

Responses to the EAs letter dated 8th September 2022 (Appendix 1 below)

Please find the supporting evidence attached with this response in the form of additional calculations and graphs as requested by the Environment Agency in their comments from the 8th September 2022 (prepared by CTP Consulting Engineers). This demonstrates that the proposal for the remedial works (as submitted in June 2022) meet the 100 year requirement.

Reason for not raising the whole length of the flood wall to 8m AOD now :

There are two main reasons for this. First one is the financial viability of raising this wall now as part of the development along with the other substantial works that are being proposed here.

Second reason is that the height of the flood wall in the future cannot be known because the modelling and evidence may change.

It is worth noting that it is proposed to be raised to comply with the 2040 level as part of the development and it has been demonstrated that it is capable of being raised to 8 AOD by year 2070.

Other Comment responses to EA letter received 8th September 2022

Comments from CTP Consulting Engineers

The new section of concrete wall is to be founded upon the existing concrete sheet piled foundation and tied into the existing concrete piers, and concrete base.

Additional sheet pile thickness readings have been taken in various locations in various different depths. The data provided in the sheet piling manual has been verified. All design requires assumptions, we are content with the data obtained and that it represents the actual condition of the structure and is a representative sample of the condition of the structure. Obtaining results deeper down is not deemed necessary due to the exposure conditions and tide levels. The factor of safety on the steel is 1.5 without any intervention, however to appease the Environment Agencies concerns additional assurance is given to the existing flood defence with the addition of further protection. This means the factor of safety will be in excess of 1.5

The challenge of Inspection to the foundations is no different to that of any other structure. Typically, foundations are not inspected regularly as there is no effective way of doing so. This comment would also apply whether the wall was enhanced or was replaced. The concrete protection would reduce the corrosion to the steel sheet piling & improve the section modulus. It is to be designed compositely in accordance with Eurocode. It is commonly used in far more severe locations on jetties and coastal structures to provide enhancement and protection to steel structures. The risk of the design will be taken by the design consultant carrying out the detailed design of the works, and the installation by a competent contractor. The remaining life of the existing structure is adequate, additional calculations have been prepared and graphs as requested to demonstrate. Please find the attached document providing further information as requested and now clearly demonstrating that the proposal for the remedial works (as submitted in June 2022) meet the 100 year requirement.

Biodiversity features are the creation of tidal coastal habitats and ecosystems in transitional waters are subjected to tides, wave action and sediment transport, which help to form habitats. This will be carried out using native suitable planning on the foreshore at appropriate levels, the details are shown on the latest development plans. There is also scope for bird/bat boxes to be included as part of the development, and for biodiversity features to be included on the existing piers. It is not our

intention to affix biodiversity elements onto the flood wall, as it usually means visual inspection is obscured.

Appendix 1 :Environment Agency comments dated : 8th September 2022:

creating a better place



Mr Toby Vaughan
Herrington Consulting Ltd.
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Valley Road
Barham
Canterbury
CT4 6DQ

Our refs: KT/2020/127776/09-L02
ENVPAC/1/KSL/00360
Your ref: 2813/KT
Date: 08 September 2022

Dear Mr Vaughan

Charged advice our ref ENVPAC/1/KSL/00360.
Response to customer comments sent in July 2022 - Structural Inspection Report of the flood defence. The proposals for development are not fixed, however, it is intended that the grade ii listed customs house building and outbuildings will be converted to accommodate 29no. Self-contained flats with associated parking, amenity and landscaping.

Custom House, The Terrace, Gravesend, Kent DA12 2DE

Thank you for your latest comments on the Structural Inspection Report for the flood defence. We welcome the proposals to replace the return section of the flood wall and to replace the flood gate with a reinforced concrete wall. Please provide information on how the new section of reinforced concrete wall be founded.

Existing flood defence wall

Please can you clarify the reason for not raising the whole length of the flood defence to 8.0 m AOD now. It would be more efficient to complete the raising to 8.0m AOD as part of the development, it will achieve greater certainty over the funding and delivery of the works and would be less disruptive to residents.

We are concerned about the residual risks of the proposed remedial works and it is our opinion that a replacement flood wall over the full length would be the most appropriate solution. Our reasons for this are explained in detail in the next two paragraphs.

The additional steel sheet pile thickness testing has been carried out at 6 locations within two trial pits. At two locations a lower thickness reading is recorded lower down. This suggests that the worst case may not have been found. It is also not

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clear that a representative sample has been tested.

If the existing sheet piling is to be retained, please provide a graph to show the remaining section thickness reduced over 100-years against position along the piles vertically, from the top down; along with the maximum bending moment with the water level at 8.0 m AOD. The section modulus required as you go down should also be provided, along with all the supporting calculations.

We are concerned over the proposal to extend the life of the existing steel sheet piled wall by installing a concrete coat extending 2.5 metres below ground level. It will be difficult to clean the existing steel thoroughly to that depth working in-situ and to achieve a watertight seal to prevent capillary action drawing water up against the steel. There will be no effective way to inspect the work periodically. The first we might learn that there is a problem is when the structure was failing during a major flood. This makes the approach too high risk to protect people from flooding for the next 100-years. It is for these reasons that a replacement flood wall over the full length appears to be the appropriate solution.

The 1.2 metre wide exclusion zone would be a sufficient **absolute minimum** offset to allow asset inspections. However, it must be demonstrated that sufficient space will be maintained to carry out minor maintenance repairs and major renewal of the flood defence. The amount of space required can be reviewed once the proposal for flood defences at this site is finalised.

We would ask to be provided with enough detail of the proposed ecological enhancements to allow us to assess whether they are workable, will provide appropriate habitat value and will not adversely affect the flood defence, including ongoing inspection.

Environmental permit - advice to applicant

The Environmental Permitting (England and Wales) Regulations 2016 require a permit to be obtained for any activities which will take place:

- on or within 8 metres of a main river (16 metres if tidal)
- on or within 8 metres of a flood defence structure or culverted main river (16 metres if tidal)
- on or within 16 metres of a sea defence
- involving quarrying or excavation within 16 metres of any main river, flood defence (including a remote defence) or culvert
- in a floodplain more than 8 metres from the river bank, culvert or flood defence structure (16 metres if it's a tidal main river) and you don't already have planning permission

For further guidance please visit <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits> or contact our National Customer Contact Centre on 03708 506 506. The applicant should not assume that a permit will automatically be forthcoming once planning permission has been granted, and we advise them to consult with us at the earliest opportunity.

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