Objection Letter - Ms Burns

Letter 1

In the first instance the scheme has been altered since the public viewing of the plans earlier in the year – the walls are now two feet higher than was presented to the public. This has implications for residents and for eventual cost and as modifications have been made the public need to me made aware accordingly. Many residents will have seen the exhibition at the Bowling club and will take those plans as the ones that have to be considered. This is misleading when the plans have already been modified.

Further to this I wish to object on grounds of cost. Several residents with knowledge – expertise even in in the flow of the river have presented cost effect and more immediate solutions to the problems faces by residents in the old Town and surrounds. These needed to be more carefully considered as flooding is possible now at any time. (Aylth is surely an example of this) Flood alerts from SEPA have been issued several times this year already and after heavy rains in July the river has swollen several times to alarming heights. The councils plans will take several years to implement – a more speedy solution is needed now and these speedier and cheaper solutions have been presented to the council.

A listed building along the Carron is to have a wall which will virtually remove the outer wall of the building from sight. The buildings of historic value to this town need to be preserved and not hidden behind "faced" walls. Also the nature of the river will change. At present it is full of wildlife enjoyed not only by myself daily but also to visitors to the town. The spoiling of the river embankment is, I feel, detrimental to the character of the town. As a culvert under the gardens of Cameron Street is planned I cannot understand why a culvert and removal of the rock armour at the mouth of the river cannot be implemented. On 17 July with a low tide and the sea out some considerable distance the river water which was very high after rain was not getting out to the sea – the layout of eh armour and height of the armour make the river – on occasion flow back on itself.

Finally the plan appear to narrow the river at key points and with velocity and volume of water would infact increase the chance of flooding not reduce them

I have been flooded twice. I now have a number of flood gates and sump umps below my property but feel the scheme proposes is unnecessary in scale and cost.

Letter 2

Further to my initial letter of objection re Flood Order I wish to add the following points:

It appears only one model exists to show increasing the channel breadth of the river by 2m to allow freer discharge of the river to the sea results in lower upstream levels. Surely further models of greater increase up t and including a "natural outlet" should be included in the Flood Order for consideration.

Upstream storage although, investigated but rejected, should also be examined to assess impact on the design flow and hence design defence levels. This again should be modelled and the storage situation studied and full review of storage options again should be presented within the Flood Order and for consideration

Lowering of the river bed at the road bridge again would indicate lower design water levels upstream. The reports do not appear to quantify the effect. There also does not appear to be a model analysis of the effect of the breadth of the proposed lowering. What effects on upstream levels would there be for a range of lowered breadths and for its proposed cross-section at the bridge.

The whole area is reclaimed land from the sea. What impact will driving pilings into the river bed have on the river bed itself and surrounding properties sub structures

The flood Order has been presented and time allowed for perusal and objections yet geophysics study is ongoing. If not all relevant studies are/were complete then this order should not have been presented at this time.

Response

1. Scope of Evidence

1.1. This is the scope of evidence regarding the objection to Stonehaven Flood Protection Scheme from Ms Burns

1.2. This evidence starts by describing the public consultation undertaken and how images have been used in the development of the scheme and the relationship with the Flood Risk Management Act application.

1.3. The evidence discusses the scheme development and how flood storage was ruled out through the option development process.

1.4. The environment is an important consideration in the development of the scheme and this evidence discusses how the works for 19 Bridgefield have been developed and design taking into account the importance of the historic structure.

1.5. Scheme costs are then presented in this evidence and why the scheme is affordable

1.6. Piling is discussed in regard to the objectors query.

1.7. The evidence will explain the hydrological studies undertaken for the scheme, identifying the magnitudes of the design flows used in the scheme.

1.8. The design flows have been used to derive the heights of the flood walls and evidence will describe how this has been undertaken and how modifications to the river corridor have been considered to minimise wall heights as well as the use of self-raising barriers to reduce the permanent wall height.

1.9. The evidence finishes with a discussion on the outlet of the River Carron and the consideration of the rock armour and waves.

2. Public Consultation material

2.1. The scheme has been under development since 2009 and has evolved during this period. There have been a number of public consultations during this time, including informal public updates made at community meetings. At each stage there have been various images displayed which have developed as the scheme has progressed.

2.2. In May 2015 a public exhibition was held to give an indication of the scheme at that moment in time. On display were a variety of technical drawings and a small number of artist impressions of material finishes, stone types, bridge options and landscaping ideas. (fig1 & fig 2)

2.3. One image/artist impression on display was of the proposed wall outside 19 Bridgefield (fig 2). No actual levels were shown as it was intended to provide an impression of the wall finishes. The final proposal for this section of wall does have window and a door opening and is slightly higher. It is recognised that this image could have been interpreted as the finished height.

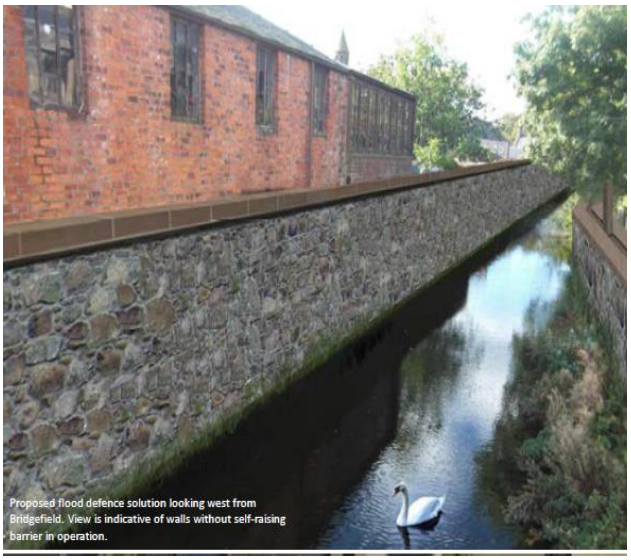
2.4. In the same approach, a number of the artist impressions, such as the bridge shown in (fig1) was taken from a variety of sources and do not directly represent Stonehaven.

2.5. Only when the Flood Order is advertised does the scheme become fixed, unless mitigation is recommended by Committee. The level of the top of the wall is as it was reported for the FPO application and public exhibition of the flood protection scheme in 2015. The new wall will form a consistent style for the whole 125m length.

2.6. All those directly impacted by the scheme or those with an interest in land would have received an individual plan detailing the impact on their own property.

Figure 1

Figure 2



3. Scheme Development & Storage

3.1. Appendix B: Option Development and Economic Appraisal

3.2. The scheme has been developed over a number of years with key decisions made at the following stages

- 2009 scheme development commenced
- 2010 option development consultation
- April 2013 review of the scheme following 2012 flooding event
- Nov 2013 Preferred scheme report
- June 14 Stakeholder workshop
- June 2015 FPO advertised

3.3. In 2010, a public consultation was undertaken and a range of options presented to the community.

- Direct defences (walls & embankments)
- Direct defences (walls & embankments) with channel modifications
- Direct defences (walls & embankments) with channel modifications and bridge raising
- Upstream Storage
- Combination of upstream attenuation and direct defences (walls & embankments)

3.4. The information gathered from this consultation indicated strongest support for direct defences (walls & flood embankments) through the town or storage upstream of the town. Public opinion was taken forward and options for upstream storage and/or direct defences were investigated in more detail.

3.5. The design flood event has a flow magnitude of $78m^3/s$ in combination with the Carron Water and Burn of Glaslaw. Flooding has occurred on the Carron Water on a number of occasions, as identified in Appendix A: Stonehaven December 2012 Flood Event Review. In comparison to the design flood event, flow magnitudes of $31m^3/s$ and $42m^3/s$ were determined for the 2012 and 2009 events, respectively.

Appendix B: Option Development and Economic Appraisal compares the options of direct defences, upstream storage and a combination of storage and walls. The report identifies that a storage only option on the Carron Water would not be sufficient to alleviate flood risk in the town without some further works chapter 5 economic appraisal indicates that a storage option would cost in the order of £26M compared to the £16M direct defences costs. The storage option considered was not economically viable with a benefit to cost ration of less than 1 and therefore was not considered further.

4. Environmental & Visual Impact

4.1. Appendix B: Option Development and Economic Appraisal

4.2. A large proportion of the scheme is within a conservation area and a number of existing walls and structures in the vicinity or directly affected by the scheme are classified as listed by Historic Scotland.

4.3. A screening opinion was sought both under the Town and Country planning (Environmental Impact Assessment)(Scotland) regulations 2011 and under the Flood Risk Management (Scotland) (Flood Protection schemes, Potentially Vulnerable Areas and Local Plan Districts) regulations 2010. It was confirmed that an Environmental Impact Assessment would not be required. However a variety of environmental assessments were undertaken to address potential effects associated with the scheme.

4.4. The building referred to in the objection is 19 Bridgefield. This is located just upstream of Bridgefield Bridge on Carron Water. 19 Bridgefield is a Category C listed historic structure and the fabric of the building is important to its listing.

4.5. The wall is exposed to the river and the elements and will continue to deteriorate. The existing wall of 19 Bridgefield has been repaired in recent years with cement mortar and has a concrete beam at river bed level. This is not in keeping with the listing requirements. (fig 3 & fig 4)

Figure 3

Figure 4

4.6. The existing walls of 19 Bridgefield on the river are old and have been assess to be not structurally strong enough to withstand a flood events over the 100 year lifetime of the scheme. Therefore engineering intervention is required to maintain the integrity of the existing walls.

4.7. On the south side of the river the existing walls are higher than the northern side as shown in Figure 5. The lowest walls are not high enough to provide the necessary flood protection and need to be replaced with higher walls. The strength of the higher part of all the walls is also unknown and is a mismatch of materials, repairs and construction. The new wall will be designed to act as a flood wall and form a consistent finish in keeping with the local character.

Figure 5

4.8. There have been a number of proposals developed for the building as the scheme has developed. Initial proposals investigated the possibility of works inside the building to retain the exterior face. However from discussions with the owner and with Historic Scotland it was felt that this was not suitable as this would significantly alter the fabric of the building. An external intervention also means minimal disruption to the building owner.

4.9. The proposal is now to construct a wall to the outside face of the building. This wall is not fixed to the building and retains the window openings as well as a glass panel to expose the existing door.

4.10. It is recognised that the introduction of walls along the river will have an impact on the visual environment and the wildlife. All proposals will take account of legislative requirements when constructing around protected species.

4.11. A significant number of investigations have been undertaken to ensure we have a baseline record of what species are located within the scheme area. We have also been working closely with statutory and non-statutory bodies to ensure the scheme can blend with the environment.

4.12. Extensive discussions have taken place with SEPA, Dee Fisheries Trust and Stonehaven Angling Association regarding the impact of the proposals on the river both in a permanent state and also during construction. Various mitigation measures have been implemented including a fish passes/ladders.

5. Scheme Costs

Appendix B: Option Development and Economic Appraisal

5.1. There have been a number of suggestions put forward by members of the public which have been investigated and if found appropriate these have been introduced. However no suggestion has been forthcoming which provides the level of protection that is required by the proposed Scheme.

5.2. The proposed scheme is designed to provide a 0.5% AP (200 year flood event) standard of protection, including an allowance for climate change. This would provide a standard of protection well above the current association of British Insurers requirements (75yr flood event).

5.3. The current construction costs have been estimated to be in the region of £16.5M

5.4. Flood damages have been assessed for both direct property and indirect damages, together with an assessment of the intangible impacts on homeowners and businesses such as the health effects and anxiety caused by flooding, and the threat of flooding. The approach to estimate these aspects has been undertaken in accordance with the Benefits of Flood and Coastal Risk Management: A Manual of Assessment Techniques (2013) (also known as the Multi-Coloured manual) and HM Treasury and Scottish Government guidelines.

6. Piling

6.1. The proposed piles for the scheme are concrete bored piles. Whilst there is noise and vibration during construction, this type of pile has the lowest noise and vibration of the different types. In addition piling has the least footprint to provide a suitable foundation

for the walls, minimising impact on surrounding properties. Noise and vibration during construction will be controlled through standard limits set in the construction contract and a property condition survey will be undertaken prior to works commencing so any impact from the works can be recorded and repaired if necessary.

6.2. The piles are individual piles, penetrating like fingers into the ground. There are gaps between most of the piles. So the overall makeup of the ground will not be changed. Therefore there will be minimal permanent impact on the surrounding properties and sub structure.

7. Hydrological Studies and Design Flows

7.1. The scheme looks to alleviate fluvial flooding from the Carron Water and Burn of Glaslaw in Stonehaven

7.2. Scottish Government provides guidance on how to appraise Flood Protection Schemes and allows economically beneficial schemes to be constructed. The 1 in 200 year level of protection has been the desired target as it aligns with current guidance on development within Scottish Planning Policy and would allow for future development with areas protected to the 200 year standard from all flooding.

7.3. The proposed scheme is influenced by Scottish Planning Policy (Scottish Government, 2010) (SPP) which sets out the risk framework for flooding and flood risk to development.

7.4. SPP states "All land is to some degree susceptible to flooding. The likelihood of a site being flooded is measured in terms of probabilities per annum, which range from very low (close to 0% probability) to very high (up to 100% probability)." SPP identifies that land with an annual probability of flooding less than 0.5% is suitable for development, i.e. a low to medium risk area. The proposed flood defences for Carron Water are designed for the 0.5% Annual Probability flood event in line with SPP. The design event is the 0.5% flood (200 year flood) from the river Carron and the Glaslaw Burn. This is an event that could be expected to be met or exceeded 0.5% in any year.

7.5. The design flood magnitude has a 0.5% chance of being met or exceeded in any year.

7.6. SEPA recommend an allowance for future climate change to be included in a flood protection scheme design. In line with the Government UK Climate predictions (UKCP09) for the Stonehaven area, the design flow includes a 33% increase in flows as described in Appendix B: Option Development and Economic Appraisal.

7.7. The assessment of river flows originating upstream on Carron Water was made using procedures given in the Flood Estimation Handbook (FEH). This handbook is acknowledged as the current best practice guide for hydrological studies in the UK. The assessment is described in the Appendix F: Hydrology and Hydraulic Report.

7.8. The FEH Statistical Method was used for Carron Water with the observed data from the local SEPA river gauging station on the Carron Water upstream of the Red Bridge and the Green Bridge at grid reference OS NGR 8693 8565. The FEH rainfall runoff method was used for the Burn of Glaslaw, due to the size of the catchment and lack of a river gauge on the Burn. These methods are used as standard practice and the methodology was agreed with SEPA.

7.9. The design flooding event has a flow magnitude of 78m^3/s in combination with Carron Water and Burn of Glaslaw. Flooding has occurred on the Carron Water on a number of occasions, as identified in Appendix A: Stonehaven December 2012 Flood Event Review. In comparison to the design flood event, flow magnitudes of 31m^3/s and 42m^3/s were determined for the 2012 and 2009 events, respectively. Flow in the river Carron was estimated to be 24m3/s and 37m3/s for the 2012 and 2009 event respectively (based on flows at Carron gauge). Flow in the Glaslaw Burn was estimated to be in excess of 5.7m3/s for 2012 event based on anecdotal evidence.

8. Hydraulic Modelling and Wall Heights

8.1. Flood water levels on the Carron Water have been assessed using a computer model. The model was built using TUFLOW hydraulic modelling software, an industry standard program. The model represents the river channel, the adjacent floodplain and structures, such as bridges and the downstream rock armour. The model was calibrated against the 2012 flood event.

8.2. Overall, the TUFLOW model gives a reasonable representation of flood levels for the range of flood flows used in the design.

8.3. The hydraulic model allows a range of options to be assessed and compared with the design water levels determined by selecting those works most beneficial in comparison to the physical constraints on site.

8.4. Bridgefield Bridge is a pinch point in the channel due to its deck level and by the masking of its opening area by gardens upstream as shown in Figure 6.

Figure 6

8.5. The TUFLOW model has been modified to investigate options to remove constraints in order to reduce wall heights. In the section between White Bridge and Bridgefield Bridge the capacity of the channel has been increased by lowering the channel, lowering under Bridgefield Bridge (0.2m as shown on the drawing MMD-345087-C-DR-00-XX-8104) and by proposing a new culvert (2.5mx1.5m) under the gardens on the northern bank.

8.6. The modelled options are detailed in Appendix F: Hydrology and Hydraulic Report, with Figure 2.3 showing the model with the removal of material under Bridgefield Bridge. The maximum that can be lowered under Bridgefield Bridge to give any long term benefit is

0.2m; a deeper excavation would be lower than the existing bed level downstream and would therefore be likely to fill in again in the future.

8.7. At Bridgefield Bridge the channel widens (to 8.5m) so that the opening area of Bridgefield Bridge is wider than the 6m channel upstream. The new culvert increases the capacity by discharging into the bridge zone which is masked by the gardens upstream.

8.8. On the southern upstream side the existing abutment protrudes into the river as shown in Figure 7. The new wall is designed to tie into this protrusion so not reduce the opening area of the bridge on the southern side.

Figure 7

8.9 Between Bridgefield Bridge and Beach Bridge the width of the channel is proposed to be reduced. This is proposed to facilitate the construction of the scheme which is constrained between existing walls and buildings. The effect of this change is to increase water levels between White Bridge and Bridgefield Bridge, which were mitigated by the raising of Beach Bridge (comparison of Figures 2.4 and 2.5 in Appendix F: Hydrology and Hydraulic Modelling) .

9. Waves & Rock Armour

9.1. In 1998 a feasibility study was undertaken by HR Wallingford which proposed a number of training walls with alternative alignments primarily as a method of controlling beach sediment transport (Appendix G: River Carron Rock Armour Study).

9.2. The rock armour was constructed around 2000 following the principles and approximate layout of the recommend 1b layout (pg 18 Appendix G: River Carron Rock Armour Study) however it was altered to ameliorate the effects of tidal damage to the pedestrian

walkway. Aberdeenshire Council recognise that there is no evidence to support this change in layout.

9.3. It is noted that Mean High Water Springs, the average astronomical height of sea throughout the year under spring tides and average meteorological conditions, extends to Beach Bridge and waves have been observed in the river channel at high tides when there are waves at sea.

9.4. Widening the rock armour at the outlet was one option considered. This was presented during the objection period and included as evidence with the response Appendix H: Hydrology and Hydraulic Modelling Addendum A. This included widening the channel by 5m and 10m.

9.5. The report above identified that widening the rock armour had a similar effect on flood water levels, in the Arbuthnott Street section, as raising Beach Bridge. The TUFLOW model showed that whilst the bridge could be retained if the channel was widened by 5m or more downstream of Beach Bridge, Aberdeenshire Council chose to raise Beach Bridge instead of widening.

9.6. The predicted 0.5% Annual Probability tidal level is 3.92mAoD including an allowance for climate change (Rock Armour Study – JBA 2014). The wall heights on the River Carron must be higher than this, plus an allowance for freeboard.

9.7. Whilst widening the rock armour does lower the water level between Bridgefield Bridge and Beach Bridge, the wall level is retained due to the risk from tidal influence.

9.8. It is noted that the crest level of the rock armour is at approximately 3.3mAOD. The peak flood level under Beach Bridge is predicted to be 4.3mAOD. Therefore during an extreme flood event the predicted water level is much higher than the rock armour, and so in the design flood event the flood water level would overtop the armour like a weir, limiting water level increases due to flow.

9.9. The existing rock armour alignment protects against direct waves propagating in the channel by reducing the wave energy. The effect of an open channel can be observed to the north of Carron Water at the mouth of the River Cowie, where larger waves can be observed in the mouth of the channel because there is no rock armour.

9.10. Straightening the channel would expose properties to greater wave heights as the wave energy would not be dissipated by the rock armour. To allow for this the wall heights would need to be higher if the rock armour was removed.