drainage strategies for new developments to be in accordance with the ideals of 'sustainable development' via the provision of Sustainable Drainage Systems (SuDS).
- 2.3 The Building Regulations Document H (2015) and The SuDS Manual CIRIA 753 (2015) details the appropriate hierarchy of potential methods for disposing of surface water from a development:
1. Discharge to ground via infiltration.
 2. Discharge to a surface water body such as a watercourse.
 3. Discharge to a surface water sewer.
 4. Discharge to a combined sewer.
- 2.4 Following a review of the geology, groundwater levels and low soil permeability encountered during the site investigations, infiltration as a method of disposing of the surface water runoff generated from the proposed development is considered to be unfeasible.
- 2.5 Although the River Lavant runs along the western boundary of the site, this is a defended watercourse with a raised earth embankment. Any alteration or piped connection through the bund could comprise the capability of protecting the site and downstream properties from flooding.
Although the use of flap or non-return valves could prevent high water levels in the River Lavant from backing up into the proposed site drainage system, this would affect the capability of the on-site SuDS to operate effectively during extreme rainfall events.
- 2.6 Therefore, it is proposed that all surface water runoff from impermeable areas at the development is attenuated on-site via SuDS and discharged into the existing Southern Water public surface water sewer within Langstone Road.
- 2.7 The peak rate of runoff from the development into the existing sewer will be restricted to a maximum of 1.0/l/s for up to the 1:100y+ 40%cc rainfall event.
- 2.8 All SuDS will be sized to manage the runoff from the 1 in 100 rainfall event (1% AEP), plus an additional 40% allowance for predicted future effects of climate change (in accordance with EA recommendations up to the year 2115).

- 2.9 Due to the presence of shallow groundwater at the site, all SuDS located within 1m of the maximum groundwater level should be sealed with an impermeable membrane to prevent the ingress of groundwater.
- 2.10 The proposed surface water drainage strategy offers a sustainable, safe and robust system that will afford complete flood risk protection to the occupants of the proposed dwellings and the existing properties and land within the vicinity of the site.

2.11 SuDS Selection

A range of SuDS types and components have been assessed to identify the suitability for use at this development in terms of the requirements to manage water quality, water quantity and amenity provision within the constraints and opportunities of the site.

Table 3 - SuDS Selection Matrix

SuDS Type	Description	Suitable for this site	Comments
Green Roofs	Green roofs comprise a multi-layered system that covers the roof of a building with vegetation cover over a drainage layer. They intercept and retain rainfall, reducing the volume of runoff and attenuating peak flows.		Technical factors such as increased loadings (high cost/benefit), steep roof pitches, visual impact and maintenance burden to private homeowners may preclude the use of living roofs at this development.
Rainwater Harvesting	Re-using rainwater for non-potable purposes such as irrigation and toilet flushing.		Rainwater harvesting techniques can be utilised for non-potable (greywater) re-use subject to factors such as spatial constraints, whole-life costs and maintenance burden to individual homeowners. Can not be relied upon for attenuation.
Soakaways	Soakaways provide stormwater attenuation, stormwater treatment and groundwater recharge.		The impermeable soils, perched shallow groundwater and contamination may preclude the use of infiltration.
Filter Strip / Trenches / Swales	Filter strips are linear grassed or vegetated strips of land / channels designed to accept runoff as overland sheet flow from impermeable surfaces usually located adjacent road or parking areas and used to treat infiltrated or convey runoff.	 	Infiltration not feasible. Conveyance of runoff via swales/filter strips is feasible, however lack of open space may preclude their use at this site.
Permeable Paving	Pervious pavements provide a pavement suitable for pedestrian and vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored before infiltration to the ground, reuse, or discharge to a watercourse or other drainage system.		Infiltration not feasible. However tanked permeable paving can be used for the attenuation and treatment of runoff. Offers a level of water treatment.
Ponds / Basins	Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge.	 	Infiltration not feasible. Attenuation of runoff via open ponds is feasible, however lack of open space may preclude their use at this site.
Underground Storage	Underground Concrete or Geocellular Tanks to reduce and attenuate peak flows		The use of underground storage to attenuate runoff would be suitable at this development. Does not offer water treatment.

- 2.12 It is proposed that surface water runoff from the development access road is drained via trapped road gullies into a piped drainage system.
Driveways, parking areas and shared accesses are to be constructed with permeable paving to offer a level of treatment, under-drained into the piped storm system.
The areas of permeable paving can be unlined to offer a level of infiltration.
Runoff from roofs is to be discharged directly into the piped system.
All runoff is conveyed to the swale and attenuation basin prior to discharging off-site into the existing Southern Water surface water network.

2.13 Attenuation Requirements

The SuDS attenuation is sized to manage the 1 in 100 year rainfall event (1% chance of occurring each year) plus an extra allowance of 40% for the potential predicted increase in peak rainfall up to 2115.

- 2.14 For the proposed impermeable area of 9580m², the required volume of attenuation to store the 1:100y+40% rainfall event, discharging at a maximum rate of 1.0 l/s is 1160m³.
- 2.15 The peak water level within the attenuation basin during the 1:100y+40%cc event is 600mm below the top of bank level providing a suitable margin of freeboard.

2.16 Pollution Prevention and Water Quality

It is important that the development of this site does not adversely affect the existing greenfield hydrological conditions and impact the quantity and quality of runoff that both currently infiltrates into the ground and discharges offsite into the receiving watercourses or sewer.

As such, all surface water runoff from impermeable areas at this development will receive an appropriate level of treatment to remove hydrocarbons and other contaminants prior to discharge to the receiving waterbody.

- 2.17 In terms of water quality, the proposed surface system offers a suitable level of mitigation in accordance with the Environment Agency pollution prevention guidance GP3, CIRIA C753 and DEFRA guidance.
- 2.18 The pollution hazard of surface water runoff from residential roofs is very low and the hazard of surface water runoff from residential car parks, low traffic roads (e.g. cul-de-sacs, home zones, general access roads) is low.
- 2.19 The CIRIA SuDS Manual 2015 details an approach for establishing the hazard posed by the intended land use activities and the extent to which the proposed SuDS components can reduce and mitigate the contamination risk.

- 2.20 Referring to Table 26.2 – ‘Pollution hazard indices for different land-use classifications’ the proposed development and land use results in a low pollution hazard, therefore a ‘Simple Index’ method can be used to make a qualitative assessment of the proposed SuDS management.

Table 4 – ‘Pollution hazard indices for different land-use classifications’ CIRIA C753, 2015

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

- 2.21 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index that equals or exceeds the pollution hazard index:

Total SuDS mitigation index ≥ pollution hazard index
For the development site: TSS = 0.5, Metals = 0.4, Hydrocarbons = 0.4

Table 5 – ‘Indicative SuDS mitigation indices for discharges to surface waters’ CIRIA C753, 2015

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters			
Type of SuDS component	Mitigation indices¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

- 2.22 The proposed development surface water drainage system consists of the following SuDS components:

All runoff will pass through the attenuation basin.

Primary Treatment – Basin

TSS = 0.5

Metals = 0.5

Hydrocarbons = 0.6

All flow to receive the minimum SuDS mitigation:

TSS = 0.5 which is = 0.5 therefore ok.

Metals = 0.5 which is = 0.4 therefore ok.

Hydrocarbons = 0.6 which is > 0.4 therefore ok.

In addition, all runoff from driveways /parking areas and private access roads will also pass through tanked permeable paving.

Secondary Treatment – Permeable Paving (with Inbitex filter geotextile layer)

Using mitigation indices with a 50% reduction.

TSS = 0.35

Metals = 0.3

Hydrocarbons = 0.35

All runoff from driveways /parking areas and private access roads flow to receive the following SuDS mitigation:

TSS = 0.85 which is = 0.5 therefore ok.

Metals = 0.8 which is = 0.4 therefore ok.

Hydrocarbons = 0.95 which is > 0.4 therefore ok.

2.23 SuDS Management and Maintenance

It is envisaged that the maintenance liability of private permeable driveways will be with the individual property owner.

A SuDS plan will be provided to the residents to explain the inspection, de-silting and maintenance regime required to ensure the optimum operation of the surface water drainage system is continually maintained in perpetuity.

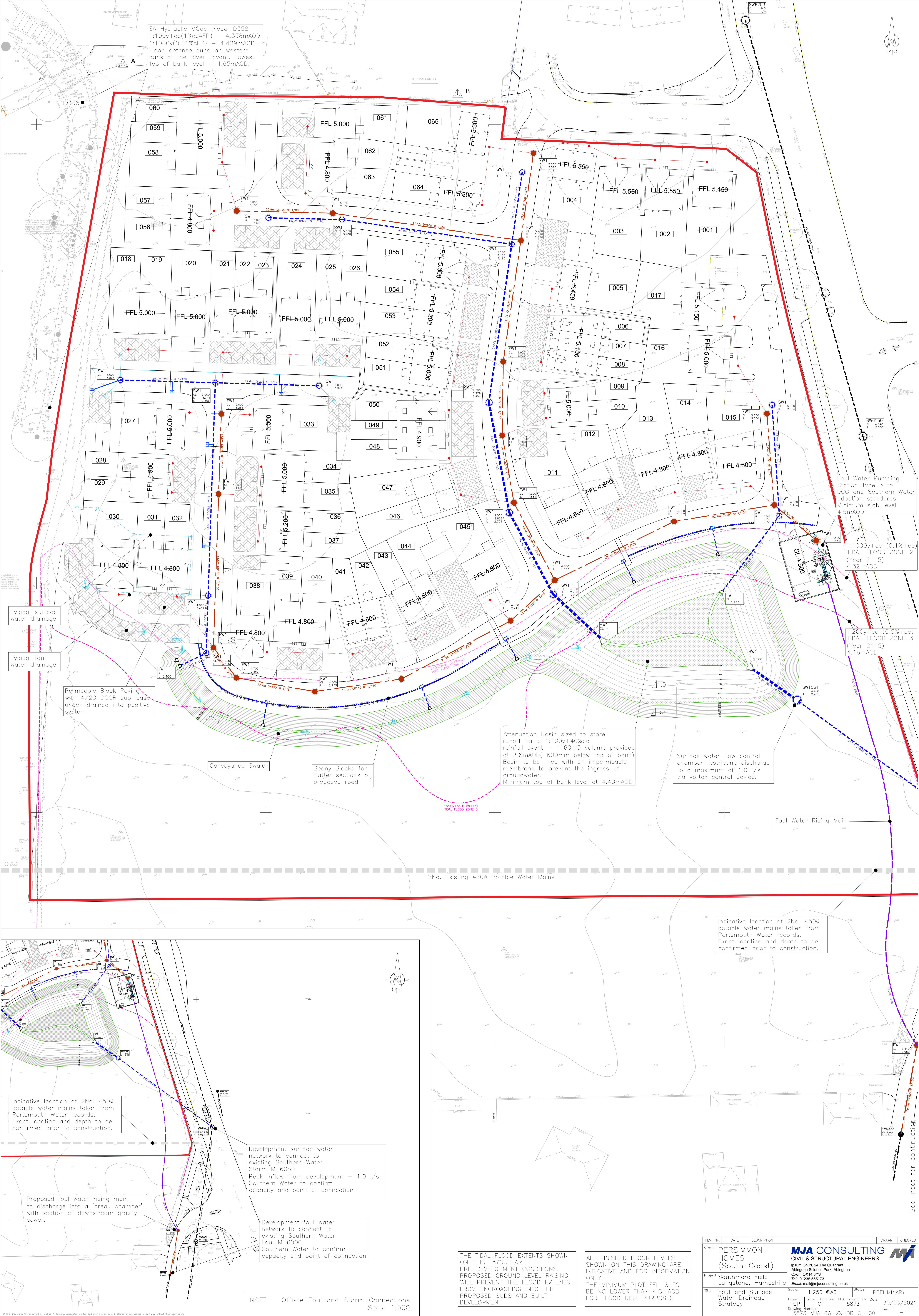
- 2.24 All areas of shared permeable paving, the swale, attenuation basin and ancillary drainage components such as headwalls and flow control chambers will be maintained by a dedicated facilities management company, funded through an annual maintenance fee levied against the residents.
- 5.25 It is proposed that all sewers and manholes within the road network and the foul pumping station be offered to Southern Water under a S104 agreement.

3 Foul water drainage strategy

- 3.1 The foul water flows from each property will drain to a new gravity foul sewer located within the development road network discharging into a new on-site pumping station.
Flows
The rising main from the pump station will connect into the existing Southern Water public foul network within Mill Lane to the south-east of the site.
- 3.2 The development foul drainage network will be offered to Thames Water for adoption under a Section 104 agreement of the Water Industry Act 1991.
- 3.3 The predicted gravity peak foul sewer discharge from the site to the pump station based on the Sewers for Adoption figure (4000 l/dwelling/day) for 65 dwellings will be 3.0l/s.
The pumped discharge rate into the existing foul network to be agreed with Southern Water.
- 3.4 Southern Water are currently being consulted to confirm capacity at the proposed point of connection to the existing foul and storm networks.
If required, reinforcement of the existing local sewer network will be carried out by Southern Water.
This will ensure that the proposed development has a 'no detriment' impact on the foul sewer system within Langstone and does not create a flood risk.

APPENDIX A

FOUL AND SURFACE WATER DRAINAGE STRATEGY



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INSET - Offsite Foul and Storm Connections
Scale 1:500

THE TIDAL FLOOD EXTENTS SHOWN ON THIS LAYOUT ARE PRE-DEVELOPMENT CONDITIONS. PROPOSED GROUND LEVEL RAISING WILL PREVENT THE FLOOD EXTENTS FROM ENCRoACHING INTO THE PROPOSED SUDS AND BUILT DEVELOPMENT

ALL FINISHED FLOOR LEVELS SHOWN ON THIS DRAWING ARE INDICATIVE AND FOR INFORMATION ONLY. THE MINIMUM PLOT FFL IS TO BE NO LOWER THAN 4.8mAOD FOR FLOOD RISK PURPOSES

REV. No.	DATE	DESCRIPTION	DRAWN	CHECKED
Client	PERSIMMON HOMES (South Coast)			
Project	Southmere Field Langstone, Hampshire			
Title	Foul and Surface Water Drainage Strategy			
Scale	1:250 @A0	Status	PRELIMINARY	
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