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FLOOD RISK ASSESSMENT

PERSIMMON HOMES SOUTH COAST

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REFERENCES

Environment Agency Flood Map Information © and database right www.environment_agency.gov.uk

Technical Guidance to the National Planning Policy Framework - NPPF (2012)
Department for Communities and Local Government ISBN: 978-1-4098-3410-6

Contains British Geological Survey materials © NERC (2014)

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 Flood Risk Assessment to determine the potential flood risks associated with the site.

1.3 Report Structure

The National Planning Policy Framework (NPPF) and the Flood Risk and Coastal Planning Practice Guidance (PPG) is the current guidance on development and flood risk in England and Wales.
The flood risk technical guidance for the National Planning Policy Framework requires a Flood Risk Assessment (FRA) to be carried out on all sites over 1ha or within flood zone 2/3 to consider all potential forms of flooding to both the development site and to offsite parties and land.

1.4 This report will take the structure of a 'Flood Risk Assessment' in accordance with the National Planning Policy Framework (NPPF), the Flood Risk and Coastal Planning Practice Guidance, Environment Agency's Flood Risk Assessment Guidance and CIRIA Report 624 'Development and Flood Risk'.

1.5 The objective of this report is:

- To confirm whether the site is affected by a current or anticipated future risk of flooding from all sources for the lifetime of the development.
- To confirm that this development will not increase the risk of flooding to any offsite properties and land.
- To undertake calculations to establish the foul and surface water runoff rates from the existing site and to assess the potential foul and surface water runoff from the proposed development.

2 The Development Site

2.1 The 3.76ha application site is located at land west of Langstone Road (A3023) in the village of Langstone in Havant, Hampshire.
The greenfield parcel of land known as Southmere Field consists of an undeveloped open grass field.

2.2 This planning application seeks the construction of up to 65No. residential dwellings with vehicular access from The Mallards at the northern boundary of the site.
The site is centred on National Grid Reference SU 71542 05148.

2.3 Topography

The existing site generally falls in a south / south-westerly direction with levels ranging from 5.4mAOD to 3.5mAOD.
The north western corner of the site falls in a north westerly direction to a low point of 4.1mAOD.

2.4 Geology

Information published by the British Geological Survey (BGS), indicates that the site is anticipated to be underlain by a bedrock of the Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation, and the Portsdown Chalk Formation overlain with River Terrace Deposits (RTD) of Sands, Silts and Clay.

2.5 An intrusive geological ground investigation was carried out at the site by Enzygo Geoenvironmental Ltd in April 2018, with the results presented in report Ref: CRM.1033.033.GE.R.001.A.

2.6 The findings of the intrusive investigation generally concur with the published geological information for the site and detail the encountered geology as comprising topsoil to 0.4mBGL over soft becoming firm and stiff with depth gravelly clay and silt consistent with River Terrace Deposits to 4.2-6.0mBGL, grading into structureless Chalk to a maximum investigation depth of 16mBGL.

2.7 Groundwater, Hydrogeology and Hydrology

Groundwater was encountered during the site investigation as seepages at depths of between 2.3m to 3.2mBGL rising to 1.6mBGL during return monitoring visits.

2.8 Due to the proximity of the site to the River Lavant and the tidal Langstone Harbour, it is possible that groundwater beneath the site is in hydraulic connectivity through the underlying River Terrace Deposits and chalk aquifer.

2.9 The National Soil Resources Institute (NSRI) Soilscape Map describes the geology for the area has having Loamy soils with naturally high groundwater.

2.10 The consideration of encountering groundwater during the construction of the development and the vulnerability of the site and proposed SuDS to high groundwater levels are to be considered during detailed design.
The base of any infiltrating SuDS structure is to be at least 1m above the maximum groundwater level or be lined to prevent interaction with any underlying groundwater.

2.11 The chalk aquifer beneath the site is classified as a 'Principal' aquifer with a medium to high groundwater vulnerability.
These are layers of rock that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage.
They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as a major aquifer.

2.12 The superficial RTD's are classified as a 'Secondary A' aquifer with a medium to high groundwater vulnerability.
These are classified as moderately permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

2.13 The Environment Agency has classified the site as not being located within a Groundwater Source Protection Zone for groundwater abstractions.

2.14 It would be expected that the hydraulic flow of groundwater beneath the site and overland surface water runoff be consistent with the local surface topography, with flows being generally in a south / south-westerly direction.

2.15 The site is within the immediate hydrological catchment of the River Lavant which runs along the western boundary of the site.
This main river flows in a southerly direction to its confluence with the North Lake arm of the Langstone Channel within Langstone Harbour.

2.16 Existing site drainage characteristics

There are no formal surface water drainage features serving the existing site.
The greenfield site comprises a grass-covered field and as such rainfall that lands on this site firstly infiltrates directly at source into the unsaturated layer of topsoils.
When the capacity of the upper soils is exceeded and can no longer accept further rainfall, temporary areas of ponding and overland surface water runoff may occur.

2.17 The River Lavant runs along the western boundary of the site.
There is a section of ordinary watercourse at the southwestern boundary of the site. This ditch flows westwards towards the River Lavant.

2.18 Due to the topography of the site which falls towards the south / south-west, the natural greenfield drainage pathway (groundwater and overland surface water) is towards and into the River Lavant that runs along the western boundary of the site.
As the River Lavant is bunded along the boundary of the site, the majority of greenfield runoff is via infiltration.

2.19 Soil Permeability and Infiltration SuDS

Although the RTD's and underlying chalk geology would be expected to be inherently permeable, the level of clay content encountered within the upper soils during the on-site investigations preclude the use of full infiltration features.

2.20 A preliminary soakaway testing was undertaken at the site however there was insufficient soakage to allow a preliminary soil infiltration rate to be estimated.

2.21 The presence of relatively shallow groundwater encountered at the site would also preclude the use of soakaways without significant ground level raising across the site to achieve the required 1m dissolution layer.

2.23 Given the presence of clayey soils and a shallow groundwater table, it is considered that full infiltration SuDS are not feasible.

2.24 There is the potential for shallow SuDS such as permeable block paving to be kept unlined to offer a slight level of infiltration prior to connecting to a positive drainage system.

2.25 If infiltration is proposed, full site wide testing to BRE365 methodology at depths commensurate with location of SuDS features will be required.

Figure 1: Site Location

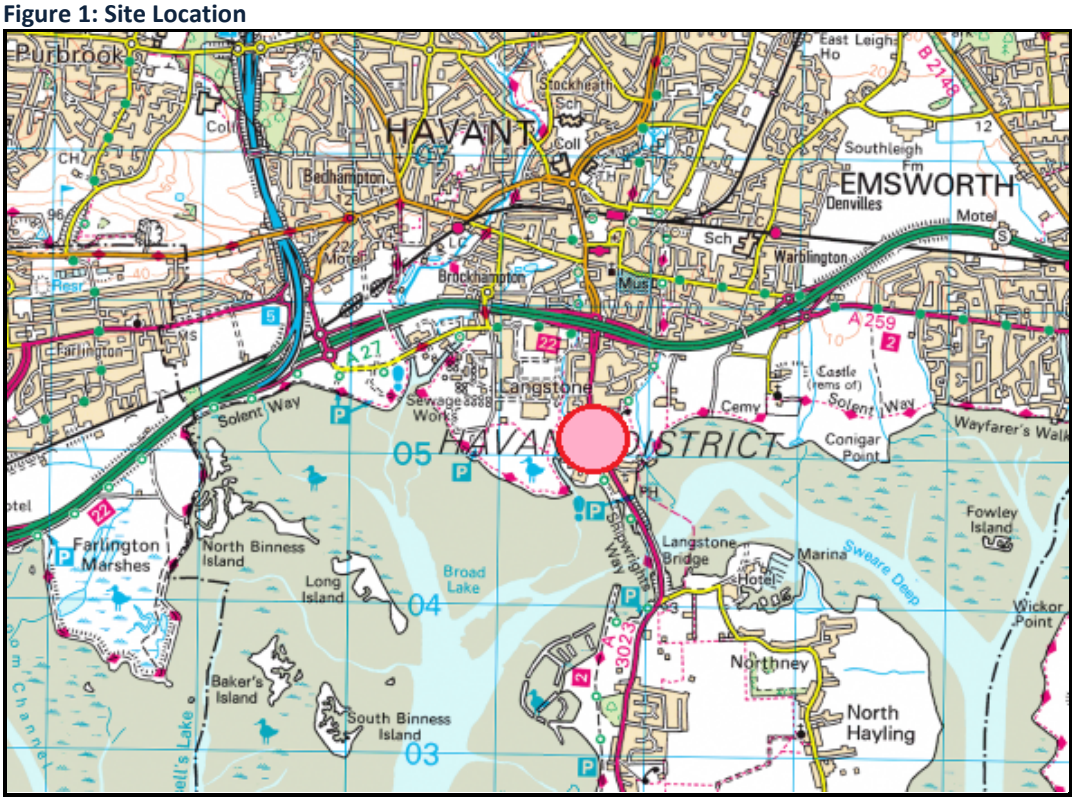


Image courtesy of: @2021 Microsoft Corporation Image courtesy of Ordnance Survey

Figure 2: Development site boundary

Image courtesy of: Map data @2021 Microsoft Corporation

3 Flood Risk Assessment

3.1 A Flood Risk Assessment requires that an evaluation of all potential forms of flood risk to the site are considered.
In accordance with the Environment Agency's Flood Risk Assessment Guidance, NPPF, PPG and CIRIA Report 624, sources of flooding to be assessed include tidal, fluvial (rivers, streams and watercourses), pluvial (overland rainfall runoff), groundwater, artificial sources (canals and reservoirs) and existing/proposed sewerage and water mains infrastructure.

3.2 Historic Flood Events

The primary sources of data for flood risk and recorded incidents of flooding for this site are as follows:

- Partnership for Urban South Hampshire (PUSH) Strategic Flood Risk Assessment (SFRA) (Atkins, 2007).
- Partnership for Urban South Hampshire (PUSH) Strategic Flood Risk Assessment (SFRA) Update (2016).
- Strategic Flood Risk Assessment (Local Plan Sites) (Havant Brough Council, 2018).
- Solent & South Downs Area Report 10 March tidal flooding event (EA, 2008).
- Environment Agency Southern Region Havant Flood Mapping Study Final Report Volume 1.
- Langstone Coastal Defence Study January 2020 Design Update (Havant Borough Council).

3.3 Additional information has been obtained from the Environment Agency (historic flood extents map), the East Solent Coastal Partnership, British Society Chronology of Extreme Hydrological Events, and local news and media archives.

3.4 Within the PRFS/SFRA studies, consultation was carried out with all relevant authorities and organisations including the Environment Agency, Southern Water, Hampshire County Council, Havant Borough Council, and local community stakeholders to identify known or perceived problem areas with respect to flooding.

3.5 The primary source of flood risk to the area of Langstone is the sea, with tidal flooding from Langstone Harbour.
The secondary source of flood risk to Havant Borough is from fluvial sources including the Lavant Stream and associated tributaries.
Historically, Havant has also been susceptible to flooding from other sources including groundwater, surface water and flooding caused by infrastructure failure.

3.6 Within the context of the site, the information presented within the SFRA and all other applicable resources has concluded that there is no historic flooding to the site from the following sources:

- Tidal
- Fluvial (Rivers and Watercourses)
- Groundwater
- Existing foul and storm sewers or potable water main infrastructure
- Artificial infrastructure including reservoirs and sewerage works

3.7 Tidal & Fluvial

The nearest source of tidal flood risk to the site is from Langstone Harbour located 250m south of the site.

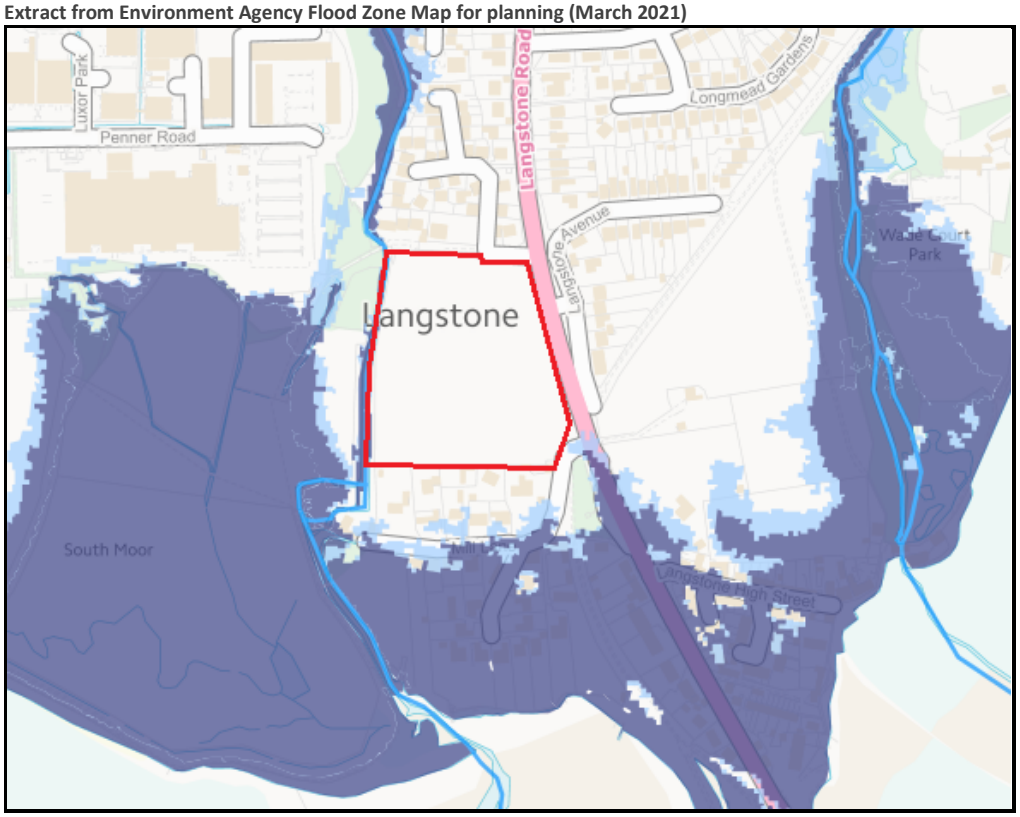
The nearest risk of fluvial flooding is from the River Lavant that runs along the western boundary of the site.

The Environment Agency's Historic Flood Map database confirms that there have been no recorded events of tidal or fluvial flooding to the site.

3.8 Environment Agency Flood Map for Planning (Rivers and Sea)

The Environment Agency (EA) is the principal flood risk management authority in England. The Flood Map for Planning (Rivers and Sea) updated quarterly by the EA, shows the natural floodplain occurring from rivers or the sea ignoring the presence of flood defences and assesses the probability of flooding to land.

Figure 3: Fluvial Flood Zone Map
Extract from Environment Agency Flood Zone Map for planning (March 2021)



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Dark Blue : (Flood Zone 3)
Shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded: from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year, or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light Blue : (Flood Zone 2)
Shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1% (1 in 1000) chance of occurring each year. These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.

Clear : (Flood Zone 1)
Shows the area where flooding from rivers and the sea is very unlikely. There is less than a 0.1% (1 in 1000) chance of flooding occurring each year.

3.9 The latest Environment Agency Flood Zone Map (March 2021) indicates that the whole of the site is located within Flood Zone 1.
Flood Zone 1 is land assessed as having the lowest risk of tidal or fluvial flooding with less than a 0.1% (1 in 1000) chance of occurring each year.

3.10 Climate Change

It should be noted that the current outlines indicated on the flood map (figure 3) do not include an allowance for a future increase in sea levels or peak river flows due to the effects of climate change.
The National Planning Policy Framework (NPPF) requires that the effects of climate change should be taken into account when assessing the flood risk to a site for the lifetime of the development.

3.11 The Environment Agency has provided current and future tidal flood levels for the coastal area to the south of the site. The table below highlights the sea levels (still water design estimates) for the 0.5% (1:200) Flood Zone 3 and the 0.1% (1:1000) Flood Zone 2 annual exceedance probabilities relevant to the site.

Table 1 : Tidal flood levels taken from the East Solent Coastal Model (JBA, 2018)

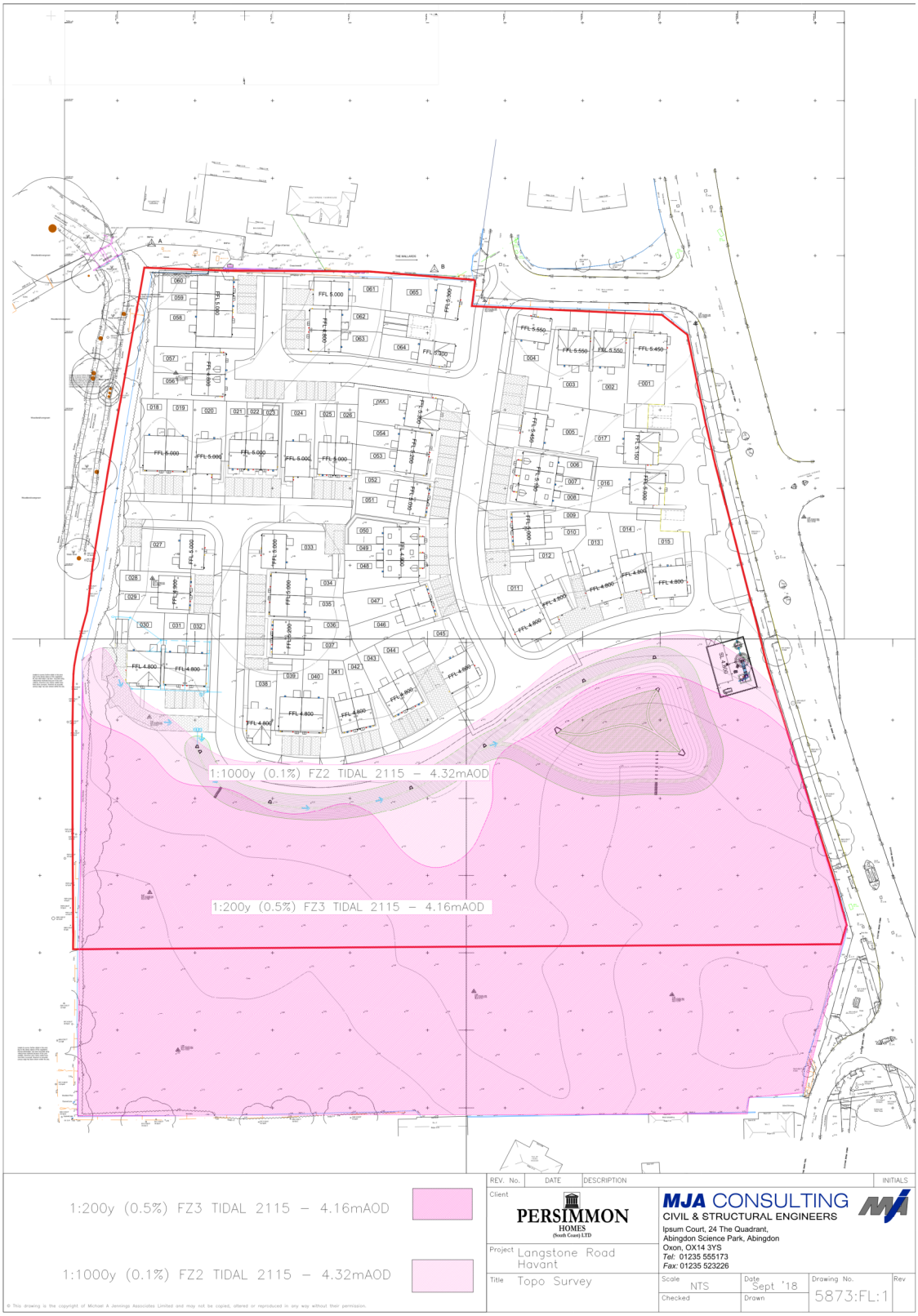
Year	Tide Level (mAOD)	
	FLOOD ZONE 3 0.5% annual exceedance probability/1 in 200 Year	FLOOD ZONE 2 0.1% annual exceedance probability/1 in 1000 Year
2015	**3.44**	**3.60**
2070	**3.75**	**3.92**
2115	**4.16**	**4.32**

3.12 Refer to Figure 4 for an overlay of these flood levels onto the detailed topographical survey and proposed development layout for the site.
This demonstrates that all proposed dwellings will be located outside of the 0.1%+cc (1:1000+cc AEP) tidal floodplain for the lifetime of the development.

3.13 The FFL of all dwellings at the development will be set at a minimum of 4.80mAOD, providing 640mm of freeboard above the 1:200+cc tidal flood level and 480mm freeboard above the 1:1000+cc tidal flood level.

3.14 Proposed Development access roads and SuDS to the south of the site will be raised to a minimum of 4.5mAOD to be above the 0.1%+cc (1:1000+cc AEP) tidal floodplain for the lifetime of the development.

Figure 4: EA Tidal Flood Zones 2 & 3 including for climate change (2115)



3.15 The NPPF has been updated to revise the climate change allowances when determining peak river flows.
This site is located within the 'South East River Basin District' and as such it is assessed that up to a 105% (Upper end) increase in peak river flows up to the year 2115 should be anticipated.

3.16 The Environment Agency have provided up to date hydraulically modelled flood level data for the River Lavant at this location.

Figure 5: EA Hydraulic Flood levels – River Lavant

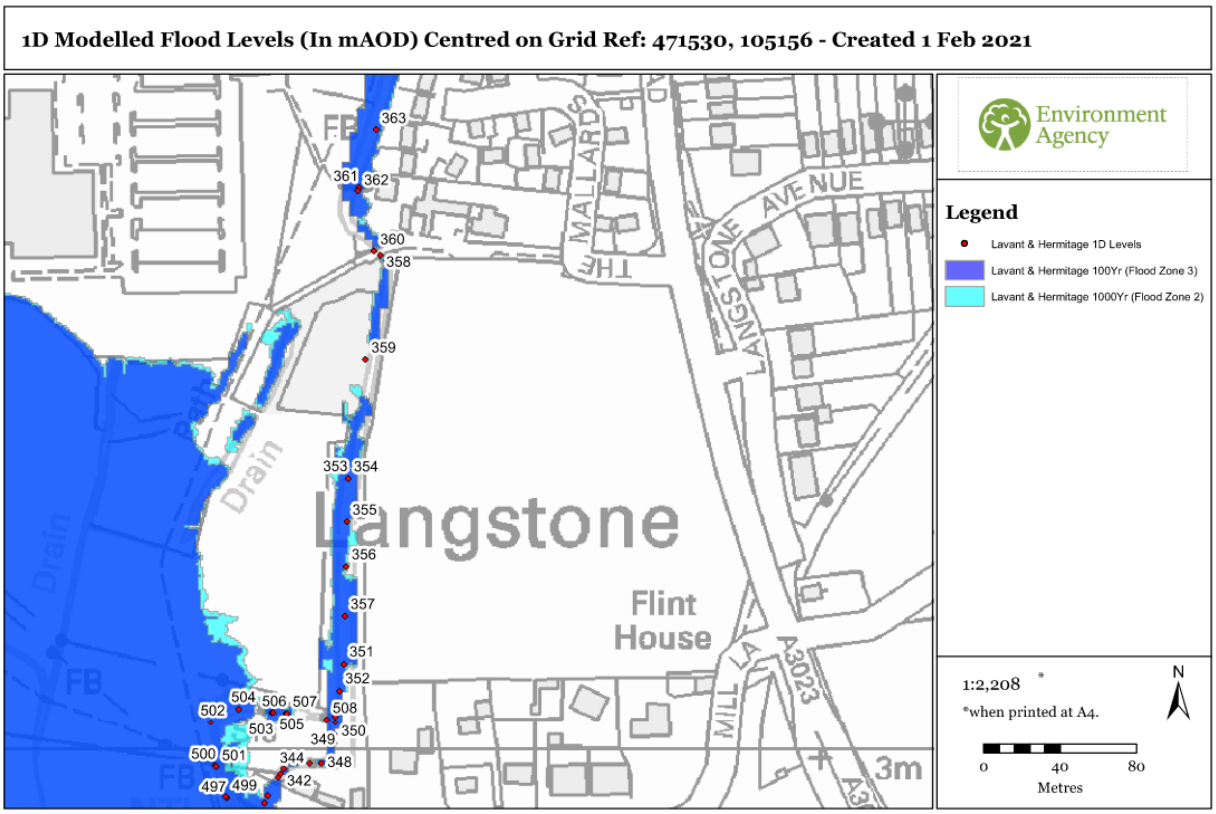


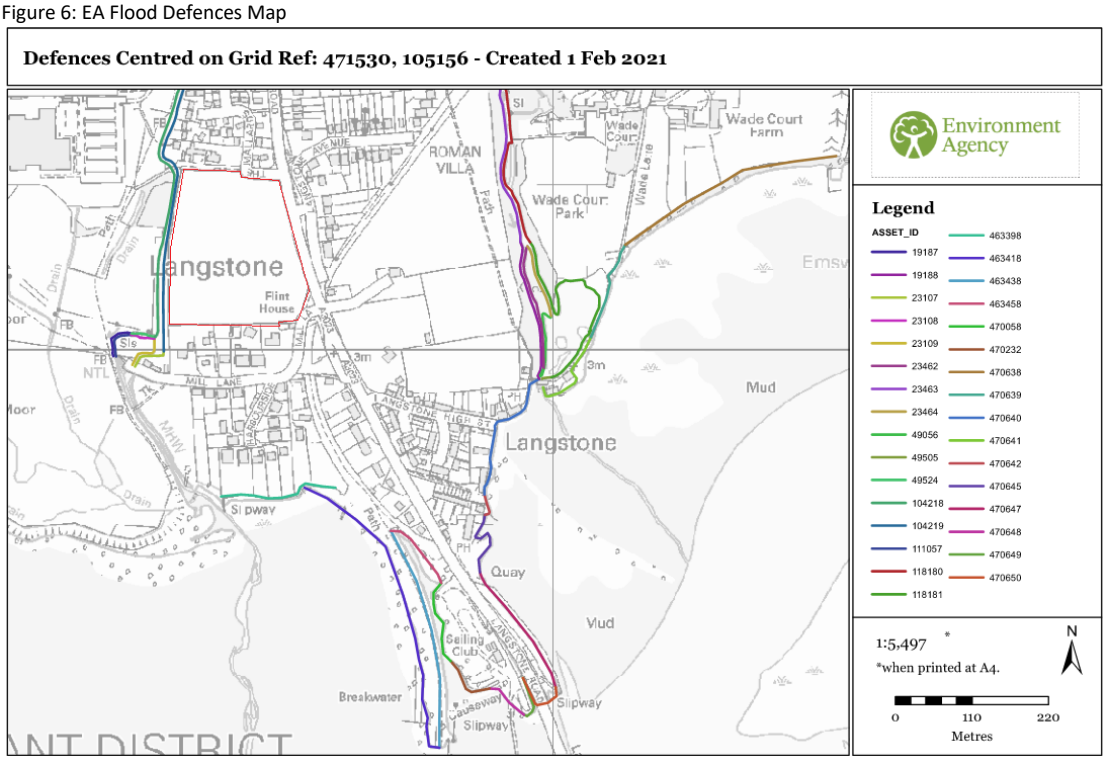
Table 2: EA Hydrualic Flood level – River Lavant

ID	EASTING	NORTHING	100YR LEVEL	100YR LEVEL NO DAM	100YR CC LEVEL	100YR CC LEVEL NO DAM	1000YR LEVEL	1000YR LEVEL NO DAM
340	471403.6	104984.97	2.841	1.859	3.906	2.098	2.942	2.439
341	471419.8	104991.93	4.008	1.859	4.051	2.098	4.111	2.439
342	471404.9	104986.38	3.926	1.859	3.998	2.098	4.031	2.439
343	471413.2	104992.54	3.986	1.859	4.029	2.098	4.088	2.439
344	471406.5	104989.14	3.959	1.859	4.005	2.098	4.062	2.439
345	471432.5	105007.47	4.077	1.859	4.125	2.098	4.19	2.439
346	471432.4	105003.05	4.071	1.859	4.118	2.098	4.182	2.439
347	471430.2	104994.43	4.059	1.859	4.105	2.098	4.168	2.439
348	471426.1	104992.11	4.042	1.859	4.087	2.098	4.149	2.439
349	471433.1	105013.82	4.079	1.859	4.127	2.098	4.192	2.439
350	471433.3	105016.84	4.079	3.939	4.127	4.473	4.192	5.235
351	471437.6	105044.76	4.118	3.939	4.171	4.477	4.244	5.289
352	471435.4	105030.63	4.1	3.939	4.151	4.473	4.219	5.235
353	471439.8	105141.66	4.189	2.735	4.245	3.026	4.322	3.506
354	471439.8	105141.63	4.189	3.939	4.245	4.474	4.322	5.291
355	471439.2	105119.02	4.167	3.939	4.223	4.474	4.299	5.291
356	471438.8	105095.58	4.148	3.939	4.204	4.475	4.279	5.29
357	471438.1	105069.54	4.131	3.939	4.186	4.476	4.26	5.29
358	471456.8	105257.88	4.309	2.734	4.358	3.026	4.429	3.505

3.17 The closest node within the River Lavant model to the site ID358, indicates that the **100 year +cc (1%+CC AEP) Flood Zone 3** level reaches **4.358mAOD** within the channel.
The **1000 year (0.1%AEP) Flood Zone 2** level peaks at **4.429AOD** within the channel.

3.18 The eastern embankment of the River Lavant is a formal fluvial flood defence in the form of a raised earth embankment. This embankment runs the entire length of the western site boundary offering flood protection.

Figure 6: EA Flood Defences Map



3.19 To ascertain the effects of these level upon the development, a level survey was undertaken along the north western boundary of the site in the region of EA ID358 to establish the top of the flood defence embankment level for the River Lavant.

3.20 The lowest top of embankment level was determined as 4.650mAOD. This ensures that the 1:100 year +cc (1%+CC AEP) Flood Zone 3 level and the 1:1000 year (0.1%AEP) Flood Zone 2 level within the River Lavant would not spill over the top of the bank level and would not encroach into the site.

3.21 This also ensures that tidal flooding from the south and subsequent backwater effect within the River Lavant would not top the flood defence embankment.

3.22 Therefore, the development will be located within Fluvial Flood Zone 1 for the lifetime of the development and will not result in the loss of floodplain storage or increase the risk of flooding offsite.

3.23 In accordance with EA recommendations, the FFL of dwellings in the vicinity of flood zone 2/3 should be situated a minimum of 300mm above the 1%AEP+CC flood level.
Therefore, all finished floor levels of all habitable dwellings at this development will be set no lower than 4.80mAOD providing 442mm of freeboard above the 1:100y+cc fluvial flood level and 371mm of freeboard above the 1:1000y fluvial flood level.

3.24 Havant Borough Council as the Lead Local Flood Authority (LLFA) are responsible for assessing the flood risk from all other ordinary watercourses (non-main rivers) in the area, with this information detailed in the PFRA/SFRA reports. These studies have concluded that the site is not at risk of flooding from all ordinary watercourses within the locality of the development.

3.25 It is demonstrated that safe and dry access and egress at the site is achievable to a publicly accessible location outside the 1:100 year (plus climate change) fluvial flood event extent, in accordance with DEFRA Report FD2320/TR2 - 'Flood Risk Assessment Guidance for New Developments'

3.26 Planning Policy and Sequential Test

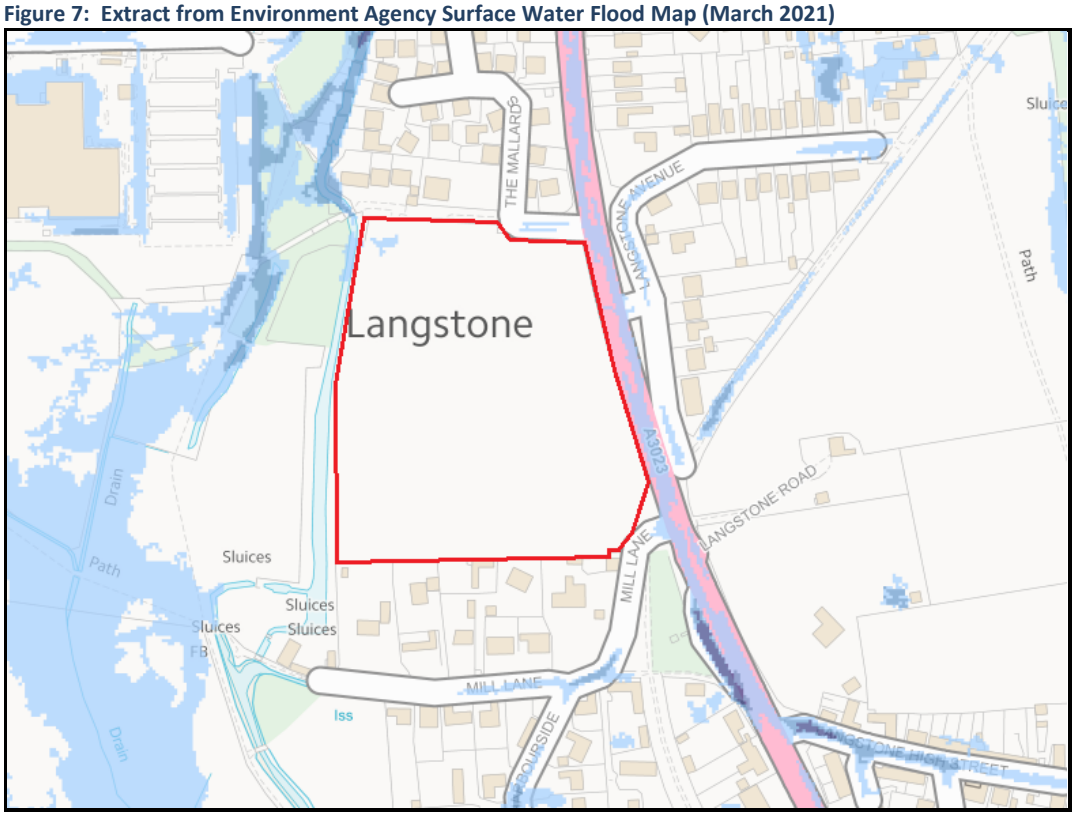
Although the southern part of the site is affected by future (climate change) tidal flooding, the flood risk to the development can be avoided by taking the sequential approach and ensuring that the built development and site access is located within land classed at Flood Zone 1.
Only minor land take and ground level raising maybe required for SuDS infrastructure and access roads within the tidal future flood zone 2 and 3 to the south of the site.

3.27 Surface Water (Pluvial)

The Environment Agency's 'uFMfSW' (updated Flood Map for Surface Water) is a theoretical indication of where there is a potential for surface water flooding to occur on land.
This nationally produced model is a broadscale assessment of potential overland surface water flow paths based upon local rainfall data and topography.

3.28 An extract of this map (Figure 7) indicates that the site has a 'Very Low' (<1:1000 or 0.1%) annual risk of flooding from surface water runoff.
There is a minor localised area of 'Low Risk' (Between 1:1000 (0.1%) and 1:100 (1%) annual risk of flooding located towards the north western part of the site.

Figure 7: Extract from Environment Agency Surface Water Flood Map (March 2021)



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High (Greater than 1:30(3.3%) chance of flooding

Medium (Between 1:100(1%) and 1:30(3.3%) chance of flooding

Low (Between 1:1000 (0.1%) and 1:100 (1%) chance of flooding

3.29 This area will be mitigated by the development of the site via the implementation of a positive surface water drainage system incorporating the use of SuDS to collect, attenuate and dispose of surface water runoff generated from the site.
This would provide a level of betterment over current conditions by preventing areas of ponding and prevent the rapid and uncontrolled runoff of surface water across the site during intense rainfall events.

3.30 It is considered that the above measures and the development of the site will not result in any significant loss of floodplain storage and will not increase the risk of surface water flooding to existing parties within the vicinity of the site or downstream.

3.31 Groundwater

With reference to the PRFA/SRFA studies, there have been no recorded events of groundwater emergence at the site or surrounding area.

3.32 It is noted that the historic borehole data held by the BGS indicates that groundwater was encountered at a <1mBGL within the vicinity of the site.
Groundwater was encountered during the site investigation as seepages at depths of between 2.3m to 3.2mBGL rising to 1.6mBGL during return monitoring visits.

3.33 Due to the proximity of the site to the River Lavant and the tidal Langstone Harbour, it is possible that groundwater beneath the site is in hydraulic connectivity through the underlying River Terrace Deposits.
Therefore, it should be anticipated that groundwater could be encountered at relatively shallow depths at the development site.

3.34 The National Soil Resources Institute (NSRI) Soilscape Map describes the geology for the area has having Loamy soils with naturally high groundwater.

3.35 The consideration of encountering groundwater during the construction of the development and the vulnerability of the site and proposed SuDS to high groundwater levels is to be considered during detailed design.
The base of any infiltrating SuDS structure is to be at least 1m above the maximum groundwater level or be lined to prevent interaction with any underlying groundwater.

3.36 To mitigate the onsite risk from groundwater, no basement levels are proposed, and finished floor levels of all properties will be a set a minimum of 150mm above surrounding ground level.

3.37 To mitigate the effect of groundwater within excavations during the site construction phase, a dewatering system will remove unwanted groundwater to ensure construction is carried out in dry and stable conditions.
Prior to any dewatering, the ground worker will prepare and submit a method statement for the local authority and Environment Agency sign off before the operation of any pumping.

3.38 The proposed development is unlikely to have any significant impact upon natural groundwater flows beneath the site either during or after completion of the proposed works and therefore is unlikely to create an increased risk of flooding on or off the site.
If groundwater levels were to rise above the base of proposed foundations during winter months, groundwater would be able to flow laterally around these obstructions without any major increase in local groundwater levels and consequently will have a negligible effect on the site-wide and offsite groundwater flow regime and overall flood risk from groundwater.

3.39 Existing Sewers and Water Mains

There are no recorded incidents of flooding to the site from existing sewers or potable water mains within or in the vicinity of the site.

3.40 With reference to Southern Water records, there are no public sewers within the site boundary.
A DN525-900 surface water sewer and a DN225 foul sewer is located beyond the eastern boundary of the site running north to south within Langstone Road.
A DN300 surface water sewer is located within The Mallards to the north of the site.
This flows northwards connecting to the large trunk sewer within Langstone Road.

3.41 Due to the topography of Langstone Road, any surcharging of existing sewers/highway drainage or flooding due to burst water mains will be contained within the road corridor and conveyed southwards away from the development.
The level of Langstone Road is approximately 300m lower than the development site, affording additional flood risk protection in the event of a flood within the existing carriageway.

3.42 The level of The Mallards to the north of the site is approximately 300mm lower than the proposed entrance to the site. In the event of surcharging from the existing drainage system, floodwater would be contained within the carriageway until capacity returns within the existing network or flow towards Langstone Road.

3.43 Portsmouth Water records indicate 2No. 450mm potable water mains crossing east to west through the southern section of the development site.
Due to the topography of the site, any flooding as a result of a burst in these existing mains would flow southwards, away from the development.

3.44 A 100mm potable water main is located within The Mallards to the north of the site.
The level of The Mallards to the north of the site is approximately 300mm lower than the proposed entrance to the site. Therefore, any flooding as a result of a burst in this existing main would be contained within the carriageway until capacity returns within the existing network or flow towards Langstone Road.

3.45 Under the development proposals all existing public sewers and potable water infrastructure located within and in the vicinity of the development will be suitably protected during all construction activities and afforded the required easements specified by Southern Water and Portsmouth Water authorities.
This will prevent the risk of flooding and allow unrestricted access for any future maintenance and repairs.

3.46 Artificial Sources

With reference to the PFRA / SFRA, there have been no recorded incidents of flooding to the site or surrounding areas from artificial sources.
The Environment Agency has assessed that the site is not at risk from reservoir flooding.

3.47 Budds Farm Wastewater Treatment Works is located approximately 600m north-west of the site.
In the event of surcharging at these works, CSO's discharge excess flows into Langstone Harbour.

3.48 There are no other sources of artificial flooding within 500m of the site.

3.49 Proposed Site Drainage

A Flood Risk Assessment requires that an evaluation of all proposed artificial drainage systems and infrastructure within, or in close proximity to the site is carried out.
In the context of this development, the following systems are to be installed which need to be assessed in terms of potential flooding through the capacity of the systems being exceeded or the structural, hydraulic, mechanical or operational failure of the system occurring during the lifetime of the development:

- Piped foul and surface water sewers, manholes and potable water mains.
- SuDS for the conveyance and attenuation of surface water.
- Foul water pumping station.

3.50 All adoptable foul and surface water drains, sewers and manholes will be designed and constructed to the Sewers for Adoption 7th Edition, including specific Southern Water addendums and the Design and Construction Guidance (CDG) (March 2020) with all private drainage constructed in accordance with *The Building Regulations Part H, BS EN 752 or BS EN 12056-2* as appropriate, ensuring adequate design capacity and robust structural integrity for the lifetime of the development.

3.51 Surface water sewers will be designed to the Sewers for Adoption / CDG requirement of 'no surcharge of pipes up to the 1 year event' and 'no flooding up to the 30 year event'.

3.52 All SuDS within the drainage system will be sized to manage the runoff from the exceptionally rare 1 in 100 storm event (1% AEP), plus an additional 40% allowance for predicted future climate change effects (in accordance with EA recommendations up to the year 2115).

3.53 If a foul water pumping station and rising main is required, this will be designed and installed in accordance with SFA 7th and DCG including Southern Water Addendums and *The Building Regulations Documentation H1 Foul Drainage*, *BS EN 12050-1:2001 wastewater pumping stations for buildings* and sites and *BS EN 752-6:1998 drain and sewer pumping stations outside buildings and sewage pump stations.*
Any pumping station compound will be located within Flood Zone 1.

3.54 Any pumping station will be fully automatic with provision for remote monitoring by telemetry.
To ensure that sewage flooding does not occur at or upstream of the pumping station during plant or power failure, additional 24hr storage will be provided within the pumping station wet well.
This storage will be above the high-level alarm and below the lowest connected lateral drain or private sewer invert.

3.55 Southern Water will be consulted to ensure that that there is sufficient capacity within the existing foul water network to accommodate the proposed development flows.

4 Existing and Proposed Site Runoff

4.1 This section aims to calculate the estimated peak rate and volume of surface water runoff from the existing site.
These existing discharge figures are then used to establish the post-development constraints to inform the preliminary design of the surface water drainage strategy.

4.2 Catchment Areas

The existing and proposed permeable and impermeable areas are listed in the table below. Of the total 3.76ha site, 2.8ha will remain undeveloped post-development.
Therefore, the greenfield runoff rate for this development has been calculated on the 0.958ha developable area only.

Site Catchment – 37 600m²	Impermeable	Permeable
Existing Site Area	0 m²	37 600 m²
Proposed Site Area	9580 m²*	28 020 m²

This development results in an increase of approximately 9580m² in impermeable area.
*In accordance with best practice, an allowance of 10% for urban creep has been applied to private areas to account for the potential increase in impermeable surfacing over the lifetime of the development.

4.3 Existing Surface Water Runoff Peak Runoff Rate & Volume (Greenfield)

An assessment of the estimated current greenfield runoff rate has been carried out using the Institute of Hydrology Report 124 (QBar) methodology.

FSR (0.958ha catchment)

1 Year	3.0 l/s
QBar	**3.5 l/s**
30 Year	7.9 l/s
100 Year	11.1 l/s
Volume 100y 6hr	228 m³

4.4 Post Development Surface Water Runoff Peak Runoff Rate & Volume

The procedure for surface water management in accordance with 'Rainfall runoff management for developments' (DEFRA/EA Report – SC030219 E, 2013) and the 'Non-statutory technical standard for sustainable drainage systems' (DEFRA, 2015) are set out below.
In the case of greenfield sites, drainage proposals will be measured against the existing performance of the site.

4.5 Peak Flow

For greenfield developments, the peak runoff rate from the redevelopment to any drain, sewer or surface water body up to the 1 in 100 year rainfall event including an appropriate allowance for climate change, must be no greater than the existing pre-developed greenfield runoff rate.

4.6 Volume Control

For greenfield developments, the runoff of volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event including an appropriate event, must be no greater than the existing pre-developed greenfield volume. Where it is not reasonably practicable to constrain the volume of runoff (i.e. via infiltration) the runoff volume must be discharged at a rate that does not adversely affect flood risk (i.e. QBar / 2.3 year runoff).

4.7 The National Planning Policy Framework requires that consideration is given to the effect of climate change on the surface water flows generated by any new development.
Table 2 of *the NPPF - Flood Risk Assessments: Climate Change Allowances – Detailed Guidance (Feb 2016)*, specifies that an assessment of a 40% increase in rainfall intensity allowance is made when calculating post-development runoff rates for sites with a design lifespan of approximately 100 years.

4.8 As a result of this development and the increase in impermeable areas, the peak rate and volume of surface water that could potentially runoff the proposed site if not effectively managed, will be greater than in its current greenfield state.

4.9 To mitigate this increase, it is proposed that all surface water runoff from impermeable areas at the proposed development for up to the 1:100year +40%cc rainfall event will be attenuated on-site via the use of sustainable drainage systems (SuDS) with an offsite discharge restricted to a maximum of 1.0 l/s.
This represents a reduction of up to 91% over existing greenfield conditions.

Table of existing and proposed peak runoff from the site

EVENT	EXISTING	PROPOSED	% REDUCTION
1 in 1 year	3.0 l/s	1.0 l/s	- 66%
1 in 2.3 year (QBar)	3.5 l/s	1.0 l/s	- 71%
1 in 30 year	7.9 l/s	1.0 l/s	- 87%
1 in 100 year	11.1 l/s	1.0 l/s	- 91%

4.10 This demonstrates that a significant level of betterment over existing greenfield conditions can be achieved by reducing the peak rate of surface water that runs off the site.
This offers a sustainable, safe and robust surface water management strategy that ensures that the development and will not increase the level of flood risk to offsite properties and for the lifetime of the site and reduces the burden on the downstream drainage network.

5.13 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.

5.14 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 1160m^3.

APPENDIX A

PROPOSED SITE LAYOUT

Rev	Date	Revision Details	Dr	Ch

PERSIMMON
Together, we make a home

Job Title
Southmere Field, Langstone

Drawing Title
Sketch Layout

Job No	Drawing No	Rev
xxx	A-02-010-SL	B
Drawn	**Checked**	**Date**
br	-	24.07.18

Scale
1:500 @ A1 / 1:1000 @ A3
metres 10 20 30 40 50

Status
INFORMATION

Persimmon Homes. No dimensions to be scaled from drawing except for the puposes of Planning Applications. The contractor should check all dimensions on site. It is the contractors responsibility to ensure compliance with Building Regulations. No drawings should be copied or modified without permission from Persimmon Homes.

File Location: p:\projects\persimmon (south coast)\5873 - southmere field, langstone\site info

APPENDIX B

TOPOGRAPHICAL SURVEY

REV. No.	DATE	DESCRIPTION	INITIALS

Client: PERSIMMON HOMES (South Coast) LTD

Project: Langstone Road Havant

Title: Topo Survey

MJA CONSULTING
CIVIL & STRUCTURAL ENGINEERS
Ipsum Court, 24 The Quadrant,
Abingdon Science Park, Abingdon
Oxon, OX14 3YS
Tel: 01235 555173
Fax: 01235 523226

Scale	Date	Drawing No.	Rev
NTS	Sept '18	5873:FL:1	
Checked	Drawn		

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APPENDIX C

GREENFIELD RUNOFF & ATTENUATION CALCULATIONS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.400
Area (ha)	0.958	Urban	0.000
SAAR (mm)	740	Region Number	Region 7

Results	**l/s**
QBAR Rural	3.5
QBAR Urban	3.5
Q1 year	3.0
Q1 year	3.0
Q30 years	7.9
Q100 years	11.1

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Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.200
Ratio R	0.350
Areal Reduction Factor	1.00
Area (ha)	0.958
SAAR (mm)	740
CWI	110.161
Urban	0.000
SPR	37.000

Results

Percentage Runoff (%)	37.40
Greenfield Runoff Volume (m^3)	227.879

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	3.090	0.490	0.7	271.0	O K
30 min Summer	3.196	0.596	0.7	364.0	O K
60 min Summer	3.299	0.699	0.8	466.2	O K
120 min Summer	3.395	0.795	0.8	575.5	O K
180 min Summer	3.449	0.849	0.8	640.5	O K
240 min Summer	3.485	0.885	0.8	685.5	O K
360 min Summer	3.538	0.938	0.8	751.9	O K
480 min Summer	3.577	0.977	0.9	801.2	O K
600 min Summer	3.607	1.007	0.9	840.2	O K
720 min Summer	3.632	1.032	0.9	872.2	O K
960 min Summer	3.670	1.070	0.9	922.9	O K
1440 min Summer	3.723	1.123	0.9	992.6	O K
2160 min Summer	3.770	1.170	0.9	1057.2	O K
2880 min Summer	3.799	1.199	0.9	1096.9	O K
4320 min Summer	3.829	1.229	0.9	1137.9	O K
5760 min Summer	3.838	1.238	0.9	1151.2	O K
7200 min Summer	3.837	1.237	0.9	1148.6	O K
8640 min Summer	3.829	1.229	0.9	1138.5	O K
10080 min Summer	3.819	1.219	0.9	1123.8	O K
15 min Winter	3.090	0.490	0.7	271.0	O K
30 min Winter	3.196	0.596	0.7	364.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	126.074	0.0	55.6	19
30 min Summer	84.745	0.0	60.1	34
60 min Summer	54.368	0.0	125.8	64
120 min Summer	33.674	0.0	132.8	124
180 min Summer	25.065	0.0	136.3	184
240 min Summer	20.180	0.0	138.4	244
360 min Summer	14.839	0.0	141.0	364
480 min Summer	11.923	0.0	142.7	484
600 min Summer	10.054	0.0	143.7	604
720 min Summer	8.741	0.0	144.2	724
960 min Summer	7.003	0.0	144.6	964
1440 min Summer	5.114	0.0	143.4	1444
2160 min Summer	3.727	0.0	294.5	2164
2880 min Summer	2.973	0.0	292.1	2884
4320 min Summer	2.159	0.0	283.0	4320
5760 min Summer	1.718	0.0	585.5	5760
7200 min Summer	1.438	0.0	577.5	7200
8640 min Summer	1.245	0.0	567.4	8640
10080 min Summer	1.102	0.0	555.4	9376
15 min Winter	126.074	0.0	55.6	19
30 min Winter	84.745	0.0	60.1	34

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	3.299	0.699	0.8	466.2	O K
120 min Winter	3.395	0.795	0.8	575.5	O K
180 min Winter	3.449	0.849	0.8	640.6	O K
240 min Winter	3.485	0.885	0.8	685.6	O K
360 min Winter	3.538	0.938	0.8	751.9	O K
480 min Winter	3.577	0.977	0.9	801.3	O K
600 min Winter	3.607	1.007	0.9	840.3	O K
720 min Winter	3.632	1.032	0.9	872.4	O K
960 min Winter	3.671	1.071	0.9	923.1	O K
1440 min Winter	3.723	1.123	0.9	993.3	O K
2160 min Winter	3.771	1.171	0.9	1058.3	O K
2880 min Winter	3.801	1.201	0.9	1098.6	O K
4320 min Winter	3.832	1.232	0.9	1141.6	O K
5760 min Winter	3.843	1.243	1.0	1157.4	O K
7200 min Winter	3.843	1.243	1.0	1158.1	O K
8640 min Winter	3.839	1.239	0.9	1151.8	O K
10080 min Winter	3.830	1.230	0.9	1139.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	54.368	0.0	125.8	64
120 min Winter	33.674	0.0	132.8	124
180 min Winter	25.065	0.0	136.3	182
240 min Winter	20.180	0.0	138.4	242
360 min Winter	14.839	0.0	141.0	362
480 min Winter	11.923	0.0	142.6	480
600 min Winter	10.054	0.0	143.6	598
720 min Winter	8.741	0.0	144.2	718
960 min Winter	7.003	0.0	144.6	954
1440 min Winter	5.114	0.0	143.3	1428
2160 min Winter	3.727	0.0	294.3	2140
2880 min Winter	2.973	0.0	291.7	2828
4320 min Winter	2.159	0.0	282.2	4236
5760 min Winter	1.718	0.0	584.1	5592
7200 min Winter	1.438	0.0	575.2	6920
8640 min Winter	1.245	0.0	564.1	8288
10080 min Winter	1.102	0.0	550.7	9576

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.900
Region	England and Wales	Cv (Winter)	0.900
M5-60 (mm)	19.200	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.958

Time (mins) From:	To:	Area (ha)
0	4	0.958

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Model Details

Storage is Online Cover Level (m) 4.400

Tank or Pond Structure

Invert Level (m) 2.600

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	329.0	0.700	1069.0	1.400	1467.0	2.100	0.0
0.100	412.0	0.800	1206.0	1.500	1513.0	2.200	0.0
0.200	503.0	0.900	1248.0	1.600	1559.0	2.300	0.0
0.300	601.0	1.000	1291.0	1.700	1606.0	2.400	0.0
0.400	707.0	1.100	1334.0	1.800	1653.0	2.500	0.0
0.500	820.0	1.200	1378.0	1.801	0.0		
0.600	940.0	1.300	1422.0	2.000	0.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0042-1000-1500-1000
Design Head (m)	1.500
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	42
Invert Level (m)	2.500
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	1.0
Flush-Flo™	0.186	0.7
Kick-Flo®	0.378	0.5
Mean Flow over Head Range	-	0.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.6	1.200	0.9	3.000	1.4	7.000	2.0
0.200	0.7	1.400	1.0	3.500	1.5	7.500	2.1
0.300	0.6	1.600	1.0	4.000	1.6	8.000	2.1
0.400	0.6	1.800	1.1	4.500	1.6	8.500	2.2
0.500	0.6	2.000	1.1	5.000	1.7	9.000	2.3
0.600	0.7	2.200	1.2	5.500	1.8	9.500	2.3
0.800	0.8	2.400	1.2	6.000	1.9		
1.000	0.8	2.600	1.3	6.500	1.9		

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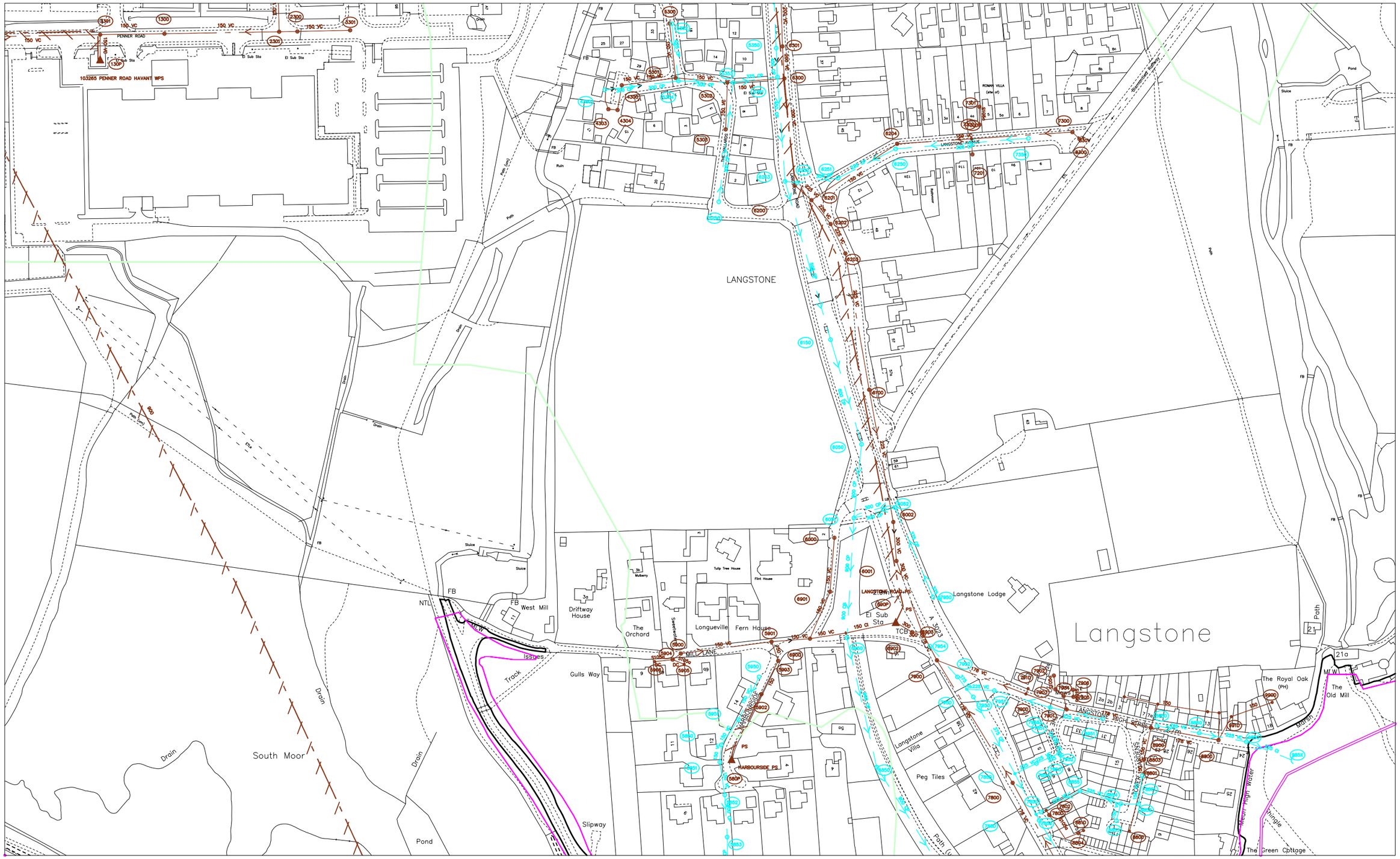
APPENDIX D

PUBLIC SEWER RECORDS

SEWER RECORDS PAGE 1 OF 2

105394

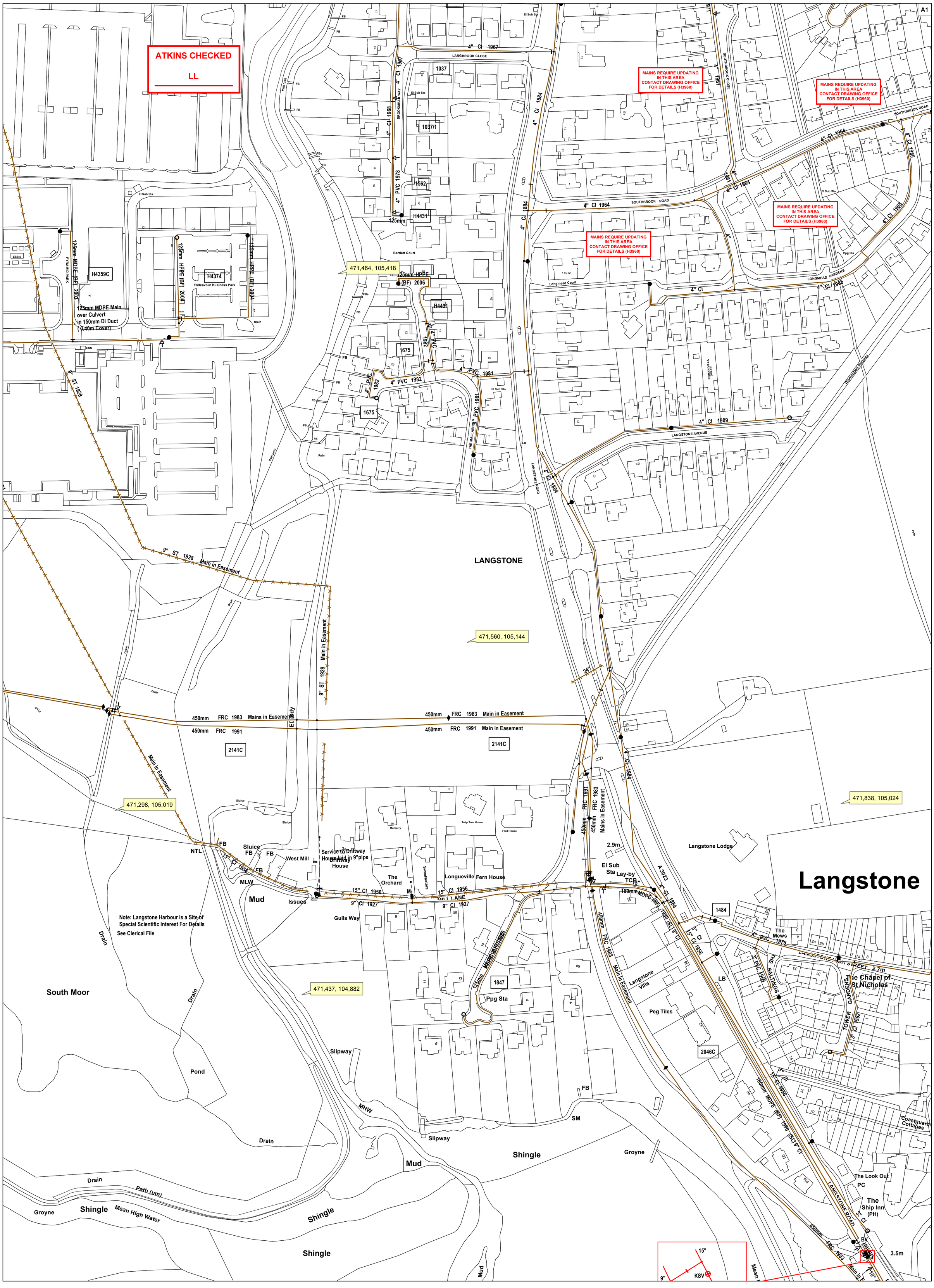


104816

471075

472018

O.S. REF. SU7105SE	Drawn by: ahmadr	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may Include Bonded Asbestos Cement	N
	Scale: 1:2500		
Title: 300088_Site off Langstone Road	Date: 09/07/2018	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.	Southern Water



REFERENCE: 66762

EXISTING MAIN		FIRE HYDRANT	
ABANDONED MAIN		PROPOSED FIRE HYDRANT	
PROPOSED MAIN		'C'	WO TO BE CUT OUT UNLESS PURCHASED BY LOCAL AUTHORITY
COMPANY WASHOUT		'C'	FH TO BE CUT OUT UNLESS PURCHASED BY LOCAL AUTHORITY
WASHOUT FIRE HYDRANT		'C'	WOFH TO BE CUT OUT UNLESS PURCHASED BY LOCAL AUTHORITY

Portsmouth Water
Registered Office
P.O. BOX NO. 8, West Street, Havant, Hampshire. PO9 1LG.
Registered in England No. 2536455
Telephone: (023) 9249 9888
Fax: (023) 9245 3632
Website: www.portsmouthwater.co.uk

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The information supplied is given in good faith as a guide to locating underground apparatus. Its accuracy cannot be guaranteed, nor does it include comprehensive information about the existence or location of service pipes or cables to individual premises.The responsibility for locating and avoiding damage to apparatus on site shall be that of the person proposing to excavate in the street who shall be liable to the apparatus owner and any third party who may be affected in any way for any loss or damage caused by their failure to do so.

Drg No:	
Job No:	
OS Ref:	SU7105SE
Scale:	1:1,250
Date:	26/07/2018

APPENDIX F
EA FLOOD DATA

creating a better place

Environment Agency

Our ref:	SSD/200236
Your ref:	
Date:	1 February 2021

chrisp@mjaconsulting.co.uk

Dear Chris,

Enquiry regarding Product 4 for site at Grid Ref: 471530, 105156.

Thank you for your enquiry which was received on 23 December 2020.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

We can confirm that the above property/site is located in Flood Zone 1 - an area where the chance of flooding from both rivers and the sea has been assessed as less than 0.1% in any year (1 chance in 1,000 in any year).

The Environment Agency has no record of flooding to this area, please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flooding Authority, Hampshire County Council or the Local Authority, Havant Borough Council for a more comprehensive flood history check.

Defences – See attached map. Information on any nearby sea defences is available from Havant Borough Council.

Fluvial Flood Levels – See attached map showing the 1D modelled flood levels for your site. These levels have been taken from the Havant Flood Mapping Study that was carried out in 2008 by Atkins.

Tidal Flood Levels – The 0.5% (1:200) and the 0.1% (1:1000) annual exceedance probabilities relevant to your site are provided in the table below. These levels have been taken from the East Solent Coastal Model that was carried out in 2018 by JBA Consulting.

Environment Agency
Romsey Depot, Canal Walk, Romsey, SO51 8DU
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

INVESTOR IN PEOPLE

Year	Tide Level (mAOD*)	
	0.5% annual exceedance probability/1 in 200 Year (Flood Zone 3)	**0.1% annual exceedance probability/1 in 1000 Year (Flood Zone 2)**
2015	3.44	3.60
2070	3.75	3.91
2115	4.16	4.32

* Levels in metres above Ordnance Datum Newlyn.

FRA advisory text

Name	Product 4
Description	Basic / Detailed Flood Risk Assessment Map for site at Grid Ref: 471530, 105156
Licence	Open Government Licence
Information Warnings	The majority of our models will not have the new climate change allowances. +20% is not suitable for the majority of planning purposes and the new allowances to use should be checked here: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
Information Warning - OS background mapping	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

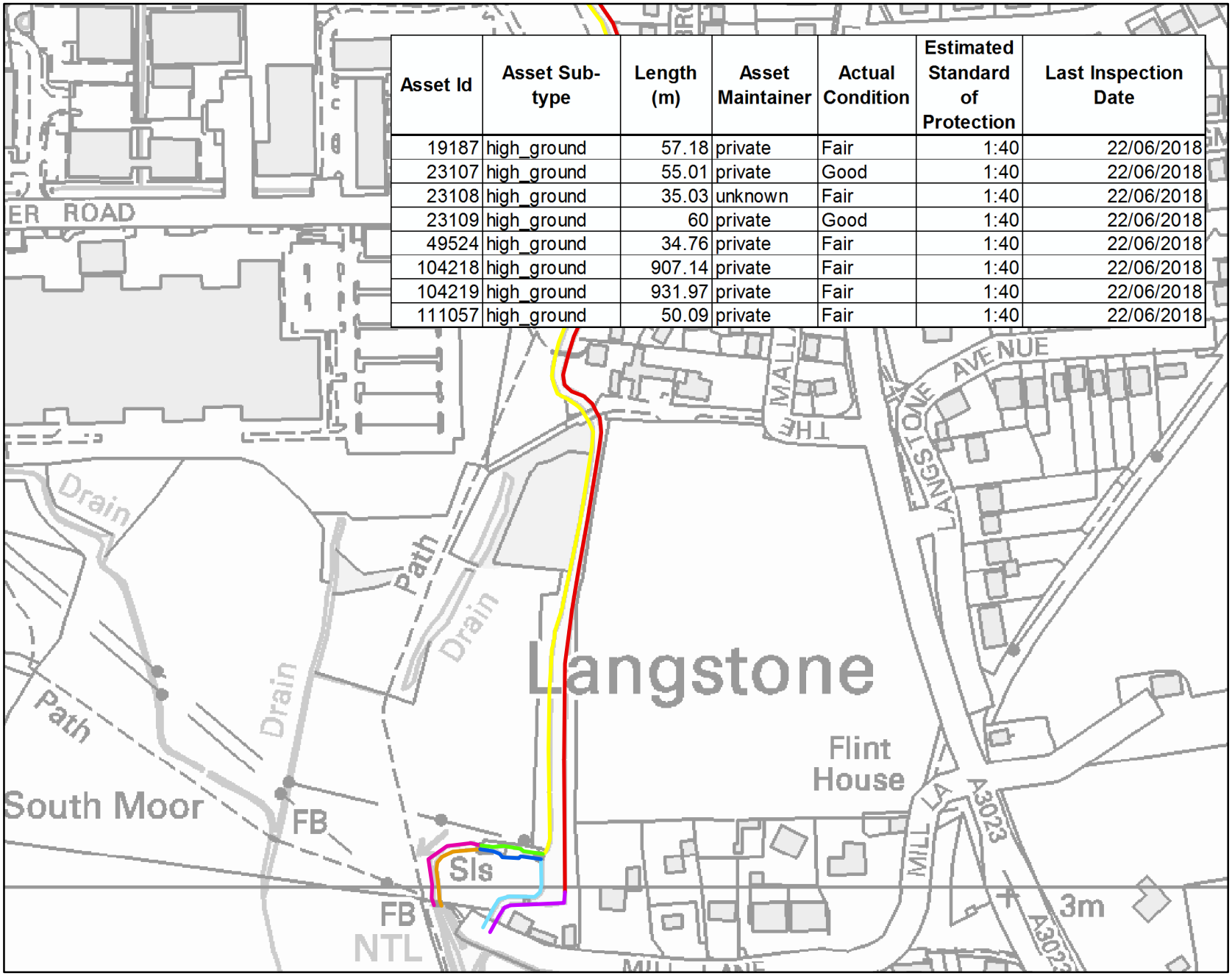
Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map

Defences Centred on SU 71639 05152 - Created 26 September 2018

Asset Id	Asset Sub-type	Length (m)	Asset Maintainer	Actual Condition	Estimated Standard of Protection	Last Inspection Date
19187	high_ground	57.18	private	Fair	1:40	22/06/2018
23107	high_ground	55.01	private	Good	1:40	22/06/2018
23108	high_ground	35.03	unknown	Fair	1:40	22/06/2018
23109	high_ground	60	private	Good	1:40	22/06/2018
49524	high_ground	34.76	private	Fair	1:40	22/06/2018
104218	high_ground	907.14	private	Fair	1:40	22/06/2018
104219	high_ground	931.97	private	Fair	1:40	22/06/2018
111057	high_ground	50.09	private	Fair	1:40	22/06/2018



Environment Agency

Legend

ASSET_ID

- 19187
- 23107
- 23108
- 23109
- 49524
- 104218
- 104219
- 111057

1:3,061 *

*when printed at A4.

N

0 60 120

Metres

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Contact Us: National Customer Contact Centre, PO BOX 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Flood Map for Planning (Rivers and Sea) Centred on Grid Ref: 471530, 105156
Created 1 Feb 2021

Environment Agency

1: 10,000

0 Metres 250

N W E S

Flood Map for Planning (Rivers & Sea)

- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occuring each year.

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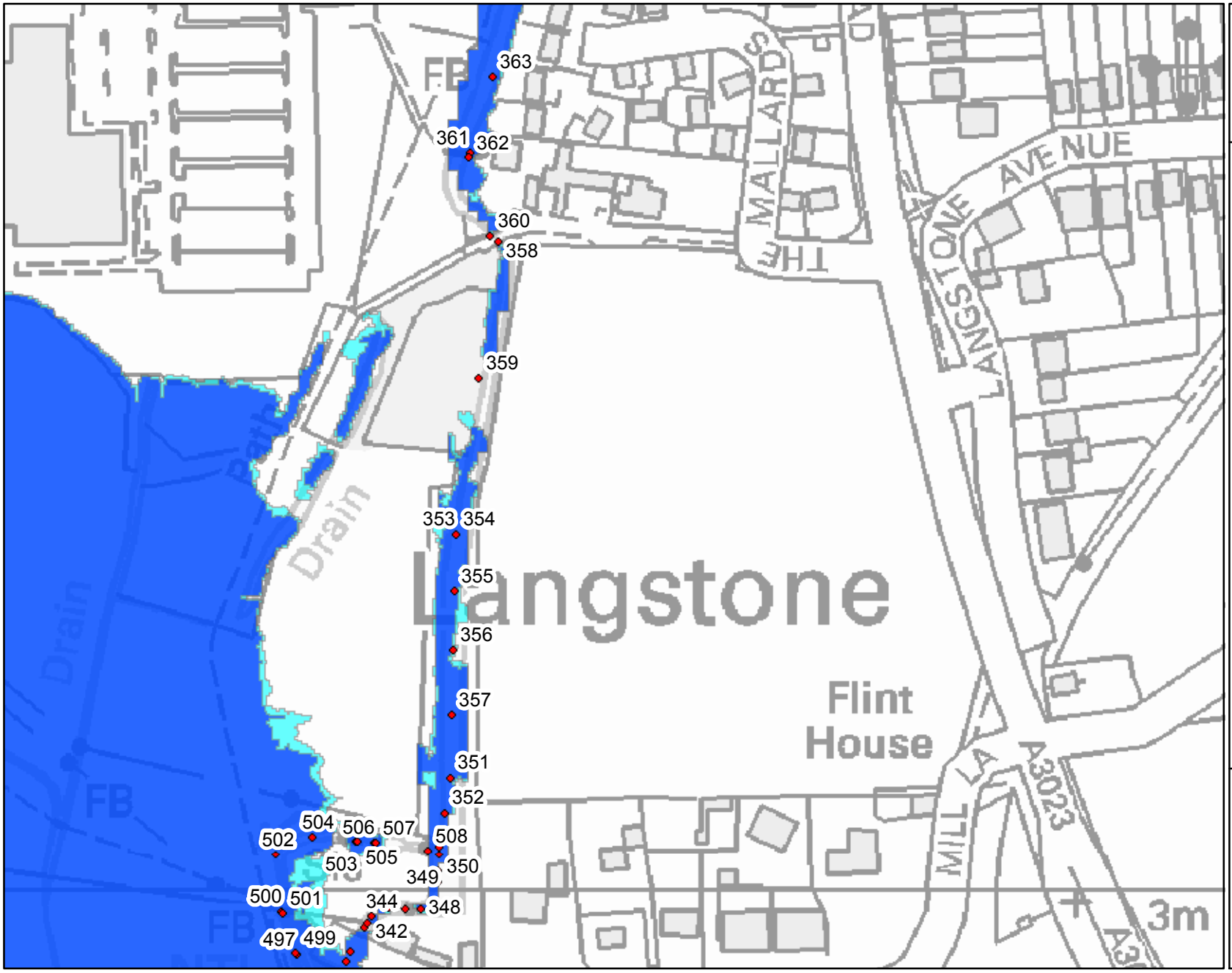
1D Modelled Flood Levels (In mAOD) Centred on Grid Ref: 471530, 105156 - Created 1 Feb 2021



Environment Agency

Legend

- Lavant & Hermitage 1D Levels
- Lavant & Hermitage 100Yr (Flood Zone 3)
- Lavant & Hermitage 1000Yr (Flood Zone 2)

1:2,208 *

*when printed at A4.

N

0 40 80

Metres

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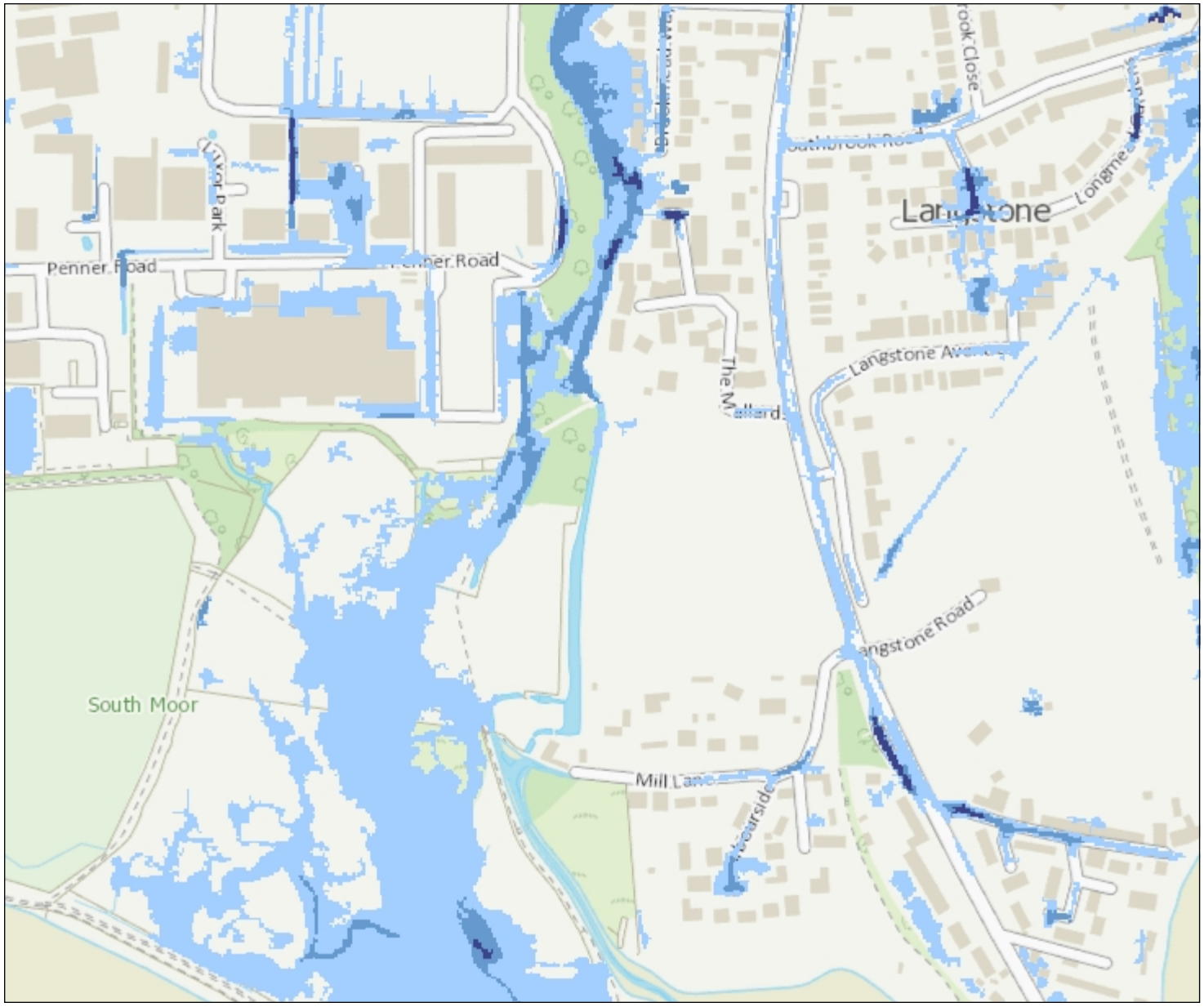
ID	EASTING	NORTHING	100YR LEVEL	100YR LEVEL NO DAM	100YR CC LEVEL	100YR CC LEVEL NO DAM	1000YR LEVEL	1000YR LEVEL NO DAM
340	471403.6	104984.97	2.841	1.859	3.906	2.098	2.942	2.439
341	471419.8	104991.93	4.008	1.859	4.051	2.098	4.111	2.439
342	471404.9	104986.38	3.926	1.859	3.998	2.098	4.031	2.439
343	471413.2	104992.54	3.986	1.859	4.029	2.098	4.088	2.439
344	471406.5	104989.14	3.959	1.859	4.005	2.098	4.062	2.439
345	471432.5	105007.47	4.077	1.859	4.125	2.098	4.19	2.439
346	471432.4	105003.05	4.071	1.859	4.118	2.098	4.182	2.439
347	471430.2	104994.43	4.059	1.859	4.105	2.098	4.168	2.439
348	471426.1	104992.11	4.042	1.859	4.087	2.098	4.149	2.439
349	471433.1	105013.82	4.079	1.859	4.127	2.098	4.192	2.439
350	471433.3	105016.84	4.079	3.939	4.127	4.473	4.192	5.235
351	471437.6	105044.76	4.118	3.939	4.171	4.477	4.244	5.289
352	471435.4	105030.63	4.1	3.939	4.151	4.473	4.219	5.235
353	471439.8	105141.66	4.189	2.735	4.245	3.026	4.322	3.506
354	471439.8	105141.63	4.189	3.939	4.245	4.474	4.322	5.291
355	471439.2	105119.02	4.167	3.939	4.223	4.474	4.299	5.291
356	471438.8	105095.58	4.148	3.939	4.204	4.475	4.279	5.29
357	471438.1	105069.54	4.131	3.939	4.186	4.476	4.26	5.29
358	471456.8	105257.88	4.309	2.734	4.358	3.026	4.429	3.505
359	471449.1	105203.87	4.237	2.734	4.29	3.026	4.363	3.505
360	471453.7	105260.44	4.369	2.734	4.423	3.026	4.503	3.505
361	471445.7	105293.45	4.434	2.733	4.489	3.025	4.571	3.505
362	471445.2	105291.51	4.416	2.733	4.47	3.025	4.55	3.505
363	471454.4	105323.84	4.455	2.95	4.507	3.436	4.585	4.348
500	471370.7	104991.22	2.824	4.554	3.912	5.95	2.922	5.968
501	471371	104990.54	2.813	4.554	3.91	6.667	2.894	6.559
502	471368.2	105013.89	2.827	3.274	3.921	3.673	2.941	3.527
503	471400.3	105019.37	2.814	2.245	3.924	2.453	2.916	2.788
504	471383.1	105021	2.825	2.386	3.924	3.056	2.932	3.387
505	471401	105019.2	2.878	2.245	3.928	2.453	3.105	2.788
506	471407.2	105018.73	2.913	2.18	3.926	2.452	3.139	2.835
507	471408	105018.59	2.987	2.18	3.926	2.452	3.188	2.835
508	471428.8	105015.28	2.989	2.16	3.918	2.455	3.189	2.875

Risk of flooding from Surface Water Centred on Grid Ref: 471530, 105156
Created 1 Feb **2021**



Environment Agency

1: 5,000

0 Metres 125

N W E S

Likelihood of flooding from Surface Water

- Flood Extent 1 in 30
- Flood Extent 1 in 100
- Flood Extent 1 in 1000

Likelihood of flooding from Surface Water

High:	Greater than or equal to 3.3% (1 in 30) chance in any given year
Medium:	Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
Low:	Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
Very Low:	Less than 0.1% (1 in 1,000) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on GOV.UK.

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