

Flood Risk Assessment

Former Adur Civic Centre, Ham Road,

Shoreham By Sea, BN43 9SA

Client

The Hyde Group
30 Park Street
London
SE1 9EQ
Ref: 10292
Date: October 2020

Consulting Engineers

GTA Civils & Transport Limited
66a Church Walk
Burgess Hill
West Sussex
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Schedule of Appendices

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Annexe – Flood Risk Management Plan

Issue	Issue date	Compiled	Checked
Preliminary Issue	27 October 2020	JP	MR
2nd Preliminary Issue	20 November 2020	JP	MR
3rd Preliminary Issue	19 March 2021	JP	MR

Introduction

1.1 This report has been prepared for The Hyde Group in relation to the premises at the former Adur Civic Centre, Ham Road, Shoreham By Sea, BN43 9SA. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.

1.2 GTA Civils & Transport Limited was appointed by the client to provide a Flood Risk Assessment (FRA) as requested by the Environment Agency (EA) and Adur District Council in order to achieve Planning Approval at said property.

1.3 This report has been prepared in accordance with the 2019 National Planning Policy Framework (NPPF) and the current planning practice guidance (PPG).

1.4 Only Flood Risk and Drainage items/issues are included in this report. The proposed drainage strategy layout is contained in Appendix E.

2 Existing Site and Current Flood Conditions

2.1 The application site lies in Shoreham By Sea within the area administered by Adur District Council (ADC). It comprises a concrete base (footprint) of a demolished offices complex, plus parking areas and landscaping. An existing site location map and aerial view are shown in Appendix A. The site has a frontage on Eastern Avenue, Brighton Road and Ham Road.

2.2 Topography: a topographic survey is contained in Appendix C. The site slopes very gently from SW to NE; the levels range between 4.1m AOD and 3.38m AOD.

2.3 Hydrology: The nearest Main River to the site is the River Adur, which flows broadly southwards into the Shoreham Harbour, approx. 140m to the south of the site.

2.4 Geology: according to the BGS's online map, the site's solid geology is Chalk Formation. Overlaying drift deposits are recorded as Head (clay, silt, sand and gravel).

2.5 An excerpt of a Site Investigation is shown in Appendix C. The summary of the soakaways viability section reads thus: "Due to relatively low indicative infiltration rates recorded given the low-permeable soils of the Head and the relatively high groundwater, it is likely that traditional soakaways are not going to work satisfactorily on site".

2.6 Sewers: Southern Water's sewer records are shown in Appendix B. This area is served by both surface and foul public sewerage. A 225mm diameter foul sewer runs clockwise around the site from Ham Road into Eastern Ave. This joins with a 300mm diameter run flowing west along Brighton Road. A 1200mm diameter trunk sewer flows south through the middle of the site, while a 300mm diameter sewer runs southwards from Eastern Avenue.

2.7 The existing impermeable surface coverage at the site is effectively 100%. Greenfield runoff rates have been calculated for the developed area of 0.613 ha (see Appendix E):

Qbar	1.1 l/s
Q1	0.9 l/s
Q30	2.5 l/s
Q100	3.6 l/s

2.8 According to the Environment Agency's (EA) Rivers and Seas Flood Map (see Appendix B), the site lies in Flood Zone 3 (High Risk). Sites in FZ3A are defined in Table 1 of the 2019 National Planning Policy Framework (NPPF) as being susceptible to a flood event with an annual probability of greater than 5% (once every 20 years on average).

2.9 The EA's modelled flood data-pack (see Appendix C) shows the current 0.5% tidal undefended flood level is **4.02m AOD, while the** defended level for the same scenario is **4.15m AOD**.

2.10 The EA revised its predicted sea level rises in December 2019. Both the Higher Central and Upper End rises have to be assessed. The Higher Central rise for the south east region is 1.2m less 25 years x 5.8 = 1.055m (this is conservative as it assumes the first year of occupancy will be 2026 and the design life is 100 years). The Upper End SL rise is 1.6m less 25 years x 6.9mm = 1.427m AOD. The 2125 defended flood levels are – respectively – **5.205m AOD** and **5.577m AOD**.

2.11 According to the EA's online Surface Water Flood Map – Low Risk ('1 in 1000 years' storm) in Appendix B, the site's former external areas (plus the 3 roads to north, east and south) are susceptible to flooding up to a depth of between 300mm and 900mm. As there is no flooding on the SW side of the former building, the flood level is estimated at 3.75m AOD, this being the level at the edge of flood pattern. The maximum depth of flooding is, therefore, 3.75 – 3.38 = 0.37m.

2.12 Artificial sources: flooding from reservoirs, canals and docks. The EA's Reservoirs Flood Map in Appendix C shows that the site is removed from this source of flooding.

2.13 Groundwater: the EA's Groundwater Vulnerability Zones map and Groundwater Source Protection Zones (SPZ) map are shown in Appendix C. The site overlies a 'Major Aquifer High' but is removed from the nearest SPZ.

2.14 Historic records: the EA's online map shows that this site is removed from the nearest area of recorded flooding by the EA.

2.15 ADC's Strategic Flood Risk Assessment (SFRA) does not show any evidence of historical flood incidents affecting this site.

2.16 In conclusion the site's flood risk profile is High with the maximum likely flood level between **5.205m AOD** and **5.577m AOD** as set out in section 2.10 above. Although it benefits from coastal defences in fair condition, the crest level is too low to protect the site. It is also liable to flood from Surface Water / Overland Flow, but to a much lesser level. It is removed from other potential sources of flooding.

3 Proposed Development & Flood Mitigation

3.1 The proposal is to construct a mixed use development: this to comprise two buildings 3-11 storeys high; 1,003m^2 of commercial floorspace with 171 residential flats at high level (including 30% affordable), plus 56 car parking spaces are proposed. Soft landscaping is proposed along the north-eastern and north-western sections of the site and is to comprise communal open space (non-private gardens) with trees and bushes to be planted. The proposed layout drawings are shown in Appendix D.

3.2 No basement is proposed – probably due to the trunk stormwater sewer bisecting the site.

3.3 Vulnerability: Table 2 of the PPG for 'Flood risk and coastal change' indicates buildings used for offices and similar commercial uses are classed as 'Less vulnerable' (as are plant rooms, cycle/bin stores and the like) while residential flats are classed as 'More Vulnerable'. (Parking spaces and landscaping are classed as Water Compatible).

3.4 ADC's Strategic Flood Risk Assessment (SFRA) Site Sheets, dated July 2020, states that this development (in FZ3A) must pass the Exception Test – because More Vulnerable uses are included – as well as Less Vulnerable.

3.5 With the residential units at high level and only Less Vulnerable and Water Compatible uses on the ground floor, this development will have been designed with a "Sequential Approach", ie the More Vulnerable use will be positioned at high level, comfortably above the predicted 2115 flood level. The development passes the second part of the Exception Test – ie it will be 'safe'.

3.6 The 2 critical defended flood levels are 5.205m and 5.577m AOD, as set out in section 2.10 above. The 2 towers' FFLs will be set at 3.85m AOD (west) and 3.70m AOD (east). No residential accommodation is proposed at ground floor level, only commercial units and plant/bins/cycles plus parking and landscaping.

3.7 The lowest residential flats' floor level will be **6.50m AOD**, this being 0.923m above the *higher* flood level of 5.577m AOD). This conforms with the NPPF as there has to be a minimum of 0.6m of freeboard to bedrooms.

3.8 Flood Resilience: the ground floor of each tower is liable to flood – to a maximum depth of 1.727m in the east tower and 1.577m in the west tower. This depth is too great for resistance to be effective. Standard construction can withstand hydraulic pressure up to 0.7m in height only. Above this the water pressure is likely to cause a local hazardous failure – or partial collapse. For

this reasoning, the ground floor and up to 5.877m AOD (wall surfaces) will be constructed using flood resilient materials and techniques.

3.9 The document "Improving the Flood Performance of New Buildings - Flood Resilient Construction" published by DEFRA/Environment Agency is a good source of information on resilient techniques. It is conceded that the principles set out in this will have to be modified to suit a framed, clad building.

3.10 Flood resilient construction may include - and not necessarily limited to the following:

- Solid concrete floor with either no screed or waterproof screed;
- Altro or similar durable flooring with integral skirting – or stone/tiled floor coverings;
- Cladding to the external walls to be durable/flood-proof up to the critical flood level (5.69m AOD);
- Electrical distribution to be easily isolated (switched off) in a flood event;
- Waterproofing installed up to the critical level; waterproofing will be tied in to the ground floor slab as appropriate; details will be provided at detailed design, to comply with building regulations;
- Plasterboard will be installed horizontally to minimise the number of sheets damaged;
- Any wood fixings below 5.69m AOD will be robust and/or protected by suitable coatings to minimise damage;
- Boilers and meter cupboards will be placed in flood-proof rooms;
- A non-return valve shall be fitted to the foul water drainage network.

3.11 Safe access to dry land: occupants in the commercial units on the ground floor would have no safe route to dry land (with the potential flood depth being approximately 1.6m) and so a Flood Risk Management Plan has been prepared to help these businesses plan and prepare for such an eventuality – refer to the Annexe of this report. This will be a live document, meaning that each business will review and edit this in light of changes to the site's flood risk profile on a regular basis.

4 Proposed SuDS Drainage Strategy

4.1 The sustainable drainage (SuDS) hierarchy was applied, this giving priority to infiltration and then routing to a watercourse, if this is not viable. The site investigation concluded that, because of the low infiltration rates through the Head deposits, the soil is not sufficiently permeable for soakaways/infiltration blankets/porous pavings. In addition the depth of made ground and historic contamination also indicated that there could well be valid reason for not using infiltration methods: the made ground would have to be removed, in any case.

4.2 In the absence of a watercourse, the only viable option is to route the surface water to the nearby sewerage network. This may be revisited with additional investigation during the next stage (pursuant to a possible planning condition). This is not taken further in this report. Should infiltration prove viable then the drainage strategy shall be updated at that stage.

4.3 In line with the SuDS hierarchy, development runoff will be managed by means of on-site attenuation with discharge to the public sewer network. The proposed limiting discharge rate is 2.0 l/s, this being the practical minimum limit of vortex devices. This will provide a very significant reduction in peak discharges to the receiving sewer system compared to the existing brownfield rates. The proposed drainage layout is shown in Appendix D.

4.4 A vortex-type flow control will be fixed in the outfall manhole to manage flow rates prior to discharge to the public sewer network – see Appendix C.

4.5 There will be significant areas of green roof over the various levels of roof. The proposed roof plan in Appendix D shows the total area. Not only will this assist in reducing the volume of storage needed but will reduce the overall volume of discharge into Southern Water's sewer.

4.6 Additional SuDS treatment for roof runoff is not required. The permeable sub-base aggregate layer will provide filtration to treat runoff from vehicular areas.

4.7 Micro Drainage calculations are shown in Appendix E to demonstrate sufficient storage capacity is available for all events up to the 1 in 100 annual probability with 40% allowance included for climate change.

4.8 Including the retained brownfield element, the overall site's peak discharge is reduced by 67%. This is a significant betterment. A minimum rate of 2.0 l/s has been used for small catchments to avoid impractically small control devices.

4.9 Exceedance: External levels will be worked out at detailed design stage but will be set generally below adjacent building threshold levels. Localised grading will be done to achieve level access criteria. These measures will serve to keep surface ponding away from building entrances. The proposed storage design and permeable surfacing will help to capture surface runoff.

4.10 Ownership and maintenance responsibilities for the proposed drainage system will remain with the applicant.

4.11 Foul drainage: the strategy plan in Appendix D illustrates the proposed foul layout with the existing connection to the public sewer, which will be utilised. Updated agreements with Southern Water will be sought for these modifications to the existing discharge arrangements.

4.12 The trunk sewer that bisects the site will be protected during the works.

5 Summary and Conclusion

5.1 The application site lies within coastal Flood Zone 3A; although it benefits from existing defences, these are not built to a standard sufficient to protect it in the '1% + predicted sea level rise' event.

5.2 In the critical 2125 0.5% tidal defended scenario, the site will flood to **5.577m AOD** when the Upper End rise in sea level is considered. As the site's lowest level is 3.38m AOD it is clear that the flood depth may exceed 2m; this would be hazardous to all.

5.3 A sequential approach has been taken to designing this site. The lowest level (ground floor) will be limited to commercial space (offices) and other less vulnerable, non-habitable uses, while the apartments will be placed on the upper levels, at or above 6.50m AOD, more than 0.9m above the predicted flood level.

5.4 Flood resilient materials and techniques will be incorporated up to 5.877m AOD.

5.5 A Flood Risk Management Plan has been drafted – see the annexe to this report – for the benefit of the occupants of the ground floor offices. This will help raise the awareness of the flood risk to this site and area in general.

5.6 SuDS: an initial Site Investigation has shown the soil and groundwater level are likely to not make infiltration measures feasible. A drainage strategy has been worked up that doesn't rely on any infiltration but uses existing connections to the public sewerage.

5.7 The offsite flow rate will be restricted to 2l/s in the critical storm event, this representing a very significant reduction in the pre-development brownfield runoff rate.

5.8 A significant area of green roof shall be included. This will assist in reducing the volume of on-site storage – as well as the overall discharge volume into Southern Water's sewer.

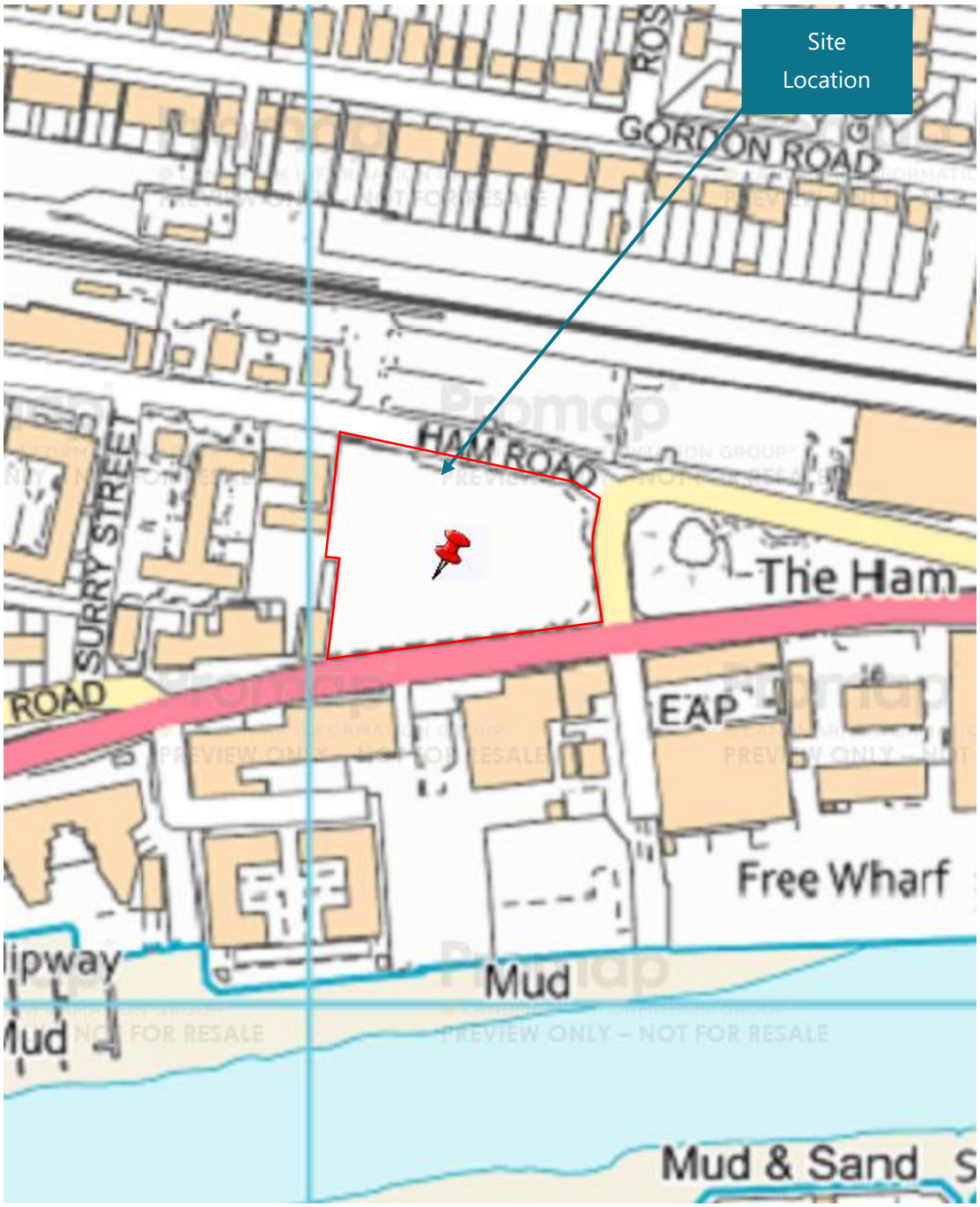
5.9 2 stages of treatment will be provided – in porous paved areas and green roof. This complies with CIRIA guidelines.

5.10 The proposed development complies fully with the 2019 NPPF and current PPG in terms of flood risk and drainage.

- End of Report -

Appendix A

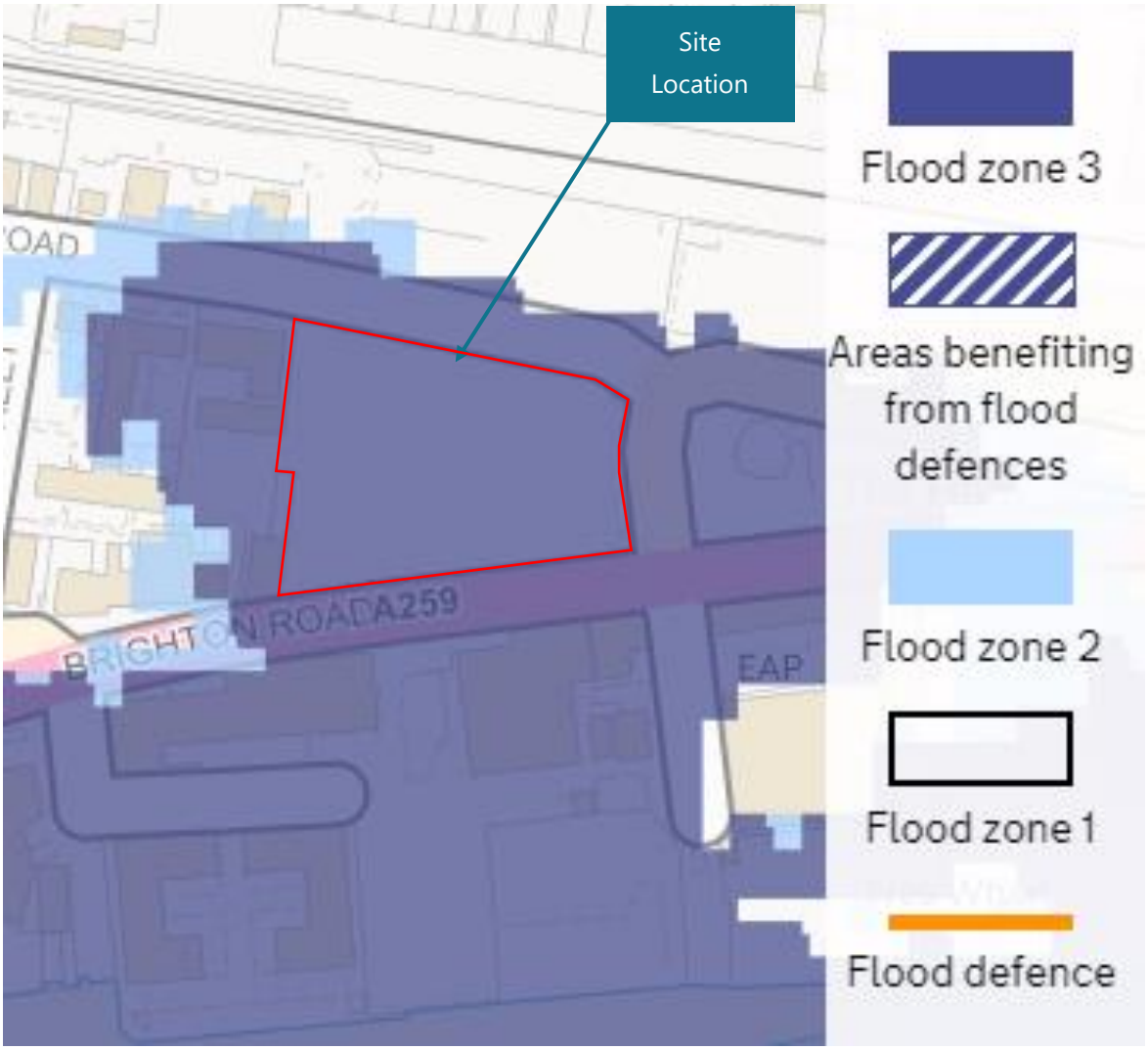
Site Location Map & Aerial Photo




Site
Location

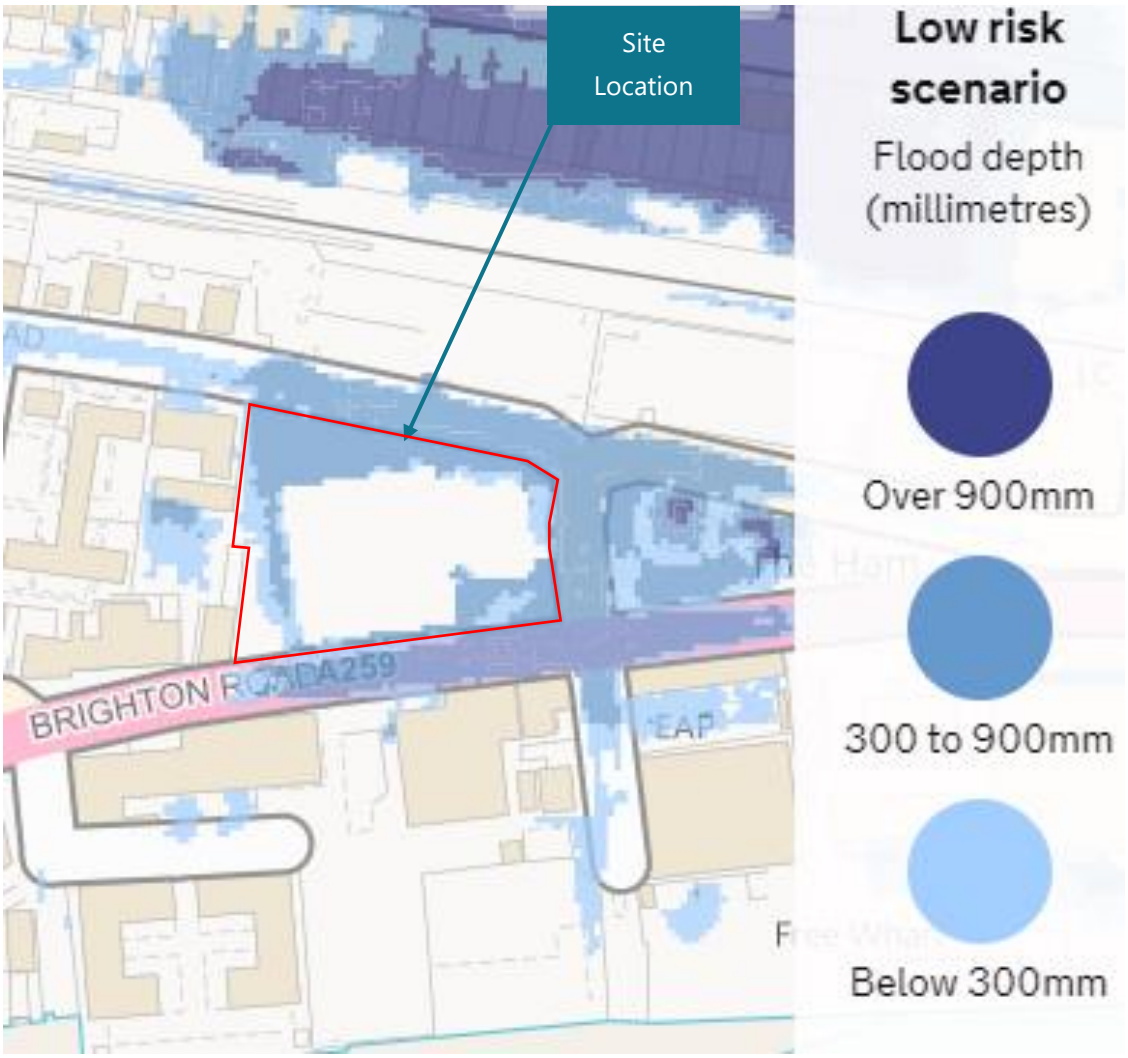
Appendix B

Environment Agency Flood & Groundwater Data



EA's Online Flood Map for Planning (Rivers and Seas)

The site is situated within Flood Zone 3 (FZ3)



EA's Online Surface Water Flood Depth Map in the 'Low Risk Scenario'
(1 in 1000 years storm event)

The extremities of the site on three sides, bordering Brighton Road, Eastern Avenue and Ham Road, are susceptible to flooding up to a depth of 900mm from this source

John Pakenham
Gta Civils And Transport
66a Church Walk,
Burgess Hill,
RH15 9AS

Our ref: SSD143752

Date: 07/10/2019

Dear John Pakenham,

Enquiry Regarding Product 4 for Flood Risk Assessment for the former Adur Civic Centre Site, Ham Road, Shoreham-by-Sea, BN43 6PR.

Thank you for your enquiry which was received on 26 September 2019.

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

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

The site is in an area located within Flood Zone 3 as 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 as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.

Flood Zone definitions can be found at www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones

Flood Defences
There are flood defences in the form of a high ground. The Asset ID is 127665. The upstream crest level is 3.87 and the downstream is 4.3. The estimated standard of protection is 1 in 200 years (0.5% AEP). The estimated condition grade is fair. The asset is maintained by Private.

Model Information
The model used was the Arun To Adur Flood Modelling which was completed by JBA Consulting in 2012.

Flood History
We hold no record of previous flooding events affecting this site.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flood Authority, **West Sussex County Council** or the Local Authority, **Adur And Worthing District Council** for a more comprehensive flood history check.

FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for **Former Adur Civic Centre Site, Ham Road, Shoreham-by-Sea, BN43 6PR.**
Licence	Open Government Licence
Information Warning - OS background mapping	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2018 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

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

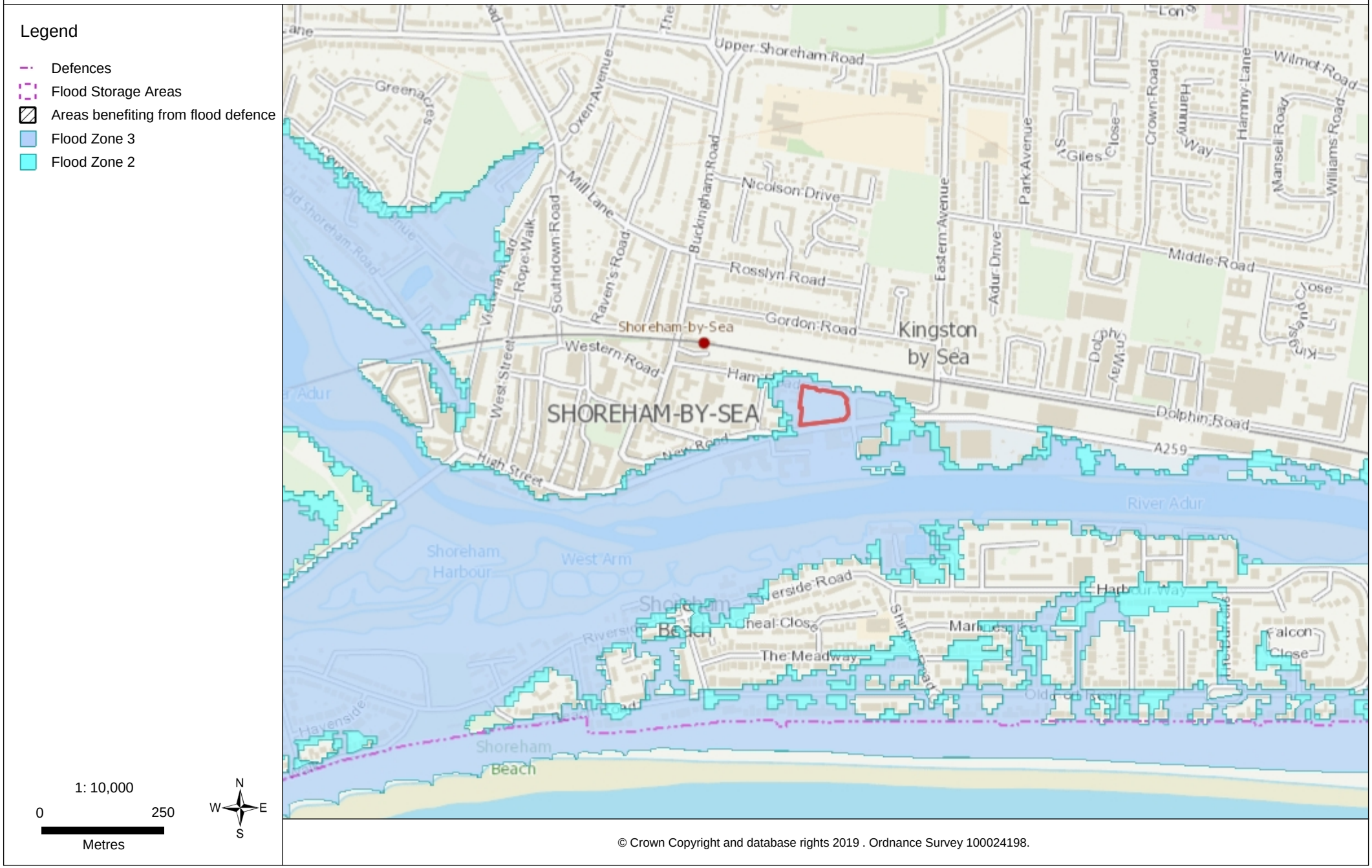
Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

Misha Misri
Flood & Coastal Risk Management Officer,
Partnership & Strategic Overview,
West Sussex,
Solent and South Downs

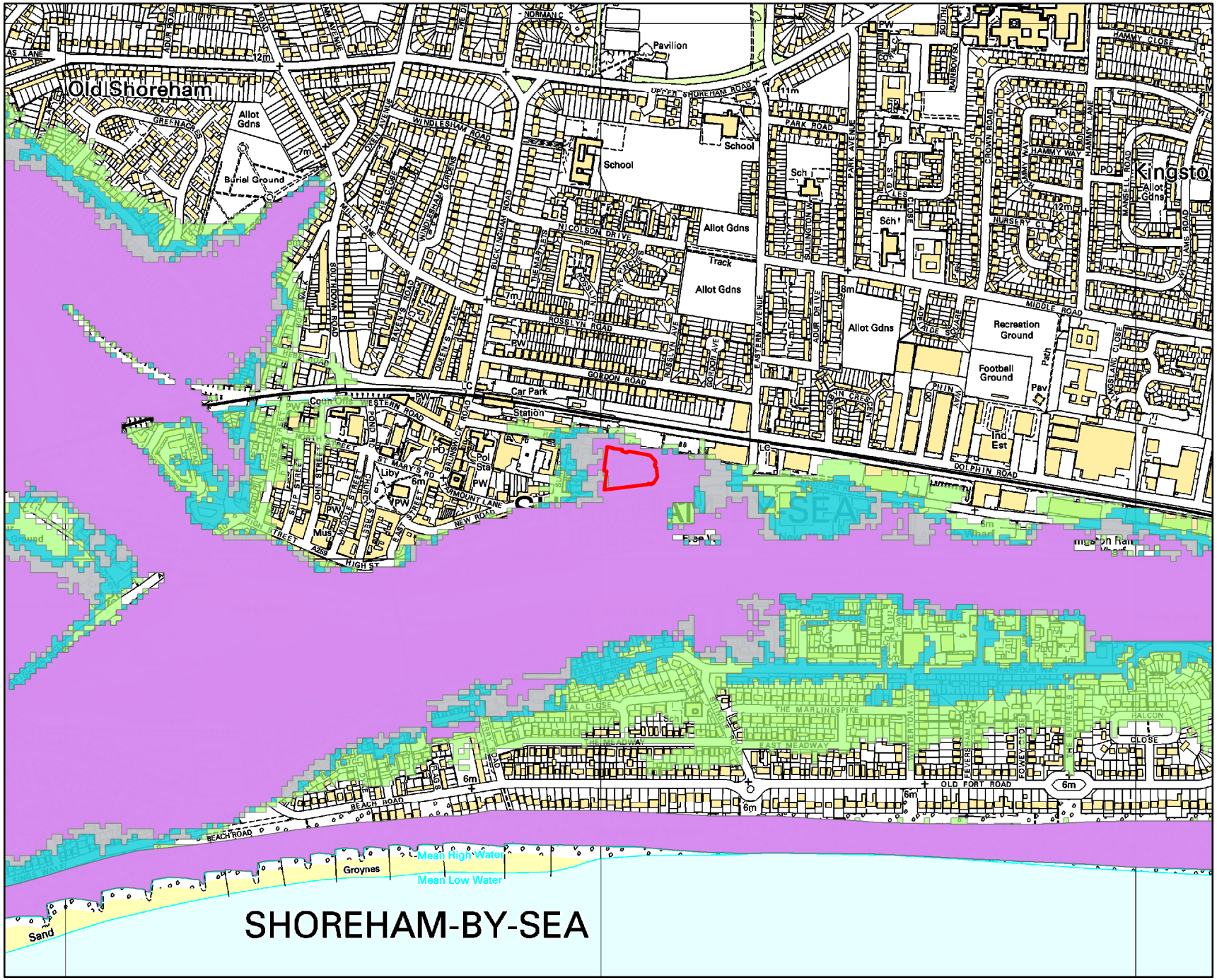
Flood Map for Planning (Rivers and Sea). Created 07/10/2019.

Environment Agency



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SSD143752 - Modelled Flood Outlines (Undefended Tidal). Created 07/10/2019. Centred BN43 6PR.



Environment Agency

N

Legend

- Site Boundary
- 0.5% AEP (2012) (Undefended)
- 0.5% AEP (2070) (Undefended)
- 0.5% AEP (2115) (Undefended)
- 0.1% AEP (2012) (Undefended)

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

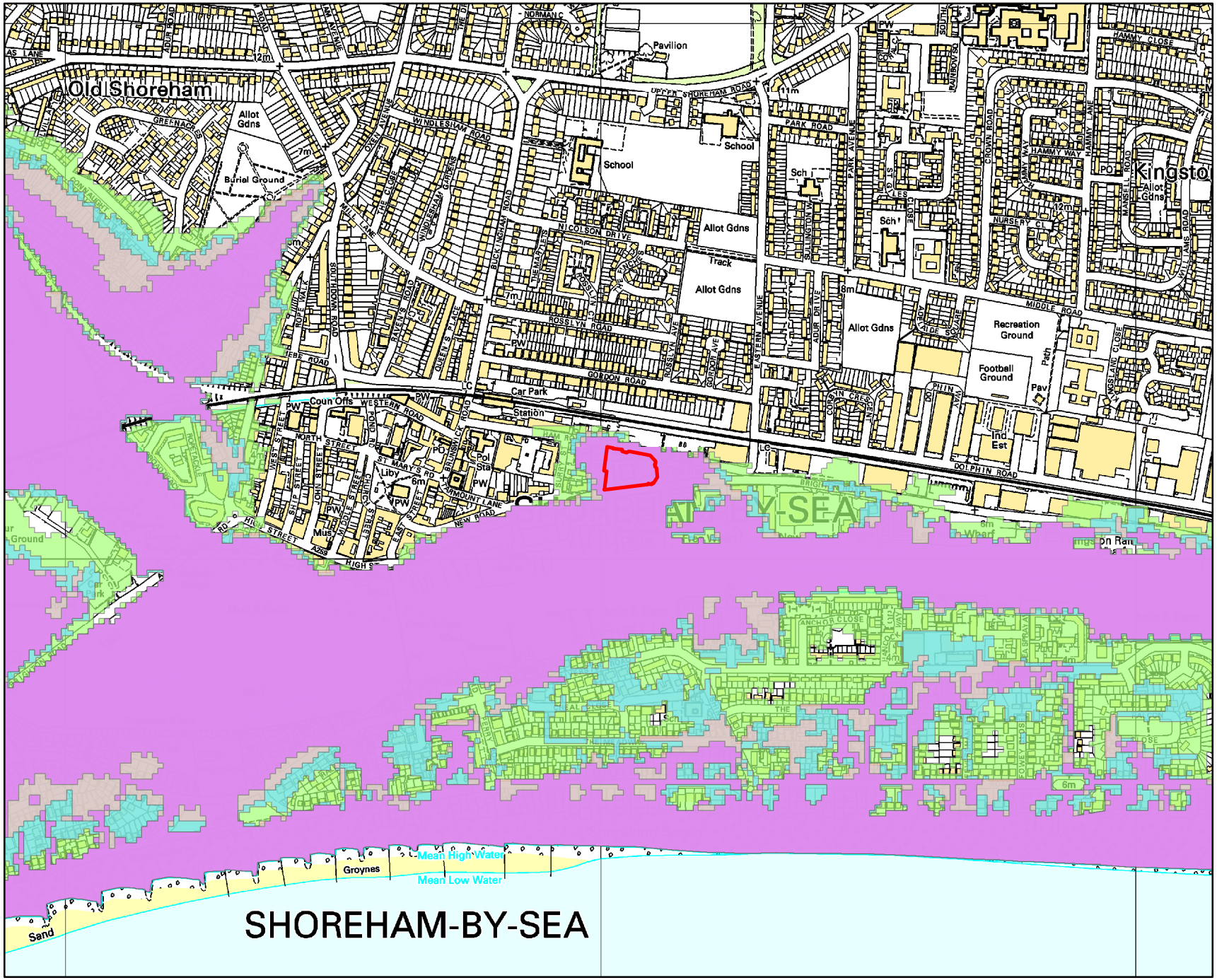
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0 0.225 0.45

Kilometers

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Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

SSD143752 - Modelled Flood Outlines (Defended Tidal). Created 07/10/2019. Centred BN43 6PR.



Environment Agency

N

Legend

- Site Boundary
- 0.5% AEP (2012) (Defended)
- 0.5% AEP (2070) (Defended)
- 0.5% AEP (2115) (Defended)
- 0.1% AEP (2012) (Defended)

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

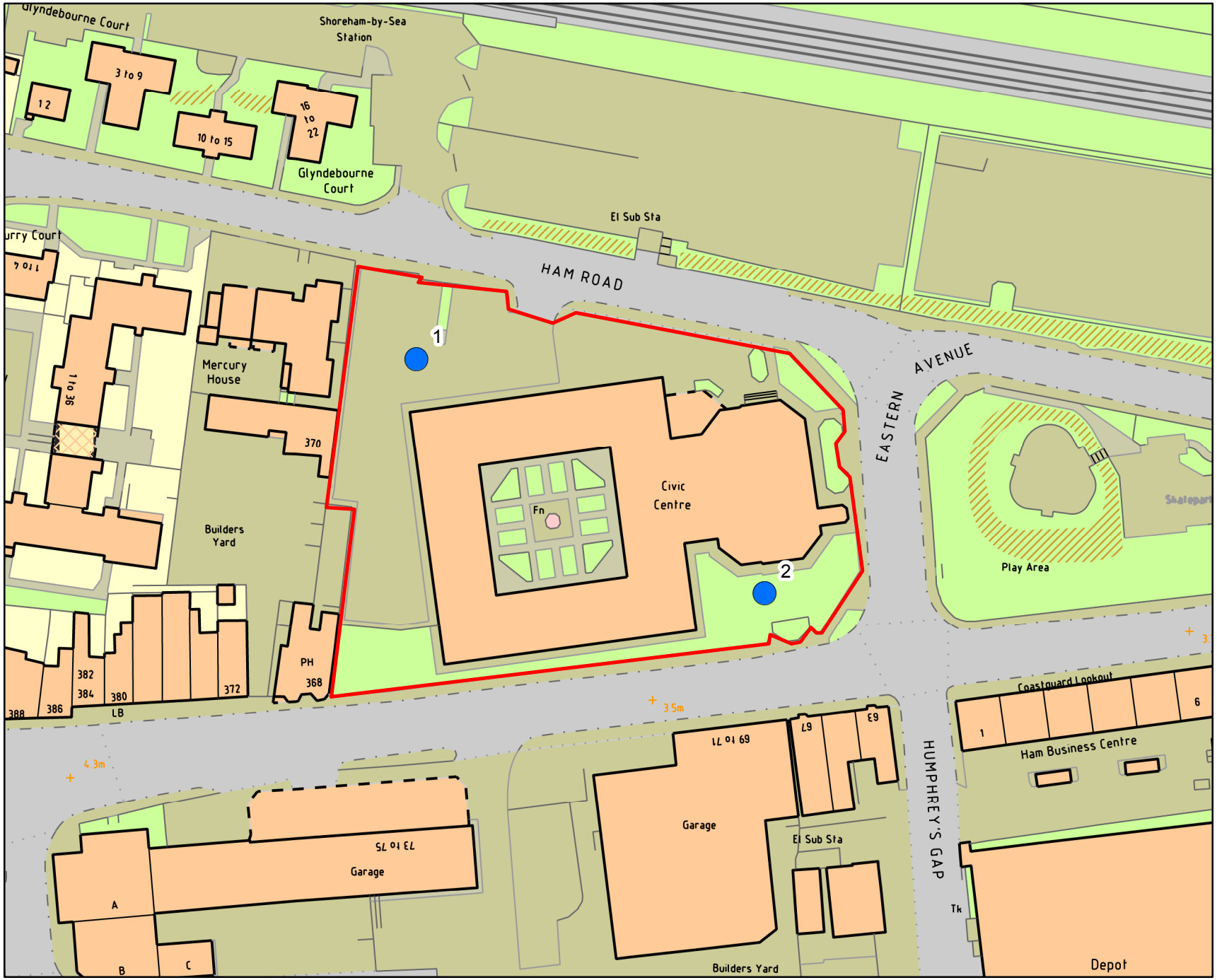
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Kilometers

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SSD143752 - Site Node Points. Created 07/10/2019. Centred BN43 6PR.



Environment Agency

N

Legend

Site Boundary

Site Nodes

Scale: 1:1,000

0 0.0225 0.045

Kilometers

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Product 4 Flood Risk Data Requested by: Gta Civils And Transport

Site: Former Adur Civic Centre Site, Ham Road, Shoreham-by-Sea, BN43 6PR

Table 1: Water Levels: Tidal Undefended

	NGR		Modelled Flood Levels in Metres AOD Undefended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	522023	105191	4.02	4.79	5.39	4.48
2	522088	105148	4.02	4.79	5.39	4.48

Table 2: Water Levels: Tidal Defended

	NGR		Modelled Flood Levels in Metres AOD Defended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	522023	105191	4.15	4.43	5.10	4.32
2	522088	105148	4.15	4.43	5.10	4.32

Table 3: Water Depths: Tidal Undefended

	NGR		Modelled Flood Depths in Metres Undefended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	522023	105191	0.42	1.89	1.79	0.88
2	522088	105148	0.37	1.14	1.74	0.83

Table 4: Water Depths: Tidal Defended

	NGR		Modelled Flood Depths in Metres Defended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	522023	105191	0.54	0.83	1.49	0.71
2	522088	105148	0.47	0.78	1.42	0.64

AIMS Flood Defence Map. Created 07/10/2019.

Environment Agency

Legend

Structures (3rd party maintained)

- Asset type not defined
- Control Gate
- Draw Off Tower
- Fish Pass
- Hydrobrake
- In Channel Stoplogs
- Inspection Chamber
- Jetty
- Outfall
- Screen
- Spillway
- Stilling Basin
- Weir

Defences (3rd party maintained)

- Asset type not defined
- Embankment
- Wall
- Flood Gate
- Demountable Defence
- Bridge Abutment
- High Ground
- Beach
- Barrier Beach
- Promenade
- Quay
- Cliff
- Dunes

Channels (3rd party maintained)

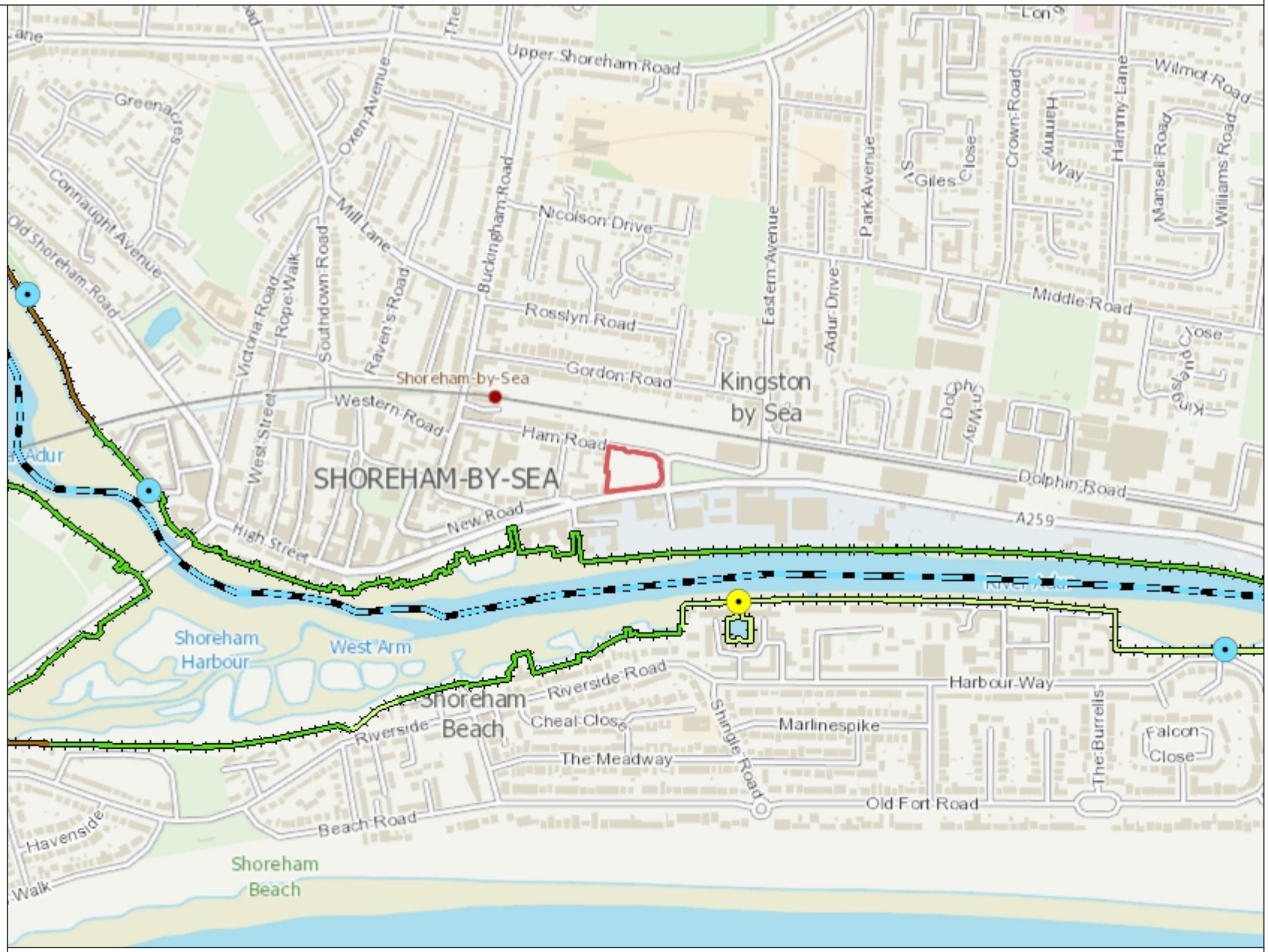
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0 250

Metres

N W E S



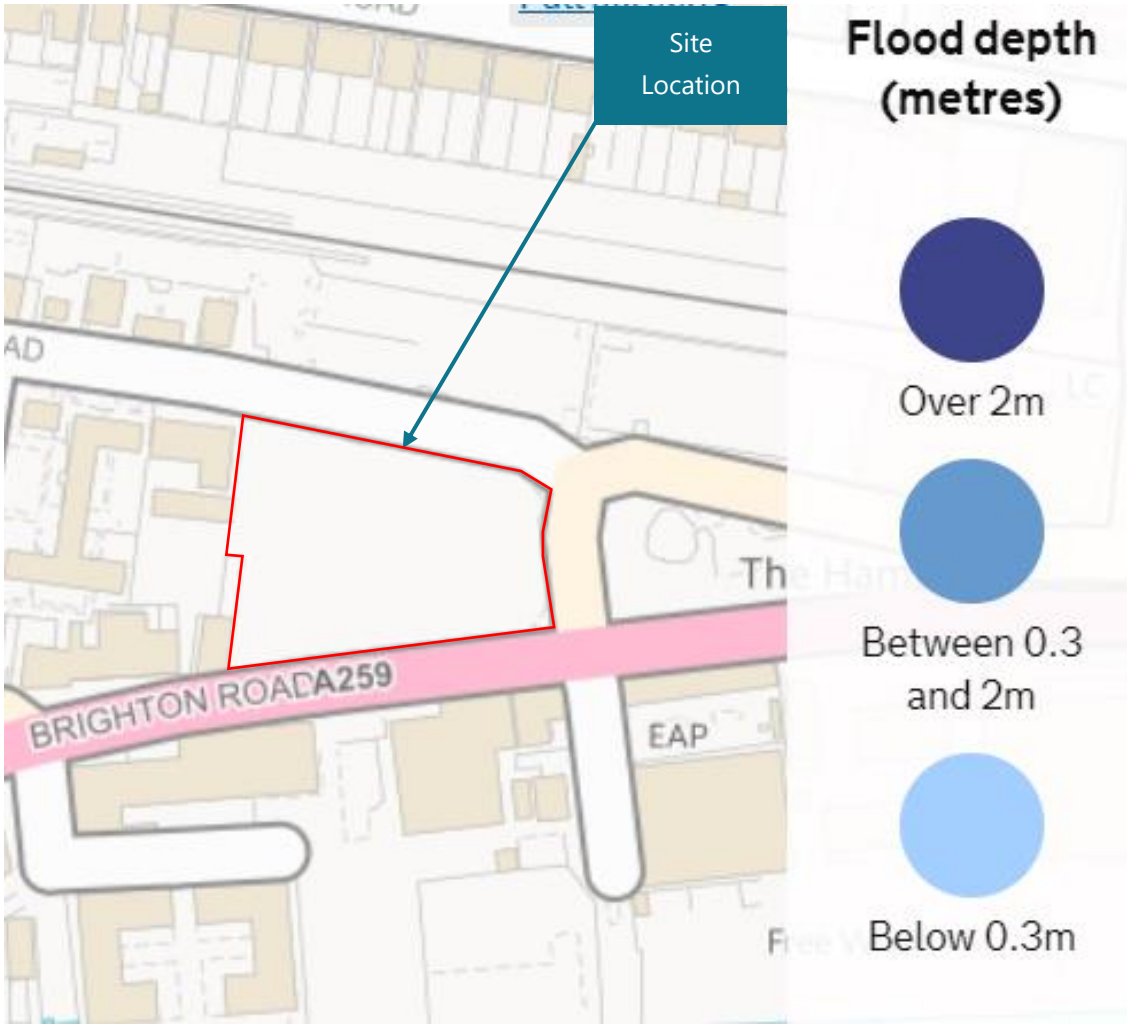
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All levels taken from Arun To Adur Flood Modelling which was completed by JBA Consulting in 2012.

Produced on: 07/10/2019

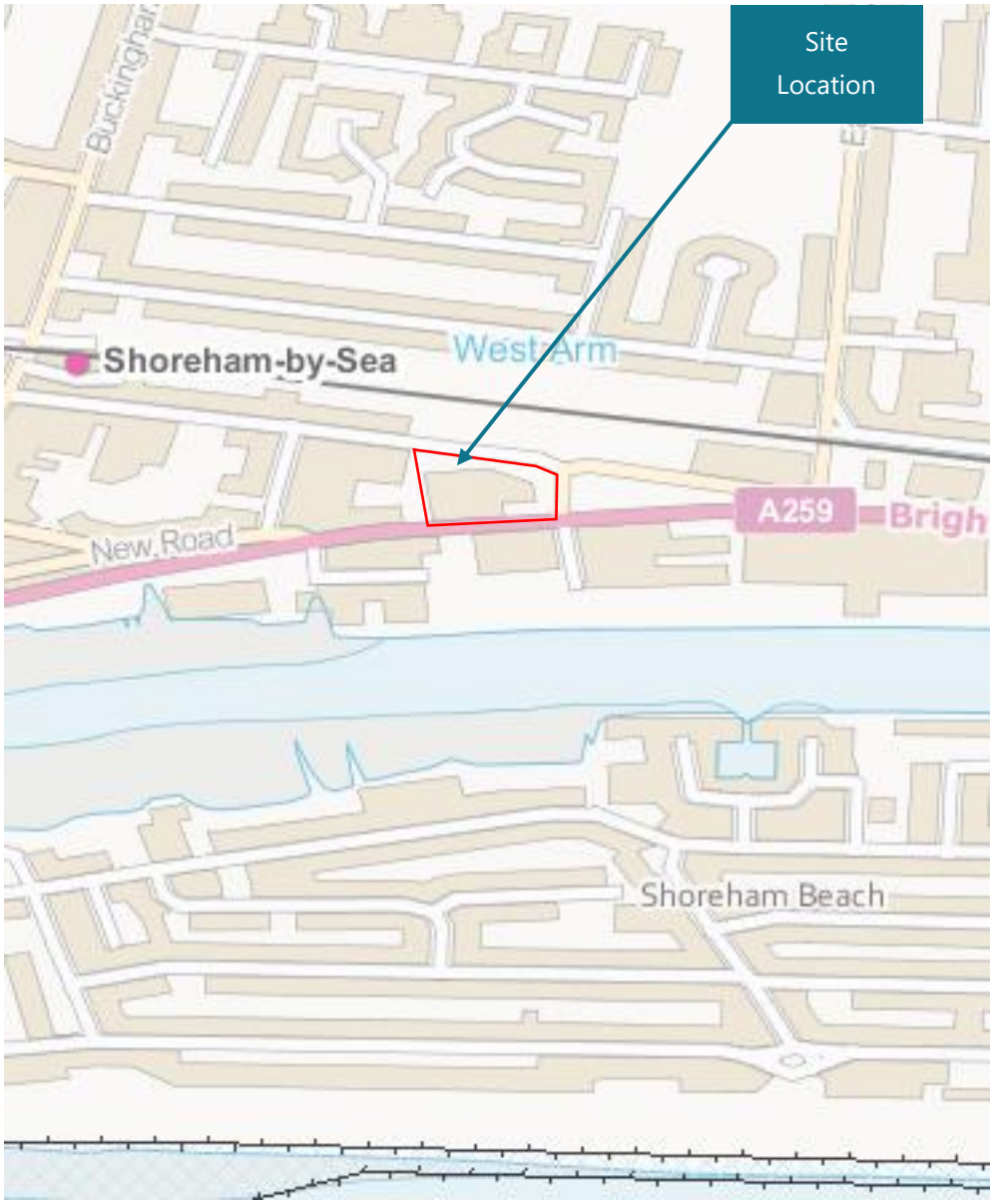
There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

Office Address: Guildbourne House, Chatsworth Road, Worthing BN11 1LD.
Customer services line: 03708 506 506. Email: enquiries@environment-agency.gov.uk
www.gov.uk/government/organisations/environment-agency



EA's Online 'Risk of Flooding from Reservoirs' Map

The site is removed from this source of flooding

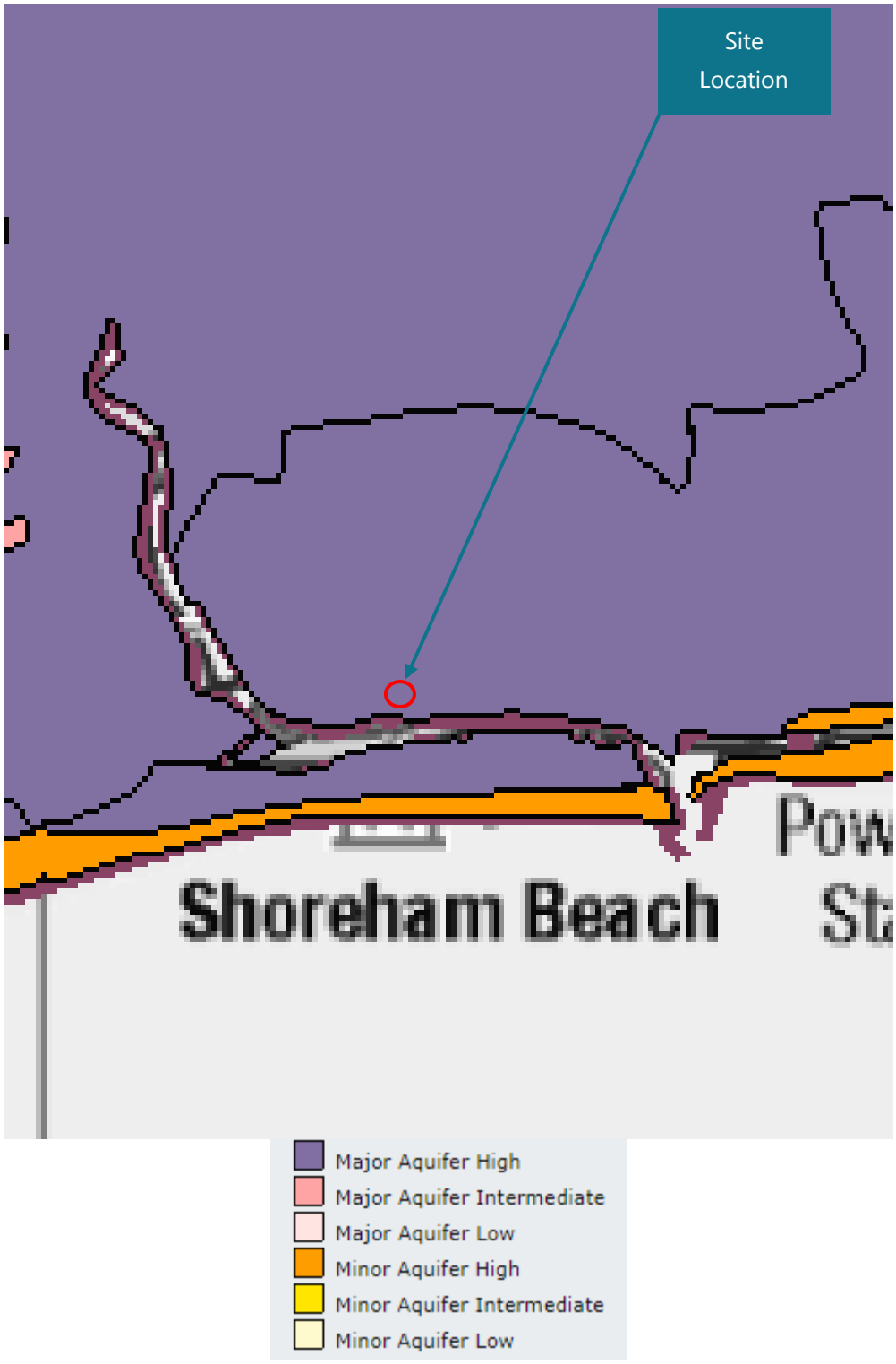


Historic Flood Map

Historic Flood Map

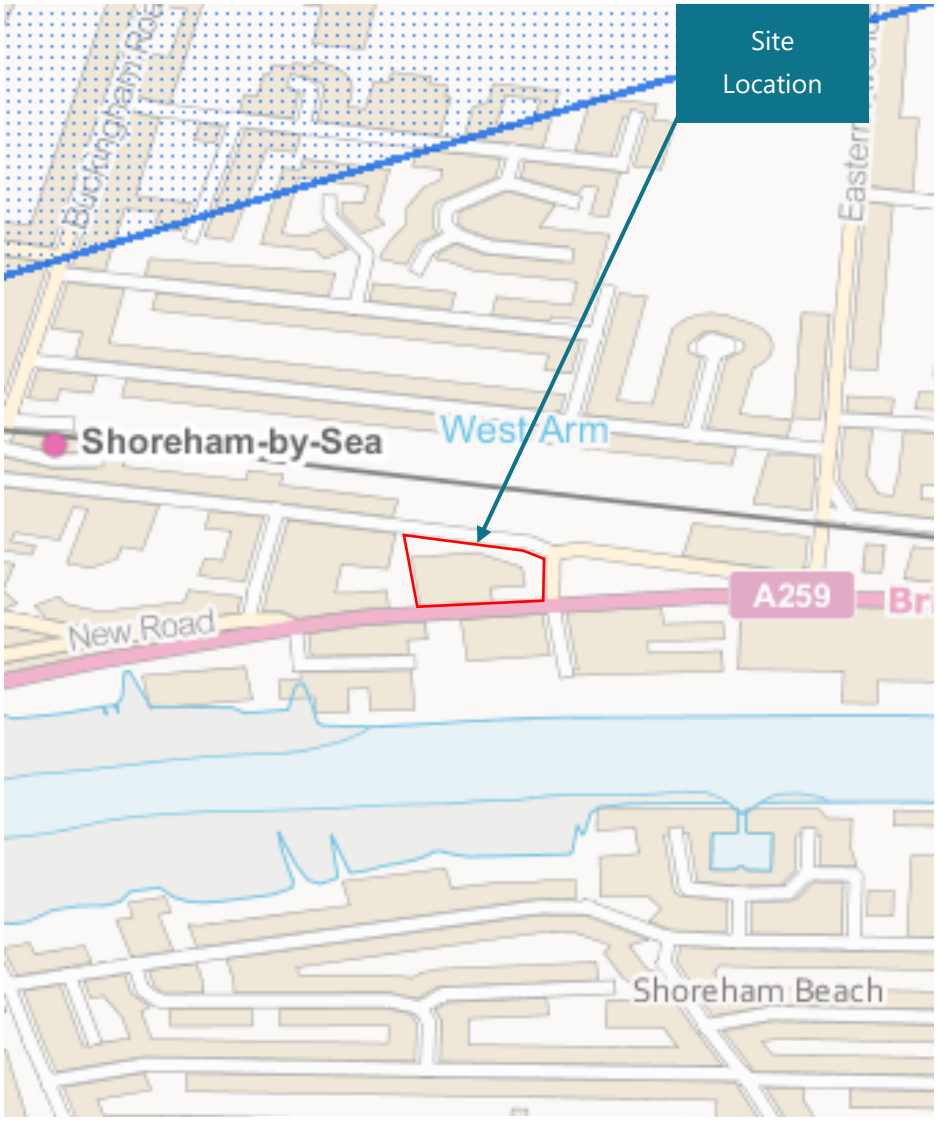
EA's Historic Flood Map

This site is removed from the nearest affected area



EA's Groundwater Vulnerability Map

This site lies over a 'Major Aquifer High'



EA's Source Protection Zone Map

The site is removed from the nearest Source Protection Zone

Appendix C

Site Investigation Excerpt, Topographic Survey and Sewer Records

Executive Summary – Conclusions and Recommendations

Site: Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex BN43 9SA
Client: Hyde Housing
Our Reference: J17882 November 2019

Geotechnical Recommendations

Proposed Development
The proposal comprises the demolition a three-storey commercial building (already demolished), referred to as the 'Adur Civic Centre' and the construction of a six-storey commercial/residential building in the western section of the site and a seven to ten-storey commercial/residential building in the eastern section of the site. Associated hardstanding car parking is to be laid in the central and western sections of the site. Soft landscaping is proposed along the north-eastern and north-western sections of the site and is to comprise communal open space (non-private gardens) with trees and bushes to be planted.

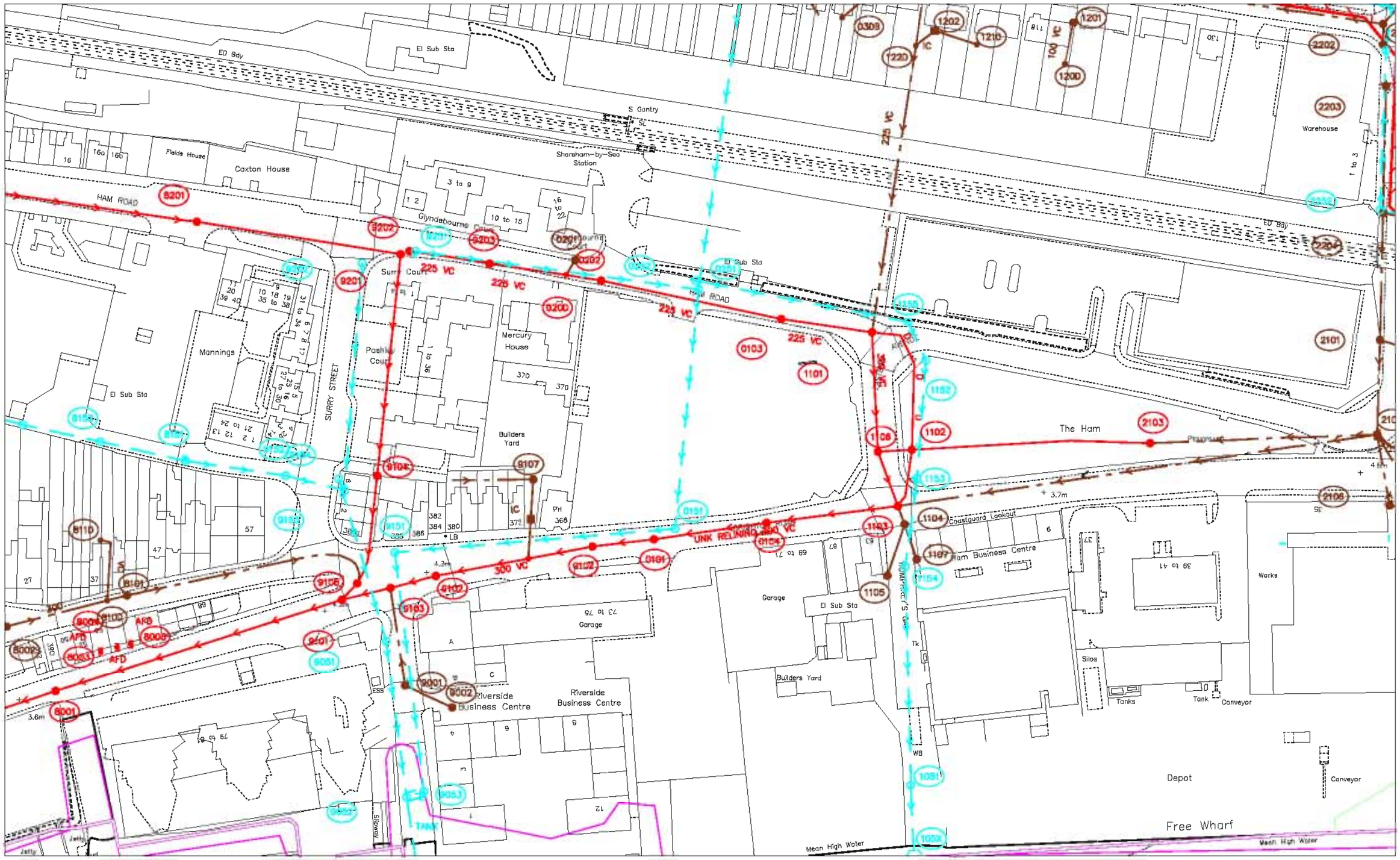
Foundation Scheme
Due to poor ground conditions to a significant depth reaching 6.00m bgl, the presence of relatively high groundwater (minimum of 1.65m bgl) and the relatively high loads anticipated by the proposed buildings, **a piled foundation solution is considered the most suitable for the proposed development; a pile design is presented in Appendix C.1**.

Soakaways
Due to relatively low indicative infiltration rates recorded given the low-permeable soils of the Head and the relatively high groundwater, it is likely that traditional soakaways are **not** going to work satisfactorily on site, therefore shallow trench soakaways and/or porous pavements could be alternatively considered.


105220N
105200N
105180N
105160N
105140N
105120N
522000E
522020E
522040E
522060E
522080E
522100E
522120E
MH20 drops into trunk sewer
MH02 is surcharged
MH01 is buried
SA @ 5.5m due to intruding connecion
SA @ 10.3m due to dex in line
SA @ 13.0m due to dex
SA @ 18.9m due to loss of vision
SA @ 20.2m due to dex in line
SA @ 6.21m due to dex
SA @ 6.0m due to dex in pipe
SA @ 10.3m due to dex in pipe
SA @ 17.1m due to jdl
Raised Planter
Grass
Canopy
Locked Cabinet
Possible Pond Pump Overflow
Possible Pond
Inconclusive Depths
GPR Scan AC3
GPR Scan AC4
GPR Scan AC13
Bus Stop
Slabs
Concrete
Asphalt
Tac
Gore Bol
Cond Box
Elec Box
Sump
Tree
Hedge
Fence
Wall
Kerb
Drop Kerb
Rail
Bollard
Lamp
Sign
Manhole
Inspection Chamber
Gully
Soil Pipe
Vent Pipe
Rodding Eye
Valve
Hydrant
Meter
Pole
Post
Cable
Duct
Ditch
Stream
Pond
Building
Roof
Window
Door
Step
Ramp
Fence
Gate
Barrier
Sign
Light
Camera
Antenna
Dish
Tank
Pump
Generator
Transformer
Switch
Box
Cabinet
Pit
Chamber
Junction
Connection
Termination
Splice
Repair
Joint
Coupling
Adapter
Reducer
Elbow
Tee
Cross
Valve
Meter
Gauge
Sensor
Transmitter
Receiver
Transceiver
Modem
Router
Switch
Hub
Server
Workstation
Laptop
Tablet
Phone
Printer
Scanner
Copier
Fax
Projector
Screen
Whiteboard
Flipchart
Desk
Chair
Table
Cabinet
Shelf
Drawer
Filing
Storage
Locker
Safe
Vault
Door
Window
Wall
Floor
Ceiling
Roof
Stairs
Lift
Escalator
Ramp
Step
Handrail
Guardrail

SEWER RECORDS PAGE 1 OF 2

105306



105017

521815

522286

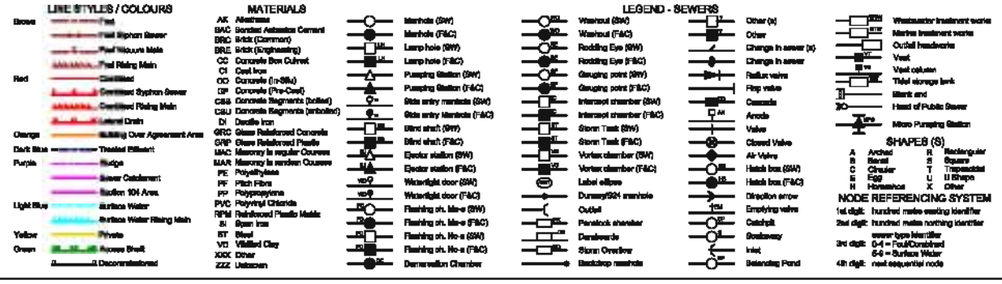
O.S. REF. TQ2205SW	Drawn by: rohandas	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.
	Scale: 1:250	WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement
Title: 356170_Former Adur Civic Centr	Date: 21/10/2019	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

N

Southern Water

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape		Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0101X	3.67	1.62	300	VC	CIRC		9201X	4.71		300	VC	CIRC												
0102X	3.85		300	VC	CIRC		9202X	4.599		225	VC	CIRC												
0103X	3.432		225	VC	CIRC		9203X	4.244		225	VC	CIRC												
0104X	3.6	1.9	300	VC	CIRC		9251X	4.42	2.5	525	VC	CIRC												
0151X	3.63	0.81	1200	VC	CIRC		9252X	4.43		300	VC	CIRC												
0201X	4.18	3.23	150	VC	CIRC																			
0202X	3.713		225	VC	CIRC																			
020DX	2.53		225	VC	CIRC																			
0251X	3.53	0.81	1200	VC	CIRC																			
0252X	3.38	2.43	225	VC	CIRC																			
0308X			OTHER	OTHER	CIRC																			
1051X			375	VC	CIRC																			
1101X	3.547	2.109	300	VC	CIRC																			
1102X	3.669	2.095	300	VC	CIRC																			
1103X	3.557		300	VC	CIRC																			
1104X			150	VC	CIRC																			
1105X			150	VC	CIRC																			
1106X	3.659	2.095	300	VC	CIRC																			
1107X			150	VC	CIRC																			
1152X	3.46	2.6	225	VC	CIRC																			
1153X	3.9	2.29	300	VC	CIRC																			
1154X			375	VC	CIRC																			
1155X		2.94	225	VC	CIRC																			
1202X			UNK	UNK	CIRC																			
120DX			100	VC	CIRC																			
121DX			UNK	UNK	CIRC																			
122DX			225	VC	CIRC																			
2101X	5.51	2.83	225	VC	CIRC																			
2102X	5.28	2.6	225	VC	CIRC	*																		
2102Y	5.28		UNK	UNK	CIRC	*																		
2103X	4.04		225	VC	CIRC																			
2106X			OTHER	OTHER	CIRC																			
2201X	5.42	3.1	225	VC	CIRC																			
2202X	5.39	3.17	225	VC	CIRC																			
2203X	5.52	4.42	150	VC	CIRC																			
2204X	5.65	3.27	225	VC	CIRC																			
2251X	5.47	3.09	225	VC	CIRC																			
2252X	5.63	3.34	225	VC	CIRC																			
2351X	5.48	1.76	900	VC	CIRC																			
8001X	3.65	1.56	300	VC	CIRC																			
8002X			300	OTHER	CIRC																			
8101X			300	OTHER	CIRC																			
810DX			300	OTHER	CIRC																			
811DX			UNK	VC	CIRC																			
8151X	5.7	3.24	225	VC	CIRC																			
8152X			OTHER	BRC	CIRC																			
8153X			OTHER	BRC	CIRC																			
8201X	5.18		300	VC	CIRC																			
9001X			150	UNK	CIRC																			
9002X			150	UNK	CIRC																			
9051X			300	VC	CIRC																			
9052X			450	BRC	CIRC																			
9053X			OTHER	BRC	CIRC																			
9101X	4.34	1.69	300	VC	CIRC																			
9102X	4.45		300	VC	CIRC																			
9103X			300	VC	CIRC																			
9104X	4.91		300	VC	CIRC																			
9105X			300	VC	CIRC																			
9106X			UNK	UNK	UNK																			
9107X			UNK	UNK	UNK																			
910DX			300	VC	CIRC																			
9151X	4.67		1200	VC	CIRC																			
9152X	5.1	2.79	300	VC	CIRC																			
9153X	4.87	2.4	OTHER	BRC	CIRC																			
9154X	4.73		300	VC	CIRC																			



Drawn by: rohandas	Southern Water
Title: 356170_Former Adur Civic Centr	
Date: 21/10/2019	

Appendix D

Architect's Proposed Scheme Drawings



CDM 2015 Health & Safety Information

This information relates only to 'Signigicant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Risk Assessment Register.

1) Possible conflict between construction work and surrounding road networks of Brighton Road, Eastern Avenue and Ham Road.These are high traffic roads which could be impacted by construction works. This includes, pedestrians, cyclists and all other vehicles. Measures you be put in place to avoid these issues.

2) All site boundaries to be suitably fenced and provided with warning signage during construction works

2) Existing tree which is subject to removal should be carefully removed prior to construction works to ensure no impact on neighbouring properties of highway.

3) Foul sewer main running through site (north to south) to be marked on site including pipe size and corresponding easement with appropriate protection prior to any works.

4) Prior to commencement of any works on site, a Refurbishment and Demolition Asbestos survey should be procured, and any asbestos identified should be removed in accordance with current asbestos regulations by a specialist registered asbestos removal company.

5) Excavation around site perimeters to be cleared and maintained during construction works to prevent possible flooding issues due to sites locaiotn within flood zone. Ditches to be protected to avoid contamination during construction works

Accommodation Key

- Commercial
- Cycle/Bin Store
- Plant

Rev	Date	Revision Details	Dr	Ch
I	07.10.20	Revised Layout		
H	18.09.20	Revised Layout		
G	07.08.20	Revised Ground Floor Layout		
F	02.07.20	Revised Ground Floor Layout		
E	17.06.20	Revised Layout		
D	27.05.20	Revised Ground Floor Layout		
C	01.05.20	Revised Ground Floor Layout		
B	13.02.20	Revised central footpath and west car park		
A	07.02.20	Revised Layout		

London: 76 Great Suffolk Street, London, SE1 0BL
T 020 7928 2773 E london@ecearchitecture.com
Sussex: Brooklyn Chambers, 11 Goring Road, Worthing, West Sussex, BN12 4AP
T 01903 248777 E sussex@ecearchitecture.com
Bristol: Westworks, Colston Tower, Colston Street, Bristol, BS1 4XE
T: 0117 214 1101 E bristol@ecewestworks.com
ECE Architecture
www.ecearchitecture.com

Hyde

Job Title
Former Adur Civic Centre

Drawing Tittle
Proposed Ground Floor Plan

Scale
1:200 @ A1 / 1:400 @ A3

meters 4 8 12 16 20

Project	Drawing No	Rev
6806	PL 10	I

Drawn	Checked	Date
IM	NF	18.11.19

Status

PRELIMINARY

CAD Plot Date:08/10/2020 10:03:21

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CDM 2015 Health & Safety Information

This information relates only to 'Signigicant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Risk Assessment Register.

Accommodation Key

- 1B2P
- 2B3P
- 2B4P
- 3B4P
- 3B5P

Rev	Date	Revision Details	Dr	Ch
E	07.10.20	Revised Layout		
D	18.09.20	Revised Layout		
C	17.06.20	Revised Layout		
B	01.05.20	Revised Floor Layout		
A	07.02.20	Revised Layout		

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ECE Architecture
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Hyde

Job Title
Former Adur Civic Centre

Drawing Tittle
Proposed First Floor Plan

Scale
1:200 @ A1 / 1:400 @ A3

meters 4 8 12 16 20

Project	Drawing No	Rev
6806	PL 11	E

Drawn	Checked	Date
IM	NF	18.11.19

Status

PRELIMINARY

CAD Plot Date:07/10/2020 16:10:37

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North

CDM 2015 Health & Safety Information

This information relates only to 'Signigicant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Risk Assessment Register.



Rev	Date	Revision Details	Dr	Ch
E	07.10.20	Revised Layout		
D	18.09.20	Revised Layout		
C	17.08.20	Revised Layout		
B	27.05.20	Revised Roof Layouts		
A	04.03.20	Drawing Number changed from 20 to 30, revised roof layout.		

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T 020 7928 2773 E london@ecearchitecture.com
Sussex: Brooklyn Chambers, 11 Goring Road, Worthing, West Sussex, BN12 4AP
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T: 0117 214 1101 E bristol@ecewestworks.com

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www.ecearchitecture.com

Hyde

Job Title
Former Adur Civic Centre

Drawing Title
Proposed Roof Plan

Scale
1:200 @ A1 / 1:400 @ A3

meters 4 8 12 16 20

Project	Drawing No	Rev
6806	PL 30	E

Drawn	Checked	Date
IM	NF	28.02.20

Status

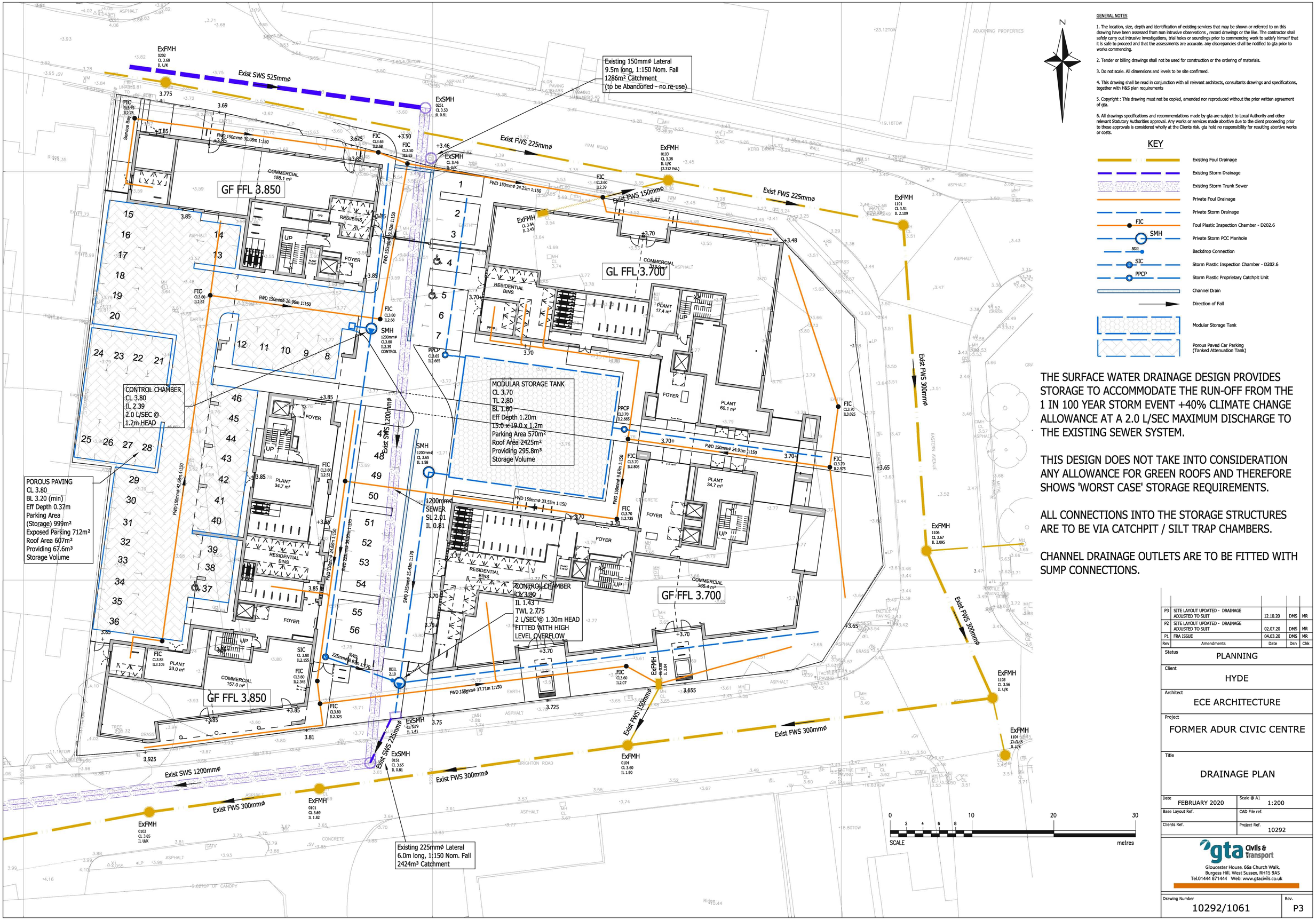
PRELIMINARY

CAD Plot Date:12/10/2020 11:53:43

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Appendix E

Drainage Strategy Layout & Calculation Sheets



N

GENERAL NOTES

1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations , record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. any discrepancies shall be notified to gta prior to works commencing.

2. Tender or billing drawings shall not be used for construction or the ordering of materials.

3. Do not scale. All dimensions and levels to be site confirmed.

4. This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements

5. Copyright : This drawing must not be copied, amended nor reproduced without the prior written agreement of gta.

6. All drawings specifications and recommendations made by gta are subject to Local Authority and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Clients risk. gta hold no responsibility for resulting abortive works or costs.

KEY

- Existing Foul Drainage
- Existing Storm Drainage
- Existing Storm Trunk Sewer
- Private Foul Drainage
- Private Storm Drainage
- FIC — Foul Plastic Inspection Chamber - D202.6
- SMH — Private Storm PCC Manhole
- BDTL — Backdrop Connection
- SIC — Storm Plastic Inspection Chamber - D202.6
- PPCP — Storm Plastic Proprietary Catchpit Unit
- Channel Drain
- Direction of Fall
- Modular Storage Tank
- Porous Paved Car Parking (Tanked Attenuation Tank)

THE SURFACE WATER DRAINAGE DESIGN PROVIDES STORAGE TO ACCOMMODATE THE RUN-OFF FROM THE 1 IN 100 YEAR STORM EVENT +40% CLIMATE CHANGE ALLOWANCE AT A 2.0 L/SEC MAXIMUM DISCHARGE TO THE EXISTING SEWER SYSTEM.

THIS DESIGN DOES NOT TAKE INTO CONSIDERATION ANY ALLOWANCE FOR GREEN ROOFS AND THEREFORE SHOWS 'WORST CASE' STORAGE REQUIREMENTS.

ALL CONNECTIONS INTO THE STORAGE STRUCTURES ARE TO BE VIA CATCHPIT / SILT TRAP CHAMBERS.

CHANNEL DRAINAGE OUTLETS ARE TO BE FITTED WITH SUMP CONNECTIONS.

Rev	Amendments	Date	Dsn	Chk
P3	SITE LAYOUT UPDATED - DRAINAGE ADJUSTED TO SUIT	12.10.20	DMS	MR
P2	SITE LAYOUT UPDATED - DRAINAGE ADJUSTED TO SUIT	02.07.20	DMS	MR
P1	FRA ISSUE	04.03.20	DMS	MR

Status: PLANNING

Client: HYDE

Architect: ECE ARCHITECTURE

Project: FORMER ADUR CIVIC CENTRE

Title: DRAINAGE PLAN

Date: FEBRUARY 2020	Scale @ A1: 1:200
Base Layout Ref.	CAD File ref.
Clients Ref.	Project Ref.: 10292

gta Civils & Transport
Gloucester House, 66a Church Walk,
Burgess Hill, West Sussex, RH15 9AS
Tel.01444 871444 Web: www.gtacivils.co.uk

Drawing Number: 10292/1061 Rev.: P3

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.300
Area (ha)	0.613	Urban	0.000
SAAR (mm)	700	Region Number	Region 7

Results l/s

QBAR Rural	1.1
QBAR Urban	1.1
Q1 year	0.9
Q1 year	0.9
Q30 years	2.5
Q100 years	3.6

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

Half Drain Time : 308 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	3.310	0.110	0.0	1.8	1.8	30.0	O K
30 min Summer	3.341	0.141	0.0	1.8	1.8	39.4	O K
60 min Summer	3.371	0.171	0.0	1.8	1.8	48.4	O K
120 min Summer	3.396	0.196	0.0	1.8	1.8	55.7	O K
180 min Summer	3.402	0.202	0.0	1.9	1.9	57.7	O K
240 min Summer	3.400	0.200	0.0	1.9	1.9	57.1	O K
360 min Summer	3.393	0.193	0.0	1.8	1.8	54.8	O K
480 min Summer	3.386	0.186	0.0	1.8	1.8	52.9	O K
600 min Summer	3.380	0.180	0.0	1.8	1.8	51.1	O K
720 min Summer	3.375	0.175	0.0	1.8	1.8	49.4	O K
960 min Summer	3.363	0.163	0.0	1.8	1.8	45.9	O K
1440 min Summer	3.340	0.140	0.0	1.8	1.8	39.0	O K
2160 min Summer	3.307	0.107	0.0	1.8	1.8	29.3	O K
2880 min Summer	3.279	0.079	0.0	1.7	1.7	20.9	O K
4320 min Summer	3.238	0.038	0.0	1.7	1.7	8.6	O K
5760 min Summer	3.216	0.016	0.0	1.7	1.7	2.0	O K
7200 min Summer	3.200	0.000	0.0	1.6	1.6	0.0	O K
8640 min Summer	3.200	0.000	0.0	1.4	1.4	0.0	O K
10080 min Summer	3.200	0.000	0.0	1.2	1.2	0.0	O K
15 min Winter	3.323	0.123	0.0	1.8	1.8	33.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.960	0.0	32.5	18
30 min Summer	86.656	0.0	43.7	33
60 min Summer	55.544	0.0	55.9	62
120 min Summer	34.343	0.0	69.4	122
180 min Summer	25.523	0.0	77.3	182
240 min Summer	20.520	0.0	82.7	240
360 min Summer	15.103	0.0	91.4	302
480 min Summer	12.133	0.0	97.9	362
600 min Summer	10.229	0.0	103.1	428
720 min Summer	8.892	0.0	107.7	496
960 min Summer	7.122	0.0	115.0	634
1440 min Summer	5.200	0.0	125.8	906
2160 min Summer	3.787	0.0	137.6	1296
2880 min Summer	3.021	0.0	146.2	1668
4320 min Summer	2.193	0.0	159.3	2336
5760 min Summer	1.744	0.0	169.0	3000
7200 min Summer	1.461	0.0	176.8	0
8640 min Summer	1.265	0.0	183.7	0
10080 min Summer	1.120	0.0	189.7	0
15 min Winter	128.960	0.0	36.4	18

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	3.359	0.159	0.0	1.8	1.8	44.6	O K
60 min Winter	3.394	0.194	0.0	1.8	1.8	55.1	O K
120 min Winter	3.424	0.224	0.0	1.9	1.9	64.1	O K
180 min Winter	3.434	0.234	0.0	1.9	1.9	67.3	O K
240 min Winter	3.435	0.235	0.0	1.9	1.9	67.6	O K
360 min Winter	3.429	0.229	0.0	1.9	1.9	65.7	O K
480 min Winter	3.418	0.218	0.0	1.9	1.9	62.5	O K
600 min Winter	3.410	0.210	0.0	1.9	1.9	60.1	O K
720 min Winter	3.402	0.202	0.0	1.9	1.9	57.6	O K
960 min Winter	3.384	0.184	0.0	1.8	1.8	52.3	O K
1440 min Winter	3.348	0.148	0.0	1.8	1.8	41.5	O K
2160 min Winter	3.299	0.099	0.0	1.8	1.8	26.7	O K
2880 min Winter	3.259	0.059	0.0	1.7	1.7	14.7	O K
4320 min Winter	3.208	0.008	0.0	1.7	1.7	0.5	O K
5760 min Winter	3.200	0.000	0.0	1.4	1.4	0.0	O K
7200 min Winter	3.200	0.000	0.0	1.2	1.2	0.0	O K
8640 min Winter	3.200	0.000	0.0	1.0	1.0	0.0	O K
10080 min Winter	3.200	0.000	0.0	0.9	0.9	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	86.656	0.0	49.0	33
60 min Winter	55.544	0.0	62.7	62
120 min Winter	34.343	0.0	77.5	120
180 min Winter	25.523	0.0	86.6	178
240 min Winter	20.520	0.0	92.8	234
360 min Winter	15.103	0.0	102.4	338
480 min Winter	12.133	0.0	109.6	386
600 min Winter	10.229	0.0	115.6	462
720 min Winter	8.892	0.0	120.5	538
960 min Winter	7.122	0.0	128.7	690
1440 min Winter	5.200	0.0	141.0	980
2160 min Winter	3.787	0.0	153.9	1380
2880 min Winter	3.021	0.0	163.9	1732
4320 min Winter	2.193	0.0	178.3	2288
5760 min Winter	1.744	0.0	189.2	0
7200 min Winter	1.461	0.0	198.0	0
8640 min Winter	1.265	0.0	205.7	0
10080 min Winter	1.120	0.0	212.5	0

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.600	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.134

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.132	32	36	0.000	64	68	0.000	96	100	0.000
4	8	0.000	36	40	0.000	68	72	0.000	100	104	0.000
8	12	0.000	40	44	0.000	72	76	0.000	104	108	0.000
12	16	0.000	44	48	0.000	76	80	0.000	108	112	0.000
16	20	0.000	48	52	0.000	80	84	0.000	112	116	0.000
20	24	0.000	52	56	0.000	84	88	0.000	116	120	0.000
24	28	0.000	56	60	0.000	88	92	0.000			
28	32	0.000	60	64	0.000	92	96	0.000			

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Model Details

Storage is Online Cover Level (m) 3.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	52.0
Membrane Percolation (mm/hr)	1000	Length (m)	19.2
Max Percolation (l/s)	277.3	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	3.200	Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0064-2000-1200-2000
Design Head (m)	1.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	64
Invert Level (m)	2.385
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.0	Kick-Flo®	0.573	1.4
Flush-Flo™	0.282	1.8	Mean Flow over Head Range	-	1.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	1.200	2.0	3.000	3.0	7.000	4.5
0.200	1.7	1.400	2.1	3.500	3.3	7.500	4.7
0.300	1.8	1.600	2.3	4.000	3.5	8.000	4.8
0.400	1.7	1.800	2.4	4.500	3.7	8.500	5.0
0.500	1.6	2.000	2.5	5.000	3.9	9.000	5.1
0.600	1.5	2.200	2.6	5.500	4.0	9.500	5.2
0.800	1.7	2.400	2.7	6.000	4.2		
1.000	1.8	2.600	2.8	6.500	4.4		

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

Half Drain Time : 308 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	3.310	0.110	0.0	1.8	1.8	30.0	O K
30 min Summer	3.341	0.141	0.0	1.8	1.8	39.4	O K
60 min Summer	3.371	0.171	0.0	1.8	1.8	48.4	O K
120 min Summer	3.396	0.196	0.0	1.8	1.8	55.7	O K
180 min Summer	3.402	0.202	0.0	1.9	1.9	57.7	O K
240 min Summer	3.400	0.200	0.0	1.9	1.9	57.1	O K
360 min Summer	3.393	0.193	0.0	1.8	1.8	54.8	O K
480 min Summer	3.386	0.186	0.0	1.8	1.8	52.9	O K
600 min Summer	3.380	0.180	0.0	1.8	1.8	51.1	O K
720 min Summer	3.375	0.175	0.0	1.8	1.8	49.4	O K
960 min Summer	3.363	0.163	0.0	1.8	1.8	45.9	O K
1440 min Summer	3.340	0.140	0.0	1.8	1.8	39.0	O K
2160 min Summer	3.307	0.107	0.0	1.8	1.8	29.3	O K
2880 min Summer	3.279	0.079	0.0	1.7	1.7	20.9	O K
4320 min Summer	3.238	0.038	0.0	1.7	1.7	8.6	O K
5760 min Summer	3.216	0.016	0.0	1.7	1.7	2.0	O K
7200 min Summer	3.200	0.000	0.0	1.6	1.6	0.0	O K
8640 min Summer	3.200	0.000	0.0	1.4	1.4	0.0	O K
10080 min Summer	3.200	0.000	0.0	1.2	1.2	0.0	O K
15 min Winter	3.323	0.123	0.0	1.8	1.8	33.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.960	0.0	32.5	18
30 min Summer	86.656	0.0	43.7	33
60 min Summer	55.544	0.0	55.9	62
120 min Summer	34.343	0.0	69.4	122
180 min Summer	25.523	0.0	77.3	182
240 min Summer	20.520	0.0	82.7	240
360 min Summer	15.103	0.0	91.4	302
480 min Summer	12.133	0.0	97.9	362
600 min Summer	10.229	0.0	103.1	428
720 min Summer	8.892	0.0	107.7	496
960 min Summer	7.122	0.0	115.0	634
1440 min Summer	5.200	0.0	125.8	906
2160 min Summer	3.787	0.0	137.6	1296
2880 min Summer	3.021	0.0	146.2	1668
4320 min Summer	2.193	0.0	159.3	2336
5760 min Summer	1.744	0.0	169.0	3000
7200 min Summer	1.461	0.0	176.8	0
8640 min Summer	1.265	0.0	183.7	0
10080 min Summer	1.120	0.0	189.7	0
15 min Winter	128.960	0.0	36.4	18

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	3.359	0.159	0.0	1.8	1.8	44.6	O K
60 min Winter	3.394	0.194	0.0	1.8	1.8	55.1	O K
120 min Winter	3.424	0.224	0.0	1.9	1.9	64.1	O K
180 min Winter	3.434	0.234	0.0	1.9	1.9	67.3	O K
240 min Winter	3.435	0.235	0.0	1.9	1.9	67.6	O K
360 min Winter	3.429	0.229	0.0	1.9	1.9	65.7	O K
480 min Winter	3.418	0.218	0.0	1.9	1.9	62.5	O K
600 min Winter	3.410	0.210	0.0	1.9	1.9	60.1	O K
720 min Winter	3.402	0.202	0.0	1.9	1.9	57.6	O K
960 min Winter	3.384	0.184	0.0	1.8	1.8	52.3	O K
1440 min Winter	3.348	0.148	0.0	1.8	1.8	41.5	O K
2160 min Winter	3.299	0.099	0.0	1.8	1.8	26.7	O K
2880 min Winter	3.259	0.059	0.0	1.7	1.7	14.7	O K
4320 min Winter	3.208	0.008	0.0	1.7	1.7	0.5	O K
5760 min Winter	3.200	0.000	0.0	1.4	1.4	0.0	O K
7200 min Winter	3.200	0.000	0.0	1.2	1.2	0.0	O K
8640 min Winter	3.200	0.000	0.0	1.0	1.0	0.0	O K
10080 min Winter	3.200	0.000	0.0	0.9	0.9	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	86.656	0.0	49.0	33
60 min Winter	55.544	0.0	62.7	62
120 min Winter	34.343	0.0	77.5	120
180 min Winter	25.523	0.0	86.6	178
240 min Winter	20.520	0.0	92.8	234
360 min Winter	15.103	0.0	102.4	338
480 min Winter	12.133	0.0	109.6	386
600 min Winter	10.229	0.0	115.6	462
720 min Winter	8.892	0.0	120.5	538
960 min Winter	7.122	0.0	128.7	690
1440 min Winter	5.200	0.0	141.0	980
2160 min Winter	3.787	0.0	153.9	1380
2880 min Winter	3.021	0.0	163.9	1732
4320 min Winter	2.193	0.0	178.3	2288
5760 min Winter	1.744	0.0	189.2	0
7200 min Winter	1.461	0.0	198.0	0
8640 min Winter	1.265	0.0	205.7	0
10080 min Winter	1.120	0.0	212.5	0

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.600	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.134

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.132	32	36	0.000	64	68	0.000	96	100	0.000
4	8	0.000	36	40	0.000	68	72	0.000	100	104	0.000
8	12	0.000	40	44	0.000	72	76	0.000	104	108	0.000
12	16	0.000	44	48	0.000	76	80	0.000	108	112	0.000
16	20	0.000	48	52	0.000	80	84	0.000	112	116	0.000
20	24	0.000	52	56	0.000	84	88	0.000	116	120	0.000
24	28	0.000	56	60	0.000	88	92	0.000			
28	32	0.000	60	64	0.000	92	96	0.000			

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Model Details

Storage is Online Cover Level (m) 3.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	52.0
Membrane Percolation (mm/hr)	1000	Length (m)	19.2
Max Percolation (l/s)	277.3	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	3.200	Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0064-2000-1200-2000
Design Head (m)	1.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	64
Invert Level (m)	2.385
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.0	Kick-Flo®	0.573	1.4
Flush-Flo™	0.282	1.8	Mean Flow over Head Range	-	1.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	1.200	2.0	3.000	3.0	7.000	4.5
0.200	1.7	1.400	2.1	3.500	3.3	7.500	4.7
0.300	1.8	1.600	2.3	4.000	3.5	8.000	4.8
0.400	1.7	1.800	2.4	4.500	3.7	8.500	5.0
0.500	1.6	2.000	2.5	5.000	3.9	9.000	5.1
0.600	1.5	2.200	2.6	5.500	4.0	9.500	5.2
0.800	1.7	2.400	2.7	6.000	4.2		
1.000	1.8	2.600	2.8	6.500	4.4		

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Cascade Summary of Results for 10292 Tank.srcx

	Upstream Structures	Outflow To	Overflow To
	10292 Paving.srcx	(None)	(None)

Half Drain Time : 1409 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	1.878	0.278	0.0	1.7	1.7	75.4	O K
30 min Summer	1.991	0.391	0.0	1.7	1.7	105.9	O K
60 min Summer	2.098	0.498	0.0	1.7	1.7	134.8	O K
120 min Summer	2.203	0.603	0.0	1.7	1.7	163.3	O K
180 min Summer	2.265	0.665	0.0	1.7	1.7	180.0	O K
240 min Summer	2.307	0.707	0.0	1.7	1.7	191.4	O K
360 min Summer	2.371	0.771	0.0	1.7	1.7	208.7	O K
480 min Summer	2.416	0.816	0.0	1.8	1.8	221.0	O K
600 min Summer	2.450	0.850	0.0	1.8	1.8	230.1	O K
720 min Summer	2.476	0.876	0.0	1.8	1.8	237.2	O K
960 min Summer	2.512	0.912	0.0	1.8	1.8	247.0	O K
1440 min Summer	2.546	0.946	0.0	1.9	1.9	256.2	O K
2160 min Summer	2.517	0.917	0.0	1.8	1.8	248.2	O K
2880 min Summer	2.479	0.879	0.0	1.8	1.8	238.1	O K
4320 min Summer	2.401	0.801	0.0	1.8	1.8	216.9	O K
5760 min Summer	2.326	0.726	0.0	1.7	1.7	196.5	O K
7200 min Summer	2.255	0.655	0.0	1.7	1.7	177.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.960	0.0	105.6	313
30 min Summer	86.656	0.0	134.8	417
60 min Summer	55.544	0.0	181.7	530
120 min Summer	34.343	0.0	224.9	654
180 min Summer	25.523	0.0	250.6	728
240 min Summer	20.520	0.0	268.6	780
360 min Summer	15.103	0.0	278.0	742
480 min Summer	12.133	0.0	279.5	702
600 min Summer	10.229	0.0	280.7	698
720 min Summer	8.892	0.0	281.8	744
960 min Summer	7.122	0.0	284.0	964
1440 min Summer	5.200	0.0	288.7	1444
2160 min Summer	3.787	0.0	446.4	1808
2880 min Summer	3.021	0.0	474.8	2092
4320 min Summer	2.193	0.0	498.4	2852
5760 min Summer	1.744	0.0	548.7	3688
7200 min Summer	1.461	0.0	574.2	4536

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Cascade Summary of Results for 10292 Tank.srcx

	Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640	min Summer	2.190	0.590	0.0	1.7	1.7	159.7	O K
10080	min Summer	2.127	0.527	0.0	1.7	1.7	142.7	O K
15	min Winter	1.915	0.315	0.0	1.7	1.7	85.4	O K
30	min Winter	2.041	0.441	0.0	1.7	1.7	119.3	O K
60	min Winter	2.152	0.552	0.0	1.7	1.7	149.5	O K
120	min Winter	2.268	0.668	0.0	1.7	1.7	180.9	O K
180	min Winter	2.336	0.736	0.0	1.7	1.7	199.3	O K
240	min Winter	2.384	0.784	0.0	1.7	1.7	212.3	O K
360	min Winter	2.459	0.859	0.0	1.8	1.8	232.6	O K
480	min Winter	2.516	0.916	0.0	1.8	1.8	248.0	O K
600	min Winter	2.558	0.958	0.0	1.9	1.9	259.4	O K
720	min Winter	2.592	0.992	0.0	1.9	1.9	268.4	O K
960	min Winter	2.640	1.040	0.0	1.9	1.9	281.5	O K
1440	min Winter	2.692	1.092	0.0	2.0	2.0	295.8	O K
2160	min Winter	2.680	1.080	0.0	2.0	2.0	292.4	O K
2880	min Winter	2.627	1.027	0.0	1.9	1.9	278.1	O K
4320	min Winter	2.511	0.911	0.0	1.8	1.8	246.6	O K
5760	min Winter	2.400	0.800	0.0	1.7	1.7	216.6	O K
7200	min Winter	2.295	0.695	0.0	1.7	1.7	188.1	O K
8640	min Winter	2.196	0.596	0.0	1.7	1.7	161.3	O K
10080	min Winter	2.098	0.498	0.0	1.7	1.7	134.8	O K

	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640	min Summer	1.265	0.0	596.0	5280
10080	min Summer	1.120	0.0	615.8	6152
15	min Winter	128.960	0.0	118.2	349
30	min Winter	86.656	0.0	131.0	466
60	min Winter	55.544	0.0	203.5	592
120	min Winter	34.343	0.0	251.7	728
180	min Winter	25.523	0.0	276.8	776
240	min Winter	20.520	0.0	278.8	706
360	min Winter	15.103	0.0	282.1	608
480	min Winter	12.133	0.0	285.0	556
600	min Winter	10.229	0.0	287.8	604
720	min Winter	8.892	0.0	290.7	724
960	min Winter	7.122	0.0	296.4	962
1440	min Winter	5.200	0.0	301.0	1428
2160	min Winter	3.787	0.0	499.8	1892
2880	min Winter	3.021	0.0	532.1	2164
4320	min Winter	2.193	0.0	521.9	3072
5760	min Winter	1.744	0.0	614.0	3984
7200	min Winter	1.461	0.0	643.0	4832
8640	min Winter	1.265	0.0	667.7	5712
10080	min Winter	1.120	0.0	690.0	6560

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Cascade Rainfall Details for 10292 Tank.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.600	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.302

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.300	32	36	0.000	64	68	0.000	96	100	0.000
4	8	0.000	36	40	0.000	68	72	0.000	100	104	0.000
8	12	0.000	40	44	0.000	72	76	0.000	104	108	0.000
12	16	0.000	44	48	0.000	76	80	0.000	108	112	0.000
16	20	0.000	48	52	0.000	80	84	0.000	112	116	0.000
20	24	0.000	52	56	0.000	84	88	0.000	116	120	0.000
24	28	0.000	56	60	0.000	88	92	0.000			
28	32	0.000	60	64	0.000	92	96	0.000			

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Cascade Model Details for 10292 Tank.srcx

Storage is Online Cover Level (m) 3.700

Cellular Storage Structure

Invert Level (m) 1.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	285.0	285.0	1.300	0.0	366.6
1.200	285.0	366.6			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0063-2000-1300-2000
Design Head (m)	1.300
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	63
Invert Level (m)	1.430
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	2.0	Kick-Flo®	0.564	1.4
Flush-Flo™	0.280	1.7	Mean Flow over Head Range	-	1.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.4	1.200	1.9	3.000	2.9	7.000	4.4
0.200	1.7	1.400	2.1	3.500	3.2	7.500	4.5
0.300	1.7	1.600	2.2	4.000	3.4	8.000	4.6
0.400	1.6	1.800	2.3	4.500	3.5	8.500	4.8
0.500	1.5	2.000	2.4	5.000	3.7	9.000	4.9
0.600	1.4	2.200	2.5	5.500	3.9	9.500	5.0
0.800	1.6	2.400	2.6	6.000	4.1		
1.000	1.8	2.600	2.7	6.500	4.2		

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Annexe – Flood Risk Management Plan

1. Introduction

The main objective of this Plan is to raise the awareness of the flood risk to this site to the manager and staff of each business with a clear procedure that shall be followed by all (staff and manager) as a team ***before*** the peak flooding - when the flood levels will make evacuation hazardous. This Plan is intended for *each* of the units on Level 00 (ground floor).

In addition, the Flood Risk Management Plan will also provide information to the Emergency Services who may attend a flooding incident, so that they can quickly assess the situation and decide on any necessary action.

A copy of this Plan must be bound into the legal documentation (leases or freehold deeds), so as to alert the owners or tenants.

This Plan shall be tested as soon as practicably possible by the manager and his deputy (of each business).

2. Background

This building is liable to flood in from the sea in a storm that has an average expectancy of occurring every 200 years. With the predicted levels of sea rise over the next century the maximum flood level is likely to increase, with increasingly hazardous conditions.

The remainder of this Plan will be addressed to **each business** within the East and West towers.

3. Warning Arrangements

The Manager shall subscribe to 'Floodline Warnings Direct', the Environment Agency's free flood warning system. This area is covered by the EA's Warnings as this is a High Risk Area. https://www.gov.uk/sign-up-for-flood-warnings is the best web page at this time – search "EA flood warnings UK" if this has been changed.

The possibility of flooding to the property will trigger an automatic 24 alert message to the registered address contact. These flood warnings are intended to be given in sufficient time to allow evacuation plans to be implemented.

Likely Depth: At the time of writing this Plan the predicted flood level may be as high as 2m above ground level. This depth is clearly hazardous to all categories, whether able bodied or not. It is imperative that the ground floor of this building is evacuated well in advance of the peak of any such flooding.

Time to inundation: the tides and weather forecasts make predicting such a flood event possible well in advance, probably between 24 and 48 hours.

This plan has been prepared so that you can prepare to evacuate the area via the best safe route – see Appendix C - so as to minimise the impact on the emergency services.

Further information on the flooding can be obtained by consulting the Environment Agency website (www.environment-agency.gov.uk/flood) and phoning Floodline on 0345 988 1188, selecting option 1. The site lies within an EA Flood Warning Area. Information given out on these telephone numbers is updated every 15 minutes.

For a local media outlet offering flood information use 1) BBC Radio Sussex broadcast on 104.5, 104.8 & 95.0–95.3 FM; DAB: 'NOW Sussex Coast' (auto tune or manual tune), Freeview channel 720, and online – or 2) local radio station Spirit FM 96.6 FM, 102.3 FM and 106.6 FM. These media details are current as of 2020 – and so must be checked and amended at each review of this Plan.

Emergency Telephone Numbers:

General first responders, namely police, ambulance and fire:	999
Gas Leaks/safety	0800 111 999
EA Floodline	0345 988 1188
Adur District Council (switchboard)	01273 263000
Adur and Worthing – out of hours emergencies	07713 889128
RSPA	0300 1234 999

You should prepare by collecting any other emergency numbers relevant to your business, eg insurers, vehicle cover, landlord, managing agent.

4. Flood Warning Codes

If flooding is forecast, warnings are issued using a set of four easily recognisable codes.

Each of the four codes indicates the level of danger associated with the warning. The EA aims to issue flood warnings up to 12 hours in advance. A Severe Flood Warning may be issued immediately, with no other warning code preceding it.

The Flood Warning Codes and their meanings are:



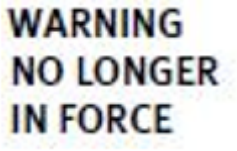
- What it means: Flooding is possible. Be prepared.
- When it's used: two hours to two days in advance of flooding.



- What it means: Flooding is expected. Immediate action required.
- When it's used: Half an hour to one day in advance of flooding.



- What it means: Severe flooding. Danger to life.
- When it's used: When flooding poses a significant threat to life.



- No further flooding is currently expected in your area.
- When it is used: When river and sea conditions return to normal.

Action to be Taken on Receipt of Flood Warnings



- What it means: Be prepared to act on your flood plan.
  Call Floodline on 0845 988 1188, select option 1 for up-to-date flooding information.
- Prepare a flood kit of essential items – refer to Section 6.0.
- Monitor local water levels and flood forecast on the EA website.

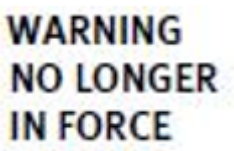


- What it means: Flooding is expected. Immediate action.
- Move valuables, pets to first floor level.
- Turn off gas, electricity and water supplies if safe to do so.

THE PROPERTY MUST BE EVACUATED IF SAFE TO DO SO.



- Co-operate with the emergency services. Call 999 if you are in immediate danger.
- If there are hazardous floodwaters surrounding the site, seek safe refuge at first floor level.



- Be careful. Floodwater may still be around for several days.
- If you've been flooded, ring your insurance company as soon as possible.

5 Preparation for a Flood Event

The Manager shall prepare a list of all the important contacts and keep this to hand. This shall include the business's insurer(s).

The Manager and any appointed deputy must know how to turn off the electricity, gas and water.

The Manager and any appointed deputy should be aware of a) the contents of this Plan, b) the other members of staff and their special needs, if any and can refer to the list of visitors at any time. They have to know what their role is in the event of having to evacuate.

Because of there being a probable warning time of over 24 hours, the Manager should consider not opening up on the next working day – and advising staff and all visitors with appointments to not make this journey and work from home, if possible – and re-schedule meetings as necessary. It should be unnecessary to have to carry out an emergency evacuation.

6 Action Checklist

An evacuation route is shown in the Appendix of this Plan. The Manager (or appointed deputy in the temporary absence of the Manager) must evacuate the premises via this or a similar route on receipt of a firm flood alert.

The evacuation route guides occupants from this building to higher, dry ground. Study this so that you are familiar with this in advance of deciding to evacuate.

Evacuate! Ensure all the measures listed above are in place – lock up and leave.

7 Upon Return & Recovery

When to go back? The responding organisations will be providing updates on the situation and notification when it is safe to return. Follow their advice.

8 How do I Recover?

- Do not start the clean-up until the threat of further flooding has passed
- Don't throw anything away until told to do so by your insurer
- Check with your insurance company if it is OK to start cleaning your property *before starting*
- Use a permanent marker to mark on the wall the height of the flood water in each room

- Wear waterproof, gloves, boots and a face mask when clearing up
- As soon as possible, ask your insurance company when a loss adjuster will visit
- Take photos and video of your damaged property
- Make a list of your damaged property

9 Awareness and Review

All members of staff must be instructed on the procedures that affect them, this being similar to how Fire Risk is managed. Any deputies acting on the Manager's behalf (eg to cover sickness and any other similar reason) must be given more detailed instruction/training.

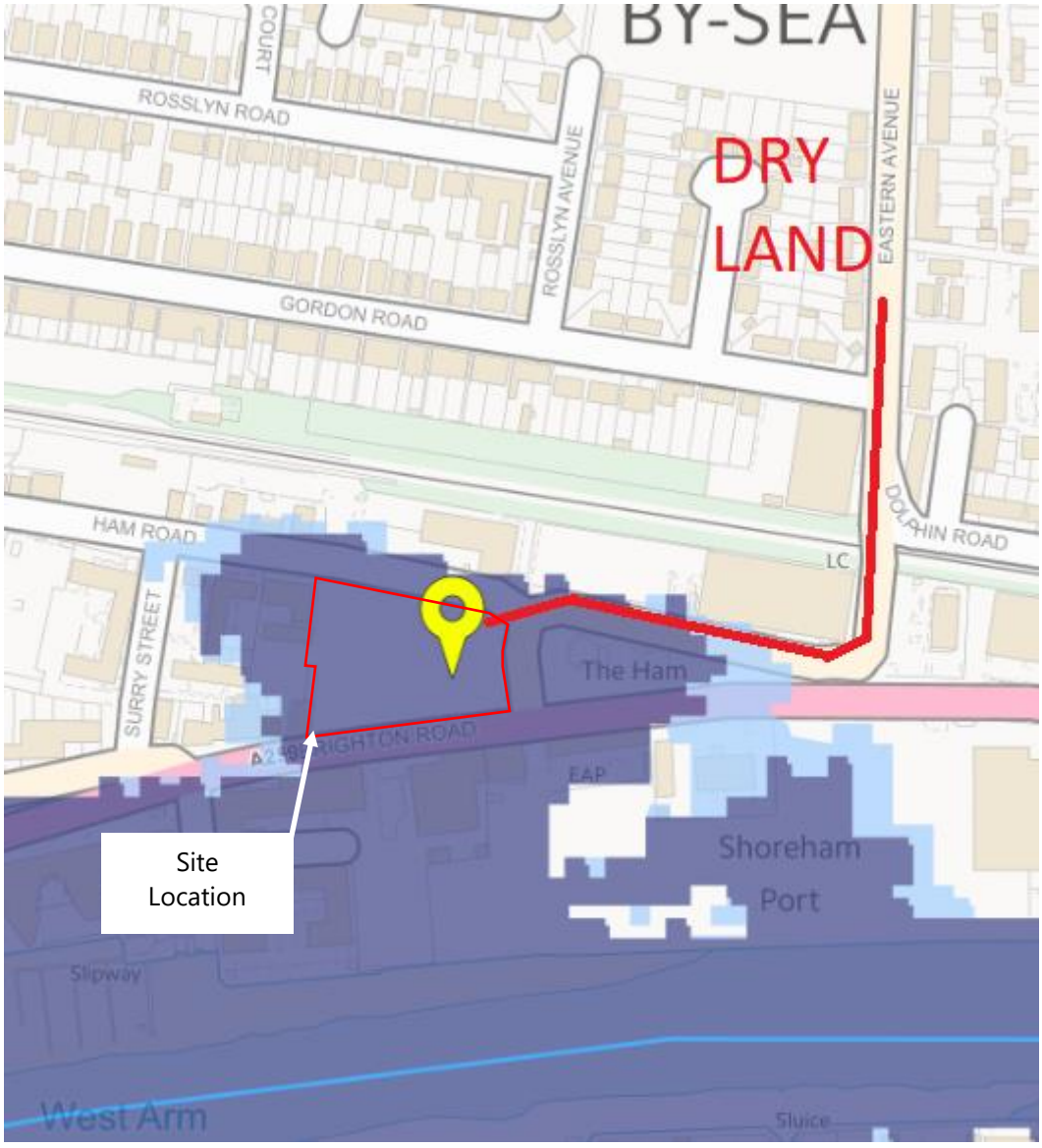
This Plan is a live document and will be reviewed and amended by the Manager. Any member of staff acting as Duty Manager must be involved during the testing and review of this Plan and assume the responsibilities, albeit temporarily, as if they were the Manager, whilst on duty.

This Plan will be reviewed no later than after 2 years after inception - and every 3 years from then onwards.

- End of Plan -

Appendix

Map Showing Route to Dry Land





Civil Engineering - Transport Planning - Flood Risk

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