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Flood Risk Assessment

for

Proposed Development at
Swiss Gardens First School (Modular Classrooms),
Shoreham by sea

E6586

July 2016

Proposed Development at Swiss Gardens First School (Modular Classrooms), Shoreham by sea

Flood Risk Assessment

July 2016

Prepared by	Reviewed by
Lloyd Gray	Stephen Wilson

Client: Pellings

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1 INTRODUCTION

1.1 Instructions were received from Pellings to undertake a Flood Risk Assessment, to appraise a proposed extension of modular classrooms to Swiss Gardens Primary School, Shoreham.

1.2 The assessment has been undertaken in compliance with Planning Practice Guidance, Flood Risk and Coastal Change (PPGFRCC) and has been prepared to support a planning application for a development at the above location.

1.3 The information used for the preparation of the assessment is given in the Appendices.

2 SITE LOCATION AND DESCRIPTION

2.1 **Site Address:** Swiss Gardens Primary School, Shoreham, West Sussex BN43 5WH. The school is located centrally within Shoreham an urban location. The existing school is located on the corner of Swiss Gardens Victoria Road. In general the site is surrounded by residential properties. A Cemetery and allotments are located to the North of the schools boundary.



2.2 **Site Area:** The total school site area is 0.695Ha (6950m^2), the site is approximately 100% impermeable. The proposed modular classrooms are approximately 160m^2 in area.

2.3 **Level of Site**: The site generally lies at around 4mAOD with a gentle slope on Swiss Gardens to the West. Levels tie-in to the adjacent public highways which it fronts on the South East and South West sides of the site.

2.4 **Site Use:** The site is currently in use as a Primary School with associated parking and playgrounds

2.5 **Environment Agency Flood Zone:** The EA website confirms that the site predominantly lies within Flood Zone 3, with a small section of the car park in Flood Zone 2. The site only just falls within the Flood Zone 2/3 area, with Victoria Road and Hebe Road to the East of the site falling within Flood Zone 1.

2.6 **Existing Drainage Regime:** Both surface and foul water drain to the local Southern Water sewerage network.

2.7 **Ground Conditions:** Based on knowledge of the local area and British Geological Survey mapping, the underlying soils consist of Clay at shallow depths with Newhaven Chalk Formation beneath the Clays. Although Chalks generally have reasonable infiltration properties, due to is proximity near the River Adur groundwater levels are anticipated to be high.

2.8 **Greenfield Run-off:** QBAR 1.3l/s. Calculated using IH124 ICOPSUDS.

The peak rate of run-off from the existing impermeable areas on the site will vary depending on the storm return period. These rates summarised below are for the entire school site including all existing impermeable areas (calculated using Modified Rational Method but excluding any allowance for climate change):

Storm Return Period	Peak Run-off
1 year	91.7 l/s
30 year	225.0 l/s
100 year	291.5 l/s

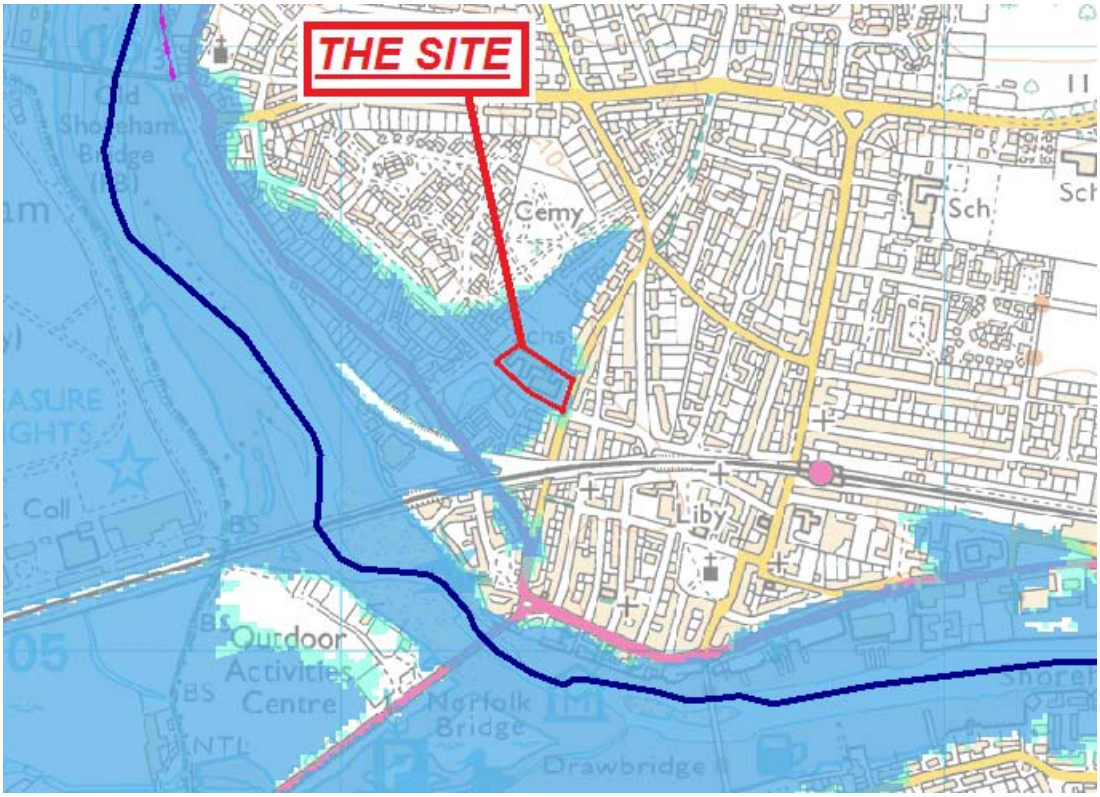
The volume of run-off from the existing impermeable area on the site, during a 1 in 100 year, 360min rainfall event is 341.261m^3.

3 PROBABILITY

3.1 Sources of Information: In order to assess the flood risk, the following documents have been reviewed:

- Environment Agency Flood Risk Maps for Planning
- Local Authority Strategic Flood Risk Assessment (SFRA)
- Public Sewer Records
- Topographic Survey
- Historic Geological Information

3.1.1 Environment Agency Flood Risk Maps: The EA Flood Risk map (below) shows that the site predominantly lies within Flood Zone 3A, with a small section of the car park in Flood Zone 2. The site only just falls within the Flood Zone 2/3 area, with Victoria Road and Hebe Road to the East of the site falling within Flood Zone 1.



Extract from Environment Agency Flood Risk Map

3.1.2 Strategic Flood Risk Assessment: A SFRA has been prepared by JBA for Adur District Council and Worthing Borough Council, and is dated January 2012. The site does not fall within any of the SFRA's listed Core Strategy Sites.

The SFRA indicates that the site is at risk of tidal flooding during a 0.5% event or greater annual probability. This is consistent with the Environment Agency flood maps and data.
The SFRA further indicates the site to be at a low risk to flooding from surface water, which again is consistent with EA mapping.

The SFRA states there is to be flood defence improvement works along the River Adur, which will decrease annual probability of tidal flooding.

3.2 Potential Sources of Flooding: The following potential sources of flooding have been assessed as follows:

3.2.1 Rivers and Watercourses: The River Adur is located approximately 350m to the West of the site. The SFRA and EA flood risk maps confirm that the site is indirectly at risk from the River Adur. The flood risk associated with the River Adur is down to the tidal nature of the river at this point, this will be discussed further in the section relating to flood risk from the sea.

3.2.2 The Sea / Tidal: The sea is approximately 1km to the South of the site, with the SFRA and EA mapping showing the site being located within Flood Zone 3A. The risk of flooding associated with the Flood Zone, is tidal flooding from the River Adur. The defended 1 in 200 year (plus climate change) flood level is 5.04m from the EA data.
The EA have confirmed that the flood defences along the River Adur are to be upgraded (in partnership with West Sussex County Council and Adur District Council) to provide protection for extreme events up to a 1 in 300 year probability (0.33%).
Therefore the flood risk associated with tidal flooding is deemed as low, as the site will benefit from the flood defence works.

3.2.3 Land (overland flow and surface water run-off): The SFRA flood risk maps show that the site lies within the low risk areas prone to pluvial flooding from overland flows or surface water run-off (1:200 year).

3.2.4 Groundwater: The SFRA flood risk map indicates that the site is at a risk of ground water flooding (>75%). Due to the underlying geology of Newhaven Chalk, and its close proximity to the River Adur groundwater levels are likely to be affected by the tidal nature of the river and will vary depending on the water level of the river.

3.2.5 Sewers: The SFRA indicates one case of flooding from this source. Due to the nature of Shoreham being low lying, sewers (both surface and foul) often rely on pumping to drive flows, as a result failure of pumping operations can sometimes lead to flooding. Topography locally to the site is such that flows would be conveyed away from the proposed building along the local highway network.

3.2.6 Reservoirs, Canals and other Artificial Sources: A small lake is located approximately 150m to the South West of the site. However, the local topography and distance, is such that it will not impact the proposed building.
There are no reservoirs or canals close to the site.

3.3 Summary of Flood Risk:

Source of Flooding	Level of Risk
Rivers and Watercourse	Low
The Sea	Low
Land	Low
Groundwater	Medium
Sewers	Low
Artificial Sources	Low

4 PROPOSED DEVELOPMENT

4.1 Description of Development: The development comprises of the construction of a 2 classroom modular unit, to be installed within the existing car parking area of the school site.

4.2 Vulnerability and Compatibility: The proposed building is to be located to the South East of the existing building. Therefore the proposed building will lay within the Zone 3A Flood Risk area identified on the EA's mapping.
The development falls within the "More Vulnerable" classification given in PPGFRCC Table 2 and according to Table 3 PPGFRCC, due its vulnerability classification and its location within a Flood Zone 3, sequential and exception tests are required.

4.2.1 Sequential Test: The school itself is located within the centre of Shoreham, and the land available within the school grounds to accommodate the proposed classrooms is located within the car park to the South East of the existing school, which lay within Flood Zone 3.

Due to predicted future growth of the existing school and that there is limited scope in the close proximity for upgrades to other primary schools, additional classrooms are required to accommodate the increase in the number students applying to attend the Swiss Gardens Primary school.

4.2.2 Exception Test: The more vulnerable classification of the educational use of the development means that an Exception test is required as set out in Table 3 of the PPGFRCC.
The Exception test as set out in paragraph 102 of the PPGFRCC states:

For the Exception Test to be passed:

a) It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and

b) A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

a) The new modular classrooms to the existing school will help West Sussex County Council meet the shortfall in available school places.

b) This FRA demonstrates that the development is safe, without increasing flood risk elsewhere.

4.3 Area of Development: The proposed development (i.e. installation of the modular classrooms) covers an area of 0.016Ha (160m^2).

4.4 Impermeable Area: The total post development area of the school site as a whole is 0.695Ha (6950m^2), however the proposed classrooms themselves are only 0.016Ha (160m^2). The impermeable areas post development will not result in an increase in impermeable area, as it is proposed to install the modular classrooms in the existing tarmac car parking area.

4.5 **Proposed Site Layout:** A site layout plan has been prepared by Pellings Architecture, a copy of which is included in the appendices.

4.6 **Disposal of Surface Water Run-off:** Building Regulations and PPGFRCC sets out a hierarchy for the disposal of surface water run-off as follows:

4.6.1 Infiltration: The underlying soils are not suitable for infiltration methods and due to anticipated ground water levels.

4.6.2 Watercourses: There are no watercourses within close proximity to the site.

4.6.3 Sewers: This is the existing method for disposal of surface water for the main school. The Southern Water records confirm there are public sewers in the close vicinity of the site.

4.7 **Post-development Run-off:** The peak rate of run-off from the developed site will vary depending on the storm return period. These rates are summarised below show the entire sites surface water runoff, including the additional runoff from the proposed classrooms (calculated using Modified Rational Method and including an allowance for climate change):

Storm Return Period	Peak Run-off
1 year	119.4 l/s
30 year	292.5 l/s
100 year	367.2 l/s

The volume of run-off from the post development impermeable area, during a 1 in 100 year, 360min rainfall event is 446.323m^3

As the impermeable area will not increase post development, the surface water runoff rate will remain as per existing, with variations between pre and post figures being down to predicted climate change which the site would be subject to anyway.

4.8 **Suitability of SUDS Methods:** Environment Agency guidance sets out a hierarchy for the use of SUDS, which is considered below:

SUDS Technique	Suitable for Site	Comments
Living Roof	**yes**	
Basins and Ponds		There is insufficient space to accommodate these techniques.
- Constructed Wetlands	**no**	
- Balancing Ponds	**no**	
- Detention Basins	**no**	
- Retention Ponds	**no**	
Filter strips and swales	**no**	As above.
Infiltration Devices		Ground Conditions are not suitable.
- Soakaways	**no**	
- Infiltration trenches and basins	**no**	
Permeable surfaces and filter drains		The proposals are such that these methods cannot be included.
- Gravelled areas	**no**	
- Soild paving blocks	**no**	
- Porous paviors	**no**	
Tanked systems		Possible to accommodate, however as no there is no increase in impermeable area, there will be no increase in the rate of surface water runoff
- Oversized pipes	**yes**	
- Cellular tanks	**yes**	

4.9 **Flood Zones:** The schools site lies within Flood Zone 3A, with a small section of the car park in Flood Zone 2. The site only just falls within the Flood Zone 2/3A area, with Victoria Road and Hebe Road to the East of the site falling within Flood Zone 1.

Both the SFRA and EA product 4 data confirm that there is planned improvement works to the flood defences along the River Adur. This will mean that this area of Shoreham will be protected up to a 1 in 300year probability event.

4.10 **Safe Access/Egress:** Pedestrian access to the school is via the main entrance on Swiss Gardens (Southern Boundary), with the vehicular access off of Victoria Road (Eastern Boundary). Access for the site post development will remain unchanged.

The access point on Swiss Gardens falls within Zone 3A. The vehicular access point off of Victoria Road lies on the boundary between a Flood Zone 1 and 2. Safe access and egress during extreme events should be used at this point to enable direct access to a Flood Zone 1.

It is recommended that the school subscribes to the Environment Agency's flood warning service and prepare a Flood Plan. The Flood Plan will help the school establish the best course of action to take prior to and during a flood event.

5 SURFACE WATER MANAGMENT STRATEGY

5.1 **Climate Change:** In order to allow for the effects of climate change the calculations for proposed surface water drainage system should include a percentage increase in peak rainfall intensity in accordance with the Environment Agency's guidance. For a design life of 100 years, an increase of 30% should be applied.

5.2 **Method of Disposal of Run-off and SUDS:** The preferred method of disposal is by connection to the existing Southern Water sewerage network.

As the proposed modular classrooms will be located on an existing impermeable area, there will be no increase in impermeable area post development, therefore the surface water runoff rate and volume will not increase due to the development.

5.3 **Allowable discharge rate:** The run-off from the development will be disposed of by connection to the existing school drainage system, which in turn drains to the Southern Water sewerage network.

As there will be no increase in impermeable area, there will be no increase in the volume or rate of surface water runoff. Therefore it is proposed to discharge the surface water runoff from the proposed classrooms into the existing system at an unrestricted rate, which will mimic the existing situation of the car park draining by gullies.

6 MAINTENANCE:

6.1 **Responsibility:** Maintenance of the surface water drainage system for the development will ultimately be the responsibility of the freeholder or management company of the main school building.

6.2 **Maintenance Required**: Regular maintenance of the surface water drainage system will ensure that it remains fully operational in the long term. A maintenance regime should be established based on monitoring the rate at which items such as silt traps fill up. It is suggested that the maintenance includes but is not limited to the following:

- Regular sweeping of surfaces
- Emptying catchpits and gullies at a minimum of 3-5 year intervals (or as required)
- Jetting/rodding pipes as and when required

6.3 **Protection of the Drainage System during Construction:** The drainage system should be protected during the construction of the development to ensure that silt and debris is excluded from completed sections and is prevented from entering the system. On completion of the development, the drainage system should be fully cleaned and left in a fully functioning condition.

7 RESIDUAL RISK AND MITIGATION:

7.1 **Off-site Impact:** Surface water run-off from the proposed modular classrooms will be disposed of via the schools exiting drainage system, which outfalls to the local sewerage network.
As impermeable areas are not increasing as a result of the development, there will be no increase in the volume or rate off surface water runoff leaving the site. Therefore there will be no impact offsite.

7.2 **On-site Impact**: The proposed surface water drainage system will be designed for a 1 in 100 year +30% critical event ensuring that the proposed dwellings are protected from flooding.
The proposed classrooms will be constructed at a level similar to that of existing car park levels on the site. Proposed flood defence works to the River Adur will help to decrease flood risk in the Shoreham area, therefore also to the site.

7.3 **Flood Risk Following the Development:** The design of the surface water drainage system as a whole will ensure that the flood risk on and off of the site remains unchanged following the construction of the development.
Although the proposed classrooms are being installed at a level similar to that of the existing car parking area, Shoreham and thus the school will benefit from the proposed improvement works to the flood defences along the River Adur increase the flood defences to cater for 1 in 300 year probability events. Therefore decreasing the flood risk to the site.

7.4 **Mitigation Measures:** Although the flood risk on the site will remain unchanged following the construction of the new classrooms. Planned improvement works to the River Adur flood defences will decrease the flood risk to the school and the Shoreham area surrounding the school.
It is recommended that the school subscribes to the Environment Agency's flood warning service and prepare a Flood Plan. The Flood Plan will help the school establish the best course of action to take prior to and during a flood event.

8 FOUL DRAINAGE:

8.1 **Existing Public Sewers:** A public combined sewer exists in Victoria Road (East boundary) and a foul sewer is present in the access to the recreation ground to the North of the site.

8.2 **Proposed Foul Drainage Disposal:** It is proposed to connect the proposed building to the existing on-site foul drainage system which in turn connects to the public sewerage network. Foul discharge from the proposed classrooms will be negligible, and will not affect the existing foul system onsite.

With regard to the impact off-site, the catchment of the sewer that serves the school is predominantly residential and it is unlikely that the peak residential flow will coincide with the peak flow from the school. The peak flow from the residential properties is likely to occur before the school opens in the morning and well after it closes in the evening. Whereas the peak flow from the school will generally be at break times including lunch time. Based on this, the small increase in flow is not likely to have a significant impact on the off-site foul drainage system.

9 CONCLUSIONS:

9.1 The proposed modular classrooms are located within Flood Zone 3A.

9.2 The proposed classrooms and school generally will benefit from the proposed improvement works to the River Adur flood defences, which provide flood protection up to a 1 in 300 year event, thus will lower the risk of flooding to the school and Shoreham area.

9.3 The surface water drainage system for the proposed classrooms will discharge to the schools existing surface water system. As the impermeable area will not increase as a result of the development, the overall discharge volume and rate of surface water will not increase either. Thus there will no increase in flood risk either on or off site.

9.4 The design of the surface water drainage system for the proposed development will include an allowance for climate change.

9.5 A maintenance regime should be established to ensure the long-term effectiveness of the surface water drainage system.

9.6 The foul drainage from the new classrooms will be discharged to the existing foul water system within the schools site, which outfalls to the public sewer.

9.7 The flood risk on and off of the site will remain unchanged.

9.8 It is recommended the school subscribes to the Environment Agency's flood warning service and prepare a flood plan.

9.9 An assessment of the flood risk concludes that the site is suitable to be developed in accordance with the planning application that this document supports, providing the surface water drainage strategy and any recommended mitigation measures herein are implemented.

APPENDIX A

SFRA Maps
Extract from Environment Agency website on Shoreham Adur Tidal Walls Scheme
Environment Agency Product 4 Data
Sewer Records
Topographic Survey

SFRA Maps

North

ADUR DISTRICT COUNCIL

Worthing BOROUGH COUNCIL

LEGEND

- Adur and Worthing Boundary
- Main River
- EA Historic Flood Map
- Fluvial Flooding
- Sewer Flooding
- Unknown Flooding
- Groundwater Flooding
- Coastal Flooding
- Surface Water Flooding
- Surface Water Flooding
- Surface Water Flooding
- Tidal Flooding
- Tidal Flooding
- Tidal Flooding
- Flooding from failure
- Flooding from failure

Note: Failure relates to a blockage or bank/structure failure and according to the SFRA 2008 this is usually related to flooding from rivers.

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JBA consulting

Map 3
Historical Flooding

Scale 1:55,000

North

Scale 1:25,000

LEGEND

- Adur and Worthing Boundary
- 1 in 20 year Present Day

Defence improvements

- Adur Tidal Walls (ATW)
- Ropetackle defences
- Shoreham Harbour walls

Note: The cross-hatched polygons show those areas that will no longer be inundated in the 1 in 20 year event if the defence improvements along the River Adur are undertaken.
Three scenarios are shown:
1. Improvement to the Adur Tidal walls
2. Improvement to the Adur Tidal walls and Ropetackle defences
3. Improvement to the Adur Tidal walls and Shoreham Harbour walls
These extents are based on the modelling undertaken as part of the West Bank Tidal Walls (Arun to Adur Model update) 2011.

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Map 17
Impact of proposed defence improvements on the 1 in 20 year (Flood Zone 3b) extent.

North

LEGEND

Adur and Worthing Boundary

AStGWF

>= 75%

>= 50% <75%

>= 25% <50%

< 25%

Areas Susceptible to Groundwater Flooding is a strategic scale map showing groundwater flood areas on a 1km square grid. The data is annotated to show what percentage of the 1km area is susceptible to groundwater flood emergence.
This provides an indication as to the degree of risk from groundwater flood risk within an area.

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Scale 1:55,000

Map 15
Indicative Groundwater Flood Risk (Areas Susceptible to Groundwater Flooding)

North

LEGEND

Adur and Worthing Boundary

Bedrock

Greensand

Chalk

Clay

Sandstone

Main Rivers

Teville Stream

Ferring Rife

River Adur

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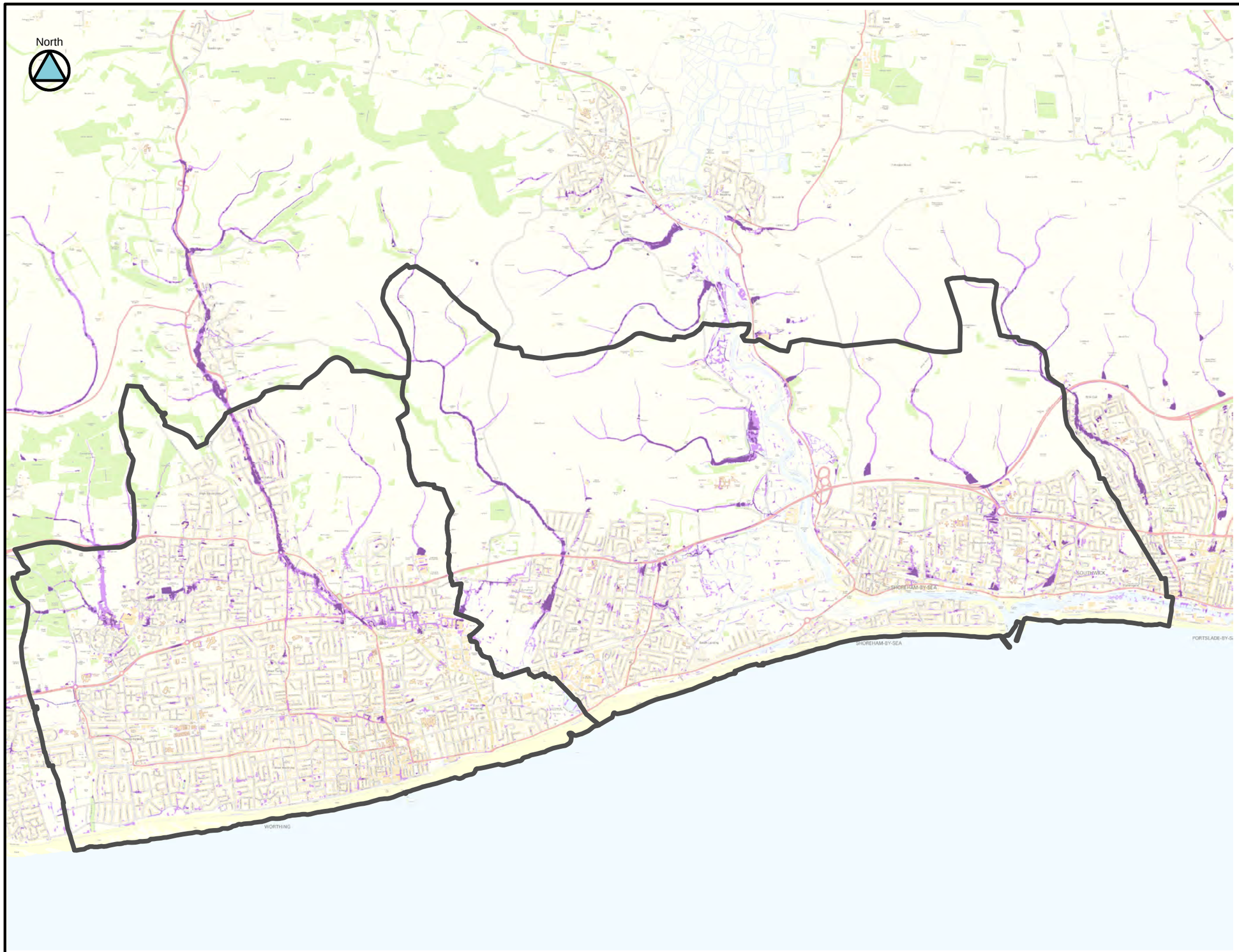
Map 2
Geology

Scale 1:55,000



LEGEND

Adur and Worthing Boundary

FMfSW 1 in 30yr - Depth

> 0.1m

> 0.3m

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Map 12
Surface Water Flood Risk
(Flood Map for Surface Water - 1 in 30 year)

Scale 1:55,000

North

LEGEND

Adur and Worthing Boundary

FMfSW 1 in 200yr - Depth

> 0.3m

> 0.1m

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Map 13
Surface Water Flood Risk
(Flood Map for Surface Water - 1 in 200 year)

Scale 1:55,000

Extract from Environment Agency website on Shoreham Adur Tidal Walls Scheme

GOV.UK

- Environment Agency (https://www.gov.uk/government/organisations/environment-agency)

See more information about this Policy paper (https://www.gov.uk/government/publications/shoreham-adur-tidal-walls-scheme)

Policy paper

Shoreham Adur tidal walls scheme

Updated 23 June 2016

Contents

Latest news - June 2016
Background
Design
Find out more

The Environment Agency is working with Coast to Capital Local Enterprise Partnership, Adur District Council and West Sussex County Council to reduce the risk of flooding to Shoreham-by-Sea and Lancing. Construction of the extensive improvements to the flood defences will begin in 2016.

Latest news - June 2016

We are currently working to secure all necessary approvals. We will be providing further information to the local community over the coming weeks but please follow this link (https://ea.sharefile.com/d-se36b8cb86b446189) to a series of frequently asked questions about aspects of the scheme.

Background

The risk of flooding to coastal settlements around the UK is high and increasing due to sea level rise and to an increase in extreme rainfall events from the effects of climate change. The Environment Agency has carried out extensive modeling to determine the likely extent and range of the potential flood events over the next 100 years.

The current flood defences in the Adur estuary do not provide a high enough level of protection, and in places are in poor condition. This leaves Shoreham-by-Sea, Lancing and the surrounding areas at risk of flooding. The Environment Agency has been developing a major improvements scheme called the Shoreham Adur Tidal Walls. The scheme will provide protection for extreme events with 0.33% probability (1 in 300 year) of occurring in 1 year, allowing for 50 years of sea level rise.

Design

The scheme is separated into 10 reaches, or lengths of the estuarine bank. The design of the defences varies between the reaches as they have different characteristics and are subject to different pressures and potential flood impacts.

The Environment Agency held consultation events in 2014 and 2015 to gain feedback on the designs. We have taken the feedback received on board and have incorporated changes into the detailed designs. The feedback has included recommendations from the Environmental Impact Assessment, input from various experts and consultation with stakeholders and the local community.

Find out more

Follow the scheme on Twitter (http://twitter.com/) (@EnvAgencySE), using #ShorehamATW.

You can also view the Shoreham Adur tidal walls Flickr album (http://www.flickr.com/photos/environment-agency/sets/72157646406089603/) for photos of the location of the defences.

The Environment Agency is working in partnership with West Sussex County Council and Adur District Council to design and build the new defences. The Coast to Capital Local Enterprise Partnership has also contributed funding to the scheme.

You can find out more information about the partner organisations by visiting their websites:

- Adur District Council (http://www.adur-worthing.gov.uk/)
- Coast to Capital Local Enterprise Partnership (http://www.coast2capital.org.uk)
- West Sussex County Council (http://www.westsussex.gov.uk)

The Environment Agency has produced a number of documents about flood risk that you may find useful. You can search for these on the publications catalogue (http://www.gov.uk/government/publications?departments%5B%5D=environment-agency).

Environment Agency Data

Lloyd Gray
99 South Street
Eastbourne
East Sussex
BN21 4LU

Our ref: SSD17721
Your ref:

Date: 27/07/2016

Dear Lloyd

Provision of *Product 4* for *Swiss Gardens Primary School, Swiss Gardens, Shoreham-by-sea, BN43 5WH*

Thank you for your request of *23/06/2016* to use Environment Agency data, *Product 4*, in the development of the *above FRA*. The information is attached.

The information on Flood Zones in the area relating to this address is as follows:

The property is in an area located within Flood Zone 3 shown on our Flood Map for Planning (Rivers and Sea).

Note - This information relates to the area that the above named property is in and is not specific to the property itself.

Please find attached a copy of the Flood Map for Planning (Rivers and Sea) for the area relating to your address.

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments

https://www.gov.uk/planning-applications-assessing-flood-risk
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Supporting Information

Flood Modelling

The attached modelled extents, depths and levels have been taken from the 2012 Arun to Adur TUFLOW Modelling Study and represent both defended and undefended tidal scenarios.

Flood History

We do not have any records of previous flood events affecting this property. However, I would recommend also contacting Adur District Council for a more comprehensive flood history check.

Defences

This site is bound in the western side by an earth embankment. This embankment has a design Standard of Protection of an estimated 1in30. Please see the attached Flood Map for the line of this defence.

The Environment Agency are due to start constriction of the Shoreham Adur tidal walls scheme in 2016. For further information please visit:

https://www.gov.uk/government/publications/shoreham-adur-tidal-walls-scheme

You are encouraged to use and re-use this information freely and flexibly, with only a few conditions. Details of which can be found here:

http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

If you are not satisfied with our response to your request for information you can contact us within 2 calendar months to ask for our decision to be reviewed.

If you have any queries or would like to discuss the content of this letter further please call us on 03708 506506.

Yours faithfully

Eleonora Pilla

Flood and Coastal Risk Management Officer, West Sussex Partnerships and Strategic Overview Team.

psowestsussex@environment-agency.gov.uk

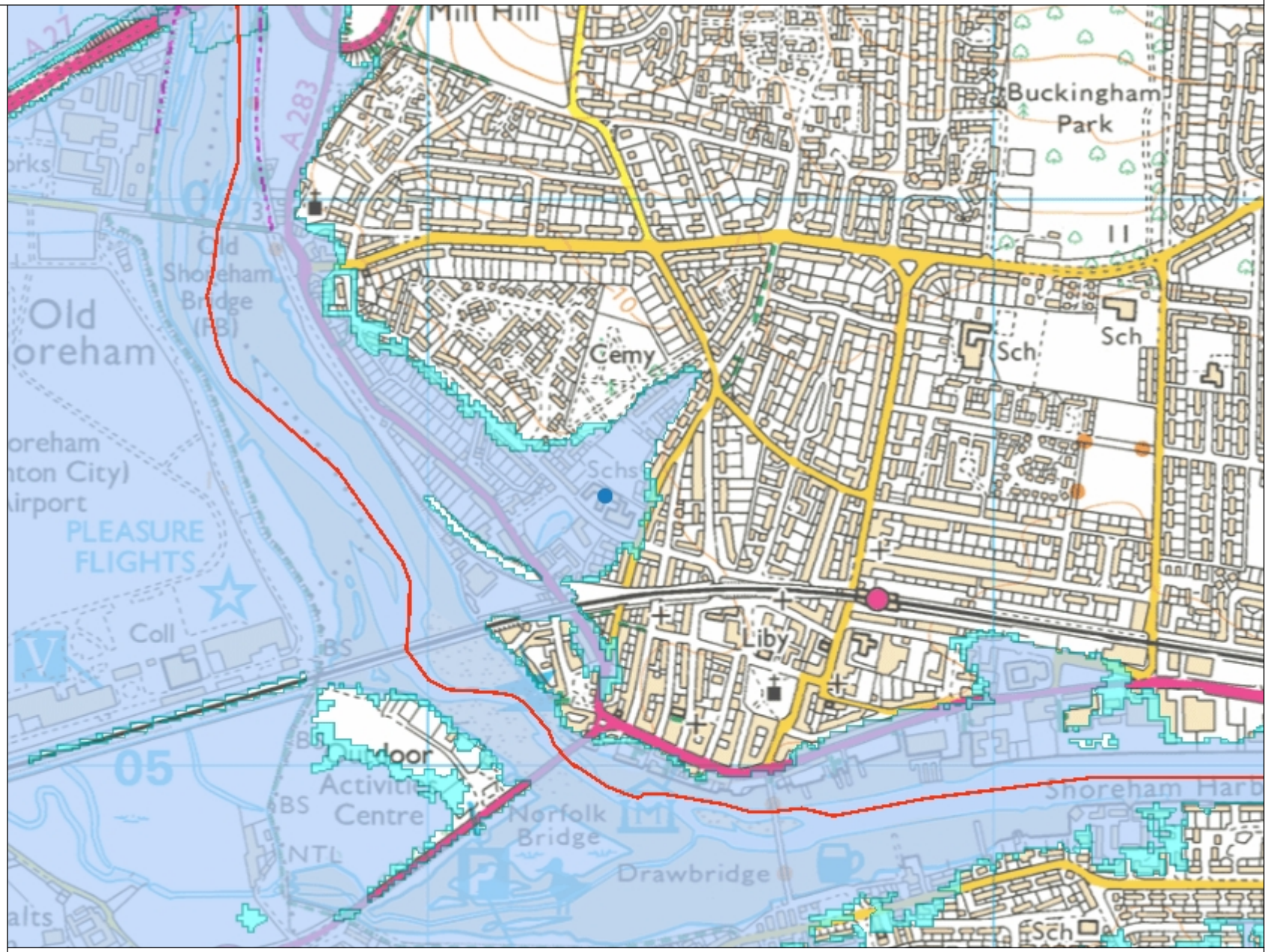
Enc. Flood Map for Planning (Rivers and Sea) / Node point locations / Flood levels/depths / Modelled flood outlines

Flood Map for Planning Centered on BN43 5WH

Environment Agency

Legend

- Sealed Main Rivers
- Defences
- Flood Storage Areas
- Areas benefiting from flood defence
- Flood Zone 3
- Flood Zone 2
- OS Traditional Maps



0 100 200 300

Metres

N W E S

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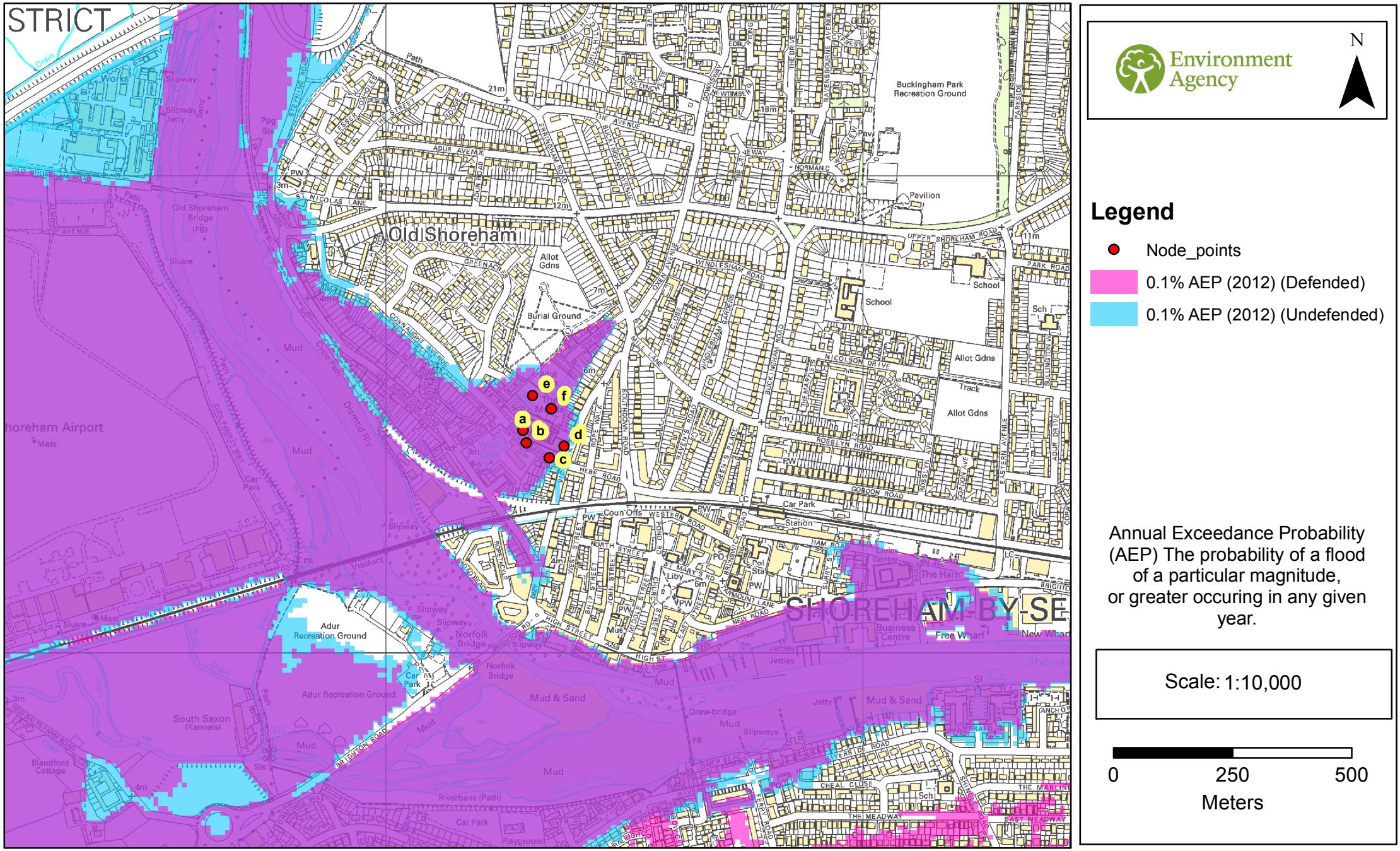
Modelled Site Node Points centred on Swiss Gardens Primary School, Swiss Gardens, Shoreham-by-sea, BN43 5WH. Created 27/07/2016 (Ref: SSD/17721)



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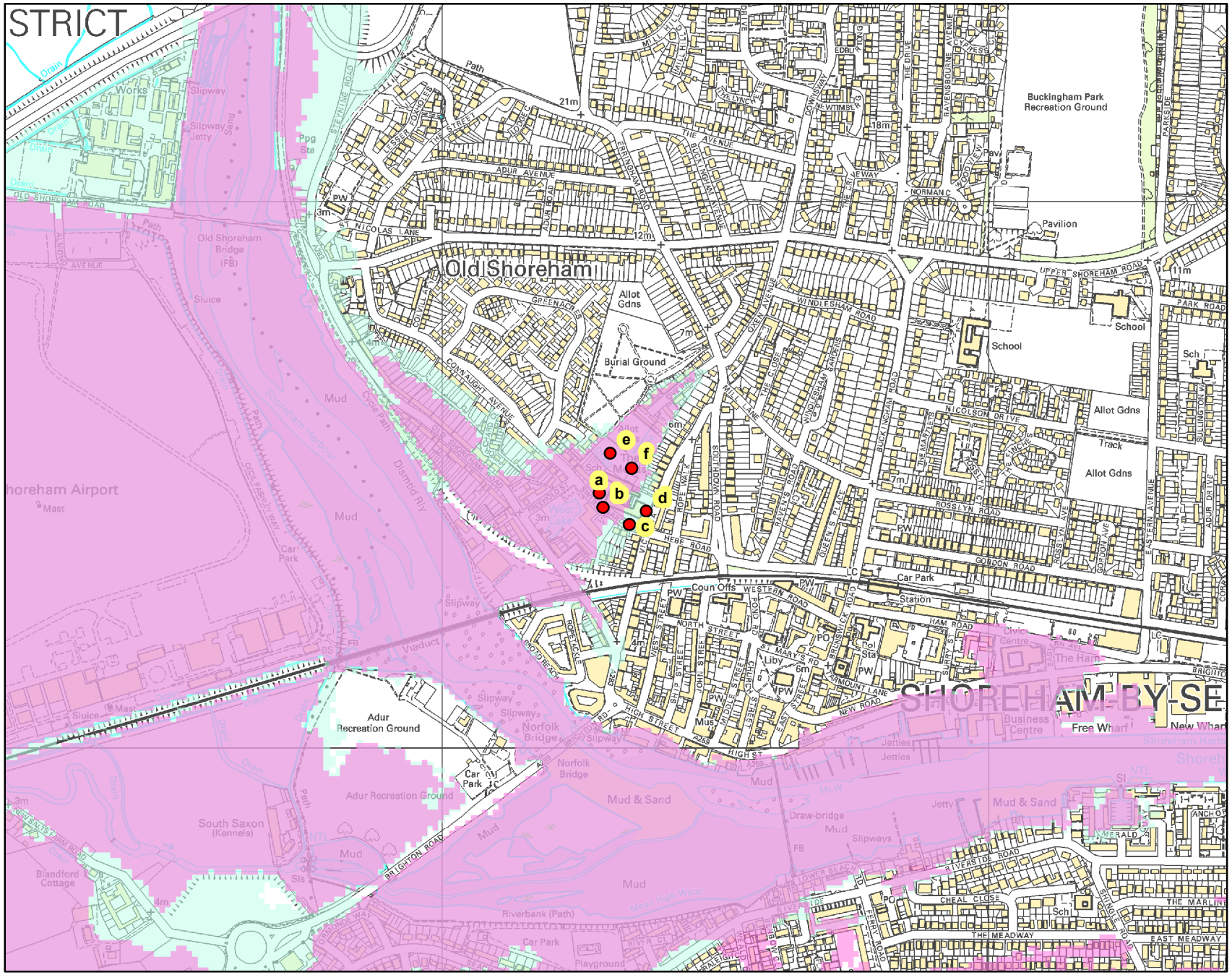
Modelled Site Node Points centred on Swiss Gardens Primary School, Swiss Gardens, Shoreham-by-sea, BN43 5WH. Created 27/07/2016 (Ref: SSD/17721)



Environment Agency

N

Legend

- Node_points
- 0.5% AEP (2012) (Defended)
- 0.5% AEP (2012) (Undefended)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occuring in any given year.

Scale: 1:10,000

0 250 500

Meters

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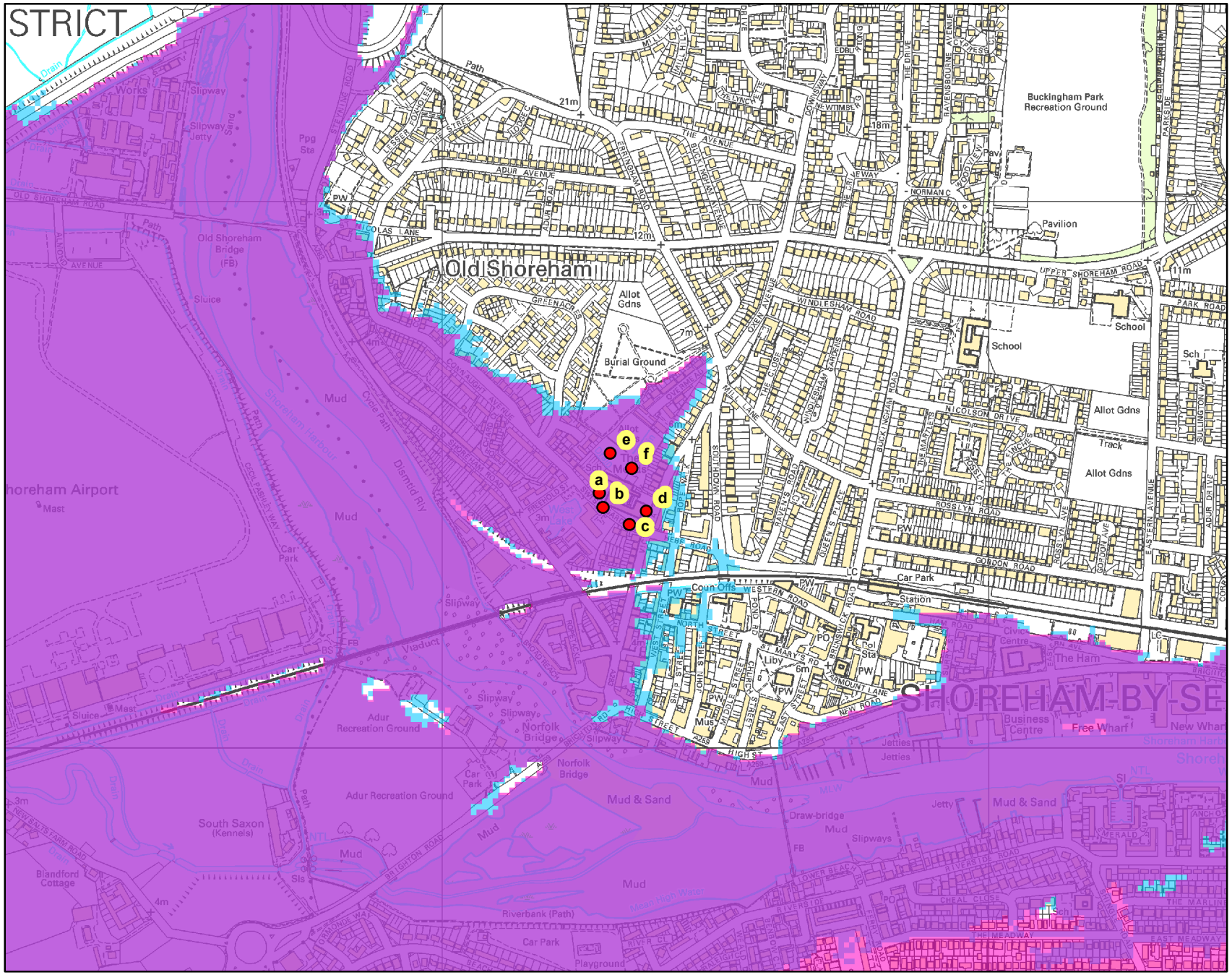
Modelled Site Node Points centred on Swiss Gardens Primary School, Swiss Gardens, Shoreham-by-sea, BN43 5WH. Created 27/07/2016 (Ref: SSD/17721)



Environment Agency

N

Legend

- Node_points
- 0.5% AEP (2115) (Defended)
- 0.5% AEP (2115) (Undefended)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occuring in any given year.

Scale: 1:10,000

0 250 500

Meters

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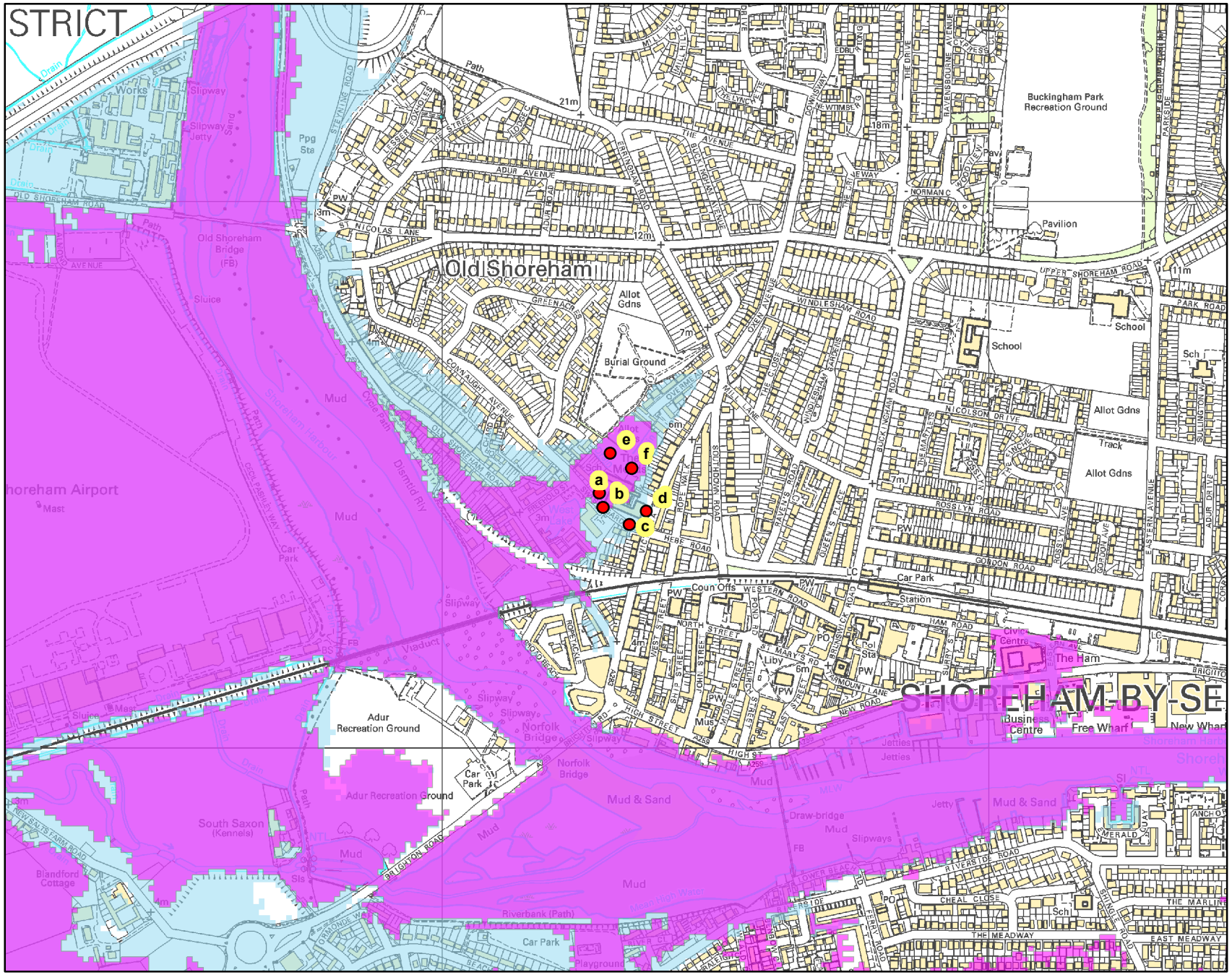

Legend

- Node_points
- 1.3% AEP (2012) (Defended)
- 1.3% AEP (2012) (Undefended)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occuring in any given year.

Scale: 1:10,000

0 250 500

Meters

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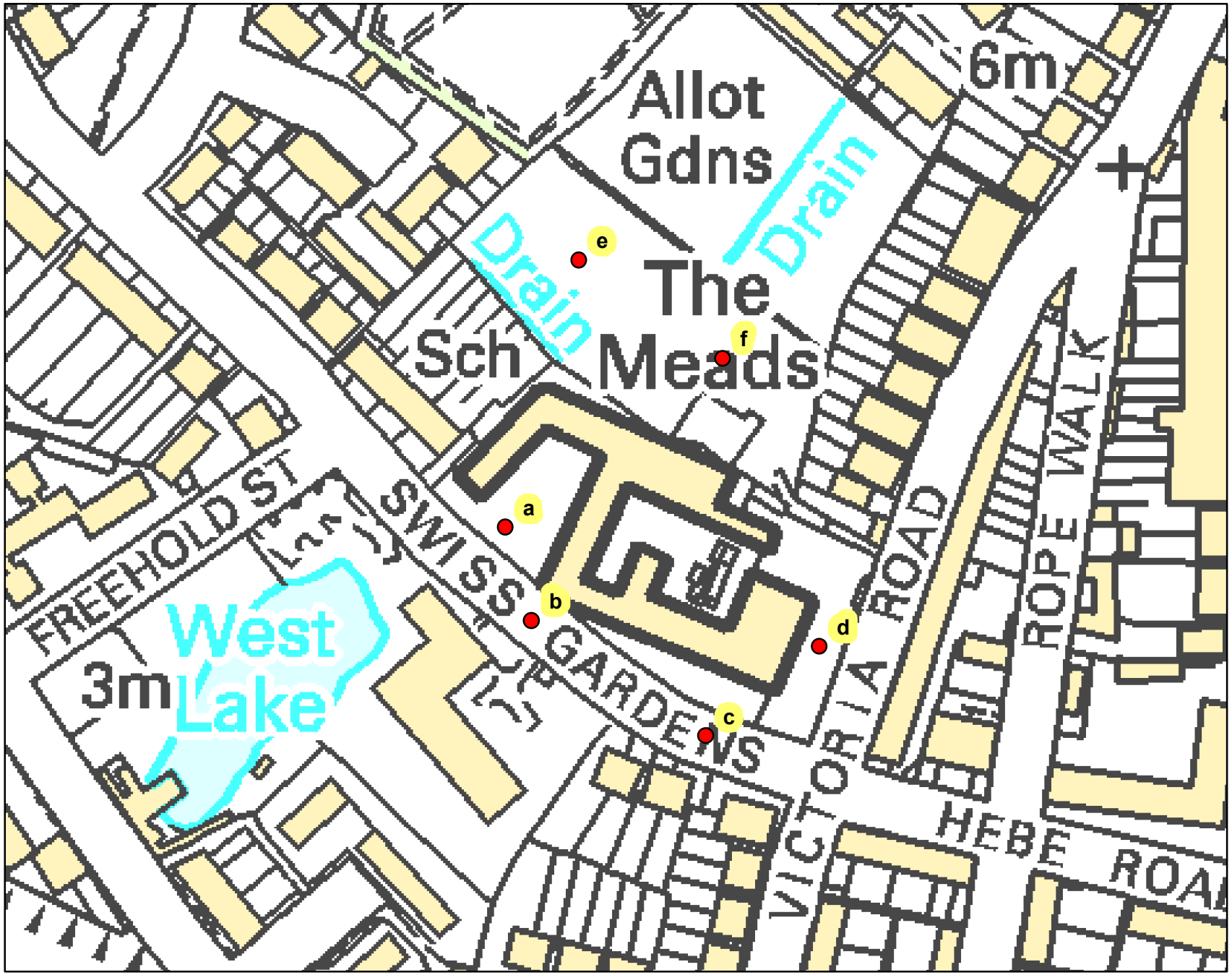

Environment Agency

N

Legend

Node_points

Scale: 1:1,500

0 37.5 75

Meters

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Flood Risk Levels Requested by: Lloyd Gray, SWP Ltd

Site: Swiss Gardens Primary School, Swiss Gardens, Shoreham-by-sea, BN43 5WH

Table 1 Water Depth: Tidal Defended

	NGR		Modelled Flood depths in Metres			
			Defended Annual Exceedance Probability			
Node Reference	Eastings	Northings	1.33%	0.5%	0.1%	0.5% 2115
A	521,287	105,465	0.43	1.08	1.52	2.32
B	521,295	105,440	-	0.66	1.10	1.89
C	521,348	105,411	-	-	0.48	1.26
D	521,380	105,436	-	-	-	0.90
E	521,309	105,539	0.64	1.29	1.74	2.53
F	521,348	105,512	0.50	1.16	1.60	2.39

Table 2 Water Depth: Tidal Undefended

	NGR		Modelled Flood Depths in Metres			
			Undefended Annual Exceedance Probability			
Node Reference	Eastings	Northings	1.33%	0.5%	0.1%	0.5% 2115
A	521,287	105,465	1.47	1.62	1.83	2.70
B	521,295	105,440	0.98	1.12	1.34	2.20
C	521,348	105,411	0.34	0.49	0.70	1.57
D	521,380	105,436	-	-	0.34	1.21
E	521,309	105,539	1.61	1.76	1.97	2.84
F	521,348	105,512	1.47	1.62	1.83	2.70

Table 3: Water surface: Tidal Defended

	NGR		Modelled Flood levels in Metres AOD			
			Defended Annual Exceedance Probability			
Node Reference	Eastings	Northings	1.33%	0.5%	0.1%	0.5% 2115
A	521,287	105,465	3.15	3.81	4.25	5.04
B	521,295	105,440	-	3.81	4.25	5.04
C	521,348	105,411	-	-	4.25	5.04
D	521,380	105,436	-	-	-	5.04
E	521,309	105,539	3.15	3.81	4.25	5.04
F	521,348	105,512	3.15	3.81	4.25	5.04

Table 4: Water surface: Tidal Undefended

	NGR		Modelled Flood levels in Metres AOD			
			Undefended Annual Exceedance Probability			
Node Reference	Eastings	Northings	1.33%	0.5%	0.1%	0.5% 2115
A	521,287	105,465	4.13	4.28	4.49	5.36
B	521,295	105,440	4.13	4.28	4.49	5.36
C	521,348	105,411	4.13	4.28	4.49	5.36
D	521,380	105,436	-	-	4.49	5.36

E	521,309	105,539	4.13	4.28	4.49	5.36
F	521,348	105,512	4.13	4.28	4.49	5.36

All levels taken from Arun to Adur Flood Modelling, completed in 2012 by JBA Consulting Summer 2012.

Produced on 27 July 2016

Sewer Records

Stephen Wilson Partnership Ltd
99
South Street
Eastbourne
East Sussex
BN21 4LU

Your ref E6586
Our ref 218150
Date 28 June 2016
Contact searches@southernwater.co.uk
Tel 0845 272 0845
0330 303 0276
Fax 01634 844514

Attention: Steven Wilson

Dear Customer

Re: Provision of public sewer and water main record extract

Location: Swiss Gardens Primary School, Swiss Gardens, Shoreham by Sea, BN43 5WH

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

VAT receipt

Ordered by:

Stephen Wilson Partnership Ltd
South Street
Eastbourne
East Sussex
BN21 4LU

VAT registration number: 813 0378 56
Order reference: 218150
Your reference: E6586

Receipt for provision of an extract from the public sewer and/or water main records.

Location	**Costs**
Swiss Gardens Primary School Swiss Gardens Shoreham by Sea BN43 5WH	£41.60
Net total	£41.60
VAT	£8.32
Total	£49.92
Paid	**Paid in full**

Thank you for your payment:

Received on: 23 June 2016

For enquiries regarding the information provided in this receipt, please contact the LandSearch team:

Tel: 0845 270 0212
0330 303 0276 (individual consumers)

Email: searches@southernwater.co.uk

Web: www.southernwater.co.uk

LandSearch
Southern Water Services
Southern House
Capstone Road
Chatham
Kent
ME5 7QA

Southern Water

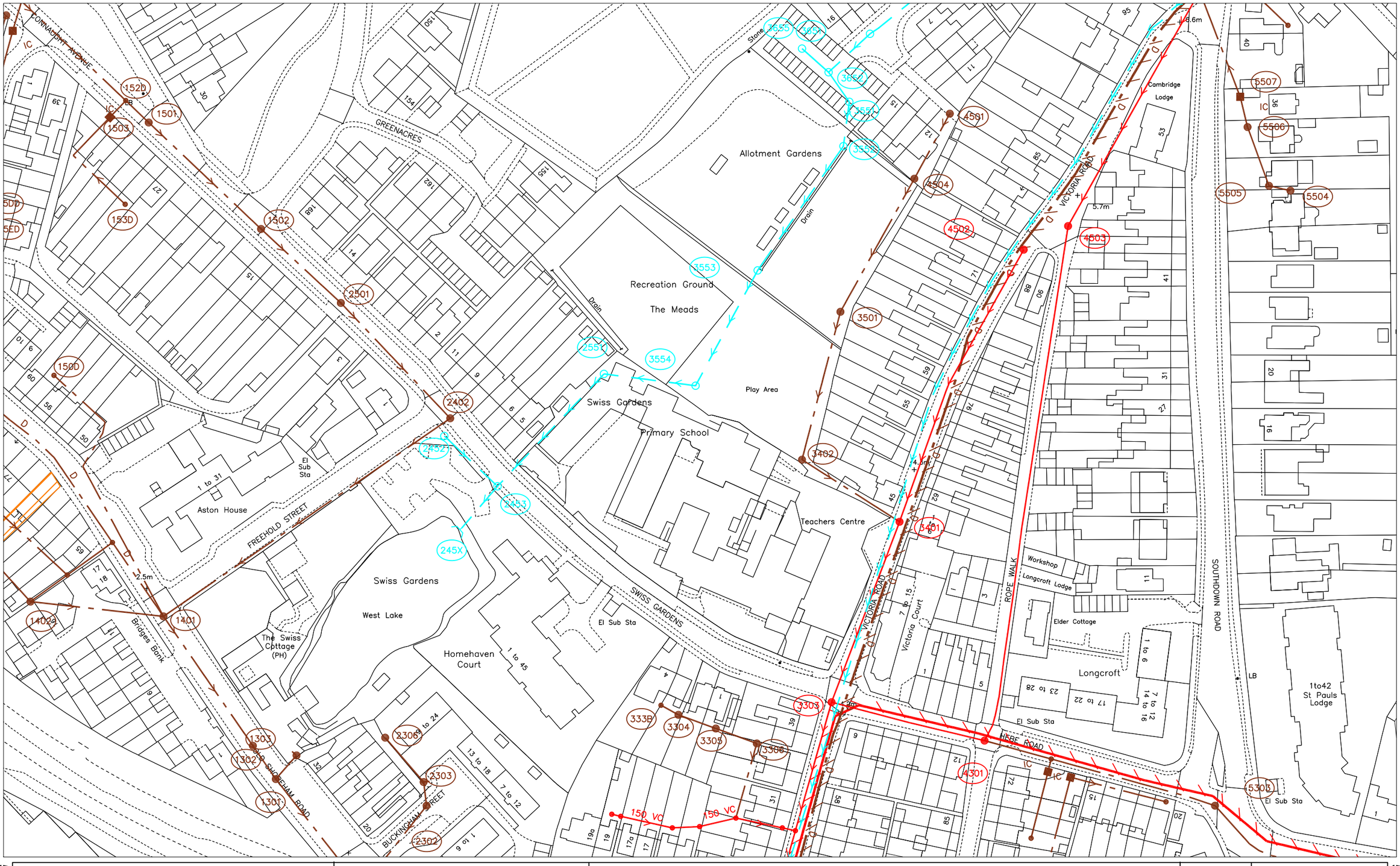
SEWER RECORDS PAGE 1 OF 2

105629

105341

521092

521565



O.S. REF.

TQ2105SW

Title: 218150_Swiss Gardens Primary S

Drawn by: kumaria

Scale: 1:1250

Date: 28/06/2016

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

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N

Southern Water

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape
05EDX			UNK	UNK	CIRC
0602X	5.48	3.54	150	VC	CIRC
1301X	2.5	1	300	VC	CIRC
1302X	2.25	1.26	150	VC	CIRC
1303X			300	VC	CIRC
1401X	2.64		300	VC	CIRC
1402X	2.07	1.2	150	VC	CIRC
141DX			OTHER	OTHER	CIRC
1501X	5.33	2.99	225	VC	CIRC
1502X	5.13	2.71	225	VC	CIRC
1503X			UNK	UNK	CIRC
150DX			OTHER	BRC	CIRC
152DX			225	VC	CIRC
153DX			UNK	UNK	CIRC
2302X	2.87	1.33	300	VC	CIRC
2303X	3.02	1.52	150	VC	CIRC
2306X			UNK	UNK	UNK
230DX			150	VC	CIRC
2402X	3.06	1.46	225	VC	CIRC
2452X			225	VC	CIRC
2453X			225	VC	CIRC
2501X	4.6	2.7	225	VC	CIRC
2551X			225	VC	CIRC
3303X	4.2	1.77	300	VC	CIRC
3304X			UNK	UNK	CIRC
3305X			UNK	UNK	CIRC
3306X			UNK	UNK	CIRC
330BX			150	VC	CIRC
330DX			300	VC	CIRC
331BX			UNK	UNK	CIRC
332BX			UNK	UNK	CIRC
333BX			UNK	UNK	CIRC
333DX			150	VC	CIRC
334DX			150	VC	CIRC
3401X	4.25	2.08	225	VC	CIRC
3402X	3.45	2.13	150	VC	CIRC
3501X	2.94	2.27	150	VC	CIRC
3551X			225	VC	CIRC
3552X			225	VC	U
3553X			225	VC	CIRC
3554X			225	VC	CIRC
3651X	3.35	1.98	225	VC	CIRC
3652X	3.48	1.89	225	VC	CIRC
3655X			150	VC	CIRC
4301X	4.97		300	VC	CIRC
4302X			UNK	UNK	CIRC
4303X			UNK	UNK	CIRC
432DX			UNK	UNK	CIRC
433DX			UNK	UNK	UNK
4501X	3.74	2.66	150	VC	CIRC
4502X	5.4	3.4	225	VC	CIRC
4503X	5.61		300	VC	CIRC
4504X	2.53		150	VC	CIRC
5303X			UNK	UNK	UNK
5504X			150	VC	CIRC
5505X			150	VC	CIRC
5506X			150	VC	CIRC
5507X			150	VC	CIRC
562DX			150	VC	CIRC

LINE STYLES / COLOURS

- Brown — Foul
- Foul Syphon Sewer
- Foul Vacuum Main
- Foul Rising Main
- Red — Combined
- Combined Syphon Sewer
- Combined Rising Main
- Lateral Drain
- Orange — Building Over Agreement Area
- Dark Blue — Treated Effluent
- Purple — Sludge
- Sewer Catchment
- Section 104 Area
- Light Blue — Surface Water
- Surface Water Rising Main
- Yellow — Private
- Green — Access Shaft
- Decommissioned

MATERIALS

AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
XXX	Other
ZZZ	Unknown

LEGEND - SEWERS

- Manhole (SW)
- Manhole (F&C)
- Lamp hole (SW)
- Lamp hole (F&C)
- Pumping Station (SW)
- Pumping Station (F&C)
- Side entry manhole (SW)
- Side entry Manhole (F&C)
- Blind shaft (SW)
- Blind shaft (F&C)
- Ejector station (SW)
- Ejector station (F&C)
- Watertight door (SW)
- Watertight door (F&C)
- Flushing ch. Mn-e (SW)
- Flushing ch. Mn-e (F&C)
- Flushing ch. No-e (SW)
- Flushing ch. No-e (F&C)
- Demarcation Chamber
- Washout (SW)
- Washout (F&C)
- Rodding Eye (SW)
- Rodding Eye (F&C)
- Gauging point (SW)
- Gauging point (F&C)
- Intercept chamber (SW)
- Intercept chamber (F&C)
- Storm Tank (SW)
- Storm Tank (F&C)
- Vortex chamber (SW)
- Vortex chamber (F&C)
- Label ellipse
- Dummy/S24 manhole
- Outfall
- Penstock chamber
- Damboards
- Storm Overflow
- Backdrop manhole
- Other (s)
- Other
- Change in sewer (s)
- Change in sewer
- Reflux valve
- Flap valve
- Cascade
- Anode
- Valve
- Closed Valve
- Air Valve
- Hatch box (SW)
- Hatch box (F&C)
- Direction arrow
- Emptying valve
- Catchpit
- Soakaway
- Inlet
- Balancing Pond
- Wastewater treatment works
- Marine treatment works
- Outfall headworks
- Vent
- Vent column
- Tidal storage tank
- Blank end
- Head of Public Sewer
- Micro Pumping Station

SHAPES (S)

A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

NODE REFERENCING SYSTEM

- 1st digit: hundred metre easting identifier
- 2nd digit: hundred metre northing identifier
- 3rd digit: sewer type identifier
  - 0-4 = Foul/Combined
  - 5-9 = Surface Water
- 4th digit: next sequential node

Drawn by:	kumaria
Title:	218150_Swiss Gardens Primary S
Date:	28/06/2016

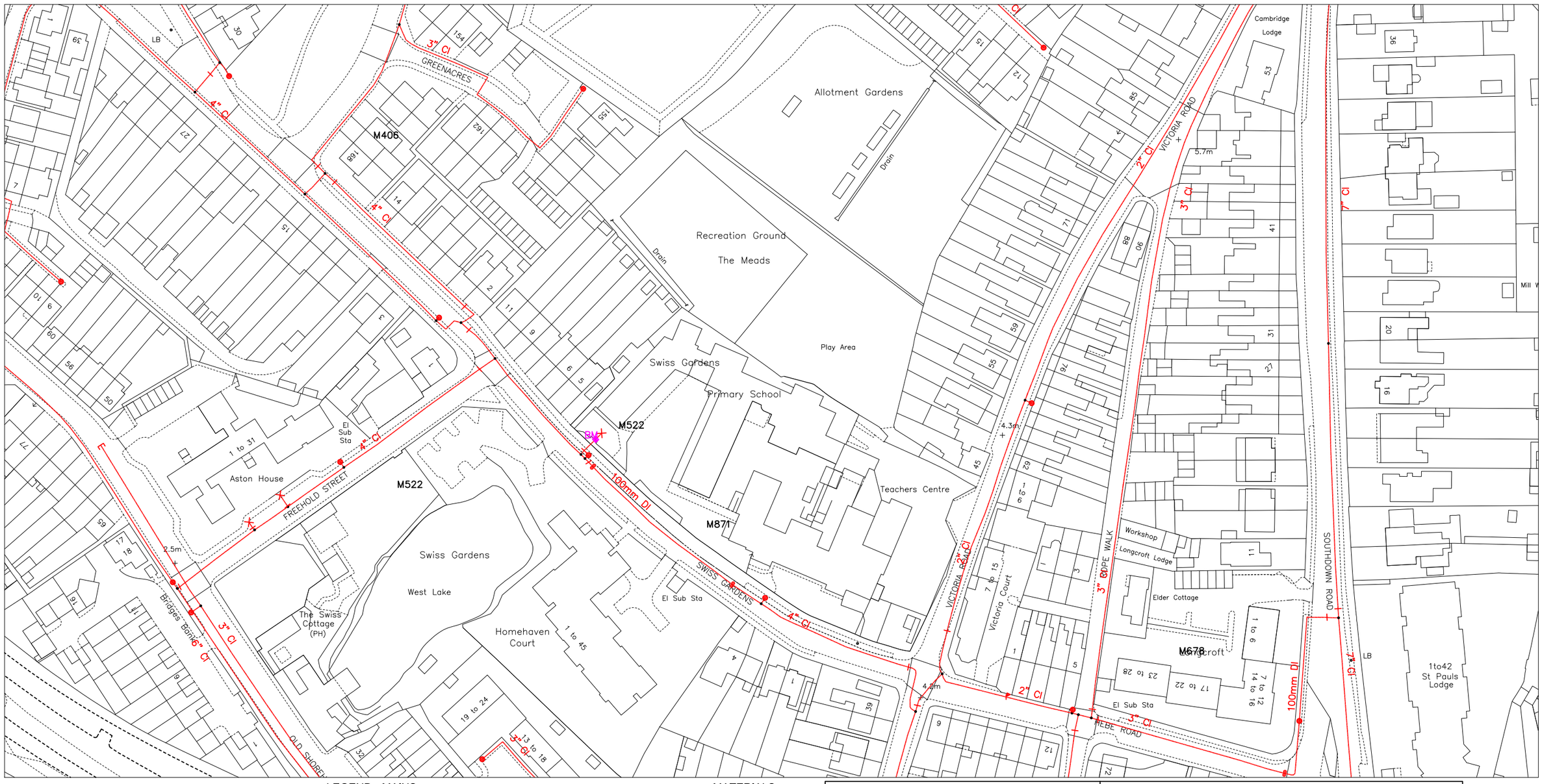
Southern Water

105607

105364

521086

521571



LEGEND - MAINS

- Distribution Main / Communication pipe
- Trunk Main
- RAW — Raw water main
- NP — Non potable
- Abandoned main
- P P — Proposed Main
- FM — Fire main
- Non SWS
- Sluice valve
- Closed valve
- AV — Air valve
- Butterfly valve
- Pressure reducing valve
- Reflux valve
- mv — Motorised valve
- Clockwise closing valve
- Fire Hydrant
- WO — Washout
- WOH — Washout hydrant
- M — Meter
- Capped end
- EP — Emptying plug
- Stopcock
- SP — Leak Noise Correlator Survey Point
- AN — Anode
- TC — Telemetry cable
- AP — Access point / hatchbox

- D — Dialysis machine
- BPT — Break pressure tank
- Change node
- Pumping station
- Booster station
- Insertion Flow Meter Point
- Water tower
- Service reservoir
- Water Supply Works
- Bore hole / Well
- Intake
- Customer site
- Swab insertion point

MATERIALS

Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

Drawn by:	kumaria
Scale:	1:1250
Date:	28/06/2016

O.S.Ref: TQ2105SW

TITLE: 218150_Swiss Gardens Primary S

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 of pipes should be determined on site.

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Southern Water

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Topographical Survey


STN1
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STN20
STNDEL4
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MH
IC
CTV
GV
LP
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SIGN
TOILET
BUSH
SAP
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GROVEL
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TORMOC
FLAT ROOF6.63
FLAT ROOF6.64
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FLAT ROOF6.46
FLAT ROOF5.50
FLAT ROOF6.35
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RIDGE942
RIDGE944
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SOFFIT6.41
FLAT ROOF6.39
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Appendix B
Site Layout
Proposed Drainage Layout

Site Layout

SWISS GARDENS FIRST SCHOOL





ALLOW TO DISMANTLE CYLE SHELTER AND ERECT NEW SHELTER TO LOCATION SHOWN ADJACENT MAIN ENTRANCE

CARRY OUT RE-SURFACING TO ENSURE CAR PARKING LOST IS REPLACED TO AREA HIGHLIGHTED

ALLOW FOR SURFACE WATER DRAINAGE TO PERIMETER OF BUILDING CONNECTING TO MAIN SEWER

ALLOW TO EXCAVATE FOR SERVICE TRENCHES FOR CONNECTING NEW FOUL WATER AND INCOMING WATER SUPPLY INTO NEW BUILDING

PROPOSED LOCATION OF MODULAR BUILDING TO INCORPORATE NEW CANOPY SHELTER FREE-STANDING LINKING TO MAIN BUILDING

CARRY OUT MINOR IMPROVEMENTS TO BOUNDARY FENCING WITH THE INCLUSION OF CLOSE BOARDED ACOUSTIC SCREENING

RETAIN ENTIRE VEGETABLE PATCH AND GARDENS

NEW BUILDING TO BE SITED ON EXISTING HARD SURFACE PLAY SURFACE FOR LEVEL ACCESS (FFL TO MATCH LEVEL OF EXTERNAL HPA)

BLOCK LAYOUT AS PROPOSED AT 1:500

NOTES:

Report all discrepancies, errors and omissions
Do not scale from this drawing.
Verify all dimensions on site before commencing any work or preparing shop drawings.
All materials, components and workmanship are to comply with all the relevant British Standards, Codes of Practice, and appropriate manufacturers recommendations that from time to time shall apply.
For all specialist work, see relevant drawings.

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Rev	Date	Description	Name
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Architecture & Planning ■ Building Surveying ■ Project Management ■ Cost Consultancy ■ CDM Co-ordination

CLIENT: WSCC WEST SUSSEX COUNTY COUNCIL
PROJECT: NEW MODULAR UNIT CLASSROOM
TITLE: SWISS GARDENS FIRST SCHOOL BLOCK LAYOUT AS PROPOSED
DATE: 06/06/16 | SCALE: 1:500 @A3 | DRAWN: JF | CHK:
DRAWING No: 250|017|003 P |B

Drainage Layout



DRAWING LEGEND

COMBINED DRAINAGE	
———	EXISTING COMBINED SEWER
——/——/——	EXISTING COMBINED RISING MAIN
SURFACE WATER DRAINAGE	
- - - - -	EXISTING SURFACE WATER DRAINAGE
—○— - - -	PROPOSED SURFACE WATER DRAINAGE
FOUL WATER DRAINAGE	
- - —·— - -	EXISTING FOUL WATER SEWER
—●— - - -	PROPOSED FOUL WATER DRAINAGE
MISC	
FFL 96.875	PROPOSED BUILDING FINISHED FLOOR LEVEL
× 97.80	EXISTING SPOT LEVEL

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER SWP DRAWINGS, AND WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND SPECIFICATION AND ANY DISCREPANCIES FOUND ARE TO BE REPORTED IMMEDIATELY TO THE ENGINEER.
2. NO DIMENSIONS ARE TO BE SCALED FROM THIS DRAWING. UNLESS NOTED OTHERWISE ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METRES FROM THE SITE DATUM.
3. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL DETAILS AND DIMENSIONS RELATING TO SUB-CONTRACTORS WORK MUST BE CHECKED AND AGREED BETWEEN THE SUB-CONTRACTOR OR SUPPLIER AND THE GENERAL CONTRACTOR.
4. THE ELECTRONIC INFORMATION FROM THIS DRAWING CAN NOT BE GUARANTEED AS DIMENSIONALLY DRAWN EXACT. FIGURED DIMENSIONS MUST BE USED FOR SETTING OUT AND DETAILING. SWP LOGOS AND COMPANY INFORMATION MUST BE REMOVED FROM COPIES IF INFORMATION IS RE-USED.
5. THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY WORKS, AND IS ALSO RESPONSIBLE FOR THE SAFE MAINTENANCE AND STABILITY OF EXISTING BUILDINGS AT ALL TIMES.
6. THE MAIN CONTRACTOR IS RESPONSIBLE FOR ALL OCCURRENCES OF GROUND WATER DURING THE CONSTRUCTION PERIOD.
7. ANY INFORMATION GIVEN REGARDING EXISTING UNDERGROUND SERVICES IS GIVEN IN GOOD FAITH AFTER CONSULTATION WITH THE RELEVANT AUTHORITY, HOWEVER ACCURACY IS NOT CERTAIN. THE MAIN CONTRACTOR IS RESPONSIBLE FOR CHECKING ALL INFORMATION ON SITE PRIOR TO WORK COMMENCING AND TAKING DUE CARE AND ATTENTION WHILST UNDERTAKING THE WORKS.
8. THE CONTRACTOR MUST COMPLY WITH ALL CURRENT LEGISLATION RELATING TO HEALTH & SAFETY.
9. ALL PRODUCTS SPECIFIED SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND INSTRUCTIONS. IF THERE ARE DISCREPANCIES BETWEEN THAT INFORMATION AND THE DETAILS ON ANY SWP DRAWINGS, THE MANUFACTURERS INSTRUCTIONS MUST BE USED.

DRAINAGE NOTES:

1. ALL DRAINAGE WORKS TO BE CONSTRUCTED IN STRICT ACCORDANCE WITH SPECIFICATION OF THE LOCAL AUTHORITY, BUILDING REGULATIONS, SEWERS FOR ADOPTION, BS8301 & BSEN.752-1.
2. FOR LOCATION AND SETTING OUT OF BUILDING DRAINAGE POINTS REFER TO ARCHITECTS DRAWINGS.
3. ALL PIPE RUNS NEAR BUILDINGS TO COMPLY WITH THE BUILDING REGULATIONS 2002 PART H1. WHERE A PIPE IS WITHIN 1m OF A FOUNDATION THE TRENCH SHALL BE FILLED WITH CLASS GEN3 CONCRETE UP TO THE LOWEST LEVEL OF THE FOUNDATION. WHERE THE TRENCH IS FURTHER THAN 1m FROM THE FOUNDATION, THE TRENCH SHALL BE FILLED WITH CLASS GEN3 CONCRETE TO A LEVEL BELOW THE LOWEST LEVEL FOR THE FOUNDATION EQUAL TO THE DISTANCE FROM THE FOUNDATION LESS 150mm. IN BOTH CASES THE PIPE SHALL BE BEDDED AND SURROUNDED IN 150mm THICK CLASS GEN3 CONCRETE.
4. WHERE PIPES, EXTERNAL TO THE STRUCTURES, HAVE A DEPTH TO SOFFIT FROM GROUND LEVEL OF LESS THAN 450mm THEY SHALL HAVE A CLASS GEN3 CONCRETE ENCASEMENT (150mm THICK).
5. WHERE A PIPE, UNDER A CARRIAGEWAY, HAS A DEPTH OF COVER OF LESS THAN 1.2m THE PIPE SHALL BE LAID IN A CONCRETE BED AND SURROUND.
6. IN ANY CIRCUMSTANCES WHERE PIPES ARE BEDDED AND SURROUNDED IN CONCRETE FLEXIBLE JOINTS SHOULD BE PROVIDED. COMPRESSIBLE BOARDS (FIBREBOARD OR POLYSTYRENE) SHALL BE PROVIDED AT A MAXIMUM OF 6m CENTRES (COINCIDING WITH PIPE JOINTS). THE BOARDS SHALL BE PRE-CUT TO PIPE DIAMETER AND TO A HEIGHT AND WIDTH EQUAL TO THE CONCRETE CROSS SECTION. A BOARD THICKNESS OF 18mm FOR PIPES UP TO 450mm NOMINAL DIAMETER AND 36mm FOR PIPES OVER 450mm NOMINAL DIAMETER.
7. ALL PRIVATE BUILDING DRAINAGE SHALL BE CONSTRUCTED IN STRICT ACCORDANCE WITH BSEN.752-1. UNLESS OTHERWISE SPECIFIED BUILDING DRAINAGE SHALL BE 100mm DIAMETER AND SHALL BE LAID AT A MINIMUM GRADIENT OF (×1LIS = 1 IN 40>1LIS = 1 IN 80) FOR FOUL DRAINS AND 1 IN 80 FOR SURFACE WATER DRAINS. ALL BUILDING DRAINS SHALL BE LAID IN CONJUNCTION WITH 'NON ADOPTIVE BEDDING DETAILS' (CLASS D, N OR B) UNLESS OTHERWISE SPECIFIED.
8. ALL PIPES, BENDS AND JUNCTION FOR PRIVATE BUILDING DRAINAGE SHALL BE UPVC CONFORMING TO BS4660 AND BS5481 AS APPROPRIATE AND SHALL BE LAID IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION. ALL PIPES, BENDS AND JUNCTION MATERIALS FOR ADOPTABLE DRAINAGE SHALL BE VITRIFIED CLAY. EXTRA STRENGTH OR SUPER STRENGTH TO BSEN295, WITH FLEXIBLE JOINTS AND KITEMARK CERTIFIED
9. ALL BACK INLET GULLIES TO BE RODDABLE OR CONNECTED TO INSPECTION CHAMBERS.
10. ALL GULLY CONNECTIONS OTHER THAN AT MANHOLES TO BE 'Y' JUNCTIONS.
11. ALL ROAD GULLY CONNECTIONS TO BE 150mm DIAMETER.
12. ALL STUB STACKS TO BE FITTED WITH AIR ADMITTANCE VALVES WHERE BRANCH DRAIN EXCEEDS 12m EXCEPT AT THE HEAD OF THE RUN. SOIL VENT PIPES LOCATED AT THE HEAD OF A RUN TO TERMINATE TO FRESH AIR.
13. ALL CONNECTIONS TO BE SOFFIT TO SOFFIT UNLESS OTHERWISE NOTED.
14. ALL CONCRETE AND CONCRETE PRODUCTS TO BE IN ACCORDANCE WITH BRE 363 FOR SULPHATES.
15. THE LOCATIONS OF ALL SVPS AND RWPS SHALL BE CROSS REFERENCED AGAINST THE ARCHITECTS DRAWINGS DURING SETTING OUT.
16. BEFORE CONNECTIONS ARE MADE TO EXISTING PUBLIC SEWERS AN APPLICATION UNDER 106 MUST BE MADE TO THE APPROPRIATE SEWERAGE PROVIDER.
17. THE PRECISE DEPTH AND LOCATION AND SIZE OF EXISTING PIPES OR MANHOLES WHERE CONNECTIONS OR DIVERSION ARE PROPOSED MUST BE CONFIRMED AND REPORTED TO THE ENGINEER AT THE EARLIEST OPPORTUNITY.
18. SURFACE WATER FROM PRIVATE DRIVES MUST NOT DRAIN ON TO THE PROPOSED OR EXISTING PUBLIC HIGHWAY AND VICE VERSA.

COLOURED DRAWING
REQUEST A COLOURED COPY IF THIS STAMP IS NOT RED

PRELIMINARY

REV.	DATE	DESCRIPTION
-	-	-

CLIENT: PELLINGS

ARCHITECT: PELLINGS

JOB TITLE: SWISS GARDENS SHOREHAM

DRAWING TITLE: DRAINAGE STRATEGY

SCALE AT A1	DATE	DRAWN	JOB No.	DRAWING No.	REV.
1:200	JUL16	LG	E6586	Sk.201	-
	ENG. LG	CHECKED GW			

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E.Mail: info@swpeast.co.uk

Appendix C
Calculations:
Greenfield Run-off (QBar)
Predevelopment Surface Water Run-off
Post development Surface Water Run-off

Green Field Run-off (QBar)

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.695	Urban	0.000
SAAR (mm)	700	Region Number	Region 7

Results l/s

QBAR Rural	1.3
QBAR Urban	1.3
Q100 years	4.0
Q1 year	1.1
Q30 years	2.9
Q100 years	4.0

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Predevelopment Run-off Rates

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

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 Coeffiecient	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 Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.900	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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%					4.189
1.001	2	15 Winter	1	+0%					3.989

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.261	0.000	0.36		90.6	OK	
1.001	2	-0.261	0.000	0.36		91.7	OK	

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

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 Coeffiecient	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 Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.900	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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	30
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%					4.335
1.001	2	15 Winter	30	+0%					4.134

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.115	0.000	0.88		222.1	OK	
1.001	2	-0.116	0.000	0.89		225.0	OK	

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

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 Coeffiecient	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 Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.900	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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+0%					4.386
1.001	2	15 Winter	100	+0%					4.185

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.114	0.000	0.93		288.5	OK	
1.001	2	-0.115	0.000	0.94		291.5	OK	

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Predevelopment Run-off Volume

360 minute 100 year Summer I+0%
Average Rainfall Intensity 10.929 mm/hr

Time (mins)	US Level (m)	DS Level (m)	Surcharged Depth (m)	Pipe Velocity (m/s)	Pipe Flow (l/s)
6	3.835	3.650	-0.465	0.6	2.8
12	3.840	3.650	-0.460	0.7	5.0
18	3.841	3.650	-0.459	0.7	5.3
24	3.842	3.650	-0.458	0.7	5.4
30	3.843	3.650	-0.457	0.7	5.6
36	3.844	3.650	-0.456	0.7	5.7
42	3.845	3.650	-0.455	0.7	5.8
48	3.846	3.650	-0.454	0.7	5.9
54	3.847	3.650	-0.453	0.7	6.1
60	3.849	3.650	-0.451	0.7	6.3
66	3.851	3.650	-0.449	0.7	6.7
72	3.851	3.650	-0.449	0.7	6.9
78	3.852	3.650	-0.448	0.7	7.2
84	3.853	3.650	-0.447	0.7	7.6
90	3.854	3.650	-0.446	0.7	8.0
96	3.855	3.650	-0.445	0.7	8.4
102	3.856	3.650	-0.444	0.7	9.0
108	3.858	3.650	-0.442	0.8	9.6
114	3.861	3.650	-0.439	0.8	10.7
120	3.864	3.650	-0.436	0.8	11.7
126	3.868	3.650	-0.432	0.9	13.5
132	3.874	3.650	-0.426	0.9	15.2
138	3.881	3.650	-0.419	0.9	18.5
144	3.890	3.650	-0.410	1.0	21.3
150	3.901	3.650	-0.399	1.0	26.5
156	3.909	3.650	-0.391	1.0	30.9
162	3.916	3.650	-0.384	1.1	36.8
168	3.927	3.650	-0.373	1.1	42.1
174	3.936	3.650	-0.364	1.2	50.1
180	3.949	3.650	-0.351	1.2	56.5
186	3.948	3.650	-0.352	1.2	59.9
192	3.936	3.650	-0.364	1.2	54.1
198	3.926	3.650	-0.374	1.2	46.9
204	3.916	3.650	-0.384	1.1	40.0
210	3.908	3.650	-0.392	1.1	34.3
216	3.901	3.650	-0.399	1.0	29.3
222	3.888	3.650	-0.412	1.0	25.4
228	3.881	3.650	-0.419	1.0	20.6
234	3.873	3.650	-0.427	0.9	17.3

Total Volumes: Over Overflow (Spill Flow) 0.000m³ Pipe 341.261m³

Post Development Run-off Rates

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

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 Coeffiecient	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 Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.900	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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1
Climate Change (%)	30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+30%					4.216
1.001	2	15 Winter	1	+30%					4.016

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.284	0.000	0.38		118.0	OK	
1.001	2	-0.284	0.000	0.38		119.4	OK	

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

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 Coeffiecient	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 Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.900	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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	30
Climate Change (%)	30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+30%					4.387
1.001	2	15 Winter	30	+30%					4.186

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.113	0.000	0.93		289.5	OK	
1.001	2	-0.114	0.000	0.94		292.5	OK	

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

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 Coeffiecient	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 Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.900	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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+30%					4.494
1.001	2	15 Winter	100	+30%	100/15 Summer				4.355

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.106	0.000	0.82		366.9	OK	
1.001	2	0.055	0.000	1.18		367.2	SURCHARGED	

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Appendix D

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