



Chartered Surveyors

ARUN DISTRICT COUNCIL				
No.	LU	190	09	
Received				

**Report on Flood Risk
Assessment**

At

**Littlehampton Coastguard Tower
The Promenade
Arun Parade
Littlehampton
BN17 5LL**

For

Mr S. Worrall
The Fold
White Hill Road
Detling
Maidstone
Kent
ME14 3HH

REF: 2892 FRA

Moore Salmon Associates
Unit 5, Vinnetrow Business Park
Vinnetrow Road
Runcton
Chichester
West Sussex
PO20 1QH
Telephone: 01243 533499
Fax: 01243 531070

E-mail: info@theconstructivegroup.com
Web: www.theconstructivegroup.com

Background

Moore Salmon Associates was commissioned by Mr S. Worrall to provide full consultancy services with regard to a proposed conversion of Littlehampton Coastguard Tower, The Promenade, Arun Parade, Littlehampton, BN17 5LL.

Aim

This report is a flood risk assessment in support of a planning application for a conversion of the redundant coastguard tower, into residential accommodation. The overall footprint is approximately 4.5m X 2.8m.

Scope

This report has been prepared using the following documents for guidance:

Planning Policy Statement 25: *Development and Flood Risk* (PPS25) (and specifically Annex E: The Assessment of Flood Risk);

The Environment Agency's guidance '*Minor Development within Flood Zones 3 and 2 (FRA3)*'; and,

CIRIA Report C624 – *Development and Flood Risk – Guidance for the Construction Industry*.

Strategic Flood Risk Assessment for Arun District – Volume I, II, III, IV

Preparation of this report included the following:

Investigation of the flood risk within and external to the site.

Consideration of the pre-development and post-development storm water run-off and identification of a means of storm water disposal.

Consideration of storm events up to the 100 year return period storm, including climate change.

This report deals with environmental issues as they are impacted by flooding, as required by Planning Policy Statement 25: *Development and Flood Risk*. Other impacts on the environment are not considered.

1.4 Climate Change

PPS25 Annex B makes the following statements in paragraph B8:

"...that winters will become wetter over the whole of the UK, by as much as 20 per cent by the 2050s. A shift in the seasonal pattern of rainfall is also expected, with summers and autumn becoming much drier than at present. Snowfall amounts will decrease significantly throughout the UK, but the number of rain-days and the average intensity of rainfall are expected to increase."

As the development is residential and has a design horizon of 100 years, in PPS25 Annex B paragraph B9 and Table B.2 over the next 100 years the peak rainfall intensity is likely to increase by 30%.

Consequently, where appropriate an allowance has been made within this report to represent anticipated climate change.

Description of Site

The approximate co-ordinates for the centre of the site are 50° 48' 08.84" North, 0° 32' 27.91" West. The following figures show the location of the site.

Fig 2a- Site Location



Fig 2b- Aerial View. – (NB: Site highlighted in Red)



The total area of the site is approximately 4.5m X 2.8m equating to 0.00126 hectares and currently comprises of a brick built redundant coastguard tower. Drawing number 2892/01 in Appendix A; shows the existing site layout. Drawing no. 2892/02; the proposed. A topographical survey shows the site to lie approximately 5.2m AOD.

The site boundary is the surrounding promenade, which is owned by the Local Authority. The site is approximately 9.5m North of the edge to the promenade and 82m East of the River Arun.

This section relates to the risk of flooding due to fluvial or coastal mechanisms and factors external to the site. This section is not concerned with the risk of flooding of the site due to the capacity of internal drainage (refer to section on Storm Water Drainage).

3.1 Environment Agency Flood Maps

The Environment Agency's Flood Maps are shown as the following figures.

Fig. 3a



★ = approximate site location

Fig. 3b



★ = approximate site location

(Source: Environment Agency.)

Legend

- Flood Zone 3 – *High Risk* (Flooding from rivers or sea without defences).
- Flood Zone 2 – *Low to Medium Risk* (Flooding from rivers or sea without defences) (Extent of extreme flood).
- Flood Defences.
- Areas benefiting from Flood Defences.

Typically the Environment Agency's Flood Maps are based on 'bare earth' catchments and thus do not reflect the presence of any flood defences or any urbanisation. The Flood Maps are a planning tool to be used to determine the appropriate Flood Zone described within PPS25.

Arun District Strategic Flood Risk Assessment, table 7.10 Peak water levels (including allowance from sea level rise) states that with the 1:100 year (1%) event water level rising to 5.33m AOD.

3.2 Sequential Characterisation of Flood Risk

Table D.1 of Planning Policy Statement 25 (PPS25) describes the allocation of Flood Zones to geographical areas according to the Annual Probability of Flooding (APF). The allocation of Flood Zones ignores the presence of flood defences. Based on the Environment Agency's Flood Map, which ignores flood defences, the site is characterised as Flood Zone 3a '*High Probability*,' as defined in Table D 1, that is land having a 1 in 100 or greater annual probability of river flooding or a 1 in 200 or greater

annual probability of flooding from the sea.

The proposed development is classified as “more vulnerable” by table D.2 of PPS25.

The Exception Test

Table D.3 of PPS25 shows that an “exception test” is required to be passed for “more vulnerable” developments within zone 3a in order to consider the development suitability. Local Planning Authorities give priority to sites in low risk zones before those at higher risk.

PPS 25 Annex D para. D9 states that:

“for the exception test to be passed:

- *it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared. If the DPD has reached the submission stage-see Figure 4 of PPS12: Local Development Frameworks- the benefits of the development should contribute to the Core Strategy’s Sustainability Appraisal;*
- *the development should be on developable, previously-developed land or, if it is not on previously developed land that there are no reasonable alternative sites on developable previously developed land; and*
- *a FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.”*

3.4 Mechanism of Flooding

The following information is provided by the Environment Agency and describes the mechanism of potential flooding of the site:

“The River Arun rises on the Weald, flows through the South Downs and across the coastal plain before discharging to the English Channel. The river has a tidal influence up to its confluence with the Western Rother at Pulborough.

The main flood defences on the River Arun are walls and embankments along the tidal extent of the river from Littlehampton to Pulborough.

The mechanism of flooding of the site due to the River Arun is likely to be tidal, but it may be a combination of both fluvial and tidal influences.

Flood Defences and Breach Analysis

The Flood Map indicates that the entire site may be at risk of coastal flooding (ignoring the presence of flood defences) and is within Flood Zone 3a.

Information via the Environment Agency revealed that the flood defences protect the site against the 100 year return period flood.

The flood defence protecting the site consists of a concrete wall along the entire length of the river bank of the Arun, along with earth embankments along the middle and lower reaches. The raised embankments are estimated to protect against a flood with 1.33% AEP. The coastline is protected by shingle beaches and sea walls, which are estimated to protect against a flood with a 0.5% AEP.

The proposed development will not have any impact on the flood defence or the level of protection currently provided by it.

The risk of failure of the flood defence is considered to be low. They are maintained annually by a divided group of parties and are inspected annually by Arun District Council and the Environment Agency to ensure that they are fit for purpose. Their current condition is described as good.

Arun District Council has a design standard on the river that its defences along this section are to a design standard of 1:75 years. The defences protect against a tidal flooding event that has a 0.1% annual probability.

In the event of extreme water levels in the River Arun and from the sea overtopping or failure of the flood defences there is a risk that the site may flood and that flooding may be rapid. This assumes an uninterrupted, smooth path from the breach allowing the water to travel to the site.

3.6 Climate Change and Tide Levels

PPS25 Annex B discusses the general implications of climate change and makes the comment that global sea level will continue to rise. It is expected that the river may cause a flood in the 2106, with potential flooding from the sea in 2056 and 2106, all due to the climate change horizons.

3.7 Proposed Finished Floor Level

Based on a topographical survey of the site, the ground floor level of the existing building is approximately 5.2 mAOD. The converted builds floor level will be raised by 75mm, making the floor level 5.275 mAOD.

3.8 Residual Flood Risk

As with any prediction of future flood levels there is an element of risk. Despite the recommendations contained within this report, the decision about appropriate ground and floor levels should be made by the Developer in conjunction with the funder(s) and

insurer(s).

The site may be at risk of flooding from extreme events and therefore it is recommended that detailed design consider minimising damage due to flooding, including overtopping or failure of the flood defences.

For example, design may include, but not be limited to, the following elements:

- Flooring and general décor to be flood compliant;
- Access and egress walkways to incorporate anti-slip water compliant surfaces;
- Waterproof membranes incorporated in concrete floors; and
- Waterproof service ducts.

3.9 Floodplain Compensation

The site is considered to be outside of the 100 year return period floodplain because it is protected by flood defences. On this basis the proposed development will not result in a loss of floodplain and therefore floodplain compensation is not required. Further, the proposed development is currently formed of hard standing and as such does not have water retaining properties.

3.10 Insurance

PPS25 Paragraph H12 makes the following statements:

“Developments at risk of flooding may increasingly face difficulties with the cost or availability of insurance. This, in turn, could cause problems for property buyers in obtaining mortgages.”

“Those proposing development, especially speculative investment, are advised to consult (Association of British Insurers) ABI guidance at an early stage in order to understand the insurance industries concerns.”

The Insurance Industry is typically concerned with the 0.5% annual probability flood for both fluvial and tidal flooding. The proposed development within the site is protected by defences from a 0.1% flood and therefore there should be no problems of insuring the site with regard to fluvial or tidal flooding.

3.11 Consequences of Flooding

The consequences of flooding should be considered within the context of the risk of flooding of the site. Based on previous discussions within this report the annual probability of flooding of the site is less than 0.1%.

The following gives a brief assessment of the economic, social and environmental consequences of flooding of the site.

Economic – The proposed development is for residential dwelling and not commercial use or industry. Flooding of the site on its own should not cause

major adverse impacts to the wider business, manufacturing, transport or employment sectors.

Social – Flooding of the site on its own would primarily impact the occupants of the site and would cause far less impact on the greater community.

Environmental – The discussion herein about environmental issues is limited to the impact of flooding on the site. Other environmental issues are not within the scope of this report. The proposed development is residential and therefore the environmental consequences of flooding are considered relatively minor.

3.12 Impact of Proposed Development on Flood Risk

Based on the above discussions the proposed development is protected against a 100 year return period flood and therefore will not result in loss of floodplain and will not impede flood flows. Therefore, it is concluded that the proposed development will not adversely impact flood risk within or external to the site.

This section relates to storm water runoff resulting from rainfall over the post-developed site and the methods of disposing of that storm water. It is also concerned with the risk of flooding of the post-developed site due to the capacity of the internal drainage.

This section is not concerned with the risk of flooding due to fluvial or coastal mechanisms (refer section on Flood Risk).

4.1 Storm Water Drainage Regime

The Building Regulations 2000 - Approved Document H (*Drainage and Waste Disposal*) – Section H3 requires that rainwater shall discharge to one of the following, listed in order of priority:

- An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
- A watercourse; or, where that is not reasonably practicable,
- A sewer.

The proposed development does not adversely alter the impermeable area of the site. The developed land in this area, is also less likely to significantly increase the 'run off'.

The existing paved drainage serving the area is suitable for the disposal of the storm water rainfall, which discharges into the main combined sewer.

4.2 Impact of Development on Receiving System/Watercourse

The post-developed site will discharge into the same storm water system as the existing coastguard station on site.

4.3 Overland Flow from Areas Around the Site

The residential areas and highways in the vicinity of the site have their own formal storm water drainage systems to prevent uncontrolled runoff, which discharge into the main sewer. To overcome any residual flood risks, consideration has been given to extreme events when the capacity of the formal drainage systems may be exceeded. In the event that these systems are overloaded the overland flow may be contained within the kerb line of the roads which are lower than the surrounding properties.

There is a very low probability that overland flow could enter the ground floor during extreme events when the surface water drainage outfalls are tide locked, coupled to a localised high intensity rainfall event.

Flood warning and evacuation of the site should be considered in the context of the risk of flooding. The site is located on the border of the Environment Agency Flood Warning Area as shown on the following figure.

Fig. 5a



★ = approximate site location

Flood Warning Area (Source: Environment Agency.)

Legend

■ Areas covered by Flood Warnings.

The Environment Agency advises that the flood status is checked every 15 minutes and that updates are provided on local television and radio.

It has previously been concluded that the mechanism of flooding of the site could be fluvial or tidal flooding or a combination of these. Tidal flooding is generally rapid but predictable and there is generally adequate time for evacuation. The flooding is also likely to abate during the tidal cycle. Due to the nature of rainfall events fluvial flooding is unpredictable but relatively gradual and generally there is adequate time for evacuation.

In the event of extreme water levels in the River Arun and overtopping or failure of the flood defence wall there is a risk that the site may flood and that flooding may be rapid however the presence of the coastguard station adjacent and the flood warning system mean that unexpected inundation is highly unlikely.

If necessary during extreme events evacuation to higher ground would be away from the coastline and River Arun towards the North. The suggested evacuation route is north along Windmill Road to South Terrace and St Catherine's Road. Whenever possible, evacuation of the site should take place prior to flooding.

In addition, the residents will be made aware of the Environment Agency's flood warning procedures. The Agency provides general advice on the appropriate action to take prior to and during flooding. It does not have a specific flood evacuation procedure for the site and has advised that it is the responsibility of the property owner or individual to decide if, when and how to evacuate.

Conclusion

Based on the work carried out in preparation of this report the following conclusions are made:

- It is proposed to build a converted Coastguard Tower to a 1No. Bed dwellings located on The Promenade, Arun Parade, Littlehampton, BN17. The existing site is a redundant Coastguard Tower.
- The site is close to the Littlehampton coastline and the River Arun; protected by a flood defence wall, embankments and shingle beach.
- The site is characterised as Flood Zone 3a '*High Probability*'. Based on the Environment Agency's advice the flood defences protect the site against the 1000 year return period flood.
- The Environment Agency has advised that the 1 in 200 year flood level is 5.13 mAOD.
- Flood protection of the site is reliant upon the flood defences and it is considered that the maintenance and upgrades of these defences will continue over the next 100 years.
- Overtopping or failure of the flood defences may result in the complete inundation of the site and the flooding of the ground floor.
- The development will not impede flood flow, will not result in a net loss of floodplain and will not adversely impact flood risk within or external to the site. The attenuation measures previously described will lessen the flood risk for and from the area.
- It is proposed that the post-developed site discharge storm water to the same system as the existing coastguard station.

Based on the work carried out in preparation of this report the following conclusions are made:

- It is proposed to convert the Littlehampton Coastguard Tower to a 1No. Bed dwellings located on The Promenade, Arun Parade, Littlehampton, BN17. The existing site is a redundant Coastguard Tower.
- The site is close to the Littlehampton coastline and the River Arun; protected by a flood defence wall, embankments and shingle beach.
- The site is characterised as Flood Zone 3a '*High Probability*'. Based on the Environment Agency's advice the flood defences protect the site against the 1000 year return period flood.
- The Environment Agency has advised that the 1 in 100 year flood level is 5.33 mAOD.
- Flood protection of the site is reliant upon the flood defences and it is considered that the maintenance and upgrades of these defences will continue over the next 100 years.
- Overtopping or failure of the flood defences may result in the complete inundation of the site and the flooding of the ground floor.
- The development will not impede flood flow, will not result in a net loss of floodplain and will not adversely impact flood risk within or external to the site. The attenuation measures previously described will lessen the flood risk for and from the area.
- It is proposed that the post-developed site discharge storm water to the same system as the existing coastguard station.

Recommendations

Based on the work carried out in preparation of this report the following recommendations are made:

- Advice should be sought from insurers on the insurability of the proposed development.
- Consideration should be given during detailed design to minimising damage to the proposed development due to flooding, including overtopping or failure of the flood defences.
- Consideration should be given during detailed design to the potential impact of overland flow from surrounding areas and to preventing flood water from entering the proposed development.