

FLOOD RISK ASSESSMENT AND MITIGATION

March 2019

Revised July 2019 to include

SEQUENTIAL FLOOD RISK ASSESSMENT

Erection of three terraced residential dwellings, garden/cycle storage sheds and associated car parking, utilizing the existing access.

Former Hotel Tennis Courts adjacent to the Royal Norfolk Hotel, West Street, Bognor Regis, Sussex, PO21 2LH

Arun District Council reference: BR63/19/PL

SEQUENTIAL FLOOD RISK ASSESSMENT

Scope:

Arun District Council's Level 1 SFRA Appendix D Climate Change Map indicates that the majority of the site will fall into Zone 3a in 2061 requiring an indicative sequential assessment in respect of the National Planning Policy Framework, namely:

158. *The aim of the sequential test is to steer new development to areas with the lowest risk of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.*

Accordingly, the test will focus on the reasonable availability of similar sized sites in the Parish.

Context:

The Bognor Regis Neighbourhood Plan, aerial photographs and maps show the parish area to be densely developed with little or no vacant sites available for development other than major developments along the sea front which are not comparable with the minor application site. Other available residential sites lie outside the area and again fall into the category of major developments.

Arun District Council's web site revealed no sites with extant planning permission or submitted proposals similar to the application site in Bognor Regis itself. Searching for minor development sites for sale in the area revealed sites in Selsey, Littlehampton, Chichester and Angmering, but no sites available for development in Bognor Regis. Accordingly, it is reasonably safe to assume that there are no available sites in the area with a lower risk of flooding.

Either way, close scrutiny of aforementioned climate change map reveals the extent of the area of flood zone 3a in respect of the application site. Regardless of the availability of alternative sites located in areas of lower risk, the revised 'Flood Risk Assessment and Mitigation' demonstrates how relatively small mitigation measures can be undertaken to alleviate any risk and remove the site from present flood zones 2 and 3 together with the 2061 Zone 3a levels predicted in the future.

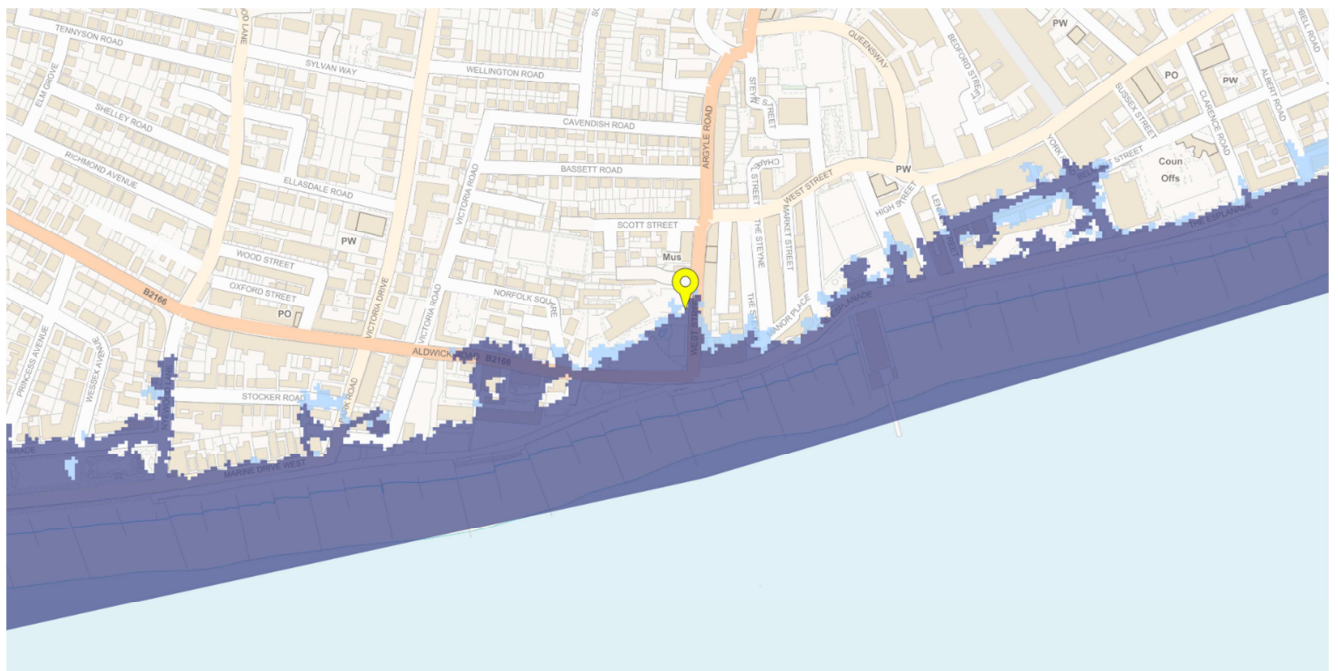
FLOOD RISK ASSESSMENT AND MITIGATION

Assessment and mitigation:

The proposed development site is located toward the southern end of West Street on its western side with its southern boundary approximately 96m from the promenade which makes up the sea defences.

In view of the close proximity to the sea, the assessment will focus on sea flooding rather than river flooding.

The site plan showing the areas of present flood probability have been interpreted from the Environment Agency flood zone maps and predicted probability from Arun District Council's Level 1 SFRA Appendix D Climate Change Maps. Superimposing the data onto the application site plan has been undertaken as accurately as possible given the large-scale of the maps, but is sufficiently accurate for the purposes of this exercise.



Notwithstanding issues relating to the 'sequential test' previously outlined in the earlier text, the assessment applies the 'exception test' to demonstrate and help ensure that the potential flood risk to people and property will be managed satisfactorily to allow the development to go ahead. For the purposes of this assessment, the proposal is considered to represent a 'more vulnerable' form of development, comprising less than 1ha and split into three separate categories, namely:

1. The built development of garden sheds and car ports considered to be a minor development in flood risk terms;
2. Permeable areas such as car park, paths and soft landscaping; and
3. The built development of four terraced dwellings.

The denoted flood zones show a direct correlation between the distance from the sea front and the ground levels with:

Zone 1	(low probability) starting at a contour height of 5.5m and above where there is a 1 in 1000 annual probability of flooding.
Zone 2	(medium probability - hatched light blue) extending to a contour height below 5.5m where there is between 1 in 200 -1000 annual probability of flooding.
Zone 3	(high probability - hatched dark blue) extending to a contour height of 5.4m where there is between 1 in 200 or greater probability of flooding.
Zone 3a	(high probability predicted in 2061 – dark green edge) extending to a contour height of approximately 5.6m where there is between 1 in 200 or greater probability of flooding in 2061.

The existing ground levels show the lowest level of the site is located in the southeast corner at 5.34 lying outside the proposed built form, rising gradually to approximately 5.6m+ toward the west and north development boundaries. Interpreting the levels into flood zones, demonstrates that the most probable small area is located in the southeast corner (zone 3) diminishing the risk to a small zone 2 level in an outward projection, thereafter, the site is predominantly zone 1.

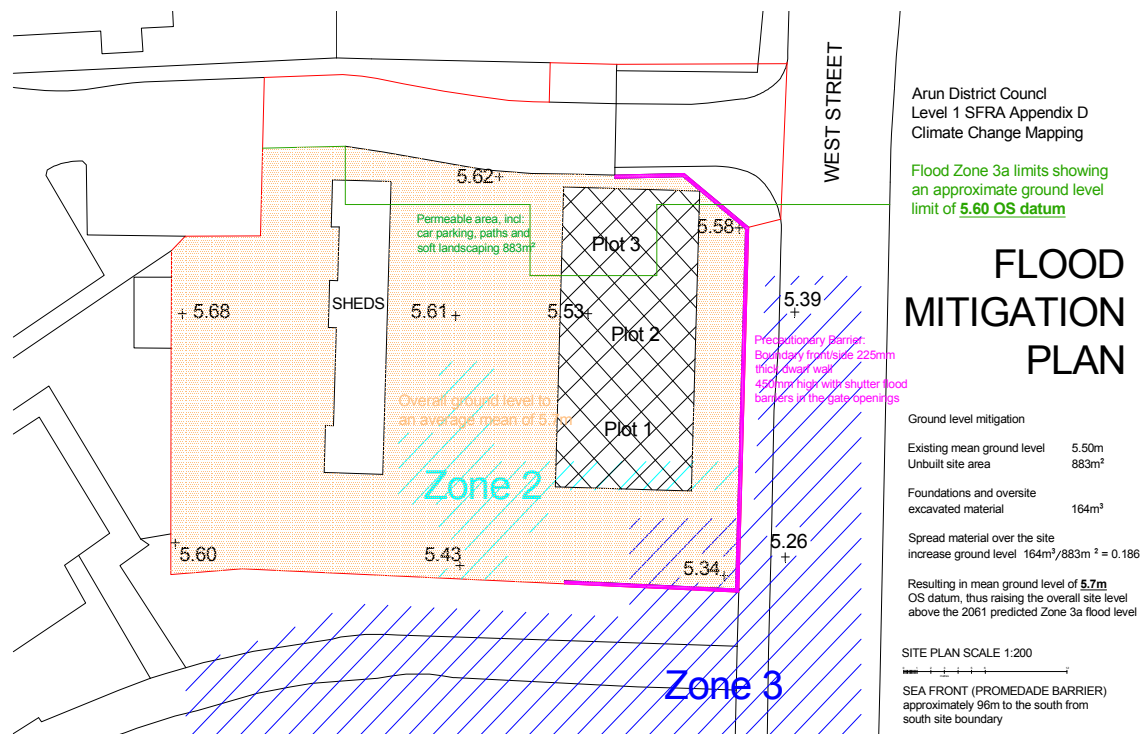
The plan demonstrates that plot 1 at the south end is the only plot marginally effected by the present zone 2. Taking into account future climate change and sea levels it is predicted that most of the site will fall within zone 3a by 2061. The extent of the predicted zone in respect of the site is indicated by a green boundary line toward the north of the site. The predicted line appears to extend to an existing ground level of 5.60m OS datum level. The earlier text explains how approximately half the site lies below 5.60m with a mean site level of 5.50m. It is proposed to mitigate the risk of flooding by raising the proposed finish ground level to 5.60m+ and the associated ground floor level 150mm above to 5.75m.

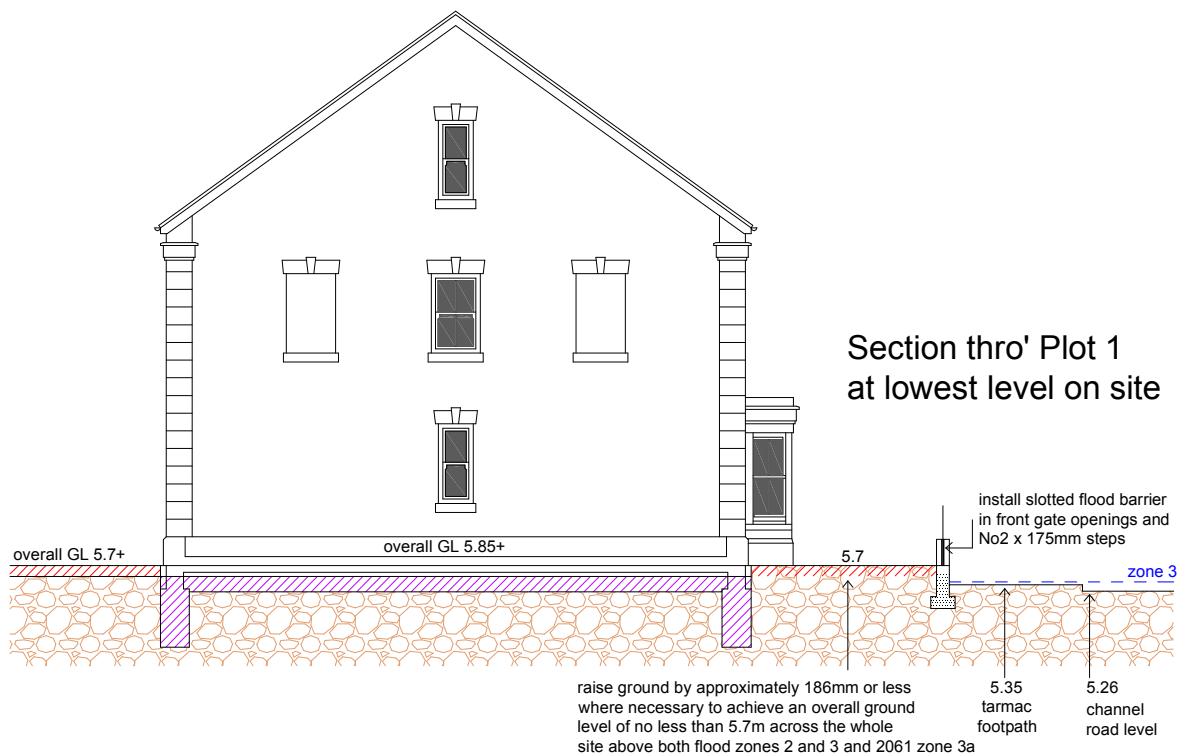
To avoid importing material, it is proposed to scrape the topsoil back for future use and use the excavated foundation and oversite materials to raise the level of the site and cover with the topsoil. Assuming a normal concrete strip foundation 1.2m depth by 600mm wide supporting load bearing walls and the normal excavation required for a block and beam floor, the amounts equate to a simple formula, namely:

Foundations	$168\text{m} \times 0.6\text{m} = 36\text{m}^2 \times 1.2\text{m depth}$	$= 100.8\text{m}^3$
Oversite	$210\text{m}^2 \times 0.3\text{m}$	$= 63^3$
Total excavated material		$= 163.8^3$

The area of the site around the proposed built parts amounts to 883m^2 . Dividing the volume of the excavated material (163.8^3) by the area (883m^2) delivers the resultant increase in overall ground level of 0.186m, added to the mean ground level (5.5m) provides an overall site level of 5.686m (5.7m) and an associated proposed ground floor level of 5.85m, thus taking the application site level above the present zone 2 and 3 levels and the 2016 predicted zone 3a level of 5.6m, resulting in an overall present and future zone 1 level where the annual probability is 0.001%.

In addition to ground level mitigation proposals it is further proposed to introduce additional measures with the construction of a dwarf brick wall to the east and part south boundary designed to be of a flood resilient and resistant construction to act as a potential flood barrier together with the installation of a frame to facilitate sliding shutter flood barriers in the gaps where the pedestrian gate entrances are located.





The previous use (brownfield) of the whole site related to tennis courts serving the adjacent Royal Norfolk Hotel. The construction comprised 1180sq.m of impervious tarmac surface enclosed with concrete kerb edgings, compared with the proposed development limiting the impervious built area to 330sq.m (including houses and outhouses) representing a net reduction in surface water run off area of 850sq.m or 72%. The remaining 850sq.m will comprise:

- Car parking area permeable brick paviors
- Paths unjoints paving slabs
- Hard landscaping loose gravel with plants
- Garden grass and earth flower beds

Conclusion:

The proposed development will require minimal changes to the existing topography, which practically amounts to little more than general site preparation and levelling, that will result in an overall level exceeding the present and future zone 1 contour level. In addition, mitigating measures relating to the boundary walls and sliding shutter barriers will ensure that no flooding impact will occur as a result of flooding beyond the site boundaries resulting in a flood free and safe zone for the occupants and the dwellings.

The Environment Agency response dated 7th May 2019 (ref: HA/2019/121285/01-LO1) relating to the earlier 'Flood Risk Assessment' raised no objection to the similar mitigation approach taken when considering the present flood risk zone levels. Accordingly, we respectfully ask the Environment Agency and the Council to accept the same approach relating to both the present and future flood levels predicted in 2061 together with the revised condition advised, namely:

Condition – Implementation of Flood Risk Assessment and Mitigation

The development shall be carried out in accordance with the submitted flood risk assessment and mitigation submitted July 2019 and the following mitigation measures it details:

- *Finish floor levels are set no lower than 5.85 meters above Ordance Datum (AOD)*

The mitigation measure shall be fully implemented prior to occupation and subsequently in accordance with the scheme's timing/phasing arrangements. The measure detailed above shall be retained and maintained thereafter throughout the lifetime of the development.

Should the Council require any additional information, please do not hesitate to contact the agents.

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