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FLOOD RISK AND DRAINAGE ASSESSMENT FOR A PROPOSED CHANGE IN LAYOUT AT BRIGHTON WHARF, BRIGHTON

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GENERAL NOTES

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1 INTRODUCTION

1.1 Background

Planning permission is being sought from West Sussex County Council for a proposed change of layout to CEMEX's aggregate processing facility on the landward side of Shoreham Harbour.

Hafren Water has been commissioned to undertake a Flood Risk and Drainage Assessment in support of the Planning Application.

1.2 Scope of the assessment

An assessment of the flood risk to and from the site is required to support the Planning Application. This assessment is presented below together with a review of existing and proposed drainage measures. Potential impacts have been identified and mitigation measures proposed, where necessary.

1.3 Data sources

The following data sources were used in this assessment:

CEMEX UK Operations Ltd

- Existing site plan, Drawing Nº TD 19005 (no date)
- Site layout and traffic management, Drawing Nº TD 18029 (7-9-2018)

Ordnance Survey (OS)

- 1:25,000 series mapping

British Geological Survey (BGS)

- Geology viewer (BGS website)

Environment Agency (EA)

- Product 4 Flood risk information and maps, Apr 2019

Adur District Council, Brighton and Hove City Council, West Sussex County Council and Shoreham Port Authority (in cooperation with Environment Agency)

- Shoreham Harbour Flood Risk Management Guide Supplementary Planning Document (SPD), Sep 2015
- Draft Shoreham Regeneration Area Joint Area Action Plan (JAAP) 2014

West Sussex County Council (WSCC)

- Local Flood Risk Management Strategy for West Sussex (2013 – 2018), May 2014.
- Beachy Head to Selsey Bill Shoreline Management Plan, May 2006
- Adur Local Plan 2017, adopted Dec 2017

Brighton and Hove City Council (BHCC)

- Brighton and Hove Council SFRA, Jan 2012
- Local Flood Risk Management Strategy, Feb 2015
- Brighton and Hove City Plan Part One, March 2016

Southern Water

- Commercial Drainage and Water Search, Apr 2019

1.4 National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG)

This FRA has been undertaken with due regard to the statutory requirements of the NPPF and with reference to the PPG in relation to development and flood risk, to ensure that flood risk is taken into account at all stages of the planning process and to avoid inappropriate development in areas potentially at risk of flooding.

PPG classifies the flood risk vulnerability of sites used for offices, minerals working and processing as 'less vulnerable' development.

1.5 Local Planning Policy Guidance

The site straddles the Brighton and Hove City Council and West Sussex County Council boundary. Both Councils are Lead Local Flood Authorities with responsibility for any potential surface water flooding issues at the site. Brighton and Hove City Council and Adur District Council are the local planning authorities for the site and their policies regarding flooding must be taken into account.

Also, Adur District Council, Brighton and Hove City Council, West Sussex County Council and Shoreham Port Authority are working in partnership to support the regeneration of Shoreham Harbour where the site is located. They have prepared a Joint Area Action Plan (JAAP) for the regeneration area for which consultations ended in March 2019. Developments within the area are expected to be consistent with strategies and policies within the JAAP. The site straddles the boundary between the 'Southwick Waterfront and Fishersgate' and 'North Quayside/South Portislade' Character Areas.

Brighton and Hove City Plan Part One 2016

The Brighton and Hove Local Plan was adopted in July 2005 and some policies have been replaced by those in the City Plan Part One which was adopted in March 2016. Of particular relevance to the proposal is:

Policy CP11 Managing Flood Risk

"Where site-specific flood risk assessments are required they must be consistent with the latest guidance in the SFRA, national planning policy framework and technical guidance, and any supplementary information from the Environment Agency. In particular development should include appropriate sustainable drainage systems in order to avoid any increase in flood risk and to ideally reduce flood risk."

Appendix 3 of the Brighton and Hove SFRA (2012) suggests Flood Risk Assessments should meet the following criteria:

- If the development is within tidal Flood Zone 3a, assess the flood risk from a breach in, or overtopping of, the tidal defences, and the risk from wave overtopping.
- Where necessary demonstrate whether the site is at residual risk from tidal flooding.
- Identify and detail the level of risk to a development from all sources.
- Detail how all sources of flood risk will be managed and the consequences mitigated.
- Where possible show how overall flood risk will be reduced.
- Undertake a drainage impact assessment to identify the impact of the proposed development on surface water drainage, including the potential impact upon neighbouring areas, and recommend the approach to controlling runoff to the required discharge rates.
- Show that safe access can be provided to an appropriate level for the type of development.
- Show that flood flow routes are preserved and floodplain storage capacity is not reduced.

Adur Local Plan 2017

Policy 36: Flood Risk and Sustainable Drainage. Of specific relevance to the proposal is:

"The flood risk assessment will need to demonstrate that development:

- is appropriately flood resilient and resistant, includes safe access and escape routes where required, and that any residual risk can be safely managed;
- will be safe for its lifetime taking account of the vulnerability of its users;

- will not increase flood risk (including sewer flooding, surface water and groundwater flood risk) elsewhere;
- will, where possible, reduce flood risk overall; and
- will give priority to the use of sustainable drainage systems"

Shoreham Harbour Flood Risk Management Guide Supplementary Planning Document (SPD) 2015

Planning applications relating to sites within the Shoreham Regeneration Area Joint Area Action Plan (JAAP), within which the site is located, will be expected to follow the guidance set out in the SPD. The site is located immediately to the west of the Aldrington Basin strategic development site for which guidance regarding flood mitigation has been provided.

The preferred approach to flood risk mitigation in Aldrington Basin is to set finished floor levels at a minimum of 5.77 metres Above Ordnance Datum (mAOD) for residential development. Non-residential development should be safe for at least 60 years from the date of receiving planning permission. Residual flood risk should be dealt with through resilient (measures that allow flooding but make a building resilient to its damaging effect) and resistant (measures to exclude flooding by dry proofing buildings) design measures.

The guidance also provides a set of 'Guiding Principles' when preparing planning applications for new development. These relate to finished floor levels, flood defences in the western harbour, habitat, contamination and SuDS.

Guiding Principle FRMG2: Finished Floor Levels

"For non-residential development, proposals must be designed to be safe for the proposed lifetime of the development, assumed to be at least a 60 year period from the date of receiving planning permission, unless otherwise agreed with the Local Planning Authority."

Draft Shoreham Regeneration Area Joint Area Action Plan (JAAP) 2014

This will provide more detailed policy for the Shoreham Harbour regeneration area. It includes the following policy for the area immediately to the east of the site:

Policy JAAP 3: Aldrington Basin

"In accordance with the emerging Flood Risk Technical Guidance, development proposals should be designed to be safe for the 1:200 yr tidal flood event level to 2115 for residential uses

and to 2082 for commercial development with an appropriate freeboard (ie watertight safety zone above the theoretical flood level)."

1.6 Flood risk classification

As defined by the Environment Agency's Flood Map for Planning (Rivers and Sea), the Application Area is located entirely within Flood Zone 3 which is land having a 1 in 100 or greater annual probability of river flooding; or land having a 1 in 200 or greater annual probability of sea flooding.

2 PROPOSED DEVELOPMENT

2.1 Location and setting

The Application Area ('the site') comprises a wharf on the landward side of Shoreham Harbour, Brighton, and is centred on National Grid Reference (NGR) TQ 259 049 (*Drawing 2762/FRA/01*). The site is bounded by the harbour basin to the south and west and an industrial area to the east. The harbour access road (Basin Road North) runs along the northern boundary with light industrial units and open ground on the opposite side of the road to the site. The A259 separates the harbour from commercial and residential areas 60 m to the north.

The existing and proposed development is shown on site layout plans in *Appendix 2762/FRA/A1.1 and Appendix 2762/FRA/A1.2,* respectively.

2.2 Pre-development (existing) site

The site extends to 3.5 hectares (ha) and includes 0.1 ha of roofs associated with the haulage workshop, office block and container office. The remaining area (3.30 ha) is occupied by processing plant, storage bays, conveyors, weighbridge and loading areas and is predominantly hardstanding with also a small (0.1 ha) permeable area around the Ballast as Dredged (BAD).

Drainage from the aggregates yard, BAD and materials stores is directed into a small sump which contains a sediment trap. Water is pumped daily from the sump to the washing plant by an activated float control valve. Excess water is discharged into the harbour via a gate valve under discharge licence (number P.4076/S/CH/91), which allows a maximum discharge of 12 cubic metres per 24 hours to the harbour at no more than 50 ppm.

Rainfall from office roofs feeds into a drain which discharges into the harbour.

2.3 Post-development site

The proposed development will involve a small change to the alignment of the northern boundary to accommodate new car parking and a revised site entrance. The development will also involve relocation of the weighbridge and demolition of an existing office block and container office to make way for a new office block, meeting room and car parking. The haulage office will be retained but new parking created. A conveyor will be installed along the wharf side. A new BAD storage facility will be installed on the wharf side in the site's south eastern corner.

The proposed development will entail a slight increase (2%) in the overall site area by 600 m^2 to 3.56 ha. The total roof area will decrease by approximately 150 m^2 and hardstanding area will increase by 750 m^2. Permeable areas will not change and therefore the total impermeable (roof and hardstanding) will increase by just 2% to 3.37 ha.

There are no known proposals to change the existing site water management. Drainage from roof areas will continue to discharge to the harbour via subsurface drains. Drainage from the aggregate yard will be directed to the existing sump next to the new BAD storage facility where water will be pumped daily to the washing plant. Excess water is discharged into the harbour under the existing discharge licence (number P.4076/S/CH/91).

3 BASELINE CONDITIONS

3.1 Topography and Ground Conditions

The site has a general elevation of 4.2 mAOD and is relatively flat. LiDAR data indicates that residential areas, commercial areas and the harbour access road to the north of the site occupy higher ground, whilst the industrial area to the east is of a similar elevation to the site. The southern and western boundaries of the site adjoin the harbour basin.

Ground within the site is predominantly hardstanding and is expected to rest on the made ground associated with the construction of the harbour and wharves.

3.2 Hydrology

3.2.1 Watercourses

The site and its immediate surroundings contain no natural watercourses.

Sewer records obtained from Southern Water show that a 100 mm diameter branch of the public combined sewer system ends next to the north-eastern corner of the site. A surface water drain in the site immediately to the east runs parallel to the eastern boundary of the site. Records show that no public drainage or sewer pipes enter or cross the site (*Appendix 2762/FRA/A2*).

3.2.2 Waterbodies

No natural waterbodies are located within the site boundary.

The Southwick Ship Canal runs east-west and parallel to the coast. It was once the River Adur channel but after a new channel mouth was created in 1816, and ship lock in the 1850s, it subsequently functioned as a harbour (Shoreham).

The site is located towards the eastern end of Shoreham Harbour and on its landward side. The harbour is linked to the sea via three locks at its western end, adjacent to the River Adur mouth. The seaward side of the harbour contains warehousing, an access road (Basin Road South) and a shingle beach.

3.3 Historical flooding

A high intensity rainfall event in July 2014 occurred over Hove and Portslade with 73.5 mm of rainfall recorded in a day. Over 100 properties were affected relating mainly to flooding of basements.

"Storm events during the Winter 2013/14 caused significant damage and disruption impacting factories and warehouses within Shoreham Port. Emergency repair works included the repair of breaches in seawalls and rebuilding some of the more critical groynes and revetments." (Shoreham Harbour Flood Risk Management Guide Supplementary Planning Document, September 2015).

3.4 Existing flood risk management

3.4.1 Flood defences

The Environment Agency and District and Borough Authorities manage the flood risk to coastal properties by managing groynes and sea walls, replenishing beach material and by maintaining the natural beach defence. Shoreline Management Plans guide the strategic management of the coastline.

The Environment Agency 'Flood Map for Planning (Rivers and Sea) shows flood defences along the opposite and seaward side of Shoreham Harbour (*Appendix 2762/FRA/A3.1*). The Environment Agency has confirmed that coastal flood defences adjacent to the site are in the form of a shingle beach, managed by Brighton and Hove Local Authority. The beach is designed to offer an estimated 1% Annual Exceedance Probability (1 in 100 standard of protection).

The Brighton Marina to Adur Strategy (November 2014) assessed the condition of defences. It states "*The lock gates at Shoreham Port are not flood defence structures, as they act only to retain water levels within the basin. The current standard of protection, taking into account the lock gates, is <100 % Annual Exceedance Probability (hereafter AEP) which equates to a 1 in 1 year event. Future sea level rise will reduce the ability of the Port to manage land use and will increasingly impact the viability of the businesses that use the port*." The strategy also noted "*….that significant variations in defence heights and beach widths along the frontage have resulted in a number of weak points susceptible to flooding including poorly maintained and deteriorated assets along the Southwick to Hove frontage*".

The site lies within the Beachy Head to Selsey Bill Shoreline Management Plan (May 2006) policy unit reference 4d13 which states "*The present-day policy for this area is to continue to protect the harbour town frontage through maintaining the existing steel sheet-piled wall, revetment, splash wall, east pier and eastern harbour breakwater (all at the harbour entrance)*."

However, the Brighton Marina to Adur Flood and Coastal Erosion Risk Management Strategy Review (November 2014) reports the Shoreham Port Authority has a strategic programme of defence renewal which manages immediate breach risk on an ad hoc basis and "*With a large*

amount of operational infrastructure to maintain, the Port's potential to improve flood defence within this area is therefore limited. However, without the coast protection activities carried out by the Port Authority, neighbouring properties and infrastructure would become vulnerable to erosion and flooding as the Port's defences fail."

3.4.2 Flood Warning

The Environment Agency has stated that the site falls partially within both the 'Shoreham Town & Lancing', and the 'Shoreham Harbour' Flood Warning Areas.

3.5 Climate change

Within the UK, projections of future climate change indicate that there will be more frequent, short duration, high intensity rainfall events and periods of long duration rainfall. Brighton and Hove City Council recommends that the effects of climate change are incorporated into surface water run-off calculations. Recommended precautionary sensitivity ranges for peak rainfall intensities and cumulative sea level rise are given on the Environment Agency website, 'Flood risk assessments: climate change allowances' (last updated February 2019) and are summarised in *Table 2762/FRA/T1* below.

2762/FRA/T1: Recommended increases in rainfall parameters due to climate change			
Peak Rainfall Intensity - Applies across all of England	**Years**		
	'2020s'(2015 to 2039)	**'2050s' (2040 to 2069)**	**'2080s' (2070 to 2115)**
Upper estimate	+10%	+20%	+40%
Central estimate	+5%	+10%	+20%

Peak rainfall intensities with a climate change adjustment of 40% have been used to calculate run-off rates and volumes for the site.

The Environment Agency's 'Flood risk assessments: climate change allowances' (last updated February 2019) also provides guidance regarding potential changes in sea level rise which are summarised in *Table 2762/FRA/T2* below. Sea level rise relates to 1990 baseline and the south east region where the cumulative increase between 1990 and 2115 is 1.21 m.

It is understood that the effect of climate change on wave overtopping has not been taken into account in estimates of sea level rise; given that the region is highly susceptible to wave overtopping, the true risk of future climate change is only partially presented in the reported increase.

2762/FRA/T2: Potential increases in sea level in the South East region due to climate change				
Component	**Years**			
	1990 to 2025	**2026 to 2055**	**2056 to 2085**	**2086 to 2115**
Incremental increase in mean sea level (mm/yr)	4	8.5	12	15
Cumulative increase in mean sea level (mm)	140	395	755	1205

4 FLOOD RISK TO SITE

4.1 Background

The risk of flooding at the site has been assessed by examining the likelihood of flooding (frequency), the hazard caused if the site were to flood (typically depth of flooding) and its vulnerability (land use type and activity). This has been undertaken for a range of likely flood sources which include: fluvial, pluvial and sewer. Given the impermeable nature of the site and its location next to a harbour, the potential for groundwater or reservoir flooding is judged to be negligible.

4.2 Fluvial flooding

The Environment Agency's Flood Map for Planning (Rivers and Sea) shows the site lies within Flood Zone 1 for fluvial flooding, which is land having a less than 1 in 1,000 annual probability of river flooding and is the lowest classification of risk (*Appendix 2762/FRA/A3.1*).

4.3 Tidal flooding

Tidal flood water levels and flood risk zones have been obtained from the Environment Agency. This information is derived from the 'Arun to Adur Flood Modelling and the Shoreham Harbour Regeneration: Design and Flood Risk Study' (JBA, 2012). The study used comprehensive extreme sea level and wave information, good quality topographic data and advanced floodplain inundation modelling techniques to define tidal Flood Zones 2 and 3 (Brighton and Hove Council SFRA, January 2012).

The Environment Agency's Flood Map for Planning (Rivers and Sea) shows areas at risk of flooding if undefended. The southwestern half of the site is situated within Flood Zone 3 and the northeastern half is within Flood Zone 2 (*Appendix 2762/FRA/A3.1*). Flood Zone 3 is the highest classification of risk and is land having a 1 in 200 or greater annual probability (0.5% Annual Exceedance Probability (AEP)) of sea flooding whilst Flood Zone 2 is land having between a 1 in 200 and 1 in 1,000 annual probability (0.5% to 0.1% AEP) of sea flooding. It should be noted that these flood zone maps do not include allowances for climate change. If the predicted effects of climate change in 2070 are taken into account then the majority of the site would be designated as Flood Zone 3 (0.5% AEP) (*Appendix 2762/FRA/A3.2*).

The Flood Zones show the site would be inundated if undefended, therefore there is a residual risk associated with a breach of the defences around the harbour. Flood mapping with defences in place predicts the effects of climate change in 2070 on the extent of Flood Zone 3 would be reduced (*Appendix 2762/FRA/A3.3*).

The Brighton and Hove Council SFRA (January 2012) states that detailed modelling has been undertaken to assess the impact of wave overtopping along the Shoreham coastal frontage. The results indicated there is a significant risk posed to parts of Shoreham Harbour. However, given the location of the site on the landward side of the harbour wave overtopping is not expected to be a significant hazard.

Predicted tidal water levels and water depths across the site have been obtained from the 'Arun to Adur Flood Modelling and the Shoreham Harbour Regeneration: Design and Flood Risk Study' (JBA, 2012) and are listed in *Appendix 2762/FRA/A3.4*. Water levels and depths for the lowest (south west corner) and highest (north east corner) parts of the site are summarised in *Table 2762/FRA/T3*. Water levels are slightly lower for the undefended scenario due to the different flow dynamics in an undefended situation.

2762/FRA/T3: Predicted tidal flood depths and elevations at the site with flood defences

Node n°	Depth/ elevation	Defended Annual Exceedance Probability							
		20%	5%	1.3%	0.5%	0.5% (2070)	0.5% (2115)	0.1%	0.1% (2115)
2 (SW corner)	Depth (m)	0.37	0.50	0.59	0.70	1.17	1.77	0.88	1.96
	Elevation (mAOD)	3.99	4.13	4.24	4.34	4.82	5.42	4.53	5.61
10 (NE corner)	Depth (m)	NF	NF	NF	NF	NF	<0.01	NF	0.17
	Elevation (mAOD)	NF	NF	NF	NF	NF	5.42	NF	5.62

Notes: NF indicates no flooding. (2070) indicates tide levels increased by climate change allowance

Mitigation measures comprise the continued use of existing drainage systems with additional actions as set out in Section 6.

4.4 Surface water flooding

Surface water flooding is largely driven by the topography of the site and its elevation relative to surrounding areas. LiDAR survey data suggests that much of the northern boundary of the site is slightly higher than the adjacent North Harbour Road. The exception is the northeastern corner of the site where gradients appear to be towards the site.

The Environment Agency's 'Risk of flooding from surface water' map (*Appendix 2762/FRA/A3.5*) indicates that the site has a 'very low' risk of surface water flooding (<0.1% AEP). There is a higher but still 'low' risk (1% to 0.1% AEP) of flooding to parts of the site running

east to west and small isolated areas of medium risk (3.3% to 1% AEP). A small area of 'high' risk (>3.3% AEP) occurs towards the centre of the southern boundary next to the harbour side. The northeastern corner of the site has a low risk of surface water flooding which is most likely caused by ground that slopes towards the site.

Due to the low risk of surface water flooding no mitigation measures are required.

4.5 Flooding from sewers and water mains

Sewer flooding generally results in localised short-term flooding caused by intense rainfall events overloading the capacity of sewers. Flooding can also occur as a result of blockage by debris or sediment, poor maintenance, structural failure or surcharging of the system due to high water levels in the receiving fluvial system.

Southern Water has indicated the site is not directly connected to a public sewer or drainage system and there are no known instances of sewer induced flooding in the vicinity. The Brighton and Hove Council SFRA, (January 2012) states that sewer flooding has been recorded in a number of locations within the Shoreham Harbour Area. These are typically clustered north of the A259 and away from the site.

Due to the absence of sewers no mitigation measures are required.

5 FLOOD RISK TO THE SURROUNDING AREA

5.1 Flood mechanism

The proposed development will slightly modify the run-off characteristics of the site due to small changes in the proportion of roof and hardstanding areas. The proposed development will entail a slight increase in the overall impermeable area of the site by 600 m^2 to 3.46 ha. The proposed total roof area (910 m^2) will decrease by approximately 140 m^2 compared to the existing site layout and hardstanding area will increase by 740 m^2 to 3.47 ha.

5.2 Surface run-off from the site

Run-off from roof areas will continue to be directed to the harbour via sub-surface drains. Run-off from the remaining hardstanding and permeable areas will continue to be directed to a sump for re-use or discharge under licence to the harbour. The site is generally at a lower level than commercial areas and the harbour access road to the north. It has been confirmed by CEMEX that storm water run-off in excess of the sump capacity and permitted discharge will therefore overflow into the harbour.

The existing site is classed as 'brownfield', therefore it is necessary to accommodate only the surface water run-off above that of the existing site, plus the allowance for climate change (40%). This increase in run-off is 840 m^3 (for the 1 in 100-year +40%CC volume) (*Appendix 2762/FRA/A4.1 and A4.2*).

The harbour basin behind the canal gates has an area of 20 ha. Therefore, the increased overflow during a 100-year 6-hour event with 40% climate change volume theoretically represents a 4 mm uplift in harbour water level over a period of six hours should the lock gates remain closed. This is a negligible change in level compared to the freeboard within the harbour and the proposed development will therefore not increase the risk of flooding to external areas.

Given the absence of an increase in flood risk to external areas no mitigation is proposed.

6 MITIGATION AND DRAINAGE STRATEGY

6.1 Summary of requirements

Table 2762/FRA/T4 shows which combinations of flooding sources and receptors require mitigation due to the proposed development.

This assessment of flood risk has identified that the development is at risk from tidal flooding and is unlikely to cause an increase in flood risk to external areas. Actions to manage this flood risk are identified (Section 6.2) along with best practice measures for managing site drainage (Section 6.3).

2762/FRA/T4: Flooding pathways requiring mitigation		
Flood mechanism	PROPOSED SITE	
	Internal receptor	External receptor
Fluvial	Not required	Not required
Tidal	**Required**	Not required
Surface water	Not Required	Not Required
Sewer and/or mains-derived	Not required	Not required

6.2 Tidal flooding

6.2.1 Flood risk

Parts of the site are located within Flood Zone 3 which is the highest classification of risk and is land having a 1 in 200 or greater annual probability (0.5% AEP) of sea flooding. From *Table 2762/FRA/T3* the 0.5% AEP tidal level at the site in 2070 is predicted to be 4.34 m AOD (0.7 m depth) and from *Table 2762/FRA/T3* this may increase by 12 mm each year to 2085.

The lock gates at Shoreham Port are not flood defence structures, as they act only to retain water levels within the basin. Flood Zone mapping shows the site would be inundated if undefended, therefore there is a residual risk associated with a breach of the defences around the harbour.

6.2.2 Flood warning

The site is on the landward side of Shoreham Harbour and benefits from coastal flood defences situated along the seaward arm of the harbour. Due to the variable level of protection provided by coastal flood defences it is recommended that the site operator signs up to the Environment Agency's 'Flood Warnings Direct' to receive direct messages whenever flooding is expected that may affect the site. More information is available at:

http://www.environment-agency.gov.uk/homeandleisure/floods/38289.aspx alternatively call Floodline on: 0345 988 1188.

6.2.3 Floor levels

The raising of floor levels within a development avoids damage occurring to the interior, furnishings and electrics in time of flood.

JAAP (2014) Policy 3 Aldrington Basin requires non-residential development be designed to be safe for the 1:200 year (0.5% AEP) tidal flood event level to 2082 with a watertight safety zone above this level. SPD (2015) Guiding Principle FRMG 2 states that finished floor levels for non-residential developments must be designed to be safe for the proposal lifetime of the development, assumed to be at least a 60-year period from the date of receiving planning permission. From *Table 2762/FRA/T2* and *Table 2762/FRA/T3* this would correspond to finished floor levels of (4.34 + 12 x 12 mm/yr) 4.49 mAOD.

To comply with paragraphs 102 and 103 of the NPPF, Policy 37: Flood Risk and Sustainable Drainage of the Proposed Submission Adur Local Plan 2014 and Policy CP 11: Managing Flood Risk of the Submission Brighton & Hove City Plan, it is recommended that new office buildings have finished floor levels at 4.49 mAOD with provision to make buildings watertight up to an additional 300 mm.

The proposed location of new offices on the northern side of the site, closest to the harbour access road, facilitates safe access and egress to the site to higher ground inland and to the north.

6.3 Surface water drainage strategy

6.3.1 Policy and flood risk

Local planning policies require proposals for development to assess the potential impact of surface drainage upon neighbouring areas and to demonstrate how the risks of surface water run-off have been reduced through SuDS, water capture and recycling technology.

Published flood risk mapping shows the risk of surface water flooding within the site is generally low. It is reported that excess runoff from the aggregates yard flows directly into the harbour along the southern and western boundaries of the site.

The proposed development involves the replacement or movement of existing buildings, storage areas and plant and a slight increase in the total area of the site. The majority of the site is impermeable and the proportion of roof, hardstanding and permeable areas will remain

largely the same. As a consequence, there will be only minor changes to surface water flow paths within the site but no significant change in the rate or volume of run-off excepting that due to climate change.

Any increase in run-off due to climate change will be relatively minor compared to the 'headroom' volume in the receiving basin of the harbour. Therefore, increased run-off from the site due to climate change would have a negligible impact on flood risk to properties surrounding the harbour.

6.3.2 Strategy

The development will not in itself cause significant changes to flow paths or the volume of run-off from the site, neither will it result in an increase in flood risk to external receptors due to the effects of climate change. Therefore, it is recommended that the existing strategy for drainage management is continued. Normally this consists of the diversion of drainage from the aggregate yard into a sump for reuse in the washing plant and discharge under licence of any excess water into the harbour. Roof drainage reports to sub-surface drains which are believed to discharge into the harbour. During extreme rainfall events excess run-off from the aggregates yard is allowed to overflow directly into the harbour at low points along the southern and western boundaries of the site.

Given the impermeable nature of the ground and its location adjacent to a waterbody that is connected to the sea, also the existing efforts to reduce run-off by recycling, there would appear to be limited opportunity and no significant flood risk benefit in further reducing run-off through the implementation of SuDS.

7 CONCLUSION

The proposed development is located within a 'brownfield' site on the landward arm of Shoreham Harbour. The site is relatively flat and is mainly impermeable. The proposed development involves changes to the layout of existing infrastructure and the replacement of existing office buildings with new offices. This would increase the area of the site by a small amount (2% or 600 m^2) which would involve an existing brownfield area adjacent to the harbour access road.

The site benefits from coastal flood defences but is within an area at high risk of tidal flooding (tidal Flood Zone 3a). Flood modelling predicts the site would be inundated if undefended, therefore there is a residual risk associated with a breach of the defences around the harbour. Water levels during a 0.5% AEP tidal flood event within a development lifespan to 2082 are predicted to be 4.49 mAOD.

Other sources of flooding (fluvial, pluvial and sewer) have a low to very low risk. Its location on the landward arm of Shoreham Harbour makes the risk from wave overtopping to be low.

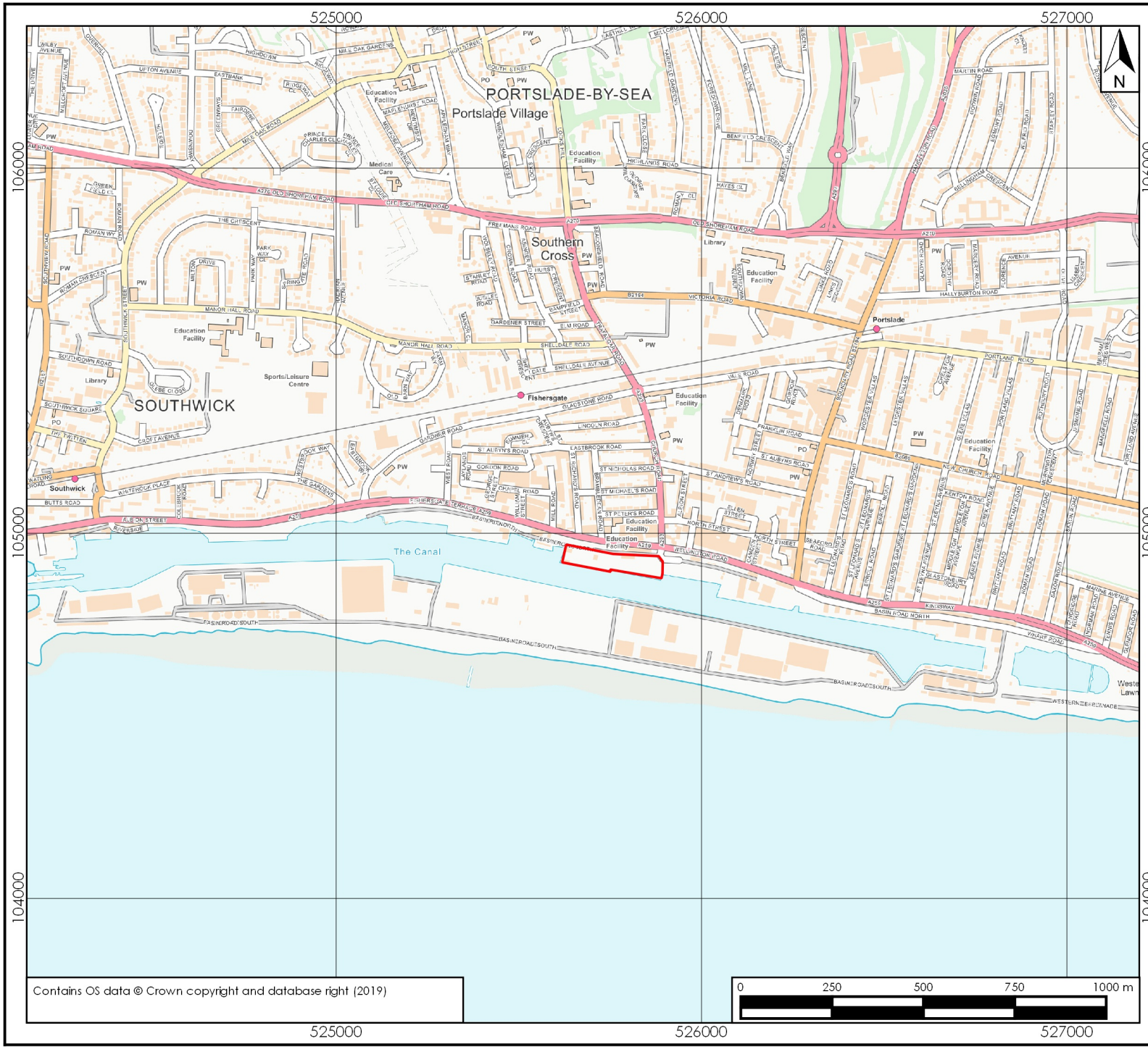
The proposed development will not significantly alter the proportions of roof, permeable and impermeable ground surface. Therefore, changes in the rate and volume of surface runoff will be negligible and those due to climate change would not increase the risk of flooding to external areas.

Offices will be located towards the northern boundary of the site, which is closest to the harbour access road, which facilitates safe access and egress to higher ground during times of flood.

It is recommended that in compliance with local planning policy floors in replacement office buildings should have a minimum level of 4.49 mAOD with provision for 300 mm of flood proofing above this level. Also, that the site operator signs up to the Environment Agency's 'Flood Warnings Direct' to receive messages whenever flooding is expected that may affect the site.

It is considered appropriate to continue with the existing surface drainage strategy. This involves the reduction of site run-off through collection and recycling of surface water drainage in the aggregate yard and discharge of excess water to the harbour during intense or prolonged rainfall events. The relatively small area of roof drainage will continue to be directed to sub-surface drains.

DRAWINGS



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Legend

Site Boundary

Scale correct at A4

Client	CEMEX UK Operation Ltd
Title	Site location
Project	Brighton Wharf
Drawing	2762/FRA/01
Version	1
Date	Apr 19
Scale	1:15,000

hafrenwater
environmental water management
Barkers Chambers • Barker Street • Shrewsbury • Shropshire • SY1 1SB
www.hafrenwater.com • Tel. 01743 355 770

APPENDIX 2762/FRA/A1

1.1 Existing site plan

1.2 Proposed site plan

Works
14
El Sub Sta
Shingle
Bollards
FISHERSGATE TERRACE
Def
Und
CF
BRAMBLEDEAN ROAD
Factory
+ 11.3m
SP
FW
Def
Works
Works
BM 6.70m
TCBs
7.7m +
WELLINGTON ROAD
CHURCH ROAD
6.4m +
1 to 11
Garage
HAULAGE WORKSHOP
WEDGE PIT & DRYING BAYS
RMX PLANT
RMX STOCK BAYS
RMX FEED HOPPER
WEIGHBRIDGE
OFFICE BLOCK
CONTAINER OFFICE
STOCKBAYS
AGGREGATE PROCESSING PLANT
Tank
CONVEYORS
CONVEYOR
YARD AREA
YARD SUMP
STOCK BAY
AGGREGATE FEED HOPPER
L Twr
BAD STORAGE AREA
STORAGE CONTAINER
CONCRETE WALLED SILT TANK (DISUSED)
Bollards
Wharf
STOCKBAY
Und
Depot
Bollards
Wharf
Shoreham Harbour
The Canal
ney Wharf
4.2m
BM 4.72m
Bollards
4.5m
Tanks
Depot
El Sub Sta
4.4m
Bollards
Co Const Bdy
Boro Const & UA Bdy
Def
Silos
WB
Timber Store
4.3m

Revisions				
	O	ORIGINAL	DATE	DRAWN

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CEMEX UK Operations Limited
CEMEX House, Evreux Way,
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CV21 2DT
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Drawn By: XX	Company: CEMEX UK MATERIALS LIMITED
Date: XX	Site: BRIGHTON WHARF
Scale(s): 1:500 @ A1	Project: BRIGHTON WHARF REDEVELOPMENT
Cmd/Model(s): XXXX	Title: EXISTING SITE PLAN
Site Ref: XXXXX	Drawing No: TD 19005 SHT 1 OF 1 — Rev: O

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Works
El Sub Sta
Shingle
Bollards
FISHERSGATE TERRACE
BRAMBLEDEAN ROAD
Factory
+ 11.3m
Works
BM 6.70m
TCBs
CHURCH ROAD
1 to 11
Garage
7.7m +
WELLINGTON ROAD
6.4m +
EXISTING RMX/WORKSHOP ENTRANCE
LORRY ENTRANCE/ EXIT
CAR ENTRANCE
FOOTPATH EXTENSION
NEW BOUNDARY
EXISTING CESSPIT
HAULAGE WORKSHOP
PALISADE FENCE
MEETING ROOM
PALISADE FENCE
CAR PARK
EXISTING BOUNDARY LINE
EXISTING CONCRETE WALL
RMX PLANT
NEW OFFICE FACILITY
CONVEYORS
AGGREGATE PROCESSING PLANT
Tank
CONVEYOR
NEW YARD SUMP
NEW BAD STORAGE APPROX 10,000 TONNES
78
20
WEIGHBRIDGE & WEIGHBRIDGE OFFICE
NEW FEED CONVEYOR
NEW FEED CONVEYOR
NEW RMX FEED HOPPER
EXISTING RMX FEED HOPPER
Bollards
N.104900
Depot
Bollards Wharf
Shoreham Harbour
The Canal
MAD 3500
R27.05
ney Wharf
4.2m
BM 4.72m
Bollards
4.5m
El Sub Sta
4.4m
Bollards
E.525600
E.525700
E.525800
E.525900
4.3m
Silos
WB
Timber Store
Co Const Bdy
Boro Const & UA Bdy
Def
Und
CF
SP
FM
Ele
Tel
Gas
Water
Drain
Overhead Wires
BRIGHTON WHARF
SWEPT PATH ANALYSIS

Revisions				
	G	CONVEYOR TO RMX MODIFIED	09MAY19	MJH
	F	ADDITIONAL ELEVATIONS ADDED	09APR19	MJH
	O	ORIGINAL	DATE	DRAWN

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Drawn By: MJH	Company: CEMEX UK MATERIALS LIMITED
Date: 07SEP18	Site: BRIGHTON
Scale(s): 1:500 @ A1	Project: OFFICE, WEIGHBRIDGE & BAD DEVELOPMENT
Chkd/Model(s): XXXX	Title: SITE LAYOUT AND TRAFFIC MANAGEMENT
Site Ref.: XXXXX	Drawing No.: TD 18029 SHT 1 OF 3 Rev: G

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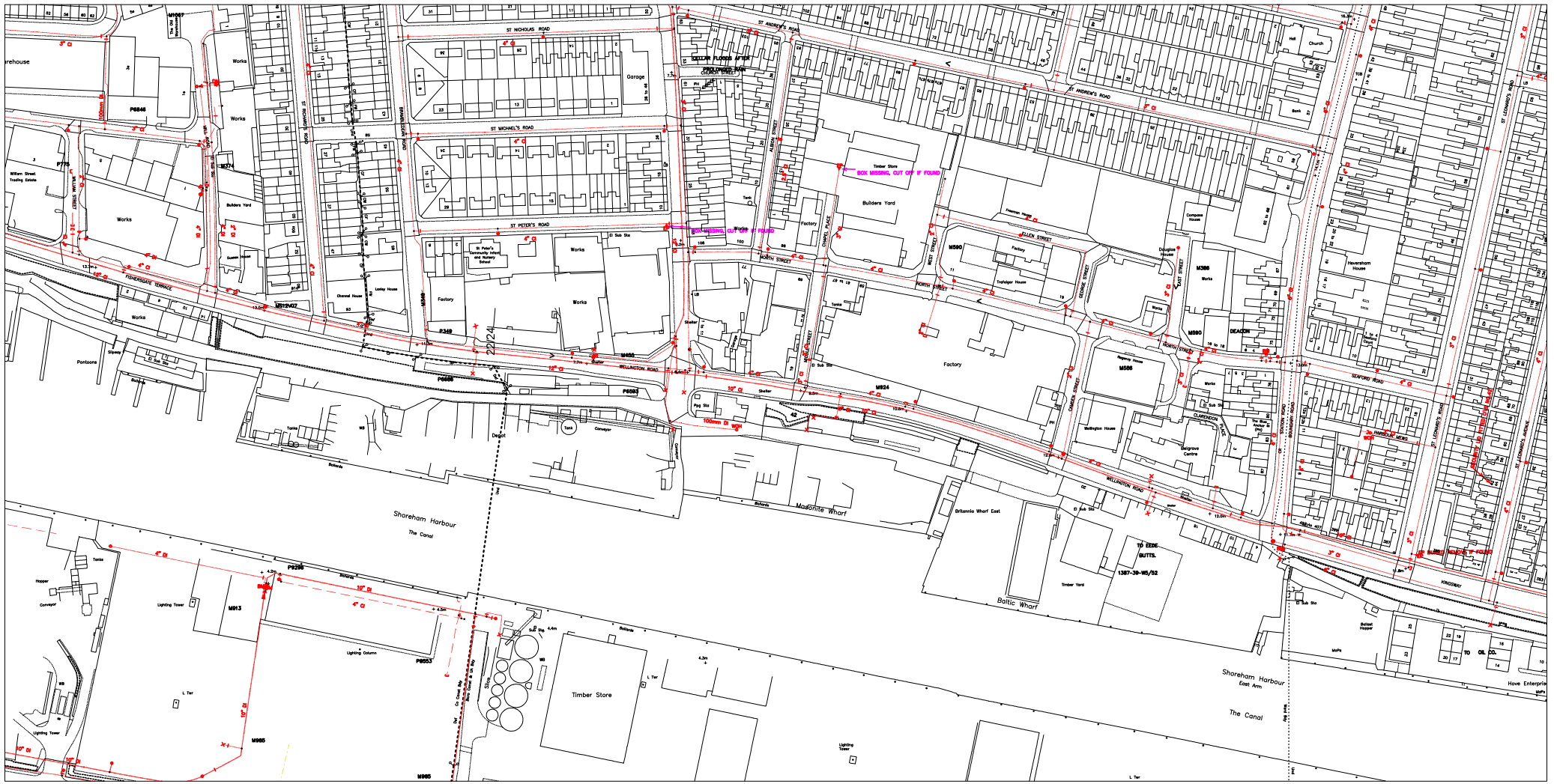
APPENDIX 2762/FRA/A2

Sewer records (Southern Water)



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:	chakrso
Scale:	1:2500
Date:	05/04/2019

O.S.Ref: TQ2504NE

TITLE: Cemex Shoreham Harbour Basin R

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

N

APPENDIX 2762/FRA/A3

EA Product 4 flood risk information and maps

A3.1 Fluvial flood risk

A3.2 Undefended tidal flood risk

A3.3 Defended tidal flood risk

A3.4 Tidal flood risk levels

A3.5 Surface water flood risk

SSD122249 Flood Map for Planning (Rivers and Sea), centred BN41 1DP



Environment Agency

Scale 1: 10,000

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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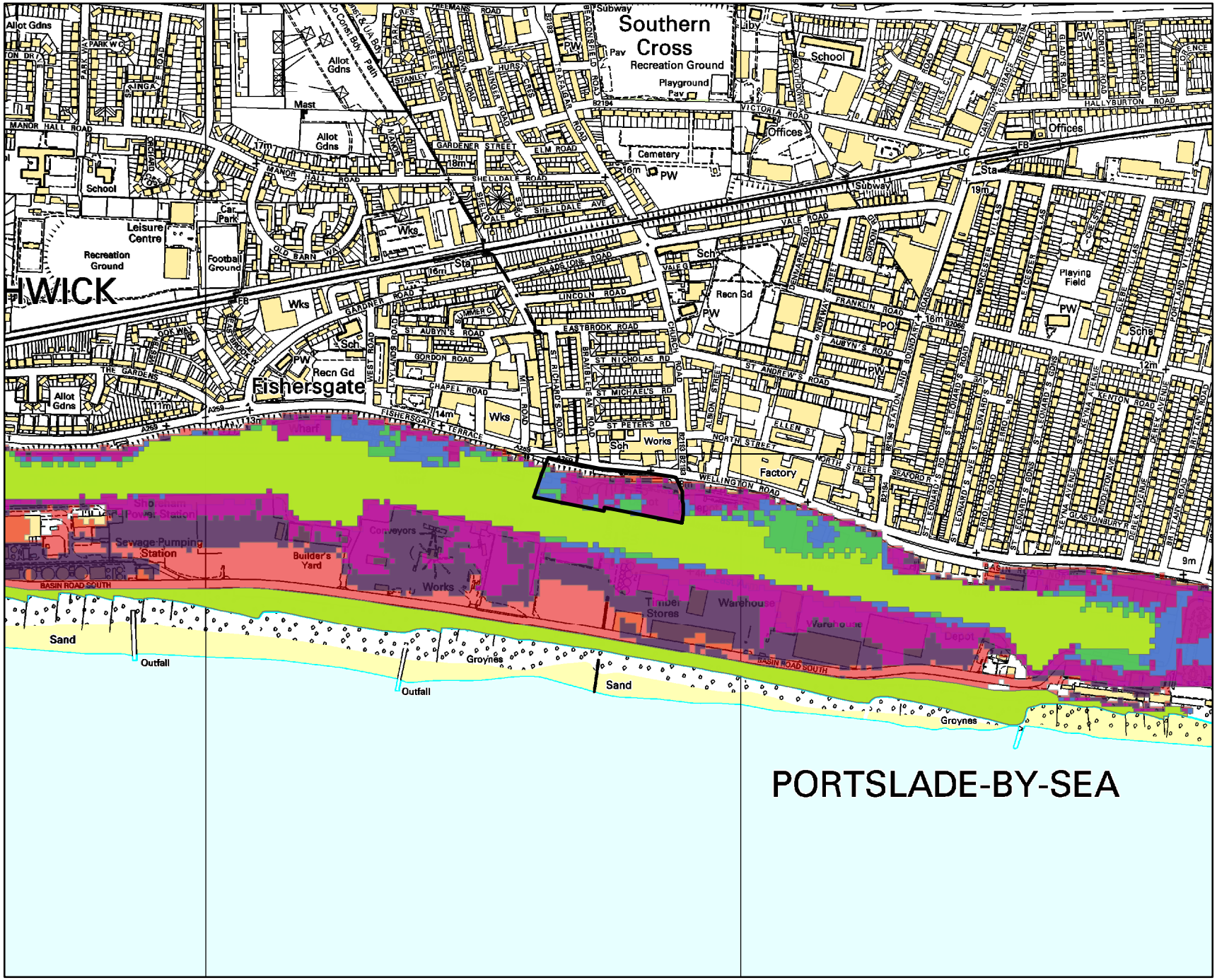
SSD122249 - Undefended Tidal Modelled Flood Outlines, centred BN41 1DP



Environment Agency

N

Legend

- Main River
- Site Boundary
- 5% AEP (2012) (Undefended)
- 1.3% AEP (2012) (Undefended)
- 0.5% AEP (2012) (Undefended)
- 0.5% AEP (2070) (Undefended)
- 0.5% AEP (2115) (Undefended)
- 0.1% AEP (2012) (Undefended)
- 0.1% AEP (2115) (Undefended)

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

Scale: 1:10,000

0 0.225 0.45

Kilometers

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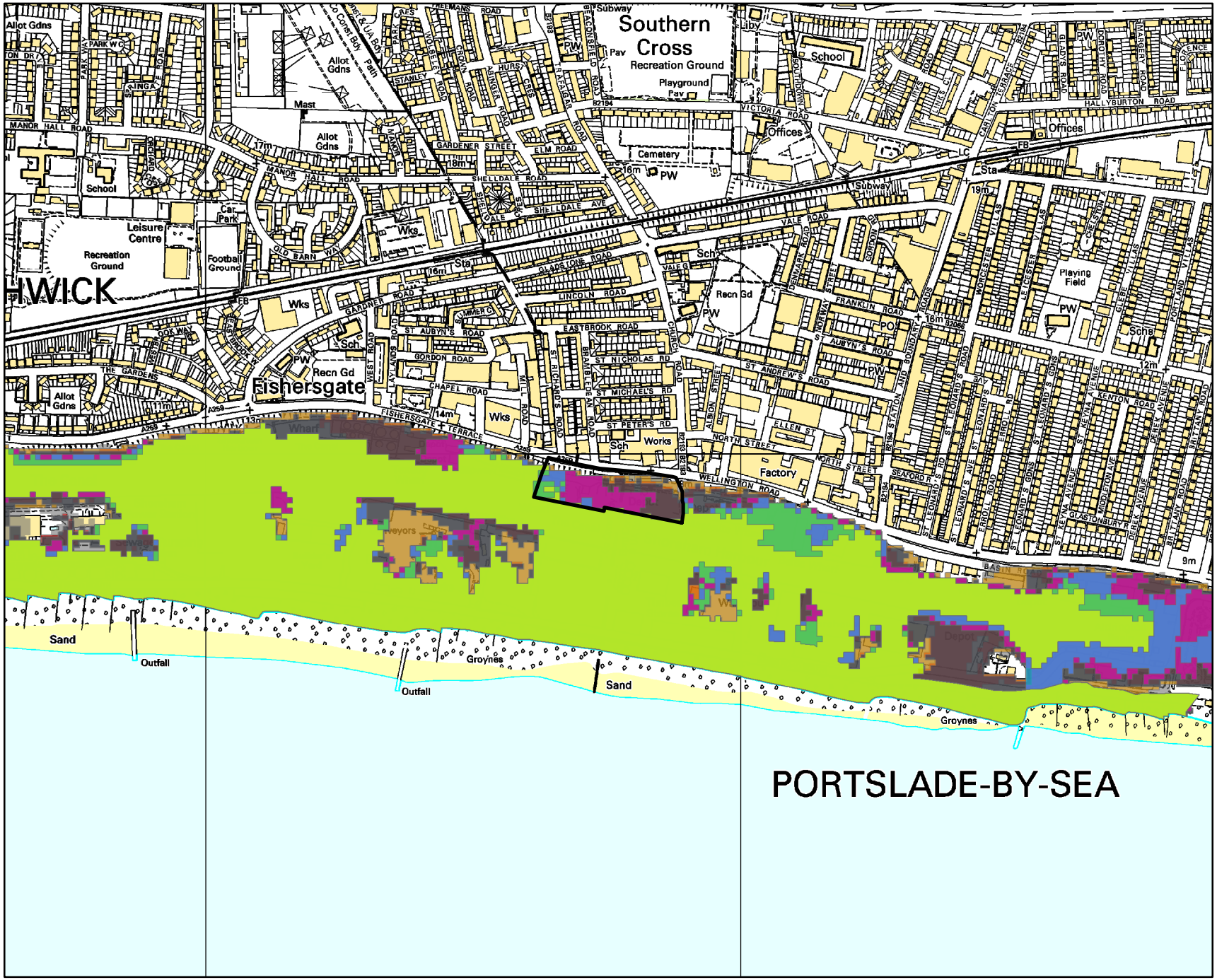
SSD122249 - Defended Tidal Modelled Flood Outlines, centred BN41 1DP



Environment Agency

N

Legend

- Main River
- Site Boundary
- 20% AEP (2012) (Defended)
- 5% AEP (2012) (Defended)
- 1.3% AEP (2012) (Defended)
- 0.5% AEP (2012) (Defended)
- 0.5% AEP (2070) (Defended)
- 0.5% AEP (2115) (Defended)
- 0.1% AEP (2012) (Defended)
- 0.1% AEP (2115) (Defended)

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

Scale: 1:10,000

0 0.225 0.45

Kilometers

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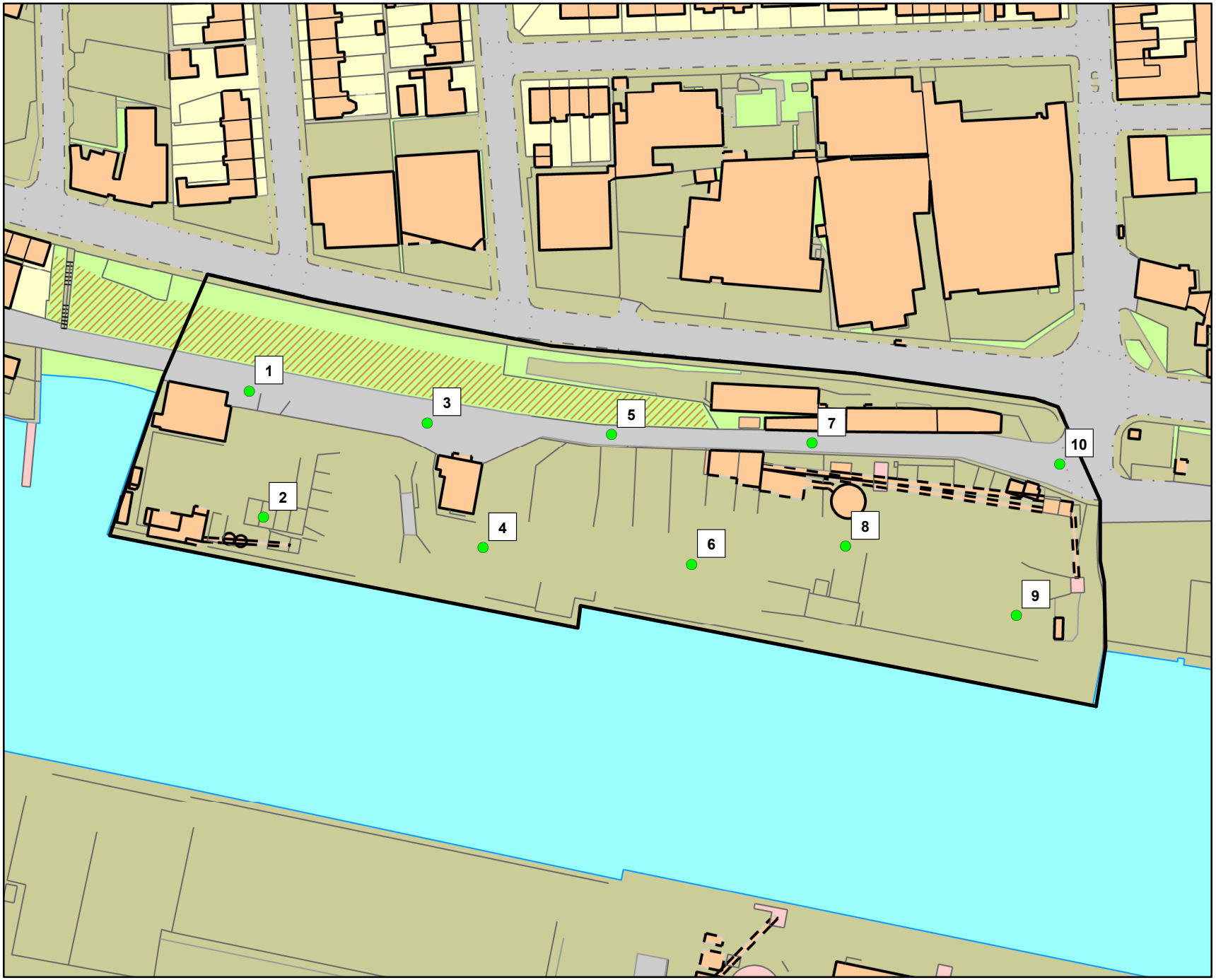
SSD122249 - Site Boundary & Node Point Locations, centred BN41 1DP



Environment Agency

N

Legend

- Node_points
- Main River
- Site Boundary

Scale: 1:1,500

0 0.0325 0.065

Kilometers

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for people and wildlife

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Product 4 Flood Risk Data Requested by: *Peter Dunn, Hafren Water, Barkers Chambers, Barker Street, Shrewsbury, Shropshire, SY1 1SB*

Site: *Brighton Wharf, Wellington Road, Portslade, East Sussex, BN41 1DP*

Table 1: Water Levels: Tidal Undefended

	NGR		Modelled Flood Levels in Metres					
			Defended Annual Exceedance Probability					
Node Reference	Eastings	Northings	5%	1.3%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	525653	104960	N/A	N/A	4.23	4.84	5.43	4.49
2	525656	104924	N/A	4.07	4.23	4.84	5.43	4.49
3	525702	104951	N/A	N/A	N/A	4.84	5.43	4.49
4	525718	104916	N/A	N/A	N/A	4.84	5.43	4.49
5	525754	104947	N/A	N/A	N/A	4.84	5.43	4.49
6	525777	104911	N/A	4.04	4.23	4.84	5.44	4.49
7	525810	104945	N/A	N/A	N/A	4.84	5.44	N/A
8	525820	104916	N/A	N/A	N/A	4.84	5.44	4.49
9	525867	104897	N/A	N/A	N/A	4.84	5.44	N/A
10	525880	104939	N/A	N/A	N/A	N/A	5.44	N/A

Table 2: Water Levels: Tidal Defended

	NGR		Modelled Flood Levels in Metres							
			Defended Annual Exceedance Probability							
Node Reference	Eastings	Northings	20%	5%	1.3%	0.5%	0.5% (2070)	0.5% (2115)	0.1%	0.1% (2115)
1	525653	104960	N/A	4.13	4.24	4.34	4.82	5.42	4.53	5.61
2	525656	104924	3.99	4.13	4.24	4.34	4.82	5.42	4.53	5.61
3	525702	104951	N/A	N/A	N/A	4.30	4.82	5.42	4.53	5.61
4	525718	104916	N/A	N/A	4.14	4.34	4.82	5.42	4.53	5.61
5	525754	104947	N/A	N/A	N/A	N/A	4.82	5.42	4.53	5.61
6	525777	104911	N/A	N/A	N/A	4.29	4.82	5.42	4.53	5.61
7	525810	104945	N/A	N/A	N/A	N/A	4.82	5.42	N/A	5.62
8	525820	104916	N/A	N/A	N/A	4.29	4.82	5.42	4.53	5.62
9	525867	104897	N/A	N/A	N/A	N/A	4.82	5.42	4.54	5.62
10	525880	104939	N/A	N/A	N/A	N/A	N/A	5.42	N/A	5.62

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Email: enquiries@environment-agency.gov.uk
customer service line 03708 506 506
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Table 3: Water Depth: Tidal Undefended

	NGR		Modelled Flood Depth in Metres					
			Defended Annual Exceedance Probability					
Node Reference	Eastings	Northings	5%	1.3%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	525653	104960	N/A	N/A	0.09	0.69	1.29	0.34
2	525656	104924	N/A	0.44	0.59	1.19	1.79	0.84
3	525702	104951	N/A	N/A	N/A	0.49	1.09	0.14
4	525718	104916	N/A	N/A	N/A	0.62	1.21	0.27
5	525754	104947	N/A	N/A	N/A	0.36	0.73	0.13
6	525777	104911	N/A	0.20	0.39	1.00	1.60	0.65
7	525810	104945	N/A	N/A	N/A	<0.01	0.29	N/A
8	525820	104916	N/A	N/A	N/A	0.61	1.20	0.25
9	525867	104897	N/A	N/A	N/A	0.21	0.81	N/A
10	525880	104939	N/A	N/A	N/A	N/A	<0.01	N/A

Table 4: Water Depth: Tidal Defended

	NGR		Modelled Flood Depth in Metres							
			Defended Annual Exceedance Probability							
Node Reference	Eastings	Northings	20%	5%	1.3%	0.5%	0.5% (2070)	0.5% (2115)	0.1%	0.1% (2115)
1	525653	104960	N/A	0.04	0.14	0.24	0.68	1.32	0.43	1.51
2	525656	104924	0.37	0.50	0.59	0.70	1.17	1.77	0.88	1.96
3	525702	104951	N/A	N/A	N/A	0.01	0.48	1.13	0.24	1.32
4	525718	104916	N/A	N/A	0.04	0.23	0.60	1.30	0.41	1.50
5	525754	104947	N/A	N/A	N/A	N/A	0.35	1.10	0.21	1.29
6	525777	104911	N/A	N/A	N/A	0.46	0.99	1.59	0.70	1.78
7	525810	104945	N/A	N/A	N/A	N/A	<0.01	0.86	N/A	1.05
8	525820	104916	N/A	N/A	N/A	0.26	0.59	1.39	0.50	1.59
9	525867	104897	N/A	N/A	N/A	N/A	0.20	0.99	0.10	1.18
10	525880	104939	N/A	N/A	N/A	N/A	N/A	<0.01	N/A	0.17

All Coastal model data taken from Arun to Adur Coastal Flood Modelling, completed in 2012, by JBA Consulting.

NB. There are no fluvial flood modelling scenarios at this site

There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

Produced on *12 April 2019*

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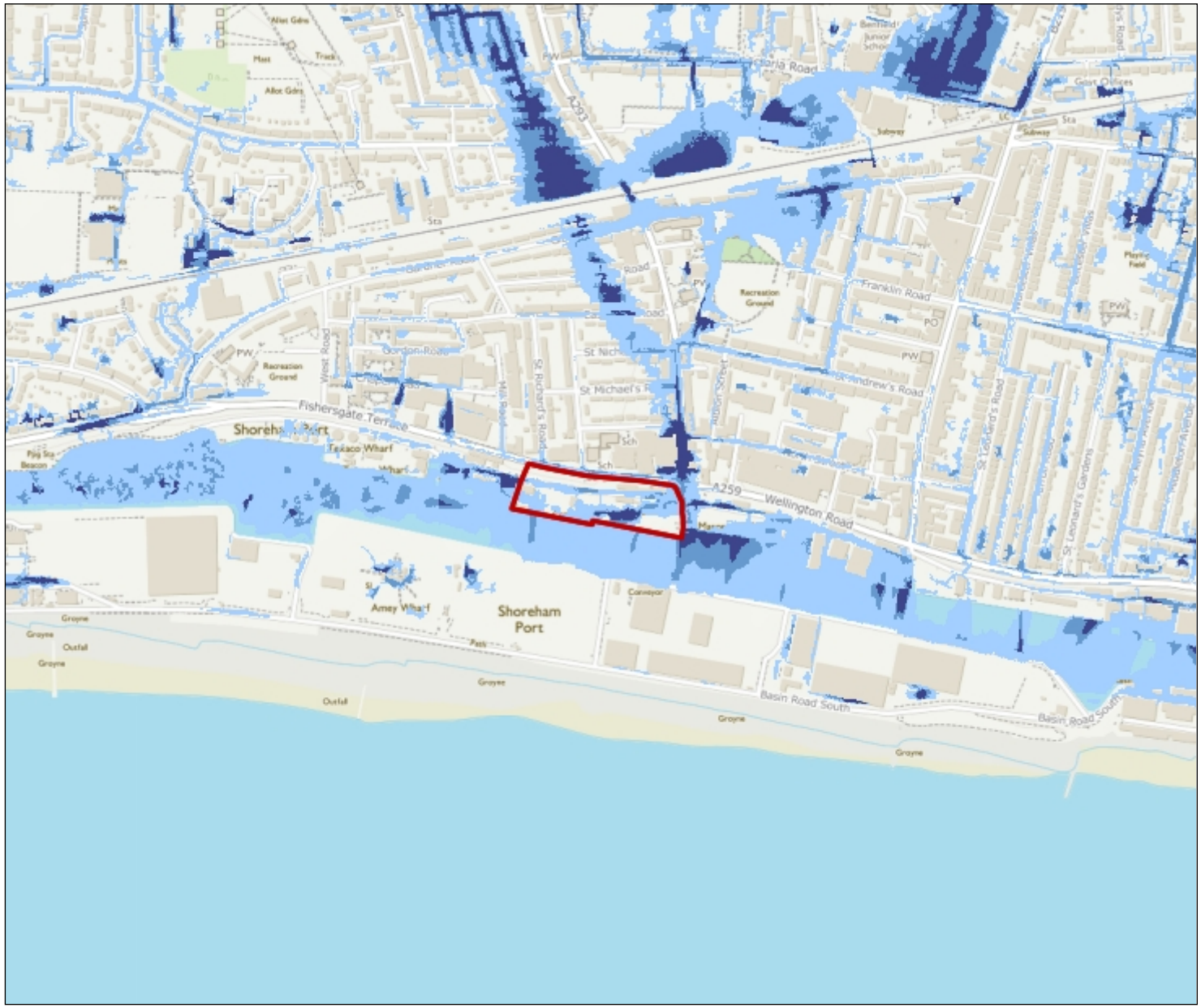
SSD122249 Risk of flooding from Surface Water, centred BN41 1DP



Scale 1:10,000

N
W E
S

Likelihood of flooding from Surface Water

- High (>= 3.3%)
- Medium (3.3% - 1%)
- Low (1% - 0.1%)
- Very Low

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 our website.

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APPENDIX 2762/FRA/A4

A4.1 Existing site run-off calculation

A4.2 Proposed site run-off calculation

Existing Brownfield Runoff Volume - 1-in-100-year 6hr storm over Roofs and Hardstanding Areas

	Roofs	Hardstanding	Permeable
Runoff Coefficient	0.95	0.8	0.5
Area Ha	0.105	3.330	0.100

The Rational Method to give peak flow Q_p is in the form:

$$Q_p = 2.78\ CiA$$

Where:

C	co-efficient of run-off (dimensionless)
i	rainfall intensity (mm/hr)
A	catchment area (Ha)

Climate change (% rainfall increase)	0	%

IH124 Estimate of QBAR Greenfield Discharge with 50% betterment	0.0	l/s

Groundwater Inflow Rate (-ve for Outflow)	0.0	l/s

Duration	Rainfall *2	Rainfall intensity	Accretion Rate from Roofing *3	Accretion Rate from Hardstanding *3	Accretion Rate from Permeable *3	Permitted Discharge to Harbour *3	Net Accretion Rate in Storage	Net Accretion Volume in Storage
	100 year event							
hours	mm	mm/hr	l/s	l/s	l/s	l/s	l/s	m^3
0.25	26.8	107.3	29.8	794.7	14.9	0	839.4	755
0.5	35.9	71.9	19.9	532.3	10.0	0	562.2	1012
1	46.1	46.1	12.8	341.1	6.4	0	360.2	1297
2	55.6	27.8	7.7	205.9	3.9	0	217.4	1565
4	66.2	16.6	4.6	122.6	2.3	0	129.5	1865
6	72.9	12.2	3.4	90.0	1.7	0	95.0	2053
8	77.7	9.7	2.7	71.9	1.4	0	76.0	2189
12	84.6	7.1	2.0	52.2	1.0	0	55.2	2383
16	89.7	5.6	1.6	41.5	0.8	0	43.8	2525
20	93.6	4.7	1.3	34.7	0.7	0	36.6	2635
24	96.8	4.0	1.1	29.9	0.6	0	31.6	2726
28	99.6	3.6	1.0	26.3	0.5	0	27.8	2804
32	102.1	3.2	0.9	23.6	0.4	0	25.0	2874
36	104.4	2.9	0.8	21.5	0.4	0	22.7	2939
40	106.5	2.7	0.7	19.7	0.4	0	20.8	2998
44	108.4	2.5	0.7	18.2	0.3	0	19.3	3053
48	110.3	2.3	0.6	17.0	0.3	0	18.0	3105

*2 Obtained from FEH CD-ROM v3

*3 Without climate change

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Client: **CEMEX UK Operations Ltd**
Wolverhampton Road
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B69 4RJ

Title:	Runoff rates and retention volumes for aggregates yard		
Project:	Brighton Wharf		
Calc Sheet:	A1.1	Date:	May-19

Future Brownfield Runoff Volume - 1-in-100-year 6hr storm over Roofs and Hardstanding Areas

	Roofs	Hardstanding	Permeable
Runoff Coefficient	0.95	0.8	0.5
Area Ha	0.091	3.369	0.100

The Rational Method to give peak flow Q_p is in the form:

$$Q_p = 2.78\ CiA$$

Where:

C co-efficient of run-off (dimensionless)
i rainfall intensity (mm/hr)
A catchment area (Ha)

Climate change (% rainfall increase)	40	%

IH124 Estimate of QBAR Greenfield Discharge with 50% betterment	0.0	l/s	
Groundwater Inflow Rate (-ve for Outflow)	0.0	l/s	

Duration	Rainfall *2	Rainfall intensity	Accretion Rate from Roofing *3	Accretion Rate from Hardstanding *3	Accretion Rate from Permeable *3	Permitted Discharge to Harbour *3	Net Accretion Rate in Storage	Net Accretion Volume in Storage
	100 year event							
hours	mm	mm/hr	l/s	l/s	l/s	l/s	l/s	m^3
0.25	26.8	107.3	36.1	1125.8	20.9	0	1182.8	1064
0.5	35.9	71.9	24.2	754.0	14.0	0	792.2	1426
1	46.1	46.1	15.5	483.2	9.0	0	507.6	1827
2	55.6	27.8	9.4	291.6	5.4	0	306.4	2206
4	66.2	16.6	5.6	173.7	3.2	0	182.5	2628
6	72.9	12.2	4.1	127.5	2.4	0	133.9	2893
8	77.7	9.7	3.3	101.9	1.9	0	107.1	3084
12	84.6	7.1	2.4	74.0	1.4	0	77.7	3358
16	89.7	5.6	1.9	58.8	1.1	0	61.8	3558
20	93.6	4.7	1.6	49.1	0.9	0	51.6	3713
24	96.8	4.0	1.4	42.3	0.8	0	44.5	3841
28	99.6	3.6	1.2	37.3	0.7	0	39.2	3952
32	102.1	3.2	1.1	33.5	0.6	0	35.2	4050
36	104.4	2.9	1.0	30.4	0.6	0	32.0	4141
40	106.5	2.7	0.9	27.9	0.5	0	29.3	4224
44	108.4	2.5	0.8	25.9	0.5	0	27.2	4302
48	110.3	2.3	0.8	24.1	0.4	0	25.3	4375

*2 Obtained from FEH CD-ROM v3

*3 Climate change factored into rainfall intensity at this stage

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Title:	Runoff rates and retention volumes for aggregates yard		
Project:	Brighton Wharf		
Calc Sheet:	A1.2	Date:	May-19