

**Proposed Camplas Technologies Ltd Development**

**at**

**Former Lafarge/ Tarmac Industrial Wharf Site**

**Briton Ferry, Neath Port Talbot.**

**Flood Consequences Assessment (TAN15).**

**May 2023**

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## 1 – Introduction.

Camplas Technology Ltd (CTL) are a manufacturer of glass reinforced plastic (GRP) storage tanks based in South Wales. CTL have been trading for over 50 years and have developed processes to enable the manufacture of very large tanks which are too big to be transported by road in one piece. There is a domestic and international demand for high capacity tanks and their transportation by sea would overcome the restrictions imposed by the UK highway system and enable whole tanks to be transported directly from a purpose built manufacturing base with wharfing facilities.

The proposal is to establish a manufacturing facility at Briton Ferry adjacent to the existing wharf facility, at the former Tarmac Lafarge batching plant, as this will allow the export of the high volume GRP tanks. The wharf is therefore a key element in the development proposal as the oversize product could be manufactured at the Briton Ferry site and then loaded directly onto suitable vessels for transportation to international customers. It is also possible that the raw materials to be used in the manufacturing process could also be delivered by sea. The proposed development would therefore accord with local planning policy in relation to the safeguarding of the wharf for the transportation of freight.

This report comprises the Flood Consequences Assessment (FCA) undertaken for the re-development of the former Lafarge/ Tarmac industrial facility at and adjacent to the wharf. The assessment has shown the site, as presently configured, is likely to be at risk from tidal flooding with much of the site within Flood Zone 3. Flood Zone 3 is categorised as an area that has more than a 1:200 chance of flooding in any one year and this risk has included the predicted effects of climate change. The assessment indicates that buildings with a finished floor level or flood threshold level of 6.8m OD (7.1m OD with 'stop logs') along with appropriate mitigation would satisfy the requirements for a 1:1000 or 0.1% annual exceedance probability (AEP), although the area of the open site and the quay would be flooded in the most extreme scenario. As the risk of flooding is uniquely attributable to tidal inundation, the assessment will only focus on tidal flooding.

It should be noted that a FCA was undertaken for a planning application made by Tarmac /Lafarge in 2014 which appeared to satisfy the requirements of TAN 15. This FCA focusses on and examines the tidal data and tidal flood scenarios in greater detail. The detail in this FCA shows a greater appreciation of the flood mechanisms and demonstrates how the flood scenarios will play out for extreme tidal events (0.1% AEP).

Significant areas of the existing site comprise concrete slabs and this is unlikely to cause increased flooding elsewhere as it is considered that suitable mitigation measures can be implemented in respect of rainfall and run off.

## **2 – Method of Approach and Policy**

The following method of approach, which refers to relevant flood and development policy, has been used in the undertaking of the assessment:

- 1- Reference to Adopted LDP (2011 - 2026).
- 2- Site Review and reference to latest topographic survey data and Planning Proposal.
- 3- Reference and review of relevant historic documents.
- 4- Use of the current TAN 15 Guidance. It is noted that revised guidance may be installed in June 2023.
- 5- Reference to the published Natural Resources Wales (NRW) flood maps for the site and adjacent area.
- 6- Tidal analysis and impact on proposed development.
- 7- An assessment of appropriate mitigation measures to manage and minimise risk.

### **3 – The Site, Site Proposals, Planning Policy and NRW Flood Maps.**

#### **3.1 The Local Development Plan (LDP) for the Site.**

The site is located at the former Lafarge/ Tarmac wharf in Briton Ferry and is referred in the LDP as indicated in the extracts presented in Appendix I. The Policy for the site, which includes the upstream facility historically known as 'Giants Grave' is TR4/3 which aims to safeguard existing and potential wharf facilities.

The proposed development has been chosen specifically to utilise the existing wharfing facilities and directly accords with the declared policy. The site was a busy facility with materials being delivered by sea supplying a concrete batching plant but has not been operating for some years. It should be noted that although dredged sand would have been delivered by sea, coarse aggregate and the concrete produced would all have been transported by road. It is therefore anticipated that the number of HGV movements will be lower than was the case for the former use. The proposals will re-energise the site, renew production activity and generate employment. Although a motivation for selecting this site for investment was the availability of wharf facility to transport the finished produce by sea, it is hoped that it may be possible to also deliver the key raw materials for the production process by sea. It should also be noted that the numerous small units proposed in the Tarmac Lafarge application of 2014 did not have a specific objective to utilise the wharf whereas the sea access and the wharfing facilities is a key element in the current application. A FCA was undertaken in support of the 2014 application. The wharf will also not preclude more general access to the wharfing facilities and there will therefore be the potential for the facilities to be utilised for other cargo if appropriate.

See Extract from LDP (Appendix I) – Map showing Proposed Development Site with Policy TR4/3.

#### **3.2 – NRW Flood Maps.**

The Flood Mapping produced by NRW is presented in Appendix II and will be considered in more detail in the Hydrology section below (Section 4). An initial review of the flood mapping shows that the area has the potential to flood. A search of the all the potential sources of flooding indicates that flooding from the sea is the only source affecting the site. Consequently, River and watercourses need not be considered further, and the assessment will therefore focus on potential tidal inundation.

The site is in Flood Zone 3 which is defined as an area with more than a 0.5% (1:200) chance of flooding from the sea in a given year, including the effects of climate change. This is typically referred to as the annual exceedance probability or AEP.

### **3.3 – Site Layout and Preliminary Development proposals.**

The current planning application comprises two buildings and reference should be made to Appendix III which contains the preliminary development plans. In addition to the access road from the highway, it is likely that a slab/ accessway will be required adjacent to the wharf with a link to the buildings to enable safe transport and loading. The approximate dimensions of the building are as follows:

Unit 1 –  $102 \times 50 = 5100\text{m}^2$

Unit 2 –  $48 \times 25 = 1200\text{m}^2$

Total area =  $6300\text{m}^2$  and 12m to eaves.

### **3.4 – Site Topographic Survey**

A topographic survey of the site has been undertaken and reference should be made to Appendix III which contains a 2020 topographic survey referenced to Ordnance Datum (OD).

### **3.5 – Historic Proposals and Documents**

In 2014 a planning application was submitted by Larfarge/ Tarmac and subsequently withdrawn. Larfarge Tarmac started a process to acquire permissions to establish a light industrial complex for Business, General Industrial, Storage and Distribution (B1,2 & 8) which comprise the following series of buildings:

- Building 1 –  $1600\text{m}^2$  with height of 11.5m.
- Building 2 – 5 No units of  $150\text{m}^2$  each in one building ( $750\text{m}^2$ ) with height of 4m.
- Building 3 –  $1400\text{m}^2$  with height of 10.5m
- Building 4 –  $550\text{m}^2$  with height of 6m

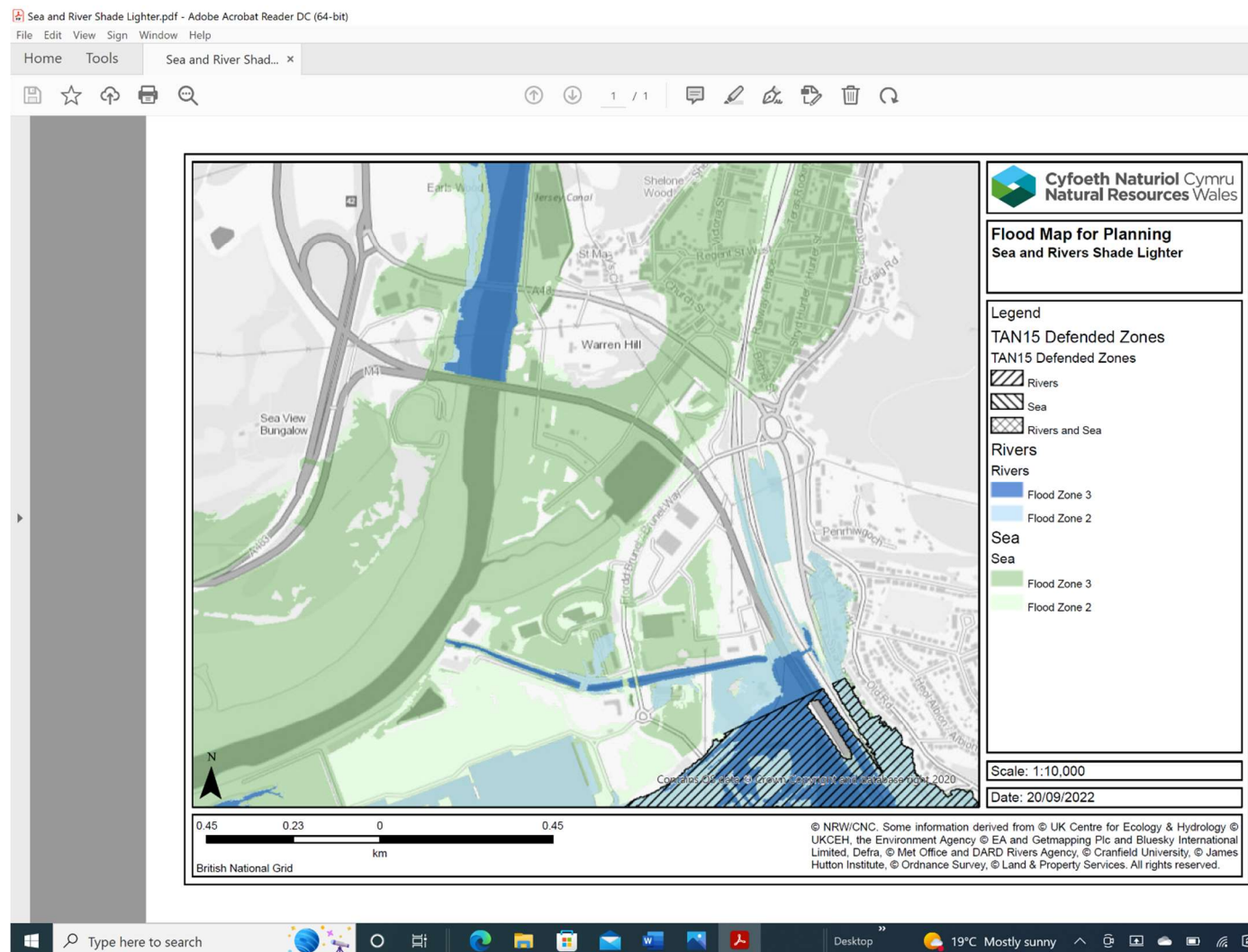
The development complex therefore comprises eight properties contained within four buildings with a total floor area of  $4,300\text{m}^2$ .

The anticipated commercial activities in the eight properties were listed as Business, General Industrial, Storage and Distribution. It would be reasonable to assume that the properties would be occupied by up to eight separate businesses and each business would have a number of staff, visitors and equipment in order to pursue commercial activity.

The proposed development of 2014 was clearly not intended to use, although was not precluded from using, the adjacent wharf facility. The application appears to have been aimed at achieving permission to establish the maximum development of the site with as many units as possible. This approach was inevitably going to elevate potential flood risk management issues. A Flood Consequences Assessment (FCA) was undertaken to support the application. The FCA highlighted a number of issues and challenges that would inevitably have had an impact on the proposed development. The FCA did however conclude that the proposed development met the TAN 15 requirements in terms of successfully undertaking the justification test and acceptability criteria. The finished floor levels were only provisionally declared and ranged from +6m OD to +6.5m OD. The FCA appeared to conclude that the proposals satisfied the flood requirements subject to the inclusion of some flood mitigation measures. It should also be noted that the proposed buildings in the 2014 application may have occupied an area closer to the wharf than the current CTL proposal. As the ground is lower towards the wharf, the set position of the CTL proposed new units allow a high finished floor level to be adopted, although ground works will inevitably be required.

#### 4 – Hydrology and TAN 15

The site is immediately adjacent to the Neath River and in an area which is dominated by tide rather than fluvial effects. The river, bank to bank, upstream at Giants Grave wharf is around 80m wide and in Neath it is around 40m wide. At the CTL site the river is over 150m wide and is only 2Km from the coast and open water. It is understood that ground water levels in the area are set at around +5mOD and are therefore unlikely to contribute to flood risk. Flood mapping produced by Natural Resources Wales (NRW) confirm total tidal domination and reference should be made to the flood maps in Appendix II and the screen shot extract below:



Virtually the whole site is located in Flood Zone 3 which is defined as an area with more than a 1:200 (0.5% AEP) chance of flooding from the sea in a given year, including the effects of climate change. A small area towards the east of the site is located within Flood Zone 2 with a further elevated area, also in the east of the site with no designated flood risk. The flood mapping (Appendix II) shows the fluvial risk from rivers and watercourse which are located some distance from the site and will have no bearing on the proposed development. The FCA is therefore only concerned with flood risk from the sea and will focus on tide, surges and sea level rise.

The proposed development is categorised in the TAN 15 guidance as being in the less vulnerable development category. TAN 15 recognises that much of the industrial development in Wales is located along rivers and on the coastal plain. TAN 15 acknowledges the need for some flexibility to enable the risks of floods to be addressed whilst avoiding potential detrimental economic impacts of preventing development. As declared earlier in the report, the location of the proposed development being adjacent to the quay is fundamental. It is envisaged that the circumstances in relation to flood risk would be similar at any other location with wharfing facilities and access to the sea. The justification for the location of the proposed development as set out in Section 6 of Tan15 is apparent due to the nature and function of the development.

The assessment of the flood consequences is set out in Section 7 of TAN 15 will be dealt with in the following section (Section 5).

The current site largely comprises concrete slabbing and it is likely that run off would find its way back into the river or, in part, run into non-metalled areas and pond/ soak away. A suitable drainage system will be designed (Section 8 TAN 15) to operate appropriately and in accordance with the requirements.

## 5 – Tidal Flood Analysis, Evaluation, Protocols and Mitigation.

The assessment of the flood consequences is set out in the following section as proposed in Section 7 of TAN 15 guidance. The assessment included a tidal flood analysis and evaluation followed by suggested protocols and mitigation.

### 5.1 Tidal Flood Analysis and Evaluation

A rudimentary understanding of tides will provide an appreciation that their behaviour is nonlinear. Water level change over time conforms to a sinusoidal relationship. Care should therefore be taken when assessing flood risk as a consequence of rising tidal levels and particular attention should be paid to the mechanism of potential inundation. This may be usefully expressed as a rate of water level rise for which values are declared in the guidance. A tolerable rate of rise is declared in the guidance at 0.3m/hr or 5mm/minute with a maximum wading depth of 600mm at peak level. The rate of rise for the Highest Astronomic Tide (HAT) ranges from 43mm/minute or an equivalent of 2.6m/hr at mid tide to zero at high water. The rate of water level rise is therefore very high at mid tide when it is clearly irrelevant and slows down, tapering off to zero at high tide when the risk of potential flooding is present. The key area for examination is therefore the tidal mechanism in the final one metre when flooding above the quay may be underway although it should be noted that the quay is well above HAT. Tidal analysis was undertaken and an extract from the Excel spread that was produced for this FCA is included in Appendix IV.

Extreme event tide level predictions, on which the flood analysis is based, have historically changed as the guidance has evolved over time. The value of the highest tide is expressed as a statistical chance of a declared level being reached for any given year. For example, a 0.5% chance would be expressed as 1:200 and a 0.1% chance as 1:1000. The values are referred to as the annual exceedance probability or AEP. The values are a summation of various components including the baseline predicted tide, surges (joint probability) and includes for sea level rise/ climate change. It would seem that the latest 1:200 and 1:1000 flood is 6.3m OD and 6.6m OD respectively. The estimated figures come with a confidence accuracy expressed as a percentage or tolerance. A pessimistic or worst-case scenario would include an allowance for confidence or tolerance limits and confidence bounds of around 97.5% would yield a level of around 7m OD whereas a + ve to – ve of 0.5m would yield an upper extreme of +7.1m OD (*Ref 1 - Coastal Flood Boundary Conditions for UK 2018 Technical Summary Report By Environment Agency SC060064/TR6*)

The site is in the 1:200 and 1:1000 category and this is confirmed and illustrated on the flood maps which can be seen in Appendix II. Data published by Natural Resources Wales (NRW) (*Ref 2 NRWs Flood Maps for Planning*). The maps also confirm that the flood risk arises entirely as a result of sea / tidal flooding with the site being in Flood Zone 3. No reference is therefore necessary to fluvial or watercourses which have no impact on the site.

The buildings will be manufacturing large tanks which will need to be transferred to the quayside for loading onto ships. The gradient between the production floor and the quay needs to be as shallow as possible to enable the safe transfer of the units. The Quay level is around +6m OD and whilst there was an initial proposal to set the finished floor level at +7m OD, it would be operationally preferable to reduce this to +6.8m OD. This is some 200/ 300mm below the target +7m/7.1m OD level for 1:1000 flood event. It is recommended that the working threshold level of main industrial door openings, where product needs to be transported, is set at +6.8m OD with provision to raise the thresholds by 300mm, using aluminium 'stop logs', to +7.1m OD. All other access points to the building should have threshold levels of +7.1m OD with appropriate compliant ramps from the surrounding ground level of around +6.8m OD.

An illustrative One Year Tide Plot and Flood Plan (Current and Proposed) has been produced and is included in Appendix V. The One Year Tide Plot plots high water level against time in days for a one-year period for Swansea. The 730 data points show the neap to spring tide modulation. Key threshold levels have been plotted onto the drawing to illustrate the freeboard in relation to typical tides and also the potential future extreme tidal events. There is a slight difference in predicted tide values (200mm nominal and 400mm at HAT) between Swansea and the Neath River and so this plot serves as an illustration. The plot illustrates the relationship between the predicted or typical high tide levels for one year with the key threshold levels used in the assessment of flooding. The plot shows significant freeboard for the normal progression of high tides and illustrates the high margin or contingency present to accommodate extreme flood events with little or no impact on the site.

An area Flood Plan (Current and Proposed) has been produced using the latest survey data and is included in Appendix V. The flood plan shows two drawing panels with the potential extreme flood contours for the current and proposed site configuration. The flood plan for the developed scenario is satisfactory. There will be some reprofiling of the site to accommodate the two new units and the roadways and this will control the extreme high-water level/ flood contour. Obviously, tidal flooding will progress from the seaward side of the quay in the west and move slowly east towards the area around the buildings which will be set at a level of around +6.8m OD. It should be noted that it may be possible to install a new concrete slab adjacent to the wharf at a slightly higher level than the existing quay. It would be feasible to set the quay to a revised level of up to +6.5m OD. This could assist with moving product to and from the quay and also increase threshold levels. The flood benefit could apply to the whole site provided the ground levels immediately upstream and downstream of the quay matched the revised quay level.

The depth of water in the most extreme flood would be less than 600mm and the volume of water displaced would be trivial in the context of the flood source being tidal with the site begin immediately adjacent to the quay.

It can be seen from the analysis that the buildings are configured to cope with a most extreme event with an AEP of 0.1%.

## **5.2 Protocols and Mitigation**

The flood analysis includes for climate change and a tolerance or confidence margin. The extreme flood level is therefore very high and there will therefore be no effective flood risk to the buildings until sufficient time has passed to allow the potential for the effects of sea level rise to become manifest. Any fears in relation to flooding will probably be not be predominant in the early years of operation which is why it is incumbent on the developer to make provision to mitigate the effects of rare events far into the future. It likely that over a period of some decades extreme events will occur that could produce still water levels that will reach a level above the wharf. As a result of these events at some time in the future, the operators will be reminded of the historic contingencies planned for in 2022 and be fully set up to avoid flooding.

Consideration should be given to the position and level of key electrical installations and, where possible, they should be set at or above +7.1mOD. Finishes below this key threshold level should be appropriate although they are likely to be industrial in nature. Should associated office accommodation be planned within the buildings on the ground floor, then a floor level of +7.1m OD should be adopted to match the entry threshold levels for the pedestrian access points to the building.

Any event that is likely to produce water levels that could result in a flood risk will be well telegraphed and it is probable that the existing flood warning systems that are currently in place and widely available will be further enhanced over time. An operator's manual will be produced for the site which will be focussed on flood risk and will list the protocols for dealing with warnings with a graduated response. The operations manual would include an annual test fitment of the stop logs. Stop logs should be stored in a dedicated (probably vertical) holder or rack on the inside of each doorway. Although it is unlikely to be necessary, it may be considered appropriate to examine whether there will be elevated areas within the building complex such as offices as referred to above. This could be flagged for future consideration in the decades to come when the worst-case risk scenarios will begin to develop. It should be noted that the maximum flooded depth on the site road will be 300mm assuming that the road is set at a level of around +6.8m OD. It should also be noted that, as indicated above, if the water level reached a peak of +7.1m OD then, using sinusoidal tidal development, the following events/ flood milestones would unfold with the following time margins:

1 – Peak water level at 7.1m OD – Time to reach peak level = Zero. Rate of rise = Zero. Max water depth around building would be 300mm before receding. Period of inundation of surrounding ground to up to 300mm may be just over 1 Hour but less than 2 hours. The inside of the buildings would be dry with stop logs deployed from the racks to the preformed channel either side of the main factory openings.

2 – Water level reaches 6.8m OD which is the proposed level of the car park, adjacent road access and factory threshold without stop logs – Time to Peak level of +7.1m OD = 40 minutes; Averaged rate of rise = 7.5mm/min or 0.45m/ hr equivalent.

3 – Water reaches the top of the wharf - 80 minutes warning before peak of 7.1m OD and 40 minutes warning before reaching access road/ factory floor level. Average rate of rise from the wharf level of +6m OD to access road / factory floor level of +6.8m OD = 13mm/min or 0.8m/hr equivalent.

Apart from the obvious advanced warnings, should conditions arise that could potentially create an extreme flood, there will be clear physical cues on site that will be slowly manifested. This will provide ample time to react and install the stop logs. The warning systems would initiate precautionary installation of the stop logs and this will be particularly important should the extreme event be predicted to occur outside normal working hours.

## **6 – Assessment of Proposed Development on Flooding Elsewhere.**

The site, from a flood consequence viewpoint is discrete and unlikely to have an impact on any of the surrounding area. The topographic survey indicates that much of the site lies on relatively elevated land and the development will marginally increase the ground level in and around the footprint of the building. As the source of any potential flooding comes from the sea, any existing flood pathways will not be affected by the development, there could therefore be no knock-on detrimental effect arising from the proposed development.

## **7 – Flood Consequences Assessment Summary.**

The proposed development will safeguard and utilise the existing wharf facilities. The presence of the quay facility is fundamental to the selection of this site for this development as the 'oversize' product will need to be transported by sea.

The flood risk is entirely derived from tidal inundation and a tidal analysis was undertaken to determine the flood mechanism for extreme events (AEP 0.5% and 0.1%). The results of the analysis were applied to the site and the developing flood scenarios were described and presented on plans. The analysis showed that a factory threshold level up to 7.1mOD would satisfy the TAN15 guidance and be acceptable. The operational requirements for the main production floors would adopt a floor level of +6.8mOD with the main door openings being furnished with 300mm 'stoplogs' or boards that would increase the threshold level to +7.1mOD. The non-industrial access points to the building would have threshold levels of +7.1m OD with appropriate access ramps to allow access from the surrounding ground/ road level of approximately +6.8mOD to 7.1mOD.

The analysis showed that the maximum water depth around the buildings would be 300mm and that the inundation of the road/car parking area around the buildings would last for just over one hour and less than two hours before waters receded. The inside of the buildings would also provide sanctuary for the short flood period should level reach up to 7.1mOD.

The FCA considered how practical operational flood management at the site would utilise current, and probably improving over time, flood warning systems. Future events that are likely to flood over the adjacent quay, which is over 1m below the proposed threshold levels and around 0.8m below the site road, will be well telegraphed in advance providing ample time to initiate any flood management plans. Flood plans will probably need to evolve over time but should be initiated with tasks commensurate with the predicted risk/ potential looming flood event. The principal task would obviously be to install the 300mm stop logs/ storm boards in the channels at each main doorway. A flood plan can be prepared in due course although the proposed layout of the site has effectively designed out the risk of detrimental consequence as a result of flooding.

This report has specifically covered the risk from tidal flooding and produced a recommendations that would more than satisfy the requirements set out in the current guidance.

## APPENDICES

Reference should be made to the appendices that are presented in separate directories as pdf files as follows:

### Appendix I – Planning Policy.

- LDP Planning Policy.

### Appendix II – NRW Flood Maps.

- Flood Zone Explanation Sheet.
- Sea and Rivers Shade Lighter.
- Sea and Rivers Zoom Shade Lighter.
- Sea.

### Appendix III – Preliminary Development Plans.

- Briton Ferry site 3D.
- Shed-02 Block Plan.
- Shed-03 Unit 1.
- Shed-04 Unit 2.
- Shed-05 Site Sections.
- SURVEY – JR-1333 TOPO SURVEY 2020.

### Appendix IV – Tide Data.

- Tide Data ANALYSIS Extract from Excel.

## Appendix V – Tide Plot and Flood Plan.

- FLOOD PLAN Current and Proposed.
- ONE YEAR TIDE PLOT.