

**RM006 Mr and Mrs Calvocoressi's objection to the Environment Agency's Application to vary the Scheme within the River Medway (Flood Relief) Act 1976**

**Environment Agency technical response, September 2020**

**1. Whilst it is recognised that there is a need for adjustment to the flood storage area in order to protect properties downstream we are very concerned that not enough consideration or communication has taken place with communities upstream. Most importantly, no monitoring has taken place, the safety aspects, accessibility of the village or potential effect on the community and property in Penshurst have not been properly assessed and no solutions have been proposed. Highways have not been consulted and the application is made based entirely on theoretical reports rather than real life evidence with no attempt made to verify the theory which has itself changed over time.**

Environment Agency response to point 1:

We are sorry you feel that the proposed expansion of the Leigh Flood Storage Area (FSA) has not properly considered or addressed the key areas of consideration or and communication with the upstream communities; monitoring of the rivers; and the safety, accessibility and potential effect on the Penshurst community and solutions for local flooding. We have responded to these areas in turn below and more detail on each can be found in our responses to the specific points you raised in your objection letter.

**Consideration and communication with upstream communities**

Whilst the primary objective of the proposed expansion is to reduce flood risk to properties in Tonbridge and the scheme will not increase the flood risk to Penshurst, our engagement has raised awareness of the FSA and opened a conversation about the wider flooding experienced in Penshurst and the problems this causes. We now recognise the depth of concern in the community about local flooding.

As a result, we are offering to fund the National Flood Forum to help the local community set up a flood action group where the concerns of the community can be raised with all of the organisations involved in managing flood risk so that ways to mitigate the impact and improve the resilience of the community to flooding can be explored together.

**Monitoring**

The Environment Agency, and the wider hydrological industry, uses modelling software, mapping techniques and topographical and rainfall data to understand a wide range of catchment processes, how river catchments respond to different rainfall events, and to identify the impacts of these events.

The Environment Agency has flow gauges upstream of Rogues Hill, at Chafford Bridge and Colliers Land Bridge on the River Medway and at Penshurst and Vexour Bridge on the River Eden. This represents a significant investment in flow monitoring and allows us to understand the water levels on both rivers. Information from these gauging stations was used to calibrate the 2015 Medway flood model and is used to inform the operation of the FSA.

In addition to the 2015 Medway flood model, the Environment Agency has photographs and data showing the extent of land flooded during previous events, and staff observed the flooding at Penshurst in February 2020 to understand the extent of flooding at this location. The timing and extent of the flooding in February 2020 was as predicted by the model.

The Environment Agency is confident that the available modelled flood data is sufficient to understand the flood risk at Penshurst, and additional flow gauging data from closer to Penshurst would align with the outputs of the 2015 Medway flood model. However, in response to the concern within the community in Penshurst that the effect of operation of the FSA on flood levels is not reliably predicted through our modelling, we are looking to provide an additional depth gauge in Penshurst, downstream of Rogues Hill. This will provide definitive data on this issue, and will hopefully provide the reassurance sought by the community.

### **Safety, accessibility and potential effect on the Penshurst community and solutions for local flooding**

Safety is always of paramount importance to us and a key consideration for all of our work.

Our modelling indicates that the proposal to increase the maximum impoundment level will not increase the depth of flooding above Rogues Hill. This is demonstrated in Figure 1 below. Figure 1 shows the increase in flooding depth from raising the Leigh FSA maximum impoundment level from 28.05m Above Ordnance Datum (AOD) to 28.6m AOD (measured at the main Leigh FSA embankment) during a 1.33% flood event. For consistency, the map below has been taken from the Flood Risk Assessment which accompanies the planning application. This map has been updated since the submission of the Application. Whilst it shows greater depth variation lower in the FSA, the point at which the effect of the expansion dissipates remains the same.

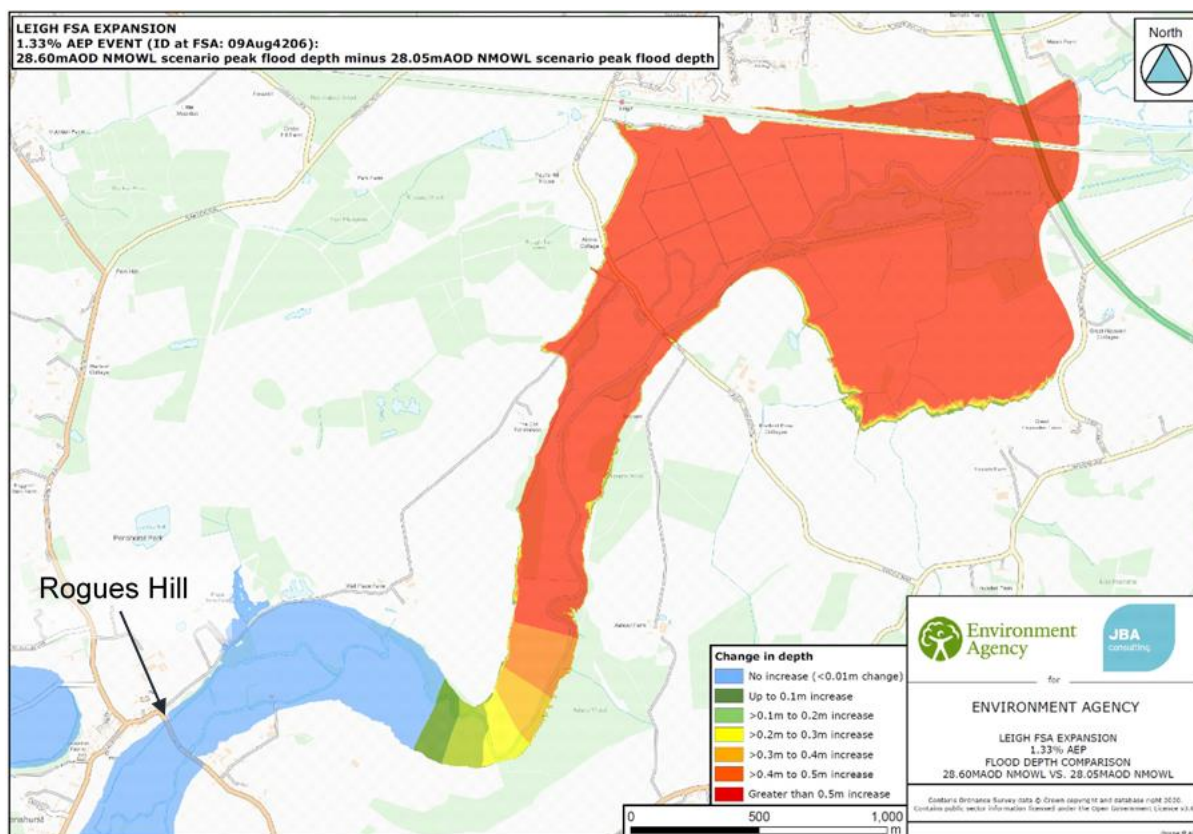


Figure 1: Increase in flood depth in a 1.33% flood event. 28.05m AOD vs 28.6m AOD

The Flood Risk Assessment was submitted with our planning application at the end of August 2020. The planning application reference number is 20/02463/FUL, and it is available for view at the Sevenoaks District Council planning portal:

<https://pa.sevenoaks.gov.uk/online-applications/applicationDetails.do?activeTab=summary&keyVal=QFPV1WBK0LO00>

Every flood event is different, depending on a number of factors, including soil saturation and weather patterns. The modelled scenario in Figure 1 was chosen to demonstrate the impact of expanding the FSA because it shows the greatest change in flood depths.

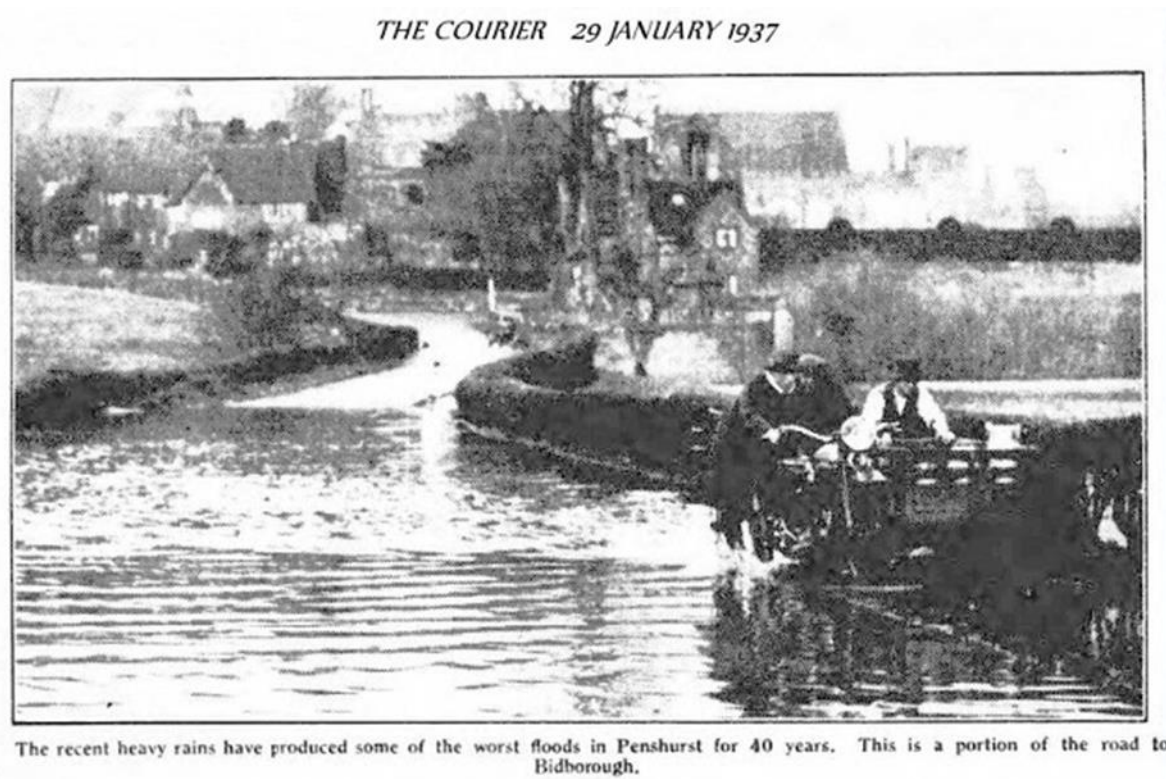
We provide further comment on accessibility and safety in our response to your fourth point below.

**2. We challenge the EA's assumptions on 'natural flooding'. We do not believe their parameters and assumptions.- In our experience as residents of the village, flooding is greater and lasts for longer when the barrier is shut, so to claim the barrier doesn't affect the village or our property is simply incorrect.**

Environment Agency response to point 2:

We acknowledge that areas of Penshurst can be affected by the operation of the existing Leigh FSA, depending on the size of the flood event.

However, there are historical reports of flooding in Penshurst which occurred prior to the construction of the FSA, demonstrating that the area is affected by natural flooding. Indeed, the FSA itself was constructed in response to the 1968 flood when the flooding at Rogues Hill was so severe that the road bridge over the River Medway was damaged and a temporary bridge had to be installed. The photograph below from a newspaper article (Figure 2) shows flooding on Rogues Hill in 1937. These events demonstrate that Rogues Hill was vulnerable to flooding prior to the construction of the FSA.



*Figure 2: Flooding of Rogues Hill in 1937*

The depth and timing of flooding at Rogues Hill is principally dictated by upstream flows. The following photographs demonstrate this.

The first photograph, below, (Figure 3) was taken in the garden of Colquhouns Cottage (next door to your garden) at 14:12 on 20 December 2019. It shows the water level at approximately 29.0m AOD. Impoundment of the FSA didn't begin until 15:30 on the same day.



*Figure 3: Flooding of the garden of Colquhouns Cottage, 14:12 on 20 December 2019*

The next two photographs (Figures 4 and 5) were taken from Rogues Hill on 16 February 2020. Figure 4 shows the fields immediately upstream of Rogues Hill and was taken at 12:51. Figure 5 was taken from the bridge on Rogues Hill over the River Medway and shows Bridge House. It was taken at 13:13. Impoundment of the FSA didn't begin until 17:15 the same day.



*Figure 4: Flooding of the fields immediately upstream of Rogues Hill, 12:51 on 16 February 2020*



*Figure 5: River Medway and Bridge House, 13:13 on 16 February 2020*

The final photograph (Figure 6), below, was taken 14 minutes earlier than Figure 4 (at 12:37 on 16 February 2020). It shows the bridge on Ensfield Road over the River Medway, 3.9km downstream of Penshurst. It is clear that the river was within bank at this location whilst at the same time there was significant flooding in Penshurst driven by upstream flows. The FSA was not in operation and all the flooding at this time in Penshurst was driven by flows from upstream.



*Figure 6: The bridge on Ensfield Road over the River Medway, 12:37 on 16 February 2020*

These photographs show that the land around Penshurst floods irrespective of operation of the FSA. The FSA only operates when there are high flows in the river. Therefore the same conditions that drive natural flooding in Penshurst also determine operation of the FSA.

**3. We do not understand why no local monitoring has taken place? There has been ample opportunity to monitor and create real reporting on the flood levels in the village, yet it has not been done. Penshurst is the point at which the rivers Eden and Medway meet, it is incredible that this has not been done. No accountability for the excess flooding we see in the village when the barrier is used has been taken, the Environmental Agency have wholly relied on theoretical reporting that does not tally with reality.**

Environment Agency response to point 3:

As stated in our response to your first point, the Environment Agency has flow gauges upstream of Rogues Hill, at Chafford Bridge and Colliers Land Bridge on the River Medway and at Penshurst and Vexour Bridge on the River Eden.

Further monitoring of the rivers is not necessary for our operational purposes. However as mentioned above, in response to the concern within the Penshurst community that the effect of operation of the FSA on flood levels is not reliably predicted through our modelling, we are looking to provide an additional depth gauge in Penshurst, downstream of Rogues Hill.

**4. The Highways agency haven't been consulted despite the fact that damage and therefore adjustment to the road will be inevitable in order to maintain the safety of residents and provide access to the village. This is especially important in regards to the road between the bridges at Rogues Hill which poses a 'Moral Hazard' when flooded as it is impassable, this road flooded recently within an hour of the barrier being closed. This is a main route for school buses and ambulances. Both bridges/roads at either end of the village flood, it is very dangerous to attempt driving through them as demonstrated earlier this year with an overturned lorry.**

Environment Agency response to point 4:

We recognise that Rogues Hill is a major route into and through the village. It is built on a causeway across the flat valley and passes over the River Medway by Bridge House.

For the reasons set out in our response to your first point, the proposed expansion would not increase the flood risk at Rogues Hill. Whilst in certain circumstances when operating the existing FSA can add up to 0.1m to the depth of water at Rogues Hill, the depth and timing of the flooding of Rogues Hill is dictated by upstream flows.

Whilst the expansion of the FSA will not increase the level of flooding experienced at Rogues Hill, we recognise the risks that arise through flooding of the roads around Penshurst. We always warn the public against driving through flood water. Flooding of these and other roads makes them dangerous, with the potential for drivers to try to pass through the floodwater at Rogues Hill and for cars to become stuck with the obvious risk to life this presents and the ongoing blockage to passage after the floodwaters have receded.

There are a number of organisations involved in managing and responding to flood risk. The Environment Agency has powers to manage flood risk from main rivers and Kent County Council provide and manage highway drainage and roadside ditches. Other organisations and risk management authorities also have roles in managing and responding to flooding.

The risk of flooding in the natural floodplain cannot be eliminated. Warning and informing presents the only viable approach to the management of the risk to road users.

As noted in our response to your first point, we are offering to fund the National Flood Forum to help the local community to set up a flood action group where the concerns of the community can be raised with all of the organisations involved in managing flood risk so that ways to mitigate the impact and improve the resilience of the community to flooding can be explored together.

**5. We know that with the proposed rise flooding will be higher and will last longer, what are the Environment Agency planning to do to mitigate the damage this will cause?**

Environment Agency response to point 5:

As explained above our modelling shows that the proposed expansion will not increase the flood risk in Penshurst.

As noted in Figure 1, depending on the size of the event, the proposed changes will increase the depth of flooding at the Leigh end of the FSA, but this effect dissipates toward the upper end of the FSA (downstream of Rogues Hill).

The Environment Agency has carried out detailed assessments of the impact of increasing the depth of water throughout the FSA area, including on the railway embankment, the A21 structure and for property owners who are affected such as at Paul's Farm and the Sailing Club.

We have used these assessments to plan the works which will be needed to mitigate any impacts. These are described in Section 3.2 in the Application.

Section 5.1.3 (page 25) of the Flood Risk Assessment submitted with the planning application gives greater detail on the change in duration of impoundment. In summary, out of approximately 3,000 scenarios modelled and analysed, the maximum additional duration of impoundment is predicted to be between 50-60



hours. However, the majority of events are for a shorter duration and the average is 19 additional hours.

Please note that these periods of time are for immediately upstream of the flow control structure. The duration at Penshurst will be less.

**6. Bridge House has flooded on 3 occasions when the barrier was in play- Dec 13, Dec 19 and Feb 20.**

Environment Agency response to point 6:

Bridge House has been built within the natural floodplain of the River Medway and so unfortunately has flooded numerous times, including prior to the construction of the FSA. It sits within flood zone 3, which is assessed as having a 1% or greater annual probability of flooding.

Whilst Bridge House is within the natural floodplain of the River Medway, and would flood even if the FSA did not exist, we acknowledge that in certain circumstances this can be made worse by the operation of the existing FSA. It is acknowledged within the River Medway (Flood Relief) Act 1976 (the 1976 Act) that properties within the FSA may be affected and the Act provides protections for affected land owners and the right to claim compensation for any damage sustained as a result of operation of the FSA.

It would not be correct to suggest that flooding at Bridge House is solely due to the operation of the FSA. The Environment Agency only operate the FSA during high flows. Therefore, the same conditions that drive natural flooding at Bridge House (and in Penshurst generally) will also determine the operation of the FSA. This does not mean that the FSA causes Bridge House to flood.

**7. There is real concern that the proposed increase will flood the concrete road at Penshurst Place potentially completely cutting off 6 residential properties, farm buildings and worryingly Well Place Nursery School.**

Environment Agency response to point 7:

For the reasons explained in our response to point 1, the proposed change will not increase the depth of flooding at Penshurst. However, this is a matter that has been raised by the Penshurst Place Estate and we are working to address it with them.

**8. Communication from the EA has been sporadic and inconsistent.**

Environment Agency response to point 8:

Your comment is noted.

**9. For example in the proposed scheme the environmental agency states that this scheme has a design life of 40 years, however they go on to say the flooding is 1/75 yrs, why the differential? Then on the recent planning for Bridge House they state flooding as a 1/100 year occurrence +climate change at 25% and that the new extension should be built with a 600mm freeboard, this is inconsistent. In reality though, serious flooding in the village and to Bridge House seems to be been more frequent than this with 3 significant floods in the last 10 years alone.**

Environment Agency response to point 9:

Figure 1 in our response to your first point shows a plan of the additional depth of water during a modelled 1.33% (1 in 75 year) flood event as a result of changing the maximum stored water level from 28.05m AOD to 28.6m AOD.

We chose this scenario to demonstrate the impact of expanding the FSA because it shows the greatest change in flood depths as a result of the proposed change. The depth increase for the majority of the storage area will be greatest for the 1.33% event.

During more extreme flood events, such as a 1% (1 in 100 year) plus climate change event, the increase in depth as a result of the proposed change reduces. This is because the natural flood level, which is greater, dominates.

Please see Section 5.1 (pages 24 to 26) and Appendices A and B of the Flood Risk Assessment for further details. For clarity and to address your concern, figures B1, B2 and B3 in Appendix B of the flood risk assessment show the change in flood depth for the following flood events: 1.33% AEP, 1% AEP and 1%+20% flow AEP.

**10. The model used we understand concentrates on information gathered from immediately behind the barrier not at Peshurst, it has also used flow rates from the 2017 flooding rather than from the peak flooding that was seen in 2013/14.**

Environment Agency response to point 10:

The Medway flood model was completed in 2015 and uses a range of data to capture the complex Medway catchment. The model uses recorded and simulated rainfall data to ensure that a range of events are considered. The flood model does not use a single event. The rainfall and flow data used in the model has been compared to the observed conditions in the 2013 flood event and the model predicts the flow to a good standard.

There is a level gauge close to the control structure at Leigh that records the level inside the storage area, it is not a flow gauge and is not used in the modelling as it

does not record flow. The flow data used to assess the accuracy of the model is collected from the flow gauges on the Medway and Eden upstream of Penshurst.

**11. The modelling is based on a level of 28.395m whilst the proposal is at 28.6m – why? On P21 it is stated that the flood levels will ‘not’ increase near Penshurst Place as a result of the proposed scheme and then they say on P23 that the flood levels in Penshurst will rise by 0.1m, then the map on P24 shows no increase!**

Environment Agency response to point 11:

The model information used in the Environment Agency’s Application to amend the Scheme is based on a storage level of 28.6m AOD, not 28.395m AOD.

The statement on page 24 of the Application is referring to the impact of the existing flood storage area at 28.05m AOD, which can be up to 0.1m for a large flood event if the storage area is used to near capacity. There is no additional increase in flood depth at Penshurst if the maximum storage level is increased to 28.6m AOD.

**12. We are also very concerned to note that in the proposed scheme the flood storage area can be used when the flow rate reaches 35 cubic meters per second when currently the barrier is only impounded when the flow rate is at 70 cubic m/sec. Why is this? If this is to be put in to practice from 35 c.m/s + it will certainly have a detrimental effect to the communities up stream in terms of unnecessary excess water building up. This should be changed to 70c/m/s to reflect what is done in practice.**

Environment Agency response to point 12:

The flow rate at which impounding begins needs to be flexible to enable optimum use of the storage volume in the FSA. This will vary for every flood event. It is important not store flood water too soon to ensure we have capacity to store the peak and the most damaging flood flows for any given event.

For the majority of floods impounding starts around 75 cubic metres per second. However that is not always the case and it may be necessary to impound water at different flows, both higher and lower, to provide the maximum flood risk reduction in Tonbridge.

Altering the Scheme’s minimum operating flow rate in law would fundamentally diminish the ability to operate the FSA, as designed, to reduce flood risk to downstream communities.

**13. We understand that at Pauls Hill the EA have just added that a new embankment is needed to prevent water finding its way around - by only just**

**adding this they demonstrate lack of thoroughness and quite how un-joined up their approach is.**

Environment Agency response to point 13:

The proposed works which are briefly described in section 3.2 of the Application are the culmination of work that began in 2017. It was identified during the outline design phase of the project that it would be necessary to raise the crest of the embankments just south of the railway line and east of Ensfield Road that were constructed as part of the original works in order to protect Leigh.

**14. There is the potential loss of access to Penshurst Place and Gardens affecting local businesses in the village and surrounding areas. Penshurst is in the greenbelt, in an AONB, a large proportion of the properties and their outbuildings are listed, it is a heritage site that should always be protected, on this basis monitoring should have taken place in the village.**

Environment Agency response to point 14:

As explained above, our modelling shows that the proposed expansion will not increase the flood risk in Penshurst, and Rogues Hill becomes flooded irrespective of operation of the FSA. Therefore, the proposed changes will not affect access and egress to Penshurst Place.

Access to Penshurst Place from the M25, Sevenoaks and Tonbridge (via Hildenborough) directions is not affected by any flooding on Rogues Hill. Traffic coming to Penshurst Place from the south might use Rogues Hill, and when the road is flooded it would be necessary to divert around Rogues Hill. The FSA has been operated on ten occasions, for a total duration of about 19 days during the months of September to February, in the last ten years. We consider the operation of the FSA has minimal effect on local businesses.

**15. With the current proposed scheme, flooding will be deeper and take longer to clear, this is going to adversely affect our property, vehicular access to the rear of our property could easily be cut off, our proposed garage, contents and garden flooded and damaged to a far greater degree. It is unacceptable that this has not been considered an issue of any concern to the EA.**

Environment Agency response to point 15:

As explained above, our modelling shows that the proposed expansion will not increase the flood risk in Penshurst, and so your property will not be affected any further than it is already.

Your garden is affected by natural flooding. The photo in Figure 3 shows your neighbour's garden flooded on 20 December 2019, before impoundment of the FSA began. Your garden is a similar level and so would have been similarly affected.

However, the Environment Agency acknowledge that in certain circumstances the existing FSA can increase the depth of flooding at your property by up to 0.1m. There is an agreement in place which covers part of your property where full and final compensation has been paid for any damage caused as a result of the operation of the existing FSA.

As a result of the 2015 Medway flood model, we now know that more land is affected by the operation of the existing FSA than was covered by the agreement. On the occasions where operation of the FSA has caused damage to areas not covered by agreements, the Environment Agency has paid compensation for that damage. This is in accordance with Section 17(4) of the 1976 Act.

Whilst the 1976 Act provides a right for those who suffer damage as a result of operation of the FSA to claim compensation on a case by case basis, we are willing to consider entering into a further agreement with you to fully and finally discharge this obligation. Please let us know if this is something you would wish to discuss further.

**16. To further manipulate the result of the application the EA appear to have cherry picked letters of support from parties who will not have researched, fully understood or have had any reason to question their reporting, so on this basis will not have given any thought to the upstream communities.**

Environment Agency response to point 16:

In May 2019, the Environment Agency's land agent, Dalcour Maclaren, wrote to 36 landowners and tenants within the existing FSA to advise them of the proposed application to increase the maximum stored water level, and to offer a meeting to explain the impact this would have on them and discuss any concerns they had. These letters were followed up with phone calls and 27 parties took up the offer of a meeting. There are no new landowners and/or occupiers that would be brought into the FSA as a result of the proposed expansion.

Alongside this process, the Environment Agency also contacted all of the organisations named within the Act as Specified Interests (plus additional organisations as directed by Defra) to make them aware of the application to expand the FSA, offer meetings to discuss the proposal and any concerns they had on behalf of their residents or members, and to understand what process they would need to go through in order to consider the proposal. These parties are listed in Section 8.1 of the Application. All of these parties, with the exception of Maidstone Borough Council represent members of upstream communities, to a greater or lesser extent.

The organisations have gone through their own processes to ensure that they understand the impact of the proposal on their residents or members.

It was hoped that by carrying out this pre-consultation, the Environment Agency could understand and resolve or mitigate any concerns prior to submitting the Application to the Minister.

The one month long formal consultation for the Application began on submission of the Application to the Minister. Any Specified Interest could make a representation (either of support or objection) during this period, therefore we do not agree that the consultation has been biased.