Aggregate Industries UK Ltd
New Wharf, Brighton Rd

Shoreham by Sea, West Sussex, England, BN43 6RE

Planning Application for Short Time Extension of Aggregates Handling/Storage Facility with Concrete Batching Plant

Flood Risk Assessment

30th September 2021

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BCL CONSULTANT HYDROGEOLOGISTS' EXPERIENCE & QUALIFICATIONS

BCL is an independent consultancy specialising in all aspects of hydrogeology and hydrology as they relate to minerals extraction, waste disposal, water supply and related industries.

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BCL has provided specialist services, advice and reporting to the extractive, waste and related industries since 2000. During this time, experience has been earned from involvement with wide variety of assignments. BCL's work has included:

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- Data interpretation;
- Conceptualisation of hydrogeological systems;
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- Formulation of mitigation measures;
- Management and undertaking of operational impact monitoring and impact assessment;
- Review and auditing of contingency mitigation schemes;
- Reporting in connection with proposed developments within varying hydrological and hydrogeological terrains at over 230 quarries throughout the United Kingdom and Republic of Ireland, and;
- Client representation at Planning Committee and Public Inquiry regarding hydrological and hydrogeological matters connected with proposed quarry developments, including prospective hard-rock quarries within greenfield sites.

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To reduce paper usage, this document has been formatted for double-sided printing

1 INTRODUCTION

1.1 Background

1.1.1 Aggregate Industries UK Ltd (AIUK), having acquired KENDALL'S BROS (Portsmouth) Ltd (KBPL), is preparing a planning application (the Application) in relation to its existing New Wharf site (the Application Area) at Brighton Rd, Shoreham by Sea, West Sussex, BN43 6RE.

1.1.2 The current planning permission at New Wharf (ref WSCC/039/17/SU) lapsed on 27th September 2020. The Application is now seeking Planning Consent for a short time extension at New Wharf through to 31st August 2022, which would provide an appropriate timescale for the Applicant to relocate its business operations to a new site that has been acquired at Brighton Wharf.

1.1.3 The business operation will be a continuation of the existing approved activities, with no other changes other than the short time extension.

1.1.4 In accordance with NPPF guidance, this Flood Risk Assessment (FRA) report has been prepared to inform consultation and determination of the Application.

1.2 Planning History

1.2.1 The Application Site has been an active marine aggregate wharf since 2000 and has been the subject of a number of temporary planning permissions.

1.2.2 At the time of the previous time extension permission, it was anticipated that the first phase of the adjacent housing permission at Free Wharf would have been built and occupied by September/October 2020. However, it is evident that the building programme had been delayed as only enabling works had commenced at this time.

1.2.3 West Sussex Joint Minerals Plan (JMP), adopted in July 2018

1.2.4 Policy M10 of the JMP confirms that New Wharf is a safeguarded site and the JMP goes on to recognise the positive contribution these temporary sites make to ensuring there is an adequate and steady supply of minerals. The JMP also allows for further permissions to be granted at these sites where there is not a conflict with other development plan policies. Given that an alternative site has now been secured, it is considered that the proposed short time extension will not conflict with the other development plan policies for this area and that the time extension is therefore in accordance with policy M10 of the JMP.

1.2.5 Adur District Local Plan, adopted in 2017

1.2.6 Policy 2 of the Plan identifies Shoreham Harbour as a focus for re-development but the supporting text notes that planning permissions for the continuation of current employment uses may be granted for temporary period on a case by case basis.

1.2.7 In addition, Policy 8 notes that the Council will work closely with site owners and businesses to identify their needs, support their future aspirations, and facilitate re-locations to suitable sites either elsewhere in the Harbour or the local area.

1.2.8 The short time extension sought in this application is precisely to facilitate such a re-location to a suitable site elsewhere in the Harbour and is therefore considered to be in accordance with the policies of the Local Plan and will facilitate the re-development plans for the Harbour.

1.2.9 The Council has prepared a report setting out the Sequential Test and Exception Test for the proposed development allocations identified in the Local Plan. This report states that Shoreham Harbour (western arm) overlaps with Flood Zones 1, 2 and 3a; noting that parts of the Harbour would flood in 1:20 Annual Exceedance Probability (AEP) but do not act as functional floodplain (Flood Zone 3b). The report shows that the Harbour passes the sequential test because the more vulnerable uses (*e.g.* residential) could be redirected to areas at lower risk of flooding. Port-Associated Uses (Water-Compatible) are appropriate in Flood Zones 1, 2 and 3a; and there is no requirement to proceed with the Exception Test.

1.2.10 Shoreham Harbour Joint Area Action Plan (JAAP), adopted in 2018

1.2.11 The policy position in respect of the western arm of Shoreham Harbour is well understood by the Applicant, which is why the search for an alternative site within the eastern arm of the harbour was prioritised when the New Wharf site was acquired in 2018. A replacement site in the eastern arm of the harbour has now been secured and all that is required is a short time extension to allow the new site to be built out.

1.2.12 This will then allow the New Wharf site to be vacated and enable the re-development aspirations of the JAAP to come forward.

1.3 Scope & Guidance

1.3.1 The scope of FRA has been informed by national and regional guidance, the principal terms of reference being:

- National Planning Policy Framework (NPPF, July 2021), as published by the Ministry of Housing, Communities and Local Government [MHCLG], formerly Department for Communities and Local Government (DCLG), and;
- "Flood Risk and Coastal Change, Planning Practice Guidance" (NPPG), DCLG / Department for the Environment Food and Rural Affairs (DEFRA), 6th March 2014.

1.3.2 These documents are promoted by Government and the Environment Agency (EA) as the lead guidance[1] for developers involved in the preparation of FRA.

1.3.3 Paragraph 030 of the NPPG requires that FRA should demonstrate / provide:

- Whether the Proposed Development is considered to be "Appropriate" given its location and classification with respect to EA designated fluvial flood risk zones;
- That the Proposed Development meets the requirements of the Exception Test (if applicable);

[1] Where current guidance provides insufficient information or clarity, reference has also been made to earlier guidance documents, these being: "Technical Guidance to the National Planning Policy Framework" (tgNPPF), DCLG, March 2012, and "Development and Flood Risk: A Practice Guide Companion to PPS25" (PPS25pg), DCLG, February 2009.

- Whether the Proposed Development is likely to be affected by current or future flooding from any source;
- Whether the Proposed Development will increase flood risk elsewhere;
- That the measures proposed to deal with any effects and risks are appropriate.

1.3.4 Paragraph 068 of the NPPG provides a checklist of the information and aims required from a site-specific FRA, the relevant extract from which is reproduced here at *annex 1*.

1.3.5 This checklist has been used to guide the FRA and to ensure that assessment has been performed using currently accepted methodology, including all Government published revisions released up to the date of reporting.

1.3.6 Regional flood-related policy and development guidance, together with assessment and calculation methodologies and data sources consulted in the course of FRA are listed here at *annex 2*.

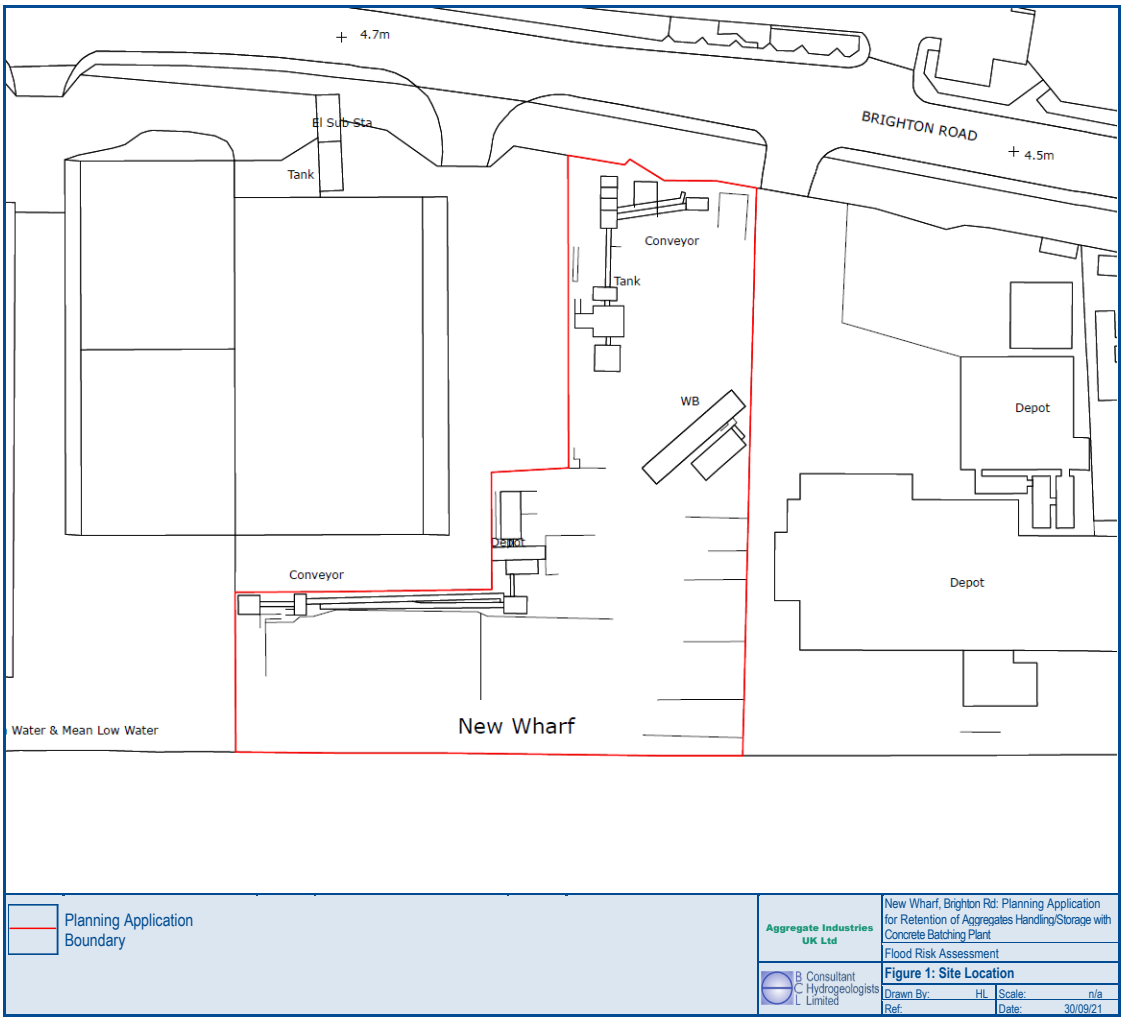
2 THE SITE

2.1 Location, Access and Current Land Use

2.1.1 New Wharf occupies an area of 0.46 hectares (Ha); the public highway (A259, Brighton Road) runs alongside the northern boundary; and the River Adur flows from west to east at the southern margin of the wharf (Application Drawings NW1 and NW2).

2.1.2 The southern end of the Site is currently used for the importation, stockpiling and processing of aggregate, including a wharf landing area. The northern part of the Site is used for the concrete batching operation as well as the weighbridge and offices.

2.1.3 New Wharf is centred upon National Grid Reference (NGR) [5]22425, [1]05070.



2.2 Topography

2.2.1 Generally, the Site has a very gentle slope from north to south.

2.2.2 Ground elevation is at *circa* 4.50-4.75 metres above Ordnance Datum (maOD) at the northern boundary alongside Brighton Road; declining to around 4.20-4.30 maOD at the southern margin on the wharf overlooking the River Adur.

2.3 Geology

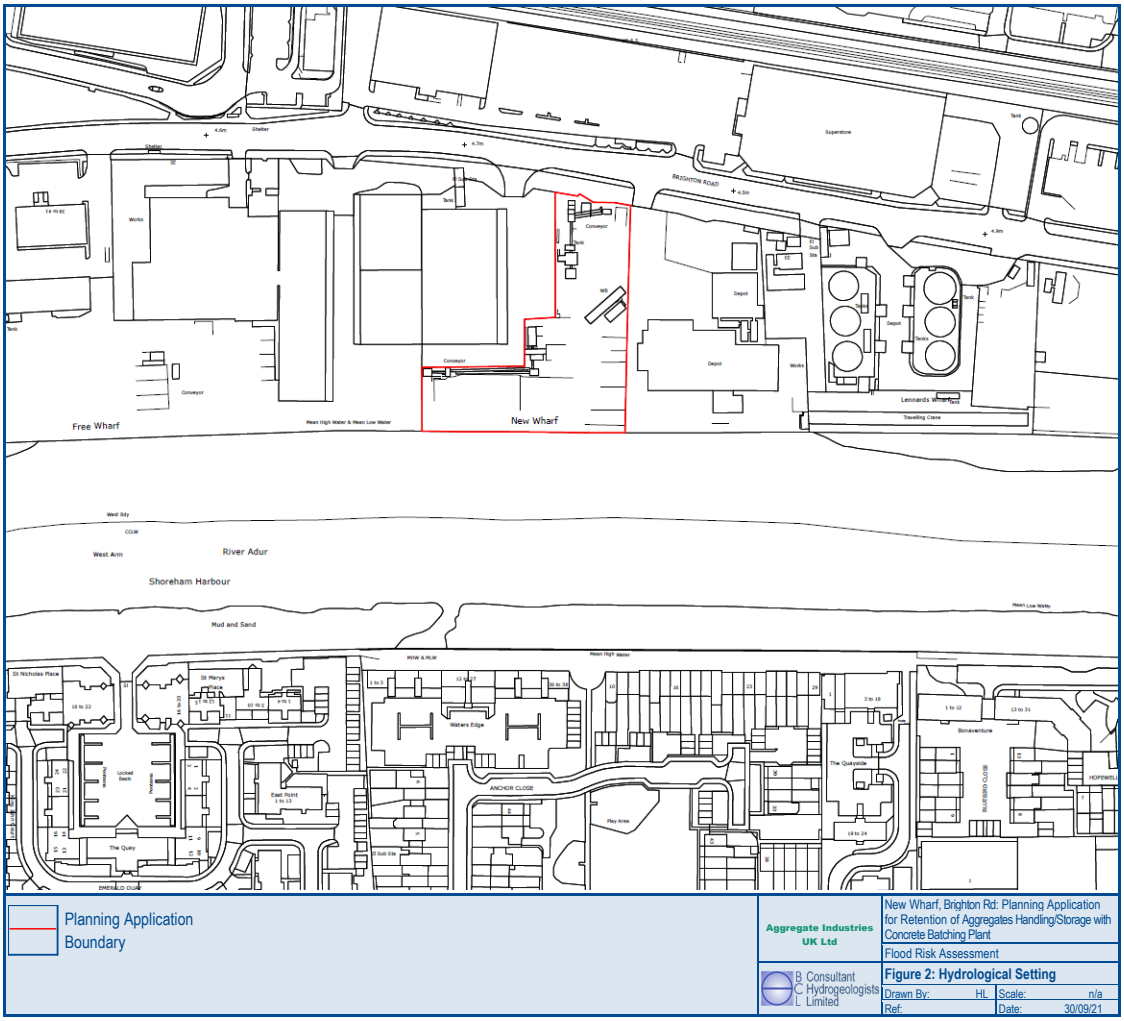
2.3.1 BGS mapping indicates that the superficial deposits at the Site comprise Beach and Tidal Flat Deposits (Undifferentiated). Beach deposits are described as "Shingle, sand, silt and clay; may be bedded or chaotic; beach deposits may be in the form of dunes, sheets or banks", and Tidal Flat Deposits: "commonly silt and clay with sand and gravel layers; possible peat layers; from the tidal zone".

2.3.2 The bedrock geology is the Tarrant Chalk Member, which is described as a "Soft white chalk with relatively widely spaced but large flint seams".

2.4 Hydrology

2.4.1 The River Adur enters Adur District from the South Downs National Park before flowing east through Shoreham by Sea, where it enters the English Channel.

2.4.2 The Application Site is located upon the northern bank of the tidal reach of the River Adur, which flows from west to east as it passes the wharf.



2.5 Hydrogeology

2.5.1 The Chalk is a highly productive Principal Aquifer, up to 450 m thick and yielding 50 to 100 l/s from large diameter boreholes and up to 300 l/s from adited systems. It is characterised by hard to very hard, good quality water.

2.5.2 The Beach and Tidal Flat Deposits are likely to be drained by evapotranspiration and through lateral flow to the river.

3 THE PROPOSED DEVELOPMENT

3.1 Short Time Extension sought by Application

3.1.1 As explained previously, the Applicant is seeking permission to extend the life of its existing New Wharf site through to 31st August 2022 to allow for an orderly re-location to a new site at Brighton Wharf.

3.1.2 The southern end of the Site is currently used for the importation, stockpiling and processing of aggregate, including a wharf landing area. The northern part of the Site is used for the concrete batching operation as well as the weighbridge and offices.

3.1.3 The business operation will be a continuation of the existing approved activities, with no other changes other than the short time extension.

3.2 Water Management

3.2.1 Full details of the current drainage scheme are given in the report: "Environmental Management Plan (EMP)" prepared by Integrated Skills Limited in February 2015 (ref: K0007/44356/EMP-V3) in support of the previous planning application for a time extension at New Wharf (ref: AWDM/1618/17). The scheme, as described in the EMP, is summarised as follows:

3.2.2 *"The Site has a concrete surface, which has a natural run toward the wharf front.*

3.2.3 *Surface water arising on site may come from a number of sources including aggregate discharged from ships, aggregate processing, dust suppression and concrete batching.*

3.2.4 *Marine aggregate cargoes discharged from ships are generally drained of free water before the discharging operation takes place and therefore the amount of retained water in the discharge is limited. The aggregates will continue to drain once stocked on the wharf front with the remaining clean saltwater draining back to the sea by the existing drainage points.*

3.2.5 *Water for the aggregate process is naturally fresh mains water and is applied to the aggregate process by spray nozzles on the screening decks. It is then recirculated until its chloride value is above the value for further use when it will be returned to the sea.*

3.2.6 *Water that is lost from the grading process is drained to a central point from where it is pumped back into the water system for re-use. Water from the stockpile areas will drain back into the sea.*

3.2.7 *The concrete batching process does not involve significant quantities of water outside of the mixing process, and typically water is only used for cleaning. The amount of water used is not significant and any such water will be collected for re-use.*

3.2.8 *The access road is kept clean to prevent mud and debris being tracked by vehicles.*

3.2.9 *The offices are connected to the main foul system.*

3.2.10 *Gas oil is required for site plant. The fuel tank is sited in a bunded area with 110% storage capacity. The floor and walls of the bund are impervious to oil and water. All pipes are vented downwards.*

3.2.11 *Oil and grease for lubrication is only held in small volumes in the general storage facility.*

3.2.12 *Used oil is stored in an appropriate container prior to off-site disposal.*

3.2.13 *Any minor spillages are cleaned straight away using oil absorbent materials or sand and are stored prior to off-site transport to an appropriate facility.*

3.2.14 *All plant and equipment are maintained in accordance with the manufacturer's specification. There is a plant maintenance programme to ensure all plant and machinery remains fit for purpose".*

3.2.15 The planning application is for a short time extension; it does not involve any change to site operations/layout/infrastructure or surface type/gradient; therefore, there will be no change to the drainage strategy described in the Environmental Management Plan.

4 NPPF STATUS

4.1 Background

4.1.1 The NPPF provides a number of criteria against which the ongoing activities at New Wharf have been evaluated in order to determine their acceptability with regard to national policy.

4.2 Flood Risk Zonation

4.2.1 Table 1, paragraph 065 of NPPG defines 4-no. Flood Zones of relevance to development planning.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	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. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	**This zone comprises land where water has to flow or be stored in times of flood.** Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

4.2.2 New Wharf overlaps with Flood Zones 1, 2 and 3a.

4.2.3 As explained in *section 1.2.9*, parts of Shoreham Harbour would flood in 1:20 Annual Exceedance Probability (AEP) but do not act as functional floodplain (Flood Zone 3b).

4.3 Development Vulnerability

4.3.1 Table 2, paragraph 066 of the NPPG defines "Minerals working and processing" as being "Less vulnerable" to flood risk; and "Docks, marinas and wharves" (Port-associated uses) are classified as "Water-compatible development".

4.4 Development Compatibility

4.4.1 Table 3, paragraph 067 of NPPG (reproduced in full below) states that the Development is considered to be "Appropriate" given its location with respect to EA designated fluvial flood risk zones and the "Flood risk vulnerability classification" of the ongoing activities.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✔	✔	✔	✔	✔
Zone 2	✔	Exception Test Required	✔	✔	✔
Zone 3a	Exception Test Required	✖	Exception Test Required	✔	✔
Zone 3b	Exception Test Required	✖	✖	✖	✔
✔ Development is appropriate ✖ Development should not be permitted					

4.4.2 This conclusion is maintained when accounting for the anticipated effects of climate change.

4.4.3 There is no requirement to apply the “exception test” in this instance.

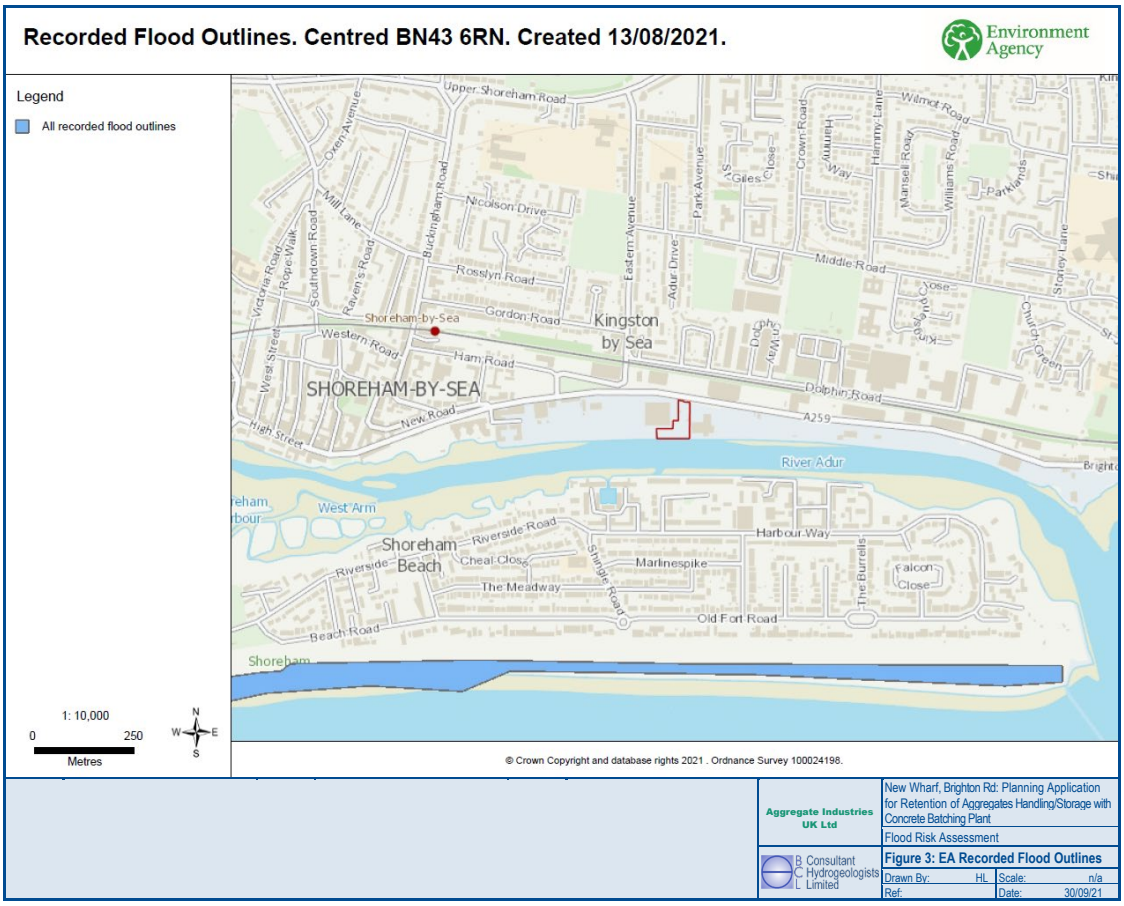
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5 FLOOD RISK POSED TO THE PROPOSED DEVELOPMENT

5.1 Fluvial and Tidal

5.1.1 Historical Flood Extents

5.1.1.1 New Wharf does not overlap with any "Recorded Flood Outlines", as confirmed by EA mapping presented below.



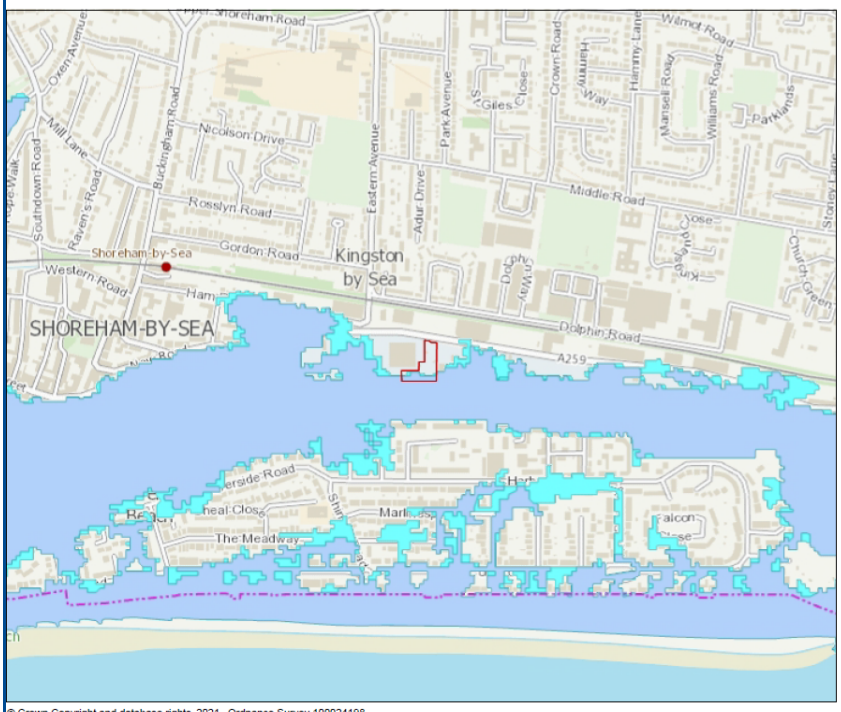
5.1.2 Fluvial Flood Extents

5.1.2.1 New Wharf overlaps with Flood Zones 1, 2 and 3a.

5.1.2.2 As explained in *section 1.2.9*, parts of Shoreham Harbour would flood in 1:20 Annual Exceedance Probability (AEP) but do not act as functional floodplain (Flood Zone 3b).

5.1.2.3 An extract from the EA Flood Map for Planning is presented below (*figure 4*). The Agency has also provided a plan showing the extent of the Flood Defences (*figure 5*) together with the following summary for the local area: "*There are flood defences in the form of a sand and shingle beach. This asset is maintained by the Environment Agency. There is also a privately maintained wall on the opposite bank of the Adur (Asset ID: 172966)*".

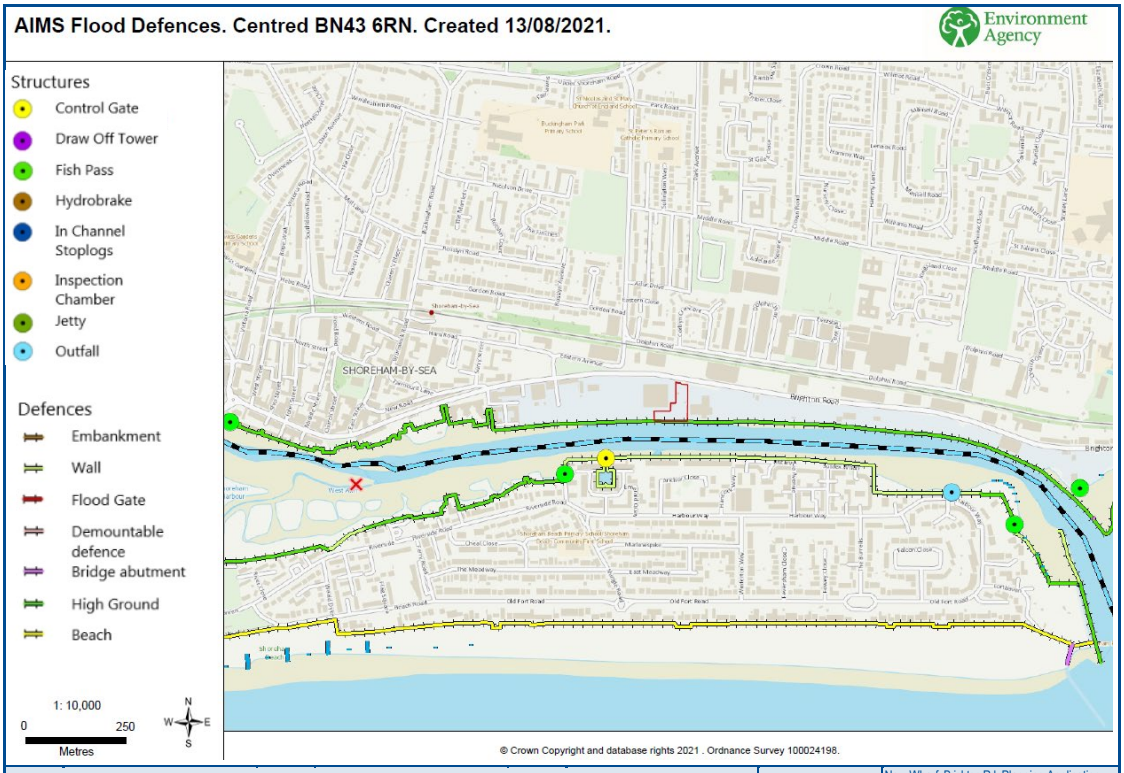
Flood Map for Planning (Rivers and Sea). Centred BN43 6RN. Created 13/08/2021.



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Aggregate Industries UK Ltd	New Wharf, Brighton Rd: Planning Application for Retention of Aggregates Handling/Storage with Concrete Batching Plant
	Flood Risk Assessment
BCL Consultant Hydrogeologists Limited	**Figure 4: EA Flood Map for Planning**
	Drawn By: HL / Scale: n/a
	Ref: / Date: 30/09/21

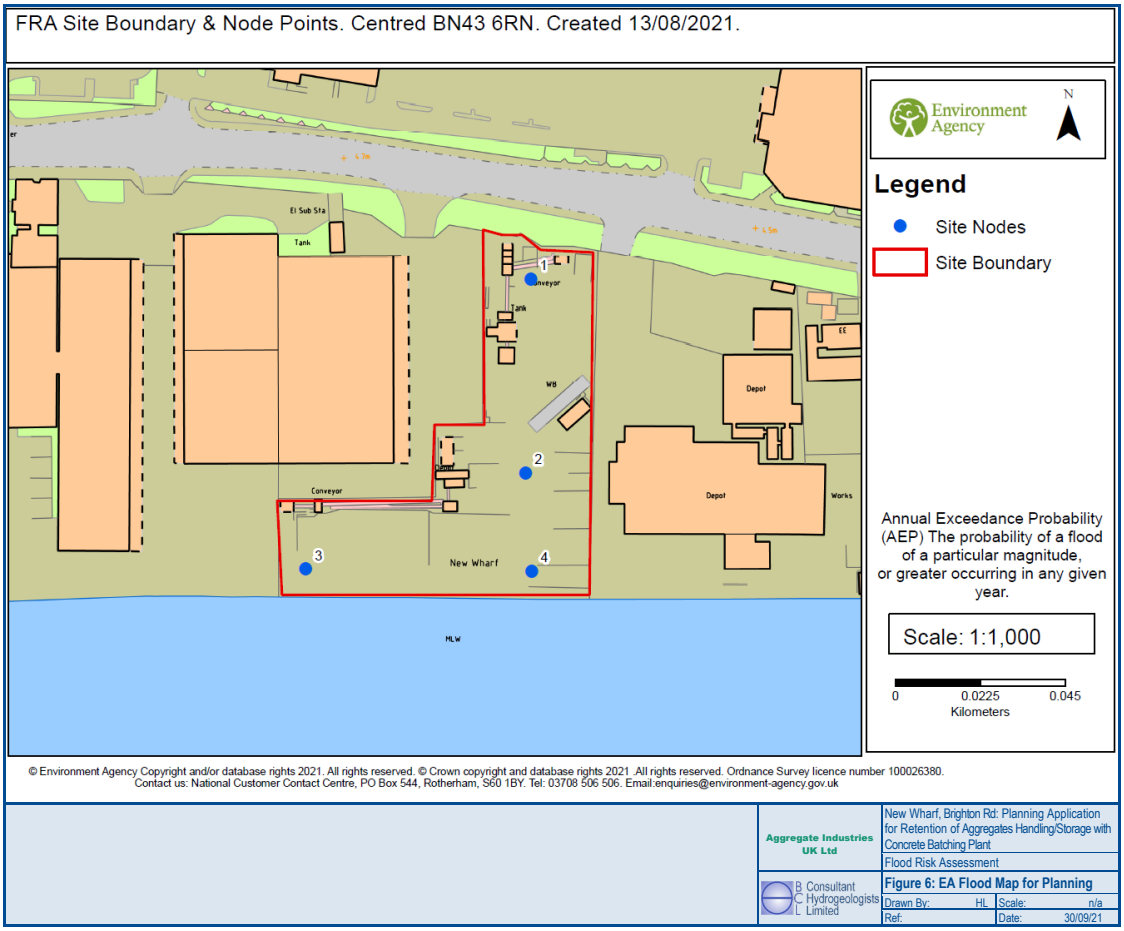
AIMS Flood Defences. Centred BN43 6RN. Created 13/08/2021.



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Aggregate Industries UK Ltd	New Wharf, Brighton Rd: Planning Application for Retention of Aggregates Handling/Storage with Concrete Batching Plant
	Flood Risk Assessment
BCL Consultant Hydrogeologists Limited	**Figure 5: EA Flood Map for Planning**
	Drawn By: HL / Scale: n/a
	Ref: / Date: 30/09/21

5.1.2.4 The EA has supplied Tidal Flood Level Data (Undefended and Defended) taken from the Adur Coastal Modelling, which was completed by JBA Consulting in 2012. The modelled Node Points are shown below.



5.1.2.5 The 0.5% (1 in 200) and 0.1% (1 in 1,000) flood level data for the "tidal undefended" and "tidal defended" scenarios at Node Points 1 to 4 have been tabulated by the EA, as follows:

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	522429	105111	-	4.80	5.40	-
2	522427	105060	-	4.80	5.40	-
3	522369	105034	4.25	4.79	5.39	4.48
4	522429	105034	4.25	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	522429	105111	-	-	5.14	-
2	522427	105060	-	-	5.14	-
3	522369	105034	4.24	4.50	5.13	4.35
4	522429	105034	4.25	4.51	5.13	4.36

5.1.2.6 The flood level data have been compared with the topographic survey.

5.1.2.7 Ground elevation is at *circa* 4.50-4.75 maOD at the northern boundary alongside Brighton Road; declining to around 4.20-4.30 maOD at the southern margin on the wharf overlooking the River Adur.

5.1.2.8 The application is seeking a short time extension through to 31st August 2022; and the Site is protected by flood defences. Therefore, it is evident that the data for 2070 and 2115 is not applicable in the proposed timeframe; and the defended scenario provides the most representative model.

5.1.2.9 In the tidal defended scenario, the depth of flooding at the wharf frontage is 5-6 cm in the 0.5% event; and 15-16 cm in the 0.1% event. As shown in *figure 4*, this would only encroach upon the southern margin of the Site. Beyond 15-20 m standoff from the river, the remainder of the operational area is above 4.50 maOD and would not be subject to flooding in the aforementioned events.

5.1.2.10 In the tidal undefended scenario, the depth of flooding at the wharf frontage is 30 cm in the 0.1% event. Beyond 15-20 m standoff from the river, LIDAR data (contours-tq2205_DTM_25CM.asc) confirms that the remainder of the operational area is higher than the modelled 0.1% flood level.

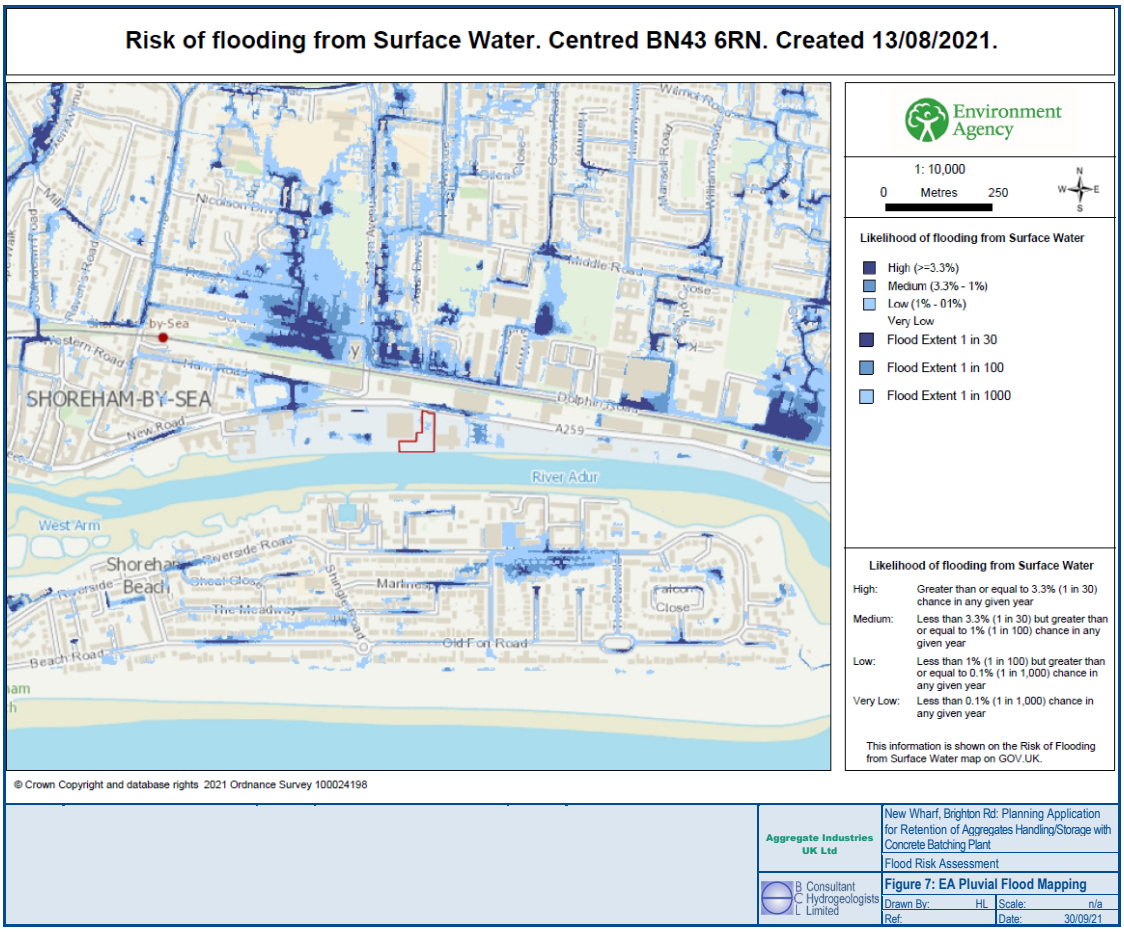
5.2 Pluvial

5.2.1 Reference has been made to EA digital surface water flood risk mapping to identify those areas within the Application Area that reside within modelled surface water flood (pluvial) risk zones[2].

5.2.2 The EA mapping shows minor areas to be at low risk of pluvial flooding within the Application Area.

5.2.3 The Development is considered to be “Appropriate” given its location with respect to EA designated fluvial flood risk zones and the “Flood risk vulnerability classification” of the ongoing activities. This classification can be extended to cover for pluvial flood risk.

2 Flooding resulting from impeded drainage of incident rainfall or rainfall runoff.



5.3 Groundwater

5.3.1 The Adur & Worthing Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA, JBA Consulting, July 2020) indicates that this location is not at risk of groundwater flooding. This is reflected in the mapping presented at Appendix H of the SFRA.

5.3.2 The Beach and Tidal Flat Deposits are likely to be drained by evapotranspiration and through lateral flow to the river.

5.4 Reservoirs

5.4.1 EA mapping confirms that there is no flood risk from reservoirs at this location.

5.5 Sewers and Drainage Systems

5.5.1 The Applicant will be responsible for completing a “services search”.

5.5.2 There have been no reported incidents of flooding from Sewers and Drainage Systems during the operational life of the Site, which has been an active marine aggregate wharf since 2000.

5.5.3 Given the “Flood risk vulnerability classification” of the ongoing activities, it is concluded that Sewers and Drainage Systems do not pose an unacceptable risk to Site operations.

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6 FLOOD RISK POSED BY THE DEVELOPMENT

6.1 Drainage Strategy

6.1.1 The down-gradient margin of the Site is delimited by the tidal reach of the River Adur.

6.1.2 As explained in *section 3.2*, full details of the current drainage scheme are given in the report: "Environmental Management Plan (EMP)" prepared by Integrated Skills Limited in February 2015 (ref: K0007/44356/EMP-V3) in support of the previous planning application for a time extension at New Wharf (ref: AWDM/1618/17).

6.1.3 The planning application is for a short time extension; it does not involve any change to site operations/layout/infrastructure or surface type/gradient. This means that the peak runoff rate from the development for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event will not exceed the current rate of discharge for the same events.

6.1.4 There will be no change to the drainage strategy described in the Environmental Management Plan.

6.2 Floodplain Compensation

6.2.1 The Site is situated in an area benefiting from flood defences, as outlined in *section 5.1.2*.

6.2.2 In this context, the EA has previously confirmed by email that there is no requirement for floodplain compensation in this type of setting.

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7 RESIDUAL FLOODING RISKS

7.1 Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions.

7.2 At this location, the most likely examples of residual flood risk are:

- The failure of flood management infrastructure;
- A severe flood event that exceeds the flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.

7.3 As such, it is important that there is adequate passive flood warning in place, with signs highlighting the residual risk of flooding on the wharf frontage alongside the river.

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8 CONCLUSIONS

8.1 In accordance with the requirements of the National Planning Policy Framework, a Flood Risk Assessment (FRA) has been undertaken in respect of the Proposed Development.

8.2 With respect to paragraph 030 of the NPPG, this FRA has demonstrated:

- That the Development represents Appropriate Development in the context of prevailing Flood Zonations;
- That the Development is safe with respect to flood risks and thus that there is no requirement to apply the Exception Test;
- That the ongoing activities will not increase flood risk elsewhere, and;
- That there will be no loss of floodplain storage.

8.3 In view of the findings of the FRA reported herein and the planned approach to the Proposed Development, there are considered to be no over-riding flooding related reasons why the planned works should not proceed in the manner described by the Application.

8.4 This conclusion assumes that any planning permission should be conditioned by implementation and adherence to any relevant recommendations advanced within this report and other such conditions that may be reasonably imposed by the statutory Planning, Flooding and Drainage authorities.

BCL Consultant Hydrogeologists Limited
30th September 2021

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Aggregate Industries UK Ltd
New Wharf, Brighton Rd
Shoreham by Sea, West Sussex, England, BN43 6RE

Planning Application for Short Time Extension of Aggregates Handling/Storage Facility with Concrete Batching Plant

Flood Risk Assessment

30th September 2021

Annex 1: NPPG FRA Checklist

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Site-specific flood risk assessment: Checklist

1 - Development site and location

You can use this section to describe the site you are proposing to develop. It would be helpful to include, or make reference to, a location map which clearly indicates the development site.

a. Where is the development site located? (eg postal address or national grid reference)

b. What is the current use of the site? (eg undeveloped land, housing, shops, offices)

c. Which Flood Zone (for river or sea flooding) is the site within? (ie Flood Zone 1, Flood Zone 2, Flood Zone 3). As a first step, you should check the Flood Map for Planning (Rivers and Sea). It is also a good idea to check the Strategic Flood Risk Assessment for the area available from the local planning authority.

2 - Development proposals

You can use this section to provide a general summary of the development proposals. It would be helpful to include, or make reference to, an existing block plan and a proposed block plan, where appropriate.

a. What are the development proposal(s) for this site? Will this involve a change of use of the site and, if so, what will that change be?

b. In terms of vulnerability to flooding, what is the vulnerability classification of the proposed development? See Table 2 of this guidance for an explanation of the vulnerability classifications.

c. What is the expected or estimated lifetime of the proposed development likely to be? (eg less than 20 years, 20-50 years, 50-100 years?). See paragraph 026 of this guidance for further advice on how to assess the lifetime of developments for flood risk and coastal change purposes. (It may also be advisable to seek advice from the local planning authority).

3 - Sequential test

For developments in flood zones 2 or 3 only. (If the development site is wholly within flood zone 1, you can skip this section and go to section 4).

You can use this section to describe how you have applied the sequential test (if needed as set out in paragraph 158 of the National Planning Policy Framework) to the proposed development, and the evidence to demonstrate how the requirements of the test have been met. See paragraph 033 of this guidance for further information. (You are advised to contact the local planning authority to confirm whether the sequential test should be applied and to ensure the appropriate level of information is provided).

a. What other locations with a lower risk of flooding have you considered for the proposed development?

b. If you have not considered any other locations, what are the reasons for this?

c. Explain why you consider the development cannot reasonably be located within an area with the lowest probability of flooding (flood zone 1); and, if your chosen site is within flood zone 3, explain why you consider the development cannot reasonably be located in flood zone 2. See Table 1 for definitions of the flood zones.

d. As well as flood risk from rivers or the sea, have you taken account of the risk from any other sources of flooding in selecting the location for the development?

4 - Climate Change

How is flood risk at the site likely to be affected by climate change? (The local planning authority's Strategic Flood Risk Assessment should have taken this into account). Further advice on how to take account of the impacts of climate change in flood risk assessments is available from the Environment Agency.

5 - Site specific flood risk

You can use this section to describe the risk of flooding to and from the proposed development over its expected lifetime, including appropriate allowances for the impacts of climate change. It would be helpful to include any evidence, such as maps and level surveys of the site, flood datasets (eg flood levels, depths and/or velocities) and any other relevant data, which can be acquired through consultation with the Environment Agency, the lead local flood authority for the area, or any other relevant flood risk management authority. Alternatively, you may consider undertaking or commissioning your own assessment of flood risk, using methods such as computer flood modelling.

a. What is/ are the main source(s) of flood risk to the site? (eg tidal/sea, fluvial or rivers, surface water, groundwater, other?). You should consider the flood mapping available from the Environment Agency, the Strategic Flood Risk Assessment for the area, historic flooding records and any other relevant and available information.

b. What is the probability of the site flooding, taking account of the maps of flood risk available from the Environment Agency, the local planning authority's Strategic Flood Risk Assessment and any further flood risk information?

c. Are you aware of any other sources of flooding that may affect the site?

d. What is the expected depth and level for the design flood? See paragraph 055 of this guidance for information on what is meant by a "design flood". If possible, flood levels should be presented in metres above Ordnance Datum (ie, the height above average sea level).

e. Are properties expected to flood internally in the design flood and to what depth? Internal flood depths should be provided in metres.

f. How will the development be made safe from flooding and the impacts of climate change, for its lifetime? Further information can be found in paragraphs 054 and 059 (including on the use of flood resilience and resistance measures) of this guidance.

g. How will you ensure that the development and any measures to protect the site from flooding will not cause any increase in flood risk off-site and elsewhere? Have you taken into account the impacts of climate change, over the expected lifetime of the development? (eg providing compensatory flood storage which has been agreed with the Environment Agency).

h. Are there any opportunities offered by the development to reduce the causes and impacts of flooding? See paragraph 050 of this guidance for further advice.

6. Surface water management *

You can use this section to describe the existing and proposed surface water management arrangements at the site using sustainable drainage systems wherever appropriate, to ensure there is no increase in flood risk to others off-site.

a. What are the existing surface water drainage arrangements for the site?

b. If known, what (approximately) are the existing rates and volumes of surface water run-off generated by the site?

c. What are the proposals for managing and discharging surface water from the site, including any measures for restricting discharge rates? For major developments (eg of 10 or more homes or major commercial developments), and for all developments in areas at risk of flooding, sustainable drainage systems should be used, unless demonstrated to be inappropriate – see paragraphs 079-086 of this guidance for further advice.

d. How will you prevent run-off from the completed development causing an impact elsewhere?

e. Where applicable, what are the plans for the ongoing operation and/or maintenance of the surface water drainage systems?

7. Occupants and users of the development

You can use this section to provide a summary of the numbers of future occupants and users of the new development; the likely future pattern of occupancy and use; and proposed measures for protecting more vulnerable people from flooding.

a. Will the development proposals increase the overall number of occupants and/or people using the building or land, compared with the current use? If this is the case, by approximately how many will the number(s) increase?

b. Will the proposals change the nature or times of occupation or use, such that it may affect the degree of flood risk to these people? If this is the case, describe the extent of the change.

c. Where appropriate, are you able to demonstrate how the occupants and users that may be more vulnerable to the impact of flooding (eg residents who will sleep in the building; people with health or mobility issues etc) will be located primarily in the parts of the building and site that are at lowest risk of flooding? If not, are there any overriding reasons why this approach is not being followed?

8. Exception test

You can use this section to provide the evidence to support certain development proposals in flood zones 2 or 3 if, following application of the sequential test, it is appropriate to apply the exception test, as set out in paragraphs 159 of the National Planning Policy Framework. See paragraph 035 of this guidance for further information on the exception test. It is advisable to contact the local planning authority to confirm whether the exception test needs to be applied and to ensure the appropriate level of information is provided.

a. Would the proposed development provide wider sustainability benefits to the community? If so, could these benefits be considered to outweigh the flood risk to and from the proposed development? See paragraph 037 of this guidance for further information.

b. How can it be demonstrated that the proposed development will remain safe over its lifetime without increasing flood risk elsewhere? See paragraph 038 of this guidance for further information.

c. Will it be possible to for the development to reduce flood risk overall (eg through the provision of improved drainage)? See paragraph 050 for further advice.

9. Residual risk

You can use this section to describe any residual risks that remain after the flood risk management and mitigation measures are implemented, and to explain how these risks can be managed to keep the users of the development safe over its lifetime. See paragraph 042 of this guidance for more information.

a. What flood related risks will remain after the flood risk management and mitigation measures have been implemented?

b. How, and by whom, will these risks be managed over the lifetime of the development? (eg putting in place flood warning and evacuation plans).

10. Flood risk assessment credentials

You can use this section to provide details of the author and date of the flood risk assessment.

a. Who has undertaken the flood risk assessment?

b. When was the flood risk assessment completed?

Other considerations

- Managing surface water

The site-specific flood risk assessment will need to show how surface water runoff generated by the developed site will be managed. In some cases it may be advisable to detail the surface water management for the proposed development in a separate drainage strategy or plan. You may like to discuss this approach with the lead local flood authority (see paragraph 006 of this guidance).

Surface water drainage elements of major planning applications (eg of 10 or more homes) are reviewed by the lead local flood authority for the area. As a result, there may be specific issues or local policies, for example the Local Flood Risk Management Strategy or Surface Water Management Plan, that will need to be considered when assessing and managing surface water matters.

It is advisable to contact the appropriate lead local flood authority prior to completing the surface water drainage section of the flood risk assessment, to ensure that the relevant matters are covered in sufficient detail.

Proximity to main rivers

If the development of the site involves any activity within specified distances of main rivers, a flood risk activity permit may be required in addition to planning permission. For non-tidal main rivers, a flood risk activity permit may be required if the development of the site is within 8 metres of a river, flood defence structure or culvert. For tidal main rivers, a flood risk activity permit may be required if the development of the site is within 16 metres of a river, flood defence structure or culvert. Details on obtaining a Flood Risk Activity Permit are available from the Environment Agency.

Paragraph: 068 Reference ID: 7-068-20140306

Revision date: 16 11 2016 See previous version

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Flood Risk Assessment

30th September 2021

Annex 2: Information & Guidance Sources

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Published Data Sources

i. Topographic maps at scales of 1:50,000, 1:10,000, and 1:2,500, including digital mapping of local watercourses and waterbodies, Ordnance Survey (OS);

ii. Google Earth & Bing Satellite Imagery;

iii. On-line Geo-Index Service, BGS;

iv. Digital boundary data, Environment Agency (EA):

- Fluvial Flood Extents at Flood Risk Zones 3 and 2;
- Pluvial Flood Risk at 0.1% AEP (1 in 1,000) to 3.3% AEP (1 in 30) or greater;
- Reservoir Flood Risk.

v. Light Detection and Ranging (LIDAR) topographic survey data published by UK Government at data.gov.uk;

vi. FEH13 Rainfall & Catchment Model, Centre for Ecology & Hydrology Flood Estimation Handbook Web Service, December 2018.

Site Specific Data Sources

i. "Product 4 for Flood Risk Assessment for New Wharf, Shoreham by Sea, BN43 6RN" as provided by the Environment Agency, dated 13th August 2021;

ii. "Environmental Management Plan (EMP)" prepared by Integrated Skills Limited in February 2015 (ref: K0007/44356/EMP-V3) in support of the previous planning application for a time extension at New Wharf (ref: AWDM/1618/17);

iii. "Planning Supporting Statement for New Wharf, Shoreham", prepared by AIUK in August 2020 in support of the Planning Application to Vary Condition 1 of Planning Permission WSCC/039/17/SU;

iv. Site Location Plan ref: NW/1;

v. Planning Application Boundary ref: NW/2.

Regulatory & Industry Standard Guidance & Methodologies & Literature References

i. National Planning Policy Framework (NPPF, July 2021), as published by the Ministry of Housing, Communities and Local Government [MHCLG], formerly Department for Communities and Local Government (DCLG);

ii. "Flood Risk and Coastal Change, Planning Practice Guidance" (NPPG), DCLG / Department for the Environment Food and Rural Affairs (DEFRA), 6th March 2014;

iii. "Technical Guidance to the National Planning Policy Framework" (tgNPPF), DCLG, March 2012;

iv. "Development and Flood Risk: A Practice Guide Companion to PPS25" (PPS25pg), DCLG, 2009;

v. "Rainfall Runoff Management for Developments", joint DEFRA / Environment Agency (EA) Flood and Coastal Erosion Risk Management R&D Programme, Report SC030219, Kellagher R, October 2013;

vi. "Flood Studies Report, Volume II: Meteorological Studies", Natural Environment Research Council (NERC), 1975;

vii. "Flood Estimation for Small Catchments (IH 124)", Institute of Hydrology, Report No.124, Marshall DCW & Bayliss AC, June 1994;

viii. IOH: "Hydrology of Soil Types: A Hydrologically based Classification of the Soils of the United Kingdom (IH126)", Institute of Hydrology, Report No.126, Boorman DB, Hollis JM & Lilly A, November 1995;

ix. "ReFH2, The revitalised Flood Hydrograph Modelling Tool", Version 3.1.7439.12207, Wallingford HydroSolutions, 2019;

x. "Flood Risk Assessments: Climate Change Allowances", EA, published 19 February 2016, updated 22 July 2020;

xi. "The Calculation of Actual Evaporation and Soil Moisture Deficit over Specified Catchment Areas", Grindley J, November 1969, Hydrological Memorandum 38, Meteorological Office, Bracknell, UK;

xii. "Estimation of Open Water Evaporation, Guidance for Environment Agency Practitioners", EA, R&D Handbook W6-043/HB, Finch JW and Hall RL, October 2001, and;

xiii. "Construction Industry Research and Information Association: Control of Groundwater for Temporary Works", CIRIA, report no. 113, Somerville S.H, 1986.

Regional Flood Related Development Policy & Guidance

i. The Adur & Worthing Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA, JBA Consulting, July 2020);

ii. "Sequential and Exception Test for the Proposed Submission Adur Local Plan 2014" (Adur District Council, October 2014).