

Prepared for:

Mr Paul Goddard

June 2017

Our reference:

87129-LRA-CoastguardTower

Location:

Former Coastguard Tower

The Promenade

Littlehampton

BN17 5LH



Document Issue Record

Project: Flood Risk Assessment for Planning
Client: Mr Paul Goddard
Location: Former Coastguard Tower, The Promenade, Littlehampton, BN17 5LH
Application: Conversion of former Coastguards Tower to residential accommodation
Our reference: 87129-LRA-CoastguardTower
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Authorisation: Mr Edward Bouët

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Key Facts

Flood Risk Posed:

- EA Flood Zone 3 (High Risk).
- Tidal flood risk from the English Channel, immediately south of the site, and the River Arun, 70m to the west.
- Flood defences consist of an area of high ground and maintained sea walls, offering a standard of protection of up to 1:300 years.
- Site situated marginally above all modelled flood levels, including the present-day 1:1000 year level, and the 1:200 year flood level in 2115.
- Risk of groundwater and sewer surcharge flooding would appear to be low.
- Risk of pluvial flooding would appear to be very low.

Flood Risk Management:

- A point of safe refuge is provided on the upper floors of the property.
- Flood proofing of the ground floor will be incorporated as appropriate.
- A flood warning and evacuation plan will be implemented post development.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Introduction

Unda Consulting Limited have been appointed by Mr Paul Goddard (hereinafter referred to as “the applicant”) to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at the Former Coastguard Tower, The Promenade, Littlehampton, BN17 5LH (hereinafter referred to as “the site”). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance, as well as relevant Local Policies.

The site appears to be located within Flood Zones 3 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

Given that the proposed application site is located in Flood Zone 3 (High Risk of flooding from rivers or the sea), and includes building works, the applicant is required to submit a FRA under the NPPF. The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development’s lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

The objectives of a FRA to support a planning application are to establish:

- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

Existing Situation

Site Usage:

The site is currently occupied by a former Coastguard Tower. The tower is attached to the existing functioning Coastguard lookout facility.

See report Appendix A for existing development plans.

Topography:

Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LIDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to +0.3m every 2m. This dataset is derived from a combination of our full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LIDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 2.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

LiDAR remotely sensed digital elevation data suggests that the ground topography on site is approximately 5.30mAOD.



Figure 1: Aerial view of the site and immediate surrounding area (Source: Google Earth)

Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, and Culver Chalk Forma – a sedimentary bedrock formed approximately 71 to 94 million years ago in the Cretaceous Period, when the local environment was previously dominated by warm chalk seas.

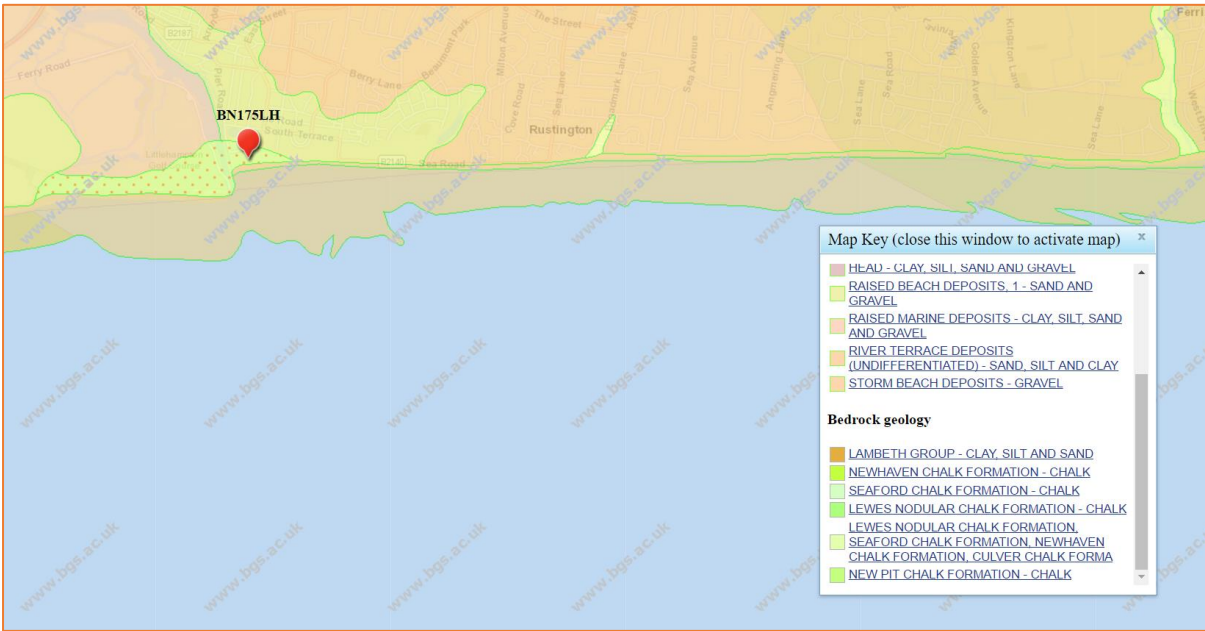


Figure 2: Local bedrock geology (Source: BGS)

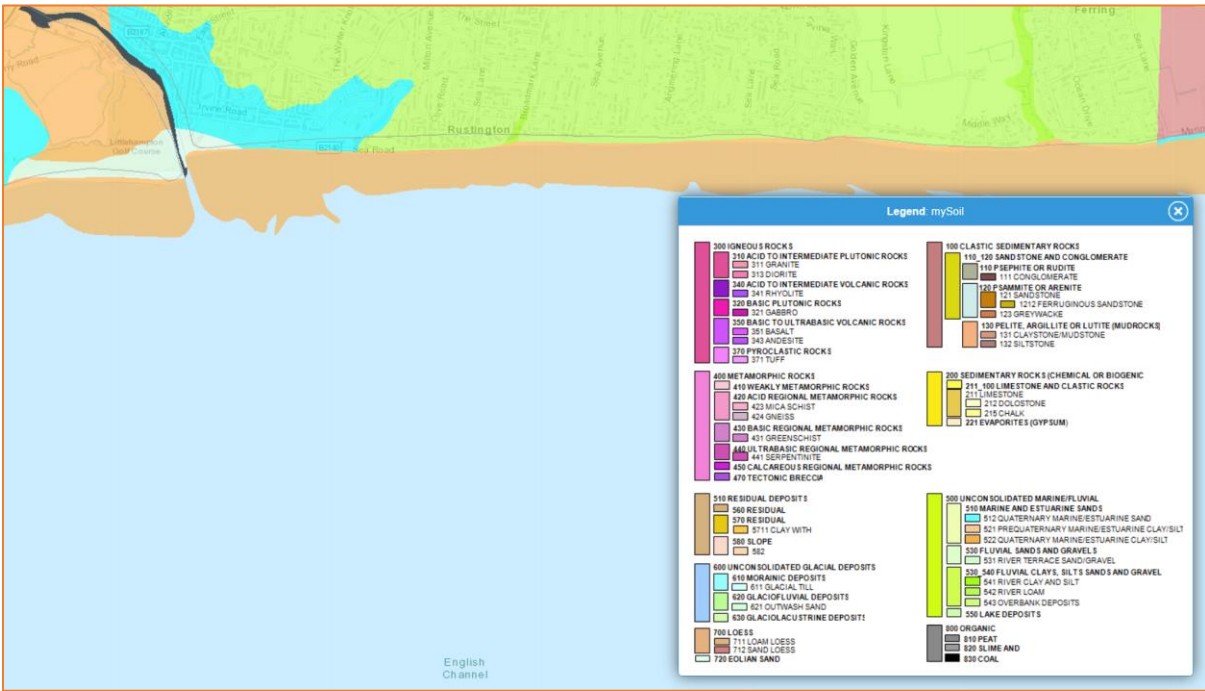


Figure 3: Local superficial geology (Source: UKSO)

The soil type in the area taken from the UKSO data is Eolian Sand - Blown Sand, superficial deposits formed up to 3 million years ago in the Quaternary Period, when the local environment previously dominated by wind-blown deposits.

Proposed Development

Proposed Application:

The proposed planning application is for the conversion of the existing tower to a single bedroom residential property over 4 storeys. The ground floor will be used as a kitchen, with bedroom and living space on the second and third floors respectively.

A small extension is proposed to the rear to house a spiral stairway.

See report Appendix A for proposed development plans.



Figure 4: Proposed frontage (Source: Liam Russell Architects)

Site Application History:

The site was previously granted planning permission in 2007 for a very similar conversion to residential accommodation (reference LU/453/07).

This permission was not enacted.

Assessment of Flood Risk

Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site.

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)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.



Figure 5: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zones 3 (High Probability), which means it is defined as land having a 1:200 or greater annual probability of tidal flooding.

The risk would appear to be predominantly tidal, and originate from the English Channel, immediately south of the site, and the River Arun, 70m to the west.

Tidal (English Channel, River Arun):

The River Arun a river in West Sussex. At 60km long, it is the longest river entirely in Sussex and one of the longest in Sussex after the River Medway, River Wey and River Mole. From the series of small streams that form its source in the area of St Leonard's Forest in the Weald, the Arun flows westwards through Horsham to Nowhurst where it is joined by the North River. Turning to the south, it is joined by its main tributary, the western River Rother, and continues through a gap in the South Downs to Arundel to join the English Channel at Littlehampton. It is one of the faster flowing rivers in England, and is tidal as far inland as Pallingham Quay, 41km upstream from the sea at Littlehampton.

The English Channel is the body of water that separates southern England from northern France, and joins the southern part of the North Sea to the Atlantic Ocean. It is about 560km long and varies in width from 240km at its widest to 33.1km in the Strait of Dover. It is the smallest of the shallow seas around the continental shelf of Europe, covering an area of some 75,000km².

Uniquely, The Channel acts as a funnel that amplifies the tidal range from less than a metre as observed at sea to more than 6m as observed in the Channel Islands, the west coast of the Cotentin Peninsula and the north coast of Brittany. The time difference of about 6 hours between high water at the eastern and western limits of the Channel are indicative of the tidal range being amplified further by resonance. Some areas along the south coast are particularly vulnerable to severe storms moving from the Atlantic eastwards along the English Channel.

Flood defences:

Multiple flood defence features and assets exist to defend both the site and surrounding area from tidal flooding. Of importance are the maintained defence walls immediately to the south of the site, and along the bank of the Arun to the west.

Due to its proximity to the sea, the site is situated atop the raised land immediately behind the sea wall to the south.

The EA have advised that these defences provide an estimated standard of protection of 1:300 years.

Modelled flood levels and events:

Modelled flood levels for use within this report have been provided by the EA as part of a Product 4 data request (EA reference SSD45461, Appendix B). All levels, depths and flood outlines are taken from the Arun to Adur Modelling completed by JBA Consulting in 2012.

Both defended and undefended modelled scenarios have been provided. Site specific flood levels have been provided for a range of return periods:

Node Reference	NGR		Modelled Flood Levels in Metres				
	Eastings	Northings	Undefended Annual Exceedance Probability				
			5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502903	101333	-	-	-	-	-

Node Reference	NGR		Modelled Flood Levels in Metres				
	Eastings	Northings	Defended Annual Exceedance Probability				
			5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502903	101333	5.23	5.24	-	5.25	5.25

Table 2: Undefended and defended modelled flood levels (Source: EA, SSD45461)

These modelled flood levels should be used in conjunction with the node location map, and modelled flood extent maps included within Appendix B.

Comparison of these modelled flood levels with topographic site levels (of approximately 5.30mAOD) shows that the site is situated marginally above all modelled flood levels, including the present-day 1:1000 year level, and the 1:200 year flood level in 2115.

Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

The site is situated on raised land immediately behind a maintained flood defence wall. It is considered that whilst the site is situated on land above the maximum modelled flood level, it may still be susceptible to inundation via wave overtopping action.

Historical flood events:

According to the EA they do not hold records of historic flood events from rivers and/or the sea affecting the area immediately local to this site.

Pluvial (Surface Water):

Pluvial flooding is the term used to describe flooding which occurs when intense, often short duration rainfall is unable to soak into the ground or to enter drainage systems and therefore runs over the land surface causing flooding. It is most likely to occur when soils are saturated (or baked hard) so that they cannot infiltrate any additional water or in urban areas where buildings tarmac and concrete prevent water soaking into the ground. The excess water can pond (collect) in low points and result in the development of flow pathways often along roads but also through built up areas and open spaces. This type of flooding is usually short lived and associated with heavy downpours of rain.

The potential volume of surface runoff in catchments is directly related to the size and shape of the catchment to that point. The amount of runoff is also a function of geology, slope, climate, rainfall, saturation, soil type, urbanisation and vegetation.

Pluvial flooding can occur in rural and urban areas, but usually causes more damage and disruption in the latter. Flood pathways include the land and water features over which floodwater flows. These pathways can include drainage channels, rail and road cuttings. Developments that include significant impermeable surfaces, such as roads and car parks may increase the volume and rate of surface water runoff.

Urban areas which are close to artificial drainage systems, or located at the bottom of hill slopes, or in valley bottoms and hollows, may be more prone to pluvial flooding. This may be the case in areas that are down slope of land that has a high runoff potential including impermeable areas and compacted ground.

Pluvial flooding can affect all forms of the built environment, including:

- Residential, commercial and industrial properties;
- Amenity and recreation facilities; and
- Infrastructure, such as roads and railways, electrical infrastructure, telecommunication systems and sewer systems.

This type of flooding is usually short-lived and may only last as long as the rainfall event. However occasionally flooding may persist in low-lying areas where ponding occurs. Due to the typically short duration, this type of flooding tends not to have consequences as serious as other forms of flooding, such as flooding from rivers; however it can still cause significant damage and disruption on a local scale.

The EA Surface Water Flood Map suggests that the site lies in an area of “Very Low” risk of flooding from surface water.



Figure 6: 1:1000 year pluvial flood depth map (Source: EA)

Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms

underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

No information has been provided to suggest that the site is particularly susceptible to groundwater flooding, or has experienced groundwater flooding previously.

Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

For a sewer to remain adoptable, any storage capacity above the 1.3% AEP (1 in 30 year) storm volume must be incorporated as an offline storage feature outside the online sewer network.

No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

Other Sources:

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. The site lies outside of the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. In accordance with the Reservoirs Act 1975 in England, these inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial / tidal flooding to occur. The Environment Agency Reservoir Flood Map illustrated below, illustrates the largest area that might be flooded if the storage area were to fail and release the water it is designed to hold during a flood event.

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, the NPPF does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency flood zones.

Overflows from canals can be common as they are often fed by land drainage, and often do not have controlled overflow spillways. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

There do not appear to be any further artificial (man-made) sources of flood risk (such as raised canals) in the vicinity of the site.

The EA Risk of Flooding from Reservoirs Map suggests that the site lies outside of the "Maximum extent of flooding" from reservoir failure.

It is not possible to effectively quantify the risk of flooding from these sources, however it is considered to be very low.

Flood Risk Management

Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

Post development, the residential property will be classified as “more vulnerable”. Accordingly, it is considered that the vulnerability of the site as a whole will increase post development.

EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m². It should not be applied if an additional dwelling is being created, e.g. a self-contained annex or additional commercial unit.

Physical Design Measures:

The NPPF requires new residential floor levels to be set at least 300mm above suitable modelled flood levels. Comparison of these modelled flood levels with topographic site levels (of approximately 5.30mAOD) shows that the site is situated marginally above all modelled flood levels, including the present-day 1:1000 year level, and the 1:200 year flood level in 2115.

However, the site is situated on raised land immediately behind a maintained flood defence wall. It is considered that whilst the site is situated on land above the maximum modelled flood level, it may still be susceptible to inundation via wave overtopping action.

Due to the nature of the development, it is not possible to raise ground floor levels significantly above their existing level (approximately 5.30mAOD).

To help protect the proposed property against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the building, in consultation with the Local Authority building control department. These measures can include the following:

- Solid concrete ground floor slab, with waterproof membrane;
- Waterproof screed used on floors;
- Closed-cell foam used in wall cavities;
- Waterproof ground floor internal render;
- External walls rendered resistant to flooding to first floor level;
- Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers;
- Ground floor electrical main ring run from first floor level; and on separately switched circuit from first floor;
- Electrical incomer and meter situated at first floor level or above;
- Boilers, control and water storage / immersion installed at first floor level or above;
- Gas meter installed at first floor level or above;
- Plumbing insulation of closed-cell design;
- Non-return valves fitted to all drain and sewer outlets;
- Manhole covers secured;
- Anti-syphon fitted to all toilets;
- Kitchen units of solid, water resistant material;
- Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
- Stairs of solid hardwood construction with wood faces treated to resist water penetration.

The applicant should also consider the use of demountable flood defence barriers to defend ground level doorways and low windows.

Safe Escape:

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 3. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm during the 1:200 year plus allowance for climate change flood event.

Whilst the site itself is situated marginally above all modelled flood levels, much of the surrounding area including routes of access and egress and not. In addition, it is considered that the site may still be susceptible to inundation via wave overtopping action.

Residents should follow the warning and evacuation procedure detailed in the following section. A point of safe refuge is provided within the upper floors of the property. During an extreme and imminent flood event, residents should seek refuge within the property.

Flood Warning:

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

To further conform to the EA Standing Advice, the applicant has agreed to implement a flood warning and evacuation plan post development, and subscribe to the EA's flood warning service.

The site lies in an Environment Agency Flood Warning Area. The EA issue flood warnings to specific areas when flooding is expected. The applicant has agreed to register online with the free Environment Agency Floodline Warnings Direct service at <https://fwd.environment-agency.gov.uk/app/olr/register> to receive flood warnings by phone, text or email.

The flood warning service has three types of warnings that will help users prepare for flooding and take action:

Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 3: Flood Warnings

Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the properties prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as electrical equipment.
- Know how to turn off gas, electricity and water supplies.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Grab your flood kit – if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.
- Switch off water, gas and electricity at mains. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.

- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

Off-Site Impacts:

Fluvial floodplain storage:

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The application site is situated within an area of predominantly tidal flood risk.

Surface Water Drainage Statement:

The development will utilise Sustainable Drainage Systems (SuDS) design in accordance with the NPPF for Planning Applications drainage hierarchy, and Local policy as follows:

1. Store rainwater for later use;
2. Infiltration techniques;
3. Attenuate rainwater by storing in tanks for gradual release;
4. Discharge rainwater direct into watercourse;
5. Discharge rainwater into surface water sewer;
6. Discharge rainwater into a combined sewer;
7. Attenuation of rainwater in ponds or open water features with controlled discharge into the local watercourse.

This approach to surface water drainage for the proposed site will offer considerable betterment over the current drainage, both reducing the rates of run-off from the site, and overall volumes of run-off.

Due to the nature of the application (change of use of an existing building), a full Surface Water Drainage Strategy should not be required at this stage of the application.

Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available. The site is situated in Flood Zone 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Post development, the site will become “more vulnerable”. Accordingly, it is considered that the vulnerability of the site as a whole will increase post development.

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	X	Exception Test required	✓	✓
Zone 3b	Exception Test required	X	X	X	✓

Table 4: Flood risk vulnerability and flood zone ‘compatibility’

Using the table above, the proposed application (“more vulnerable”) is considered to be suitable within Flood Zone 3, subject to implementation of the Exception Test.

Conclusion

Unda Consulting Limited have been appointed by Mr Paul Goddard to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at the Former Coastguard Tower, The Promenade, Littlehampton, BN17 5LH. The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance, as well as relevant Local Policies.

The site is currently occupied by a former Coastguard Tower. The tower is attached to the existing functioning Coastguard lookout facility.

The proposed planning application is for the conversion of the existing tower to a single bedroom residential property over 4 storeys. The ground floor will be used as a kitchen, with bedroom and living space on the second and third floors respectively. A small extension is proposed to the rear to house a spiral stairway.

The site was previously granted planning permission in 2007 for a very similar conversion to residential accommodation (reference LU/453/07). This permission was not enacted.

The site is located within Flood Zones 3 (High Probability), which means it is defined as land having a 1:200 or greater annual probability of tidal flooding. The risk would appear to be predominantly tidal, and originate from the English Channel, immediately south of the site, and the River Arun, 70m to the west.

Multiple flood defence features and assets exist to defend both the site and surrounding area from tidal flooding. The EA have advised that these defences provide an estimated standard of protection

Modelled flood levels for use within this report have been provided by the EA as part of a Product 4 data request (EA reference SSD45461). All levels, depths and flood outlines are taken from the Arun to Adur Modelling completed by JBA Consulting in 2012. Both defended and undefended modelled scenarios have been provided. Site specific flood levels have been provided for a range of return periods:

Comparison of these modelled flood levels with topographic site levels (of approximately 5.30mAOD) shows that the site is situated marginally above all modelled flood levels, including the present-day 1:1000 year level, and the 1:200 year flood level in 2115.

The site is situated on raised land immediately behind a maintained flood defence wall. It is considered that whilst the site is situated on land above the maximum modelled flood level, it may still be susceptible to inundation via wave overtopping action.

The risk of flooding posed to the site by groundwater and sewer surcharge flooding would appear to be low. Additionally, the risk to pluvial flooding would appear to be very low.

The applicant has confirmed that:

- A point of safe refuge is provided on the upper floors of the property.
- Flood proofing of the ground floor will be incorporated as appropriate.
- A flood warning and evacuation plan will be implemented post development.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Appendix A

Pages 21 - 22: Existing and proposed plans.



01. Entrance to tower

02. Windows looking south over beach

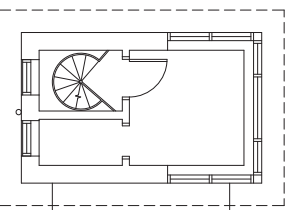
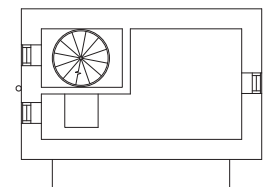
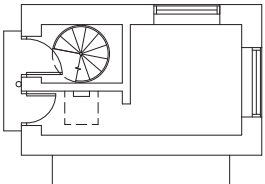


03. Panoramic sea views

04. Spiral staircase



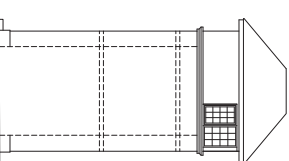
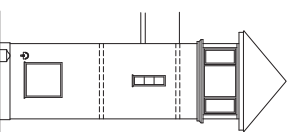
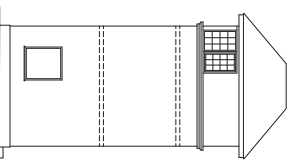
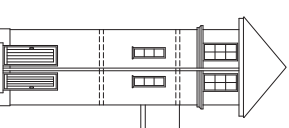
+A | aerial image of coastguard tower - not to scale



+00 - ground floor

+01 - first floor

+02 - second floor



+EL - north

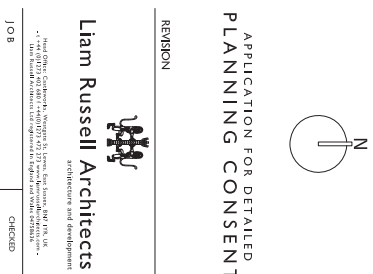
+EL - east

+EL - south

+EL - west

plans

Scale in Meters



Liam Russell Architects

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FORMER COASTGUARD'S TOWER, LITTLEHAMPTON	UMA
	DRAWN

CLIENT	DATE
MR GODDARD	03/12

DRAWING EXISTING PLANS, ELEVATIONS AND PHOTOGRAPHS	REVISION	DISTRICT
	NUMBER	

DO NOT SCALE FROM THIS DRAWING. THIS DRAWING IS COPYRIGHT © 2008 ARCADIS

The image displays four architectural floor plans of a house, labeled 1 through 4, showing different interior layouts. Each plan features a semi-circular room on the left with a radial pattern, a central living area, and a kitchen area on the right. The plans show various furniture arrangements, including sofas, chairs, and tables, and include a legend with colored squares.

Legend:

- Red square: Kitchen
- Blue square: Living room
- Green square: Bedroom
- Yellow square: Bathroom
- Grey square: Hallway
- White square: Staircase

Plan 1: Shows a kitchen with a sink and stove, a living room with a sofa and armchair, and a bedroom with a bed. The semi-circular room contains a staircase.

Plan 2: Shows a kitchen with a sink and stove, a living room with a sofa and armchair, and a bedroom with a bed. The semi-circular room contains a staircase.

Plan 3: Shows a kitchen with a sink and stove, a living room with a sofa and armchair, and a bedroom with a bed. The semi-circular room contains a staircase.

Plan 4: Shows a kitchen with a sink and stove, a living room with a sofa and armchair, and a bedroom with a bed. The semi-circular room contains a staircase.

Please note: Refer to 'type' of drawing below; planning drawings should only be treated as such.

Notes



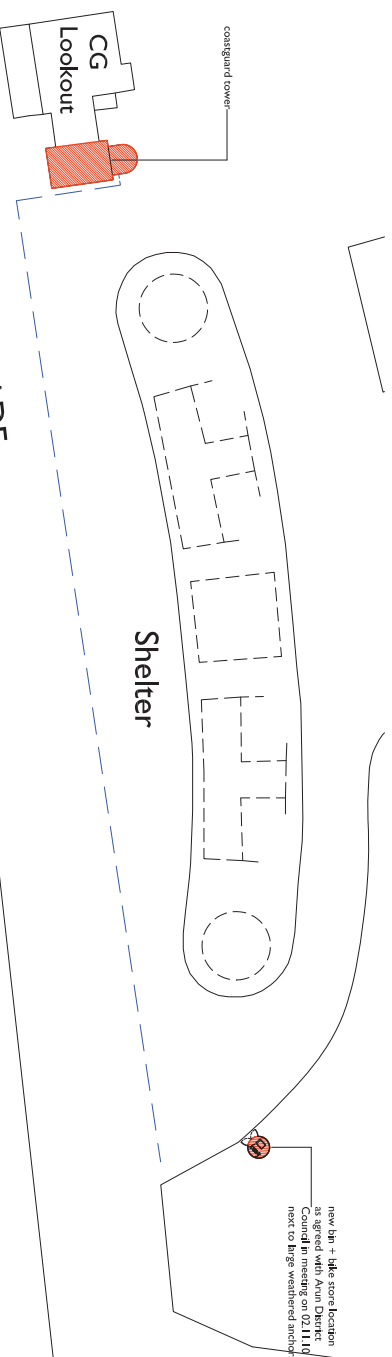
A vertical number line labeled "Scale in Meters". It has tick marks at 0, 0.5, and 2.

A vertical scale labeled "Scale in Meters" with markings at 0, 0.5, 1, and 2.

A vertical scale labeled "Scale in Meters" with markings at 0, 0.5, 1, and 2.

A vertical scale labeled "Scale in Meters" with markings at 0, 0.5, 1, and 2.

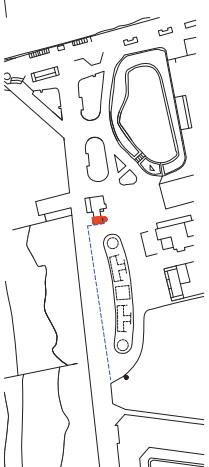
new white rendered staircore
accessing all floors and replicating
the curves of the adjacent kiosks



Scale in Meters



0 10 20 30 40 50 100



APPLICATION FOR DETAILED PLANNING CONSENT		
A	23.09.10	BIN + BIKE STORE RELOCATED
REVISION		S/C

architecture and development

JOB FORMER COAST GUARD'S TOWER, LITTLEHAMPTON	CHECKED
	LRA
	DRAWN
	PL

CLIENT	DATE
NORTON PROPERTY LTD	08/10

DRAWING	REVISION	DISTRICT
PROPOSED STAIRCASE + BIN/BIKE STORE	A	
	NUMBER	

Appendix B

Pages 24 - 32: EA Product 4 flood data.

Jessica Ridler-Baer
Unda Consulting

Our ref: SSD45461

Your ref: 87129

Dear Jessica Ridler-Baer

Provision of Product 4 for address: Former Coastguard Tower, The Promenade, Littlehampton, BN17 5LH.

Thank you for your request of 28/04/2017 to use Environment Agency data, Product 4. The information is attached.

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

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

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

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

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

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

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

<https://www.gov.uk/planning-applications-assessing-flood-risk>

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Supporting Information

Flood Defences

Our records indicate that there is a wall along the River Arun offering an estimated standard of protection of 1 in 300. There is also a concrete sea wall along The Promenade that is managed by the Local Authority.

Model Information

All levels, depths and flood outlines are taken from the Arun to Adur Modelling completed by JBA Consulting in 2012.

Flood History

Our records indicate a recorded flood outline to the west of the site from 1983. The source of the flooding was the River Arun overtopping the defences in the area. I would suggest contacting Arun District Council for a more comprehensive flood history check.

Please note our records are not comprehensive and may not include all events, you can contact your Local Authority to check if they hold any relevant information regarding your application.

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

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

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

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

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

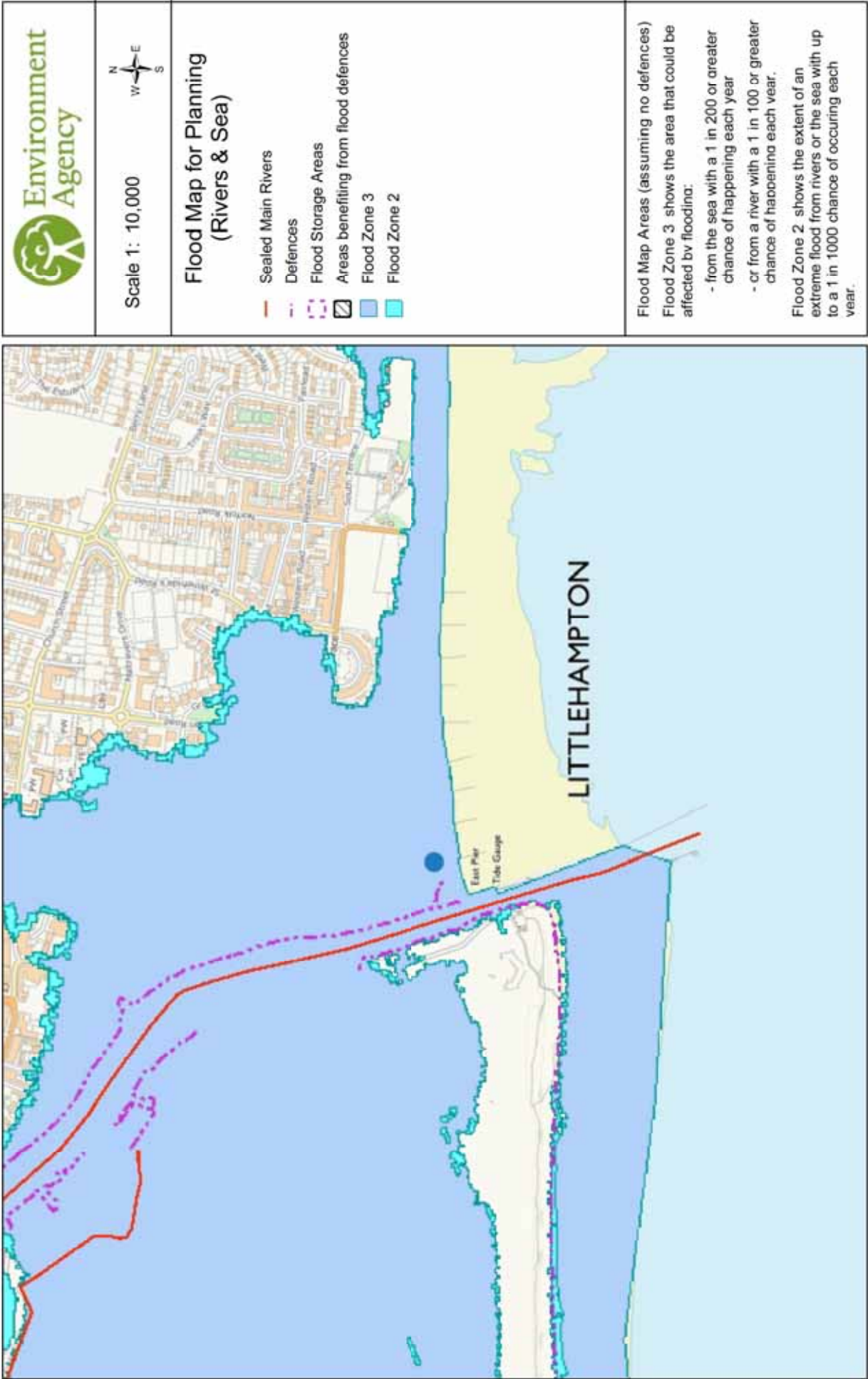
Yours faithfully,

Jake Spence

West Sussex PSO Team

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

Flood Map for Planning (Rivers and Sea). Centred BN17 5LH. SSD45461 / 87129.

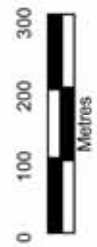


Flood Defence Locations. Centred BN17 5LH.



Legend

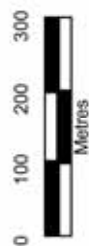
- Sealed Main Rivers
- Defences**
- Embankment
- Wall
- Flood Gate
- Demountable Defence
- Bridge Abutment
- High Ground
- Beach
- Barrier Beach
- Promenade
- Quay
- Cliff
- Dunes
- Culvert



Recorded Flood Outlines. Centred BN17 5LH.

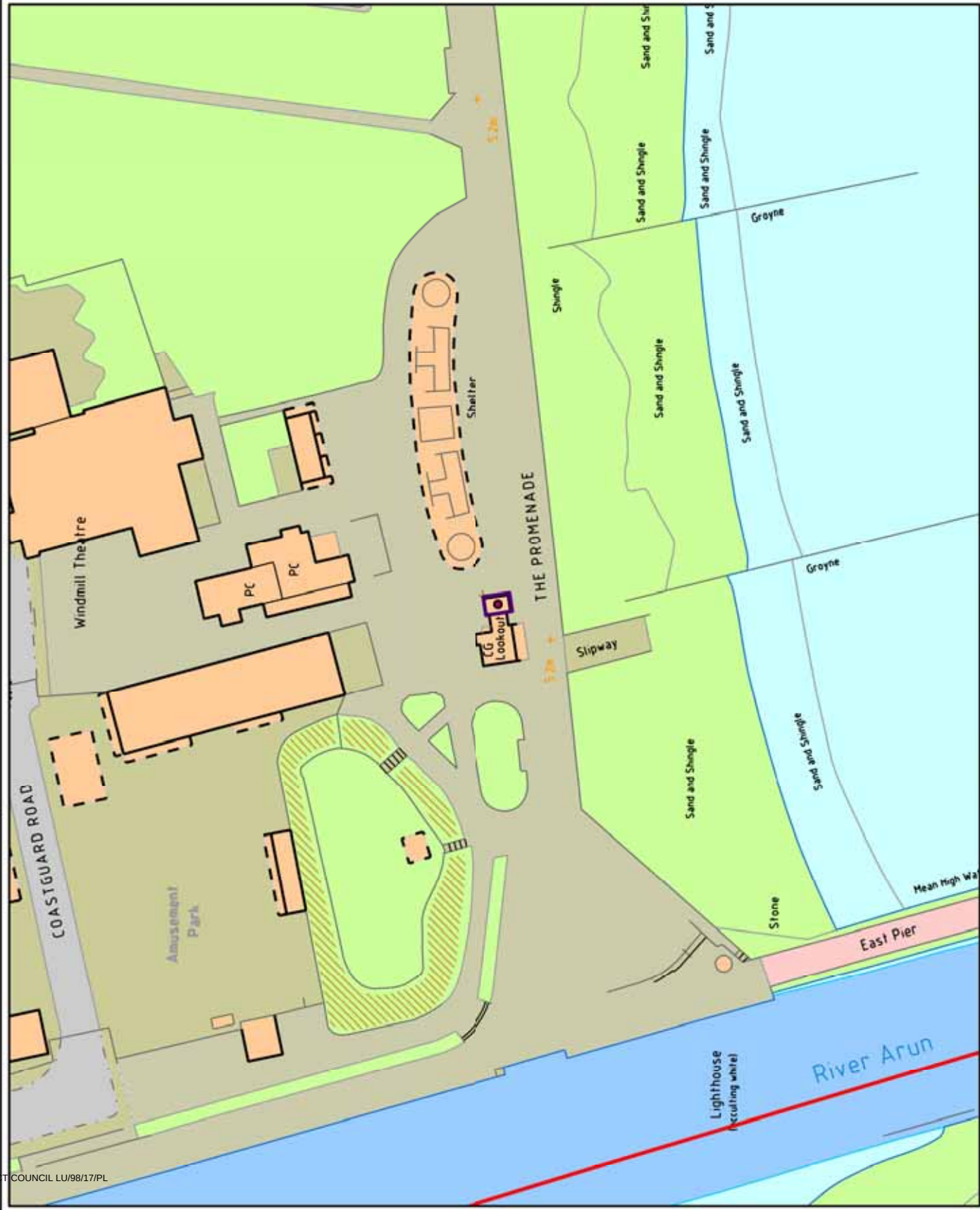


- Legend**
- Sealed Main Rivers
 - All recorded flood outlines
 - 2007 event
 - 2000 event
 - 1998 event
 - 1953 event
 - 1946/47 event



Site Boundary and Node Points. Centred BN17 5LH.(Our Ref: SSD/45641 Your Ref: 87129).

APIN DISTRICT COUNCIL LU/98/17/PL



Legend

- Site Nodes
- Site Boundary
- Main River

Scale: 1:1,000



Product 4 Flood Risk Data Requested by: Jessica Ridler-Baer

Site: Former Coastguard Tower, The Promenade, Littlehampton, BN17 5LH.

Table 3: Water Levels: Tidal Undefended

Node Reference	NGR		Modelled Flood Levels in Metres				
	Easting	Northing	Undefended Annual Exceedance Probability				
			5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502903	101333	-	-	-	-	-

Table 4: Water Levels: Tidal Defended

Node Reference	NGR		Modelled Flood Levels in Metres				
	Easting	Northing	Defended Annual Exceedance Probability				
			5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502903	101333	5.23	5.24	-	5.25	5.25

Table 7: Water Depth: Tidal Undefended

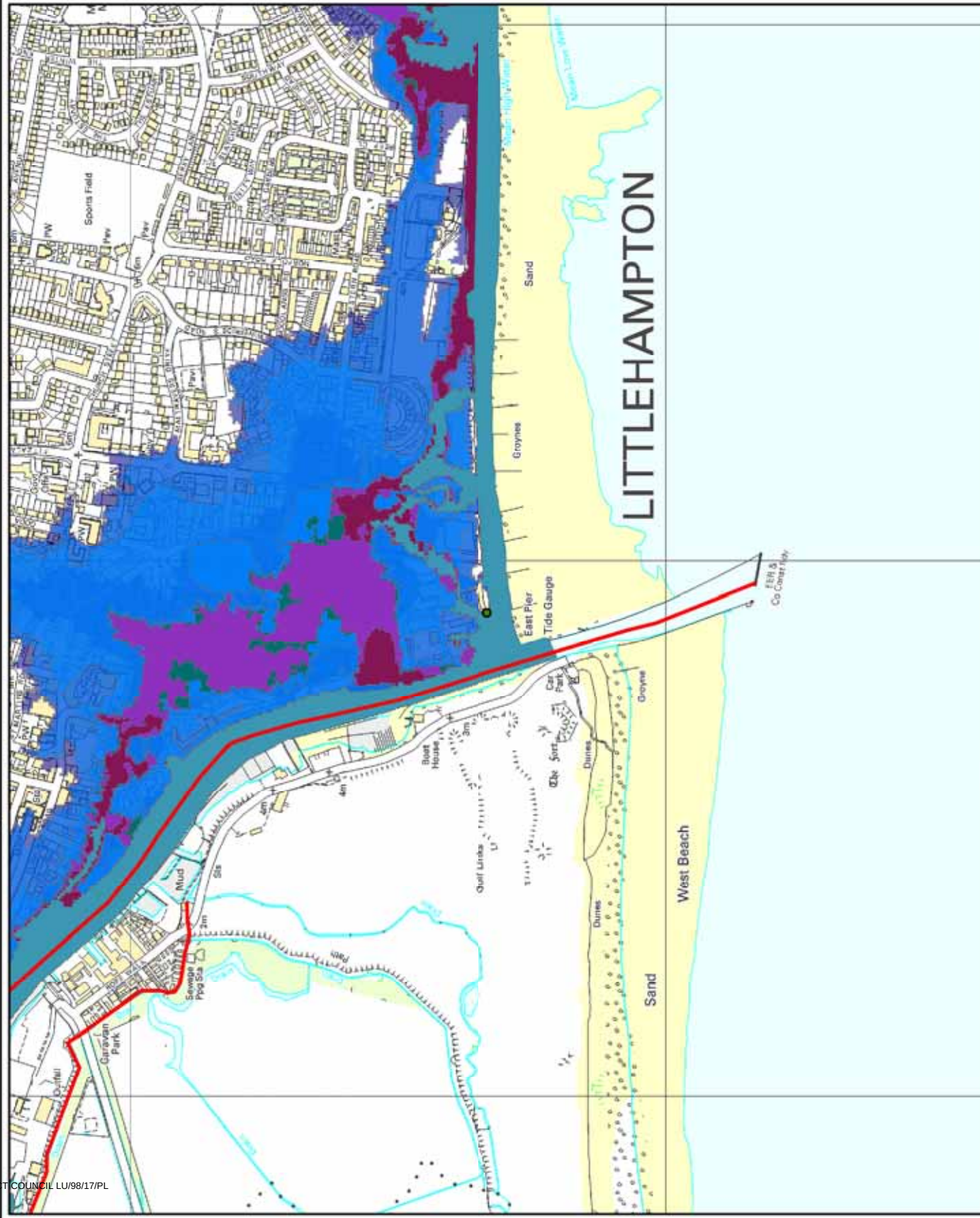
Node Reference	NGR		Modelled Flood Depth in Metres				
	Easting	Northing	Undefended Annual Exceedance Probability				
			5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502903	101333	-	-	-	-	-

Table 8: Water Depth: Tidal Defended

Node Reference	NGR		Modelled Flood Depth in Metres				
	Easting	Northing	Defended Annual Exceedance Probability				
			5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502903	101333	0.17	0.18	-	0.19	0.19

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

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

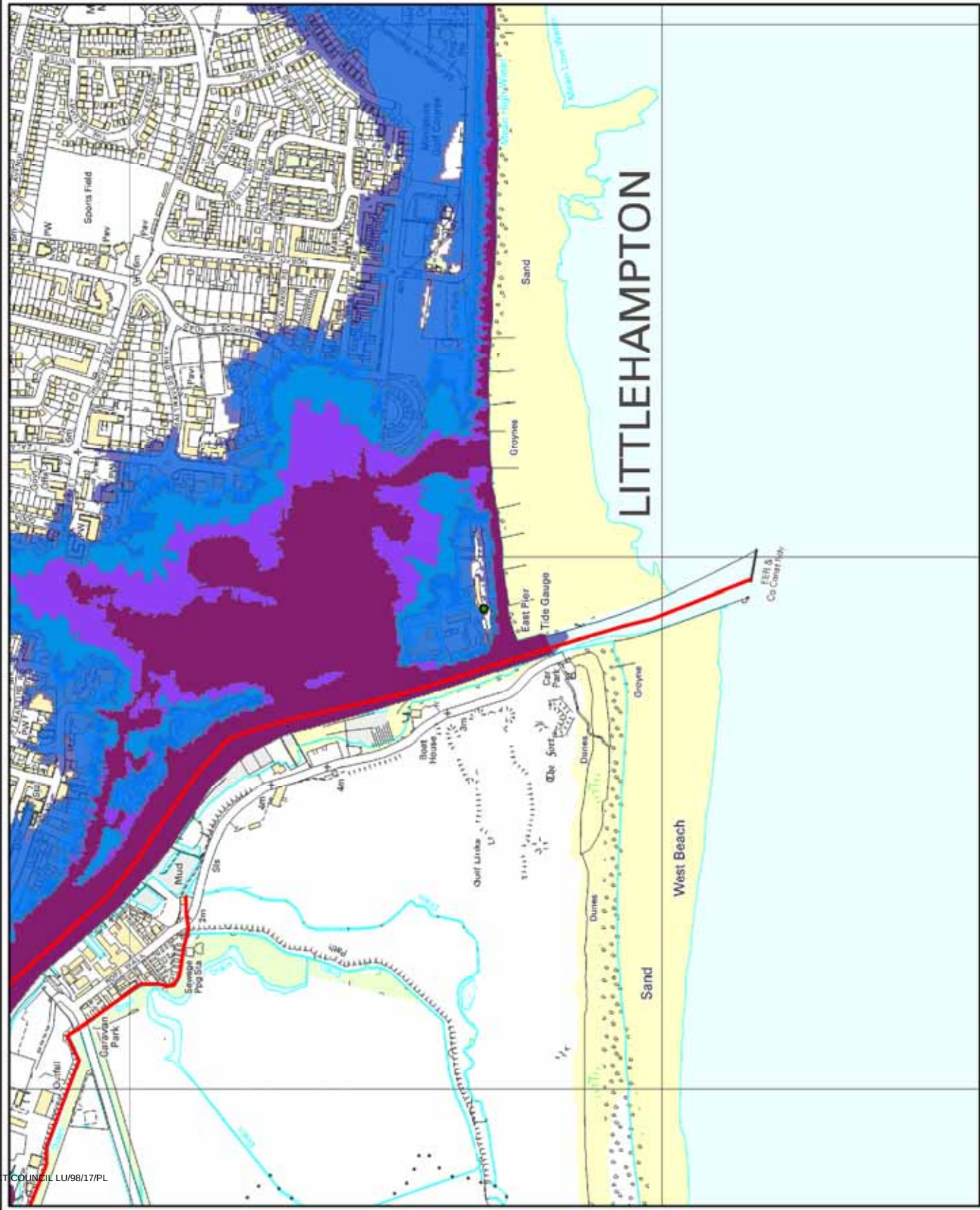


Legend

- Site Nodes
- Site Boundary
- Main River
- 20% AEP (2012) (Defended)
- 5% AEP (2012) (Defended)
- 1.3% AEP (2012) (Defended)
- 1% AEP (2012) (Defended)
- 0.5% AEP (2012) (Defended)
- 0.5% AEP (2070) (Defended)
- 0.5% AEP (2115) (Defended)
- 0.1% AEP (2012) (Defended)
- 0.1% AEP (2115) (Defended)

Scale: 1:10,000





Legend

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

Scale: 1:10,000

